

Unequal development in R&D field in CEE countries

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Intro

- R&D - key factor in promoting economic growth and competitiveness, both at national and regional level
- regional innovation and competitiveness - a relatively new theme of interest in CEE countries
- aim of the paper:
 - exploring the differences and changes in the field of R&D in twenty countries in Central and Eastern Europe
 - exploring the involvement of these countries in R&D projects financed by the EU within the FP4 – FP7 and Horizon 2020 Programmes and their topics of interest
- differences among the analysed countries are significant
- underline the ***role of the policymakers*** in developing sustainable policies on R&D, encouraging investments in this field in order to improve the quality of education, strengthen the performance in research and innovation => stimulate economic growth (next step)

Selected countries

Group	Countries (11)	Group	Countries (3)	Group	Countries (6)
EU members	Bulgaria (BG) Croatia (HR) the Czech Republic (CZ) Estonia (EE) Hungary (HU) Latvia (LV) Lithuania (LT) Poland (PL) Romania (RO) the Slovak Republic (SK) Slovenia (SI)	Eastern Partnership members	Belarus (BY) Moldova (MD) Ukraine (UA)	EU candidate and potential candidate countries	Albania (AL) Bosnia and Herzegovina (BE) Kosovo (XK) Macedonia (MK) Montenegro (ME) Serbia (RS)

Analysed Framework programmes

FP4 – 1994-1998	FP5 – 1998-2002	FP6 – 2002-2006	FP7 – 2007-2013	H2020 – 2014-2020
FP4-ACTS	FP5-EAECTP C	FP6-AEROSPACE	FP7-COH	H2020-EU1.1. - ERC
FP4-BIOMED 2	FP5-EESD	FP6-CITIZENS	FP7-ENERGY	H2020-EU1.2.- FET
FP4-BIOTECH 2	FP5-GROWTH	FP6-COORDINATION	FP7-ENVIRONMENT	H2020-EU1.3. -MSCA
FP4-BRITE / EURAM 3	FP5-HUMAN POTENTIAL	FP6-EURATOM	FP7-EURATOM	H2020-EU1.4. - INFRA
FP4-ENV 2C	FP5-INCO 2	FP6-FOOD	FP7-GA	H2020-EU2.1. - LEIT
FP4-ESPRIT 4	FP5-INNOVATION-SME	FP6-INCO	FP7-HEALTH	H2020-EU2.2. - RISK FINANCE
FP4-ESSI 2	FP5-IST	FP6-INFRASTRUCTURES	FP7-ICT	H2020-EU2.3. - INNOVATION
FP4-FAIR	FP5-LIFE QUALITY	FP6-INNOVATION	FP7-IDEAS-ERC	H2020-EU3.-EU2.-FTIPilot
FP4-INCO		FP6-IST	FP7-INCO	H2020-EU3.1. - HEALTH
FP4-INNOVATION		FP6-JRC	FP7-INFRASTRUCTURES	H2020-EU3.2. - AGRI
FP4-MAST 3		FP6-LIFESCIHEALTH	FP7-JTI	H2020-EU3.3. - ENERGY
FP4-NNE-JOULE C		FP6-MOBILITY	FP7-KBBE	H2020-EU3.4. - TRANSPORT
FP4-SMT		FP6-NMP	FP7-NMP	H2020-EU3.5. - ENVIR
FP4-TELEMATICS 2C		FP6-POLICIES	FP7-PEOPLE	H2020-EU3.6. - SOCIETY
FP4-TMR		FP6-SME	FP7-REGPOT	H2020-EU3.7. - SECURITY
FP4-TRANSPORT		FP6-SOCIETY	FP7-REGPOT	H2020-EU4. - DISEMINATION
FP4-TSER		FP6-SUPPORT	FP7-REGPOT	H2020-EU5. - SCIENCE
		FP6-SUSTDEV	FP7-SIS	H2020-Euratom
			FP7-SME	
			FP7-SPACE	
			FP7-SSH	
			FP7-TRANSPORT	

Analysed data – Framework programmes

CORDIS datasets – EU research projects under:

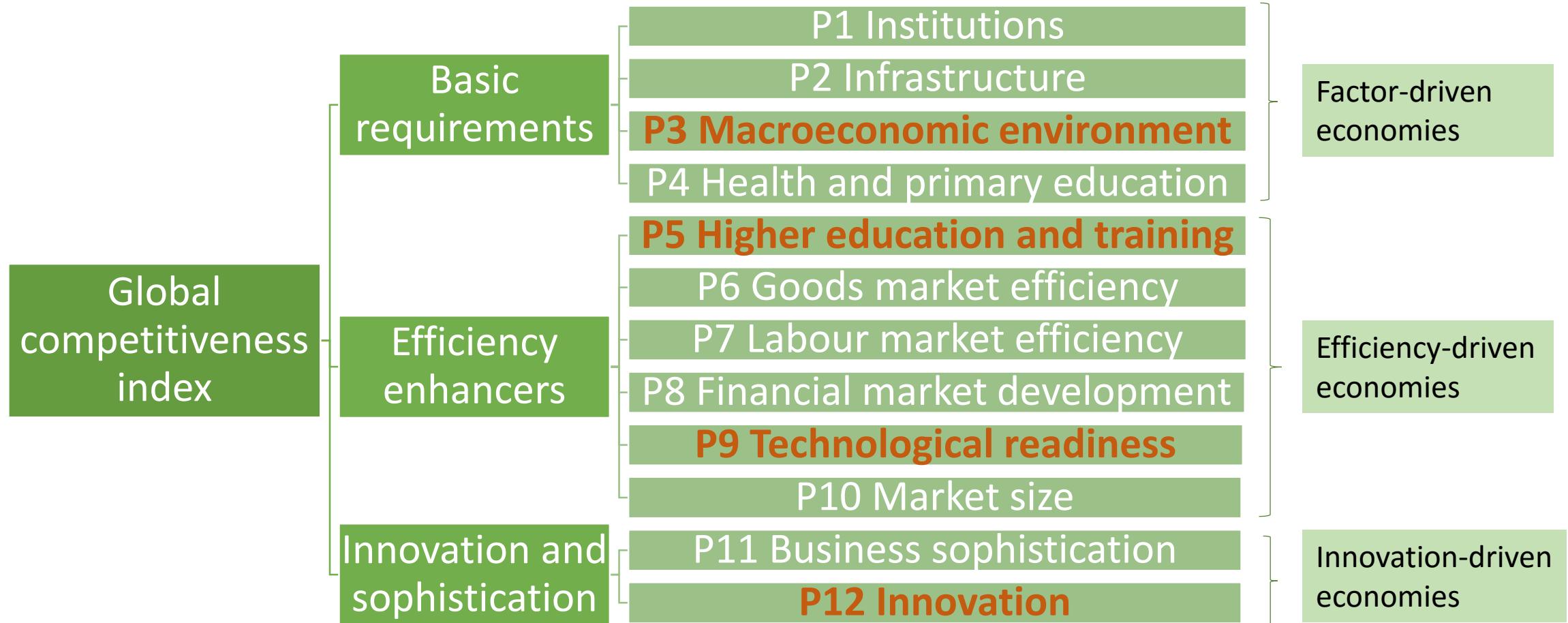
	FP4	FP5	FP6	FP7	H2020
TOTAL Projects	14.567	17.202	10.091	25.607	11.069
Analysed Projects (in which selected countries were coordinators and/or partners)	763	2.714	3.336	5.331	1.938
% of selected projects in the total	5%	16%	33%	21%	18%

Analysed data – World development indicators R&D – 1994-2016

- GDP per capita, PPP (constant 2011 international \$)
- High-technology exports (current US\$ + % of manufactured exports)
- Industrial design applications, non-resident & resident, by count
- Patent applications, non-residents & residents
- Scientific and technical journal articles
- Research and development expenditure (% of GDP)
- Researchers in R&D (per million people)
- Technicians in R&D (per million people)
- Trademark applications, non-resident & resident, by count
- Charges for the use of intellectual property, payments & receipts (BoP, current US\$)
- Educational attainment, Doctoral or equivalent, population 25+, total (%) (cumulative)
- Expenditure on tertiary education (% of government expenditure on education)
- Internationally-recognized quality certification (% of firms)
- Labour force with advanced education (% of total working-age population with advanced education)
- New business density (new registrations per 1,000 people ages 15-64)

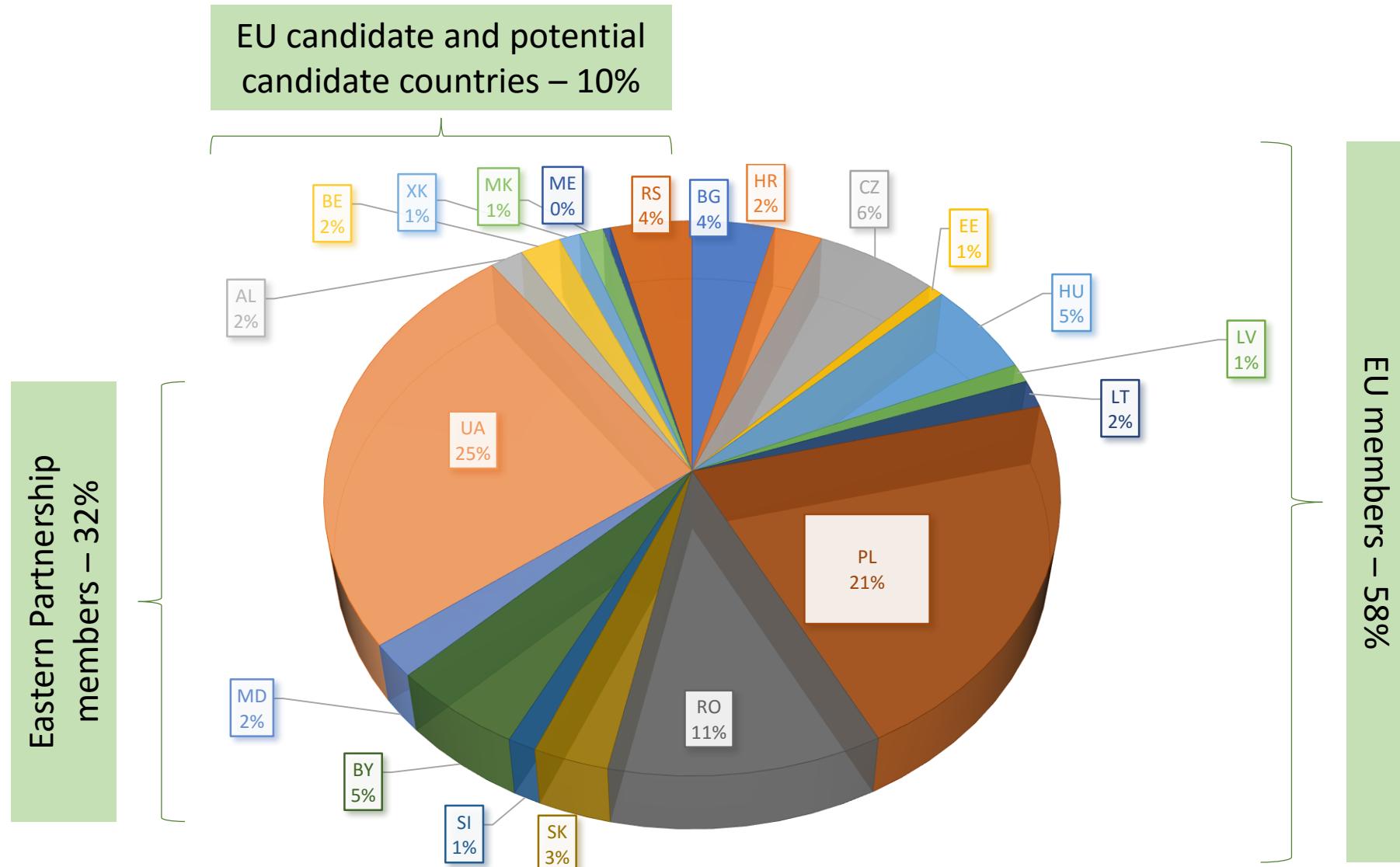
Science &
technology
indicators

Analysed data – Global Competitiveness Reports – WEF*



* Belarus and Kosovo are not included

Population structure 2016

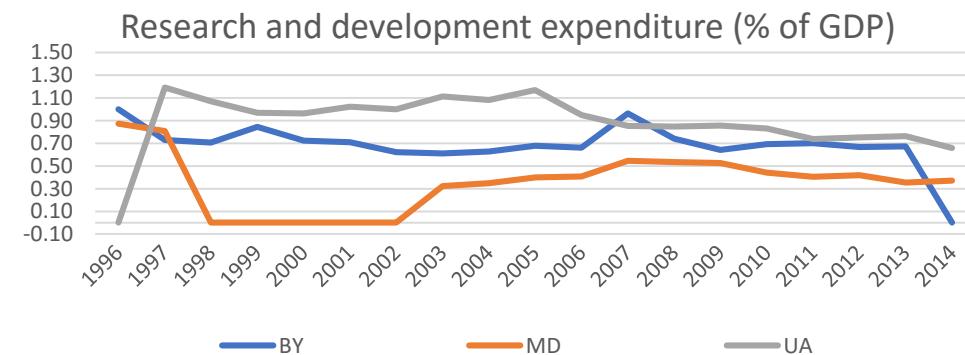
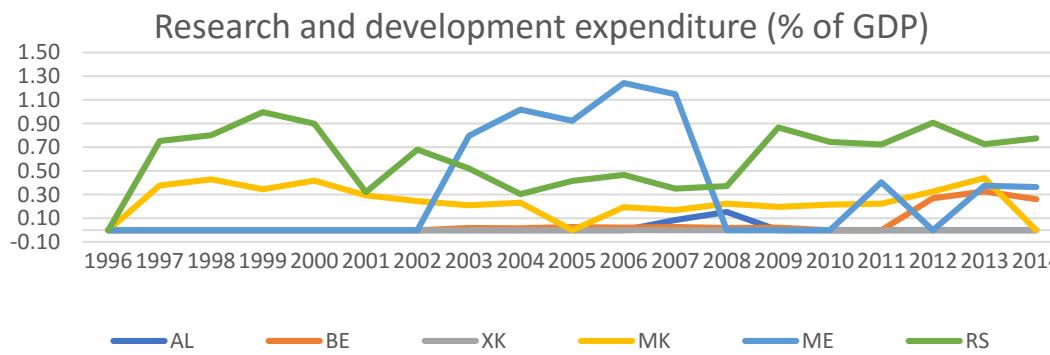
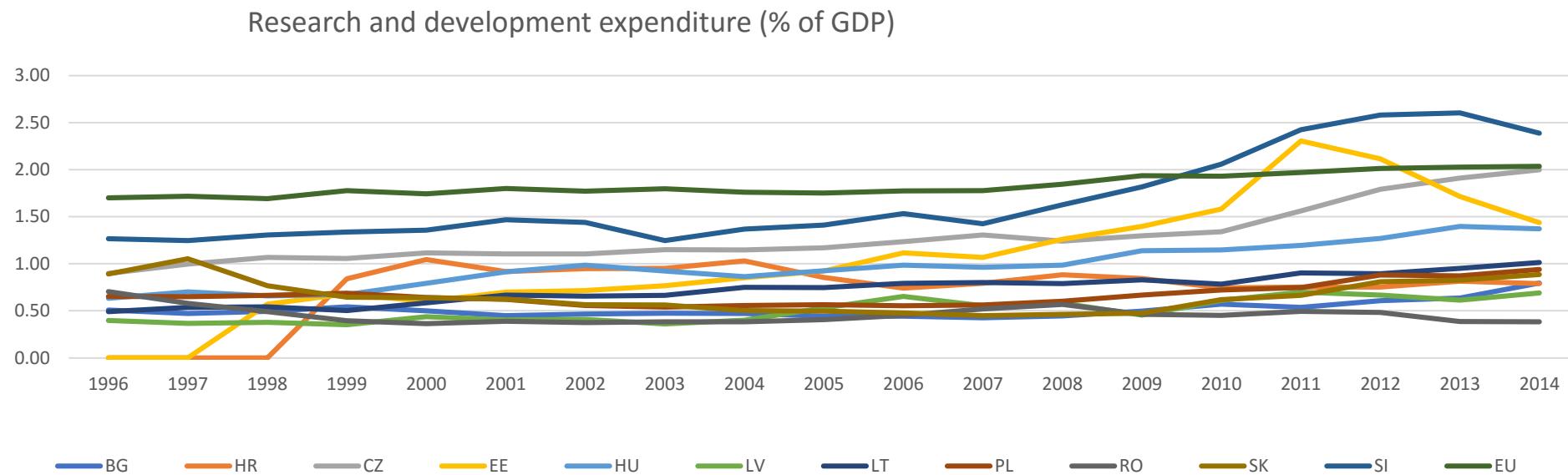


Findings (1) - GDP/capita

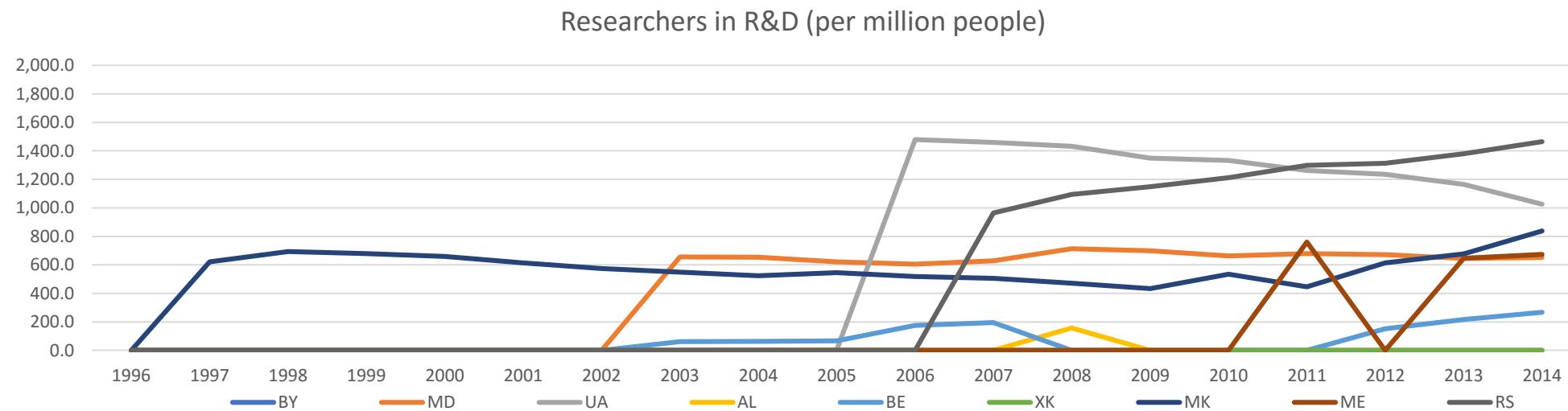
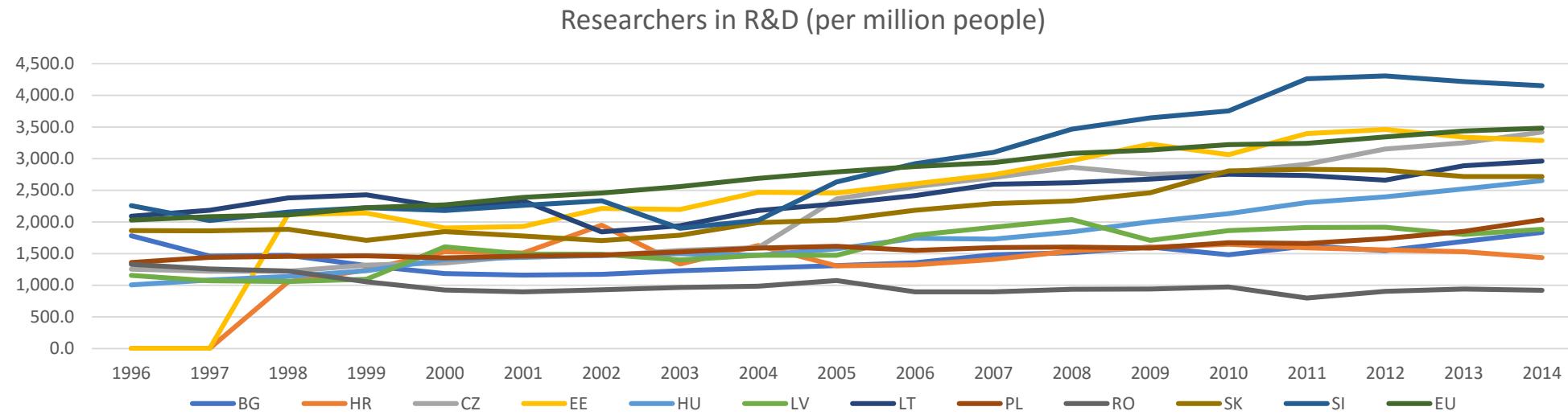
	Highest	Lowest	Ratio H/L
All countries	Slovenia (1997-2011) and Czech Republic (2012-2016)	Moldova (1995-2016)	max 9.8 in 2000 min 6.1 in 2014 6.3 in 2016
EU members	Czech Republic	Bulgaria	1.8 in 2016
Eastern Partnership members	Belarus	Moldova	3.4 in 2016
EU candidate and potential candidate countries	Montenegro	Kosovo	1.7 in 2016

- GDP/capita of the Czech Republic is approx. twice the GDP/capita of Belarus and Montenegro
- GDP/capita of Bulgaria is higher than the GDP/capita of Belarus and Montenegro
- GDP/capita of Bulgaria is 1.9 higher than the GDP/capita of Kosovo and 3.6 higher than the GDP/capita of Moldova

Findings (2) - Research and development expenditure (% of GDP)

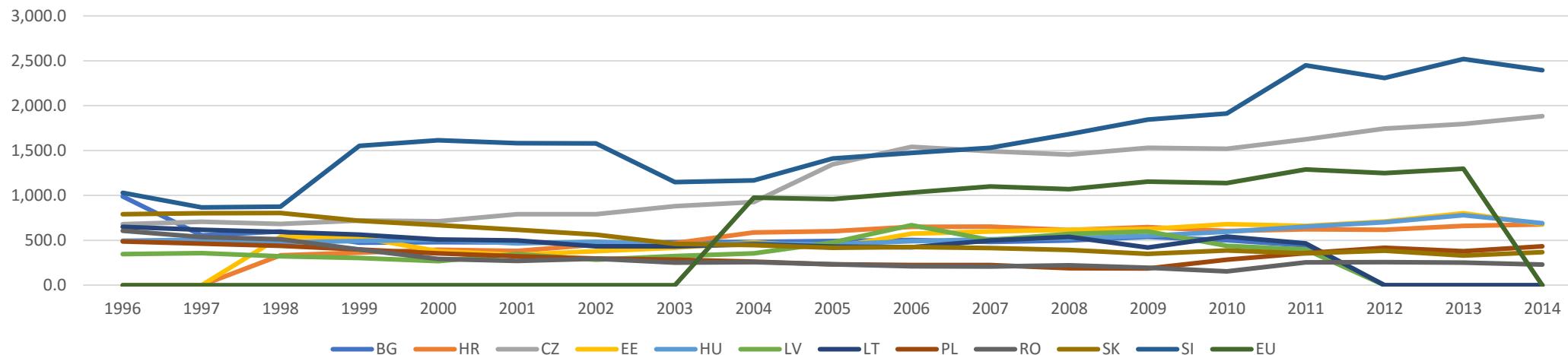


Findings (3) - Researchers in R&D (per million people)

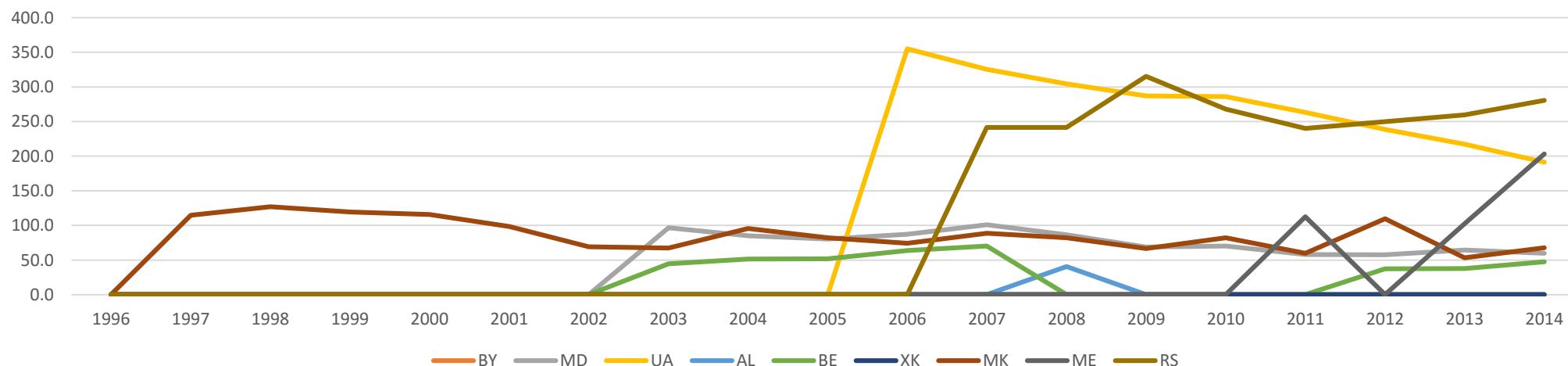


Findings (4) - Technicians in R&D (per million people)

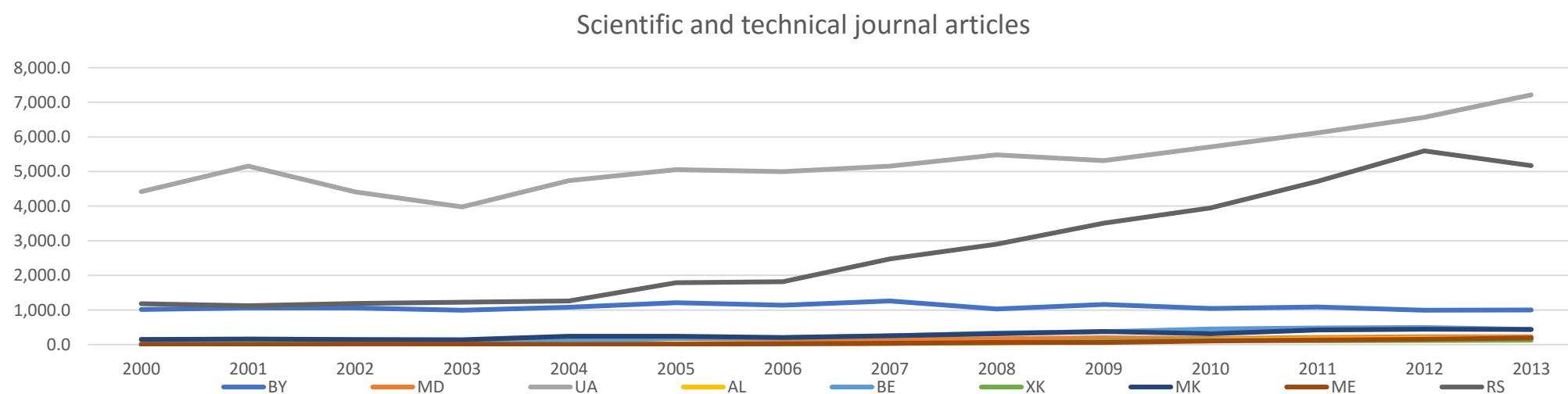
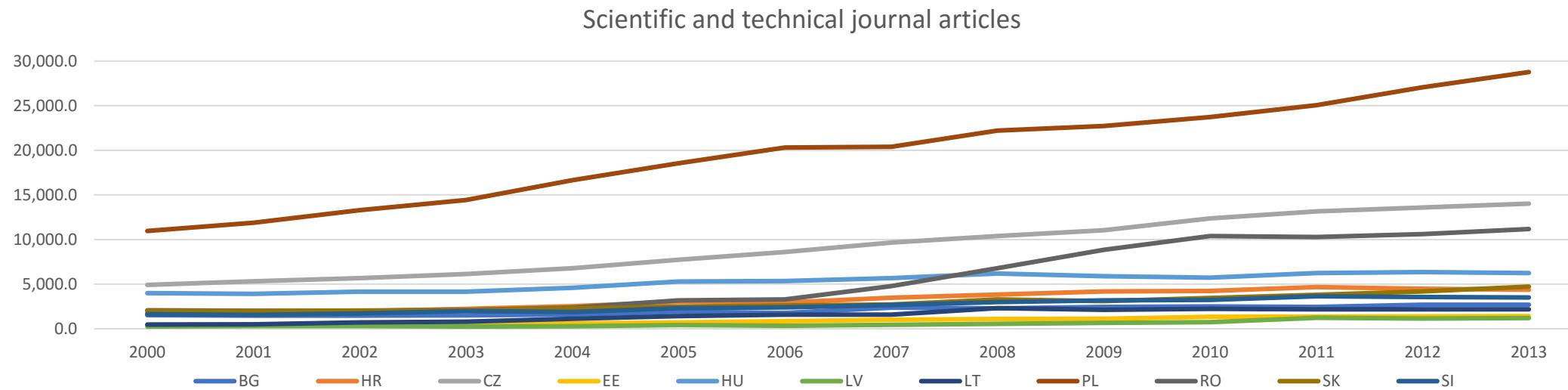
Technicians in R&D (per million people)



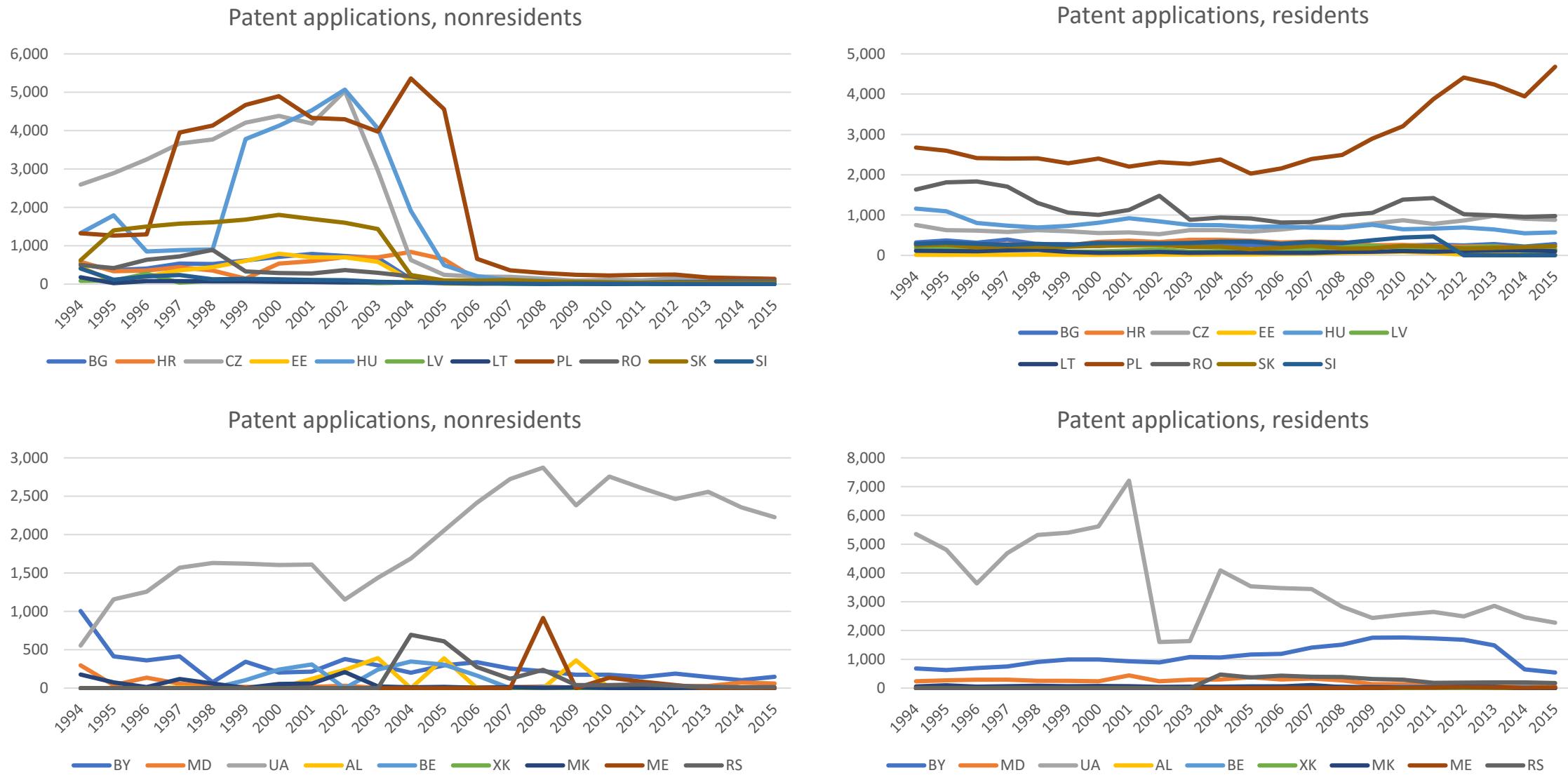
Technicians in R&D (per million people)



Findings (5) - Scientific and technical journal articles

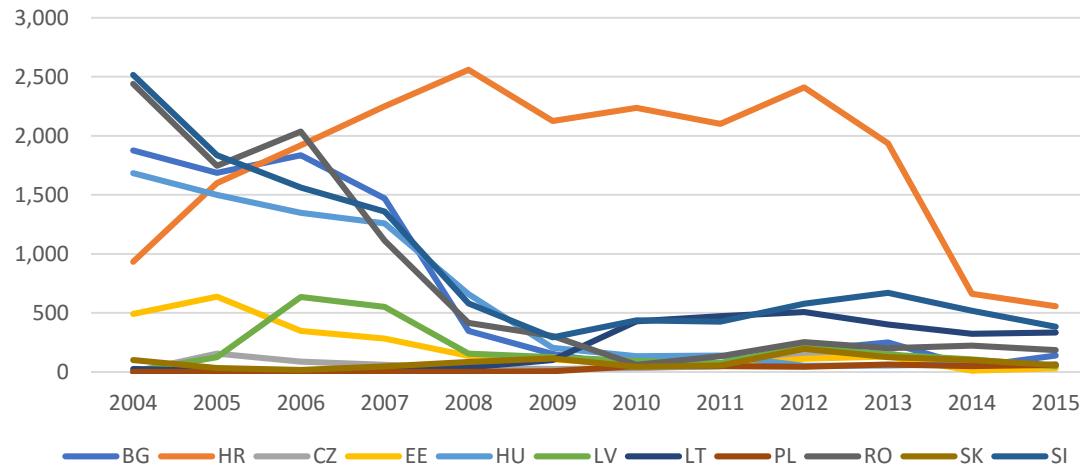


Findings (6) - Patent applications, non-residents & residents

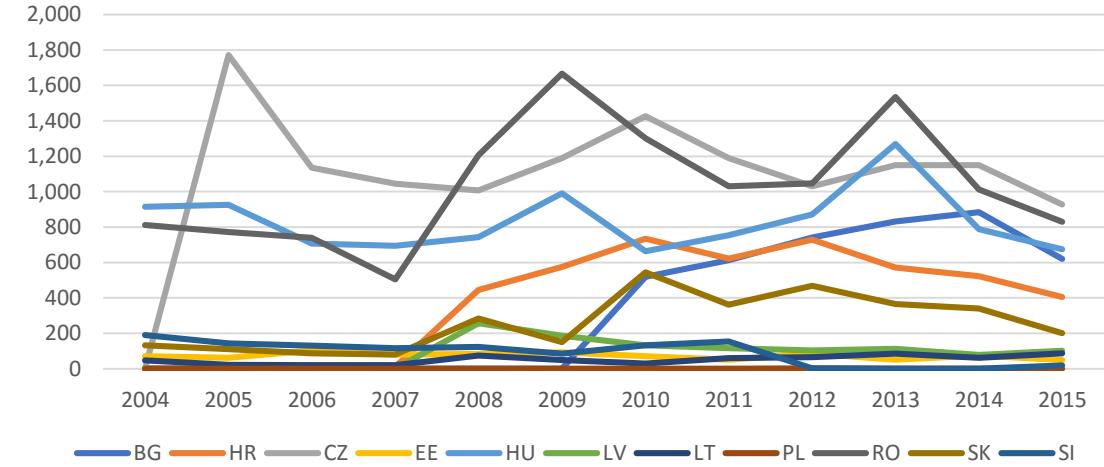


Findings (7) - Industrial design applications, non-residents & residents

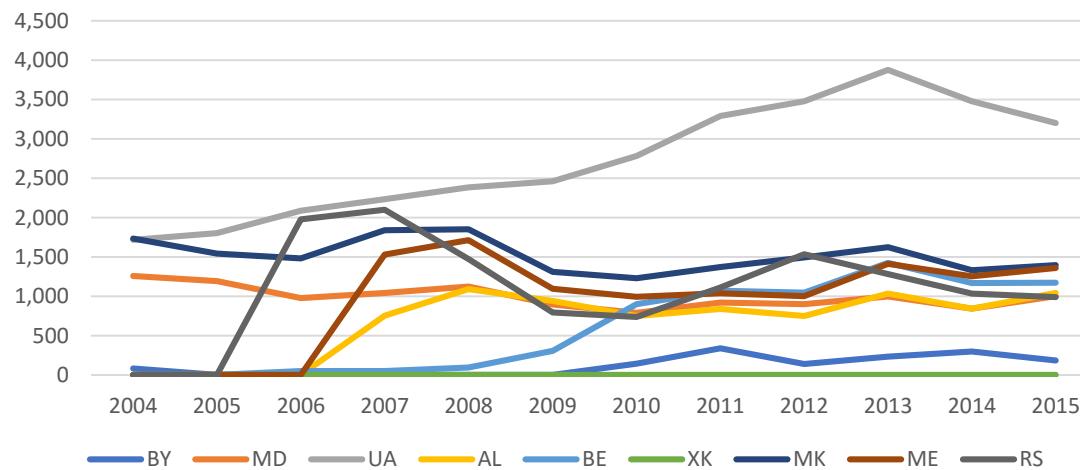
Industrial design applications, nonresident



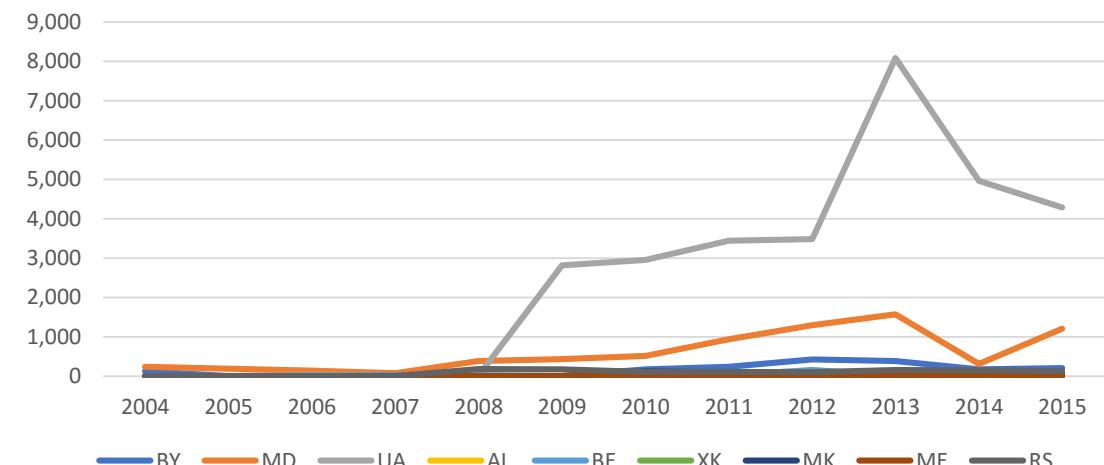
Industrial design applications, resident



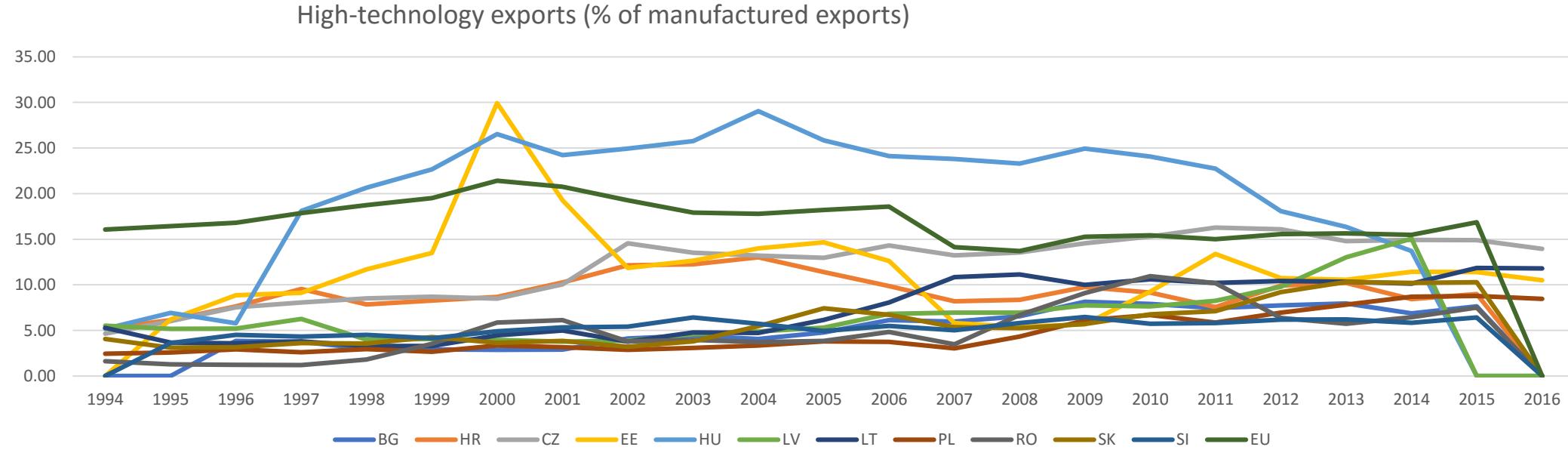
Industrial design applications, nonresident



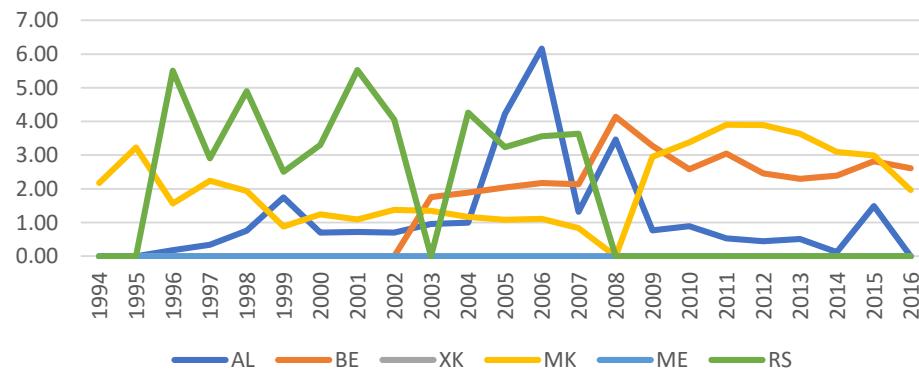
Industrial design applications, resident



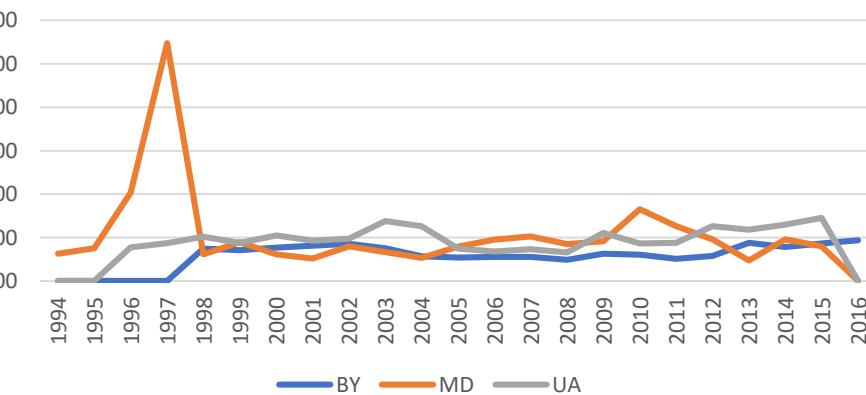
Findings (8) - High-technology exports (% of manufactured exports)



High-technology exports (% of manufactured exports)

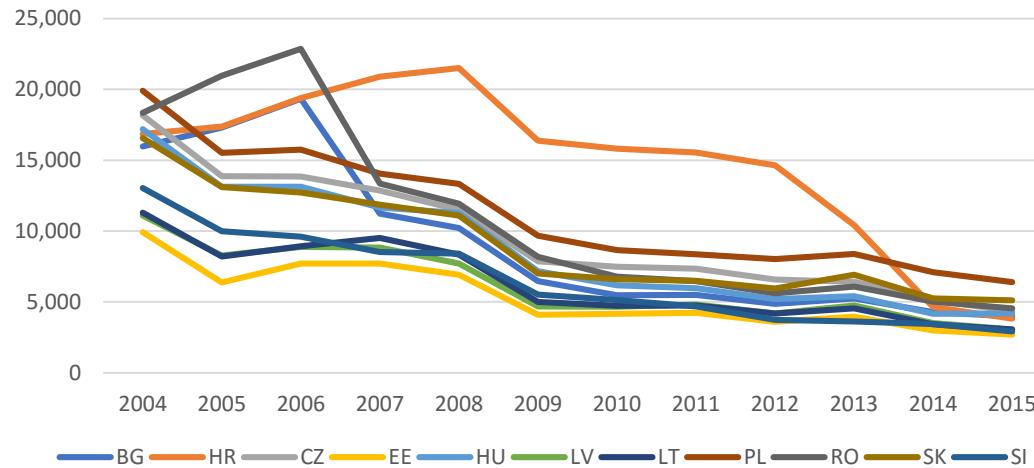


High-technology exports (% of manufactured exports)

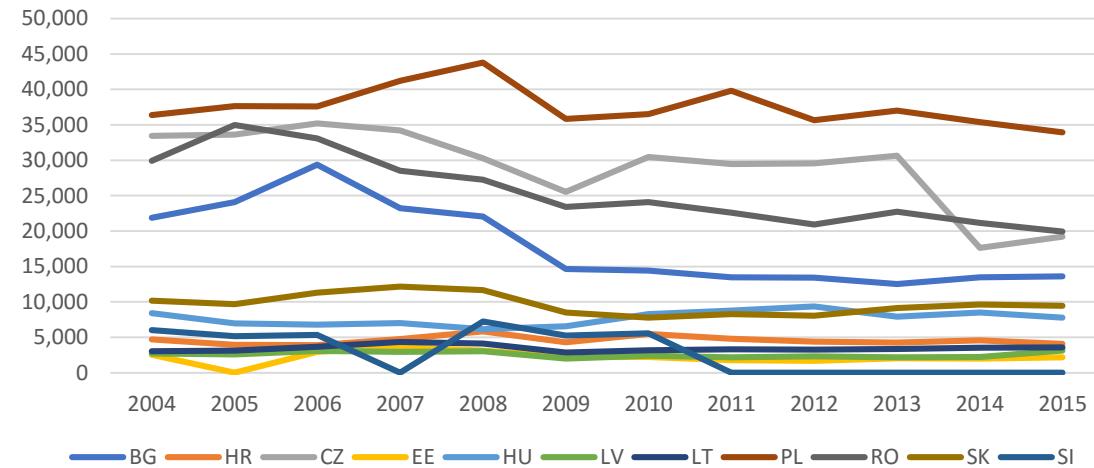


Findings (9) - Trademark applications, non-residents & residents

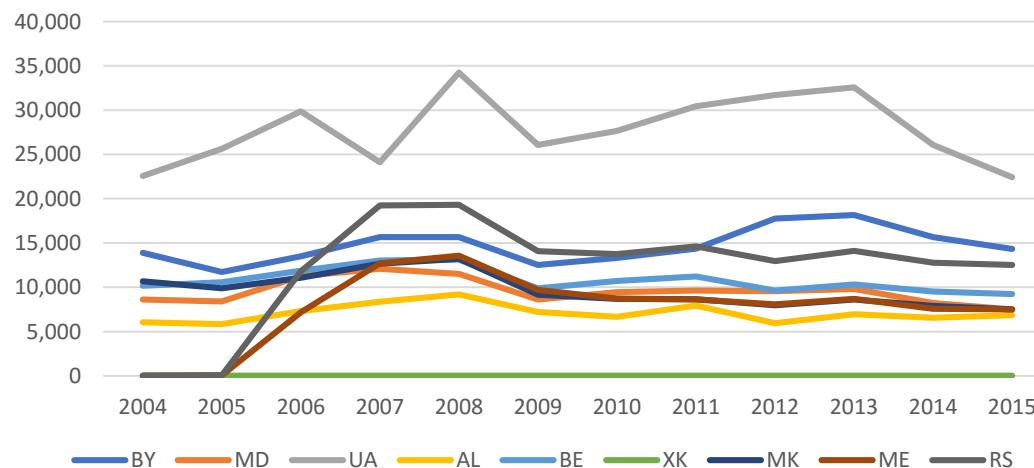
Trademark applications, nonresident,



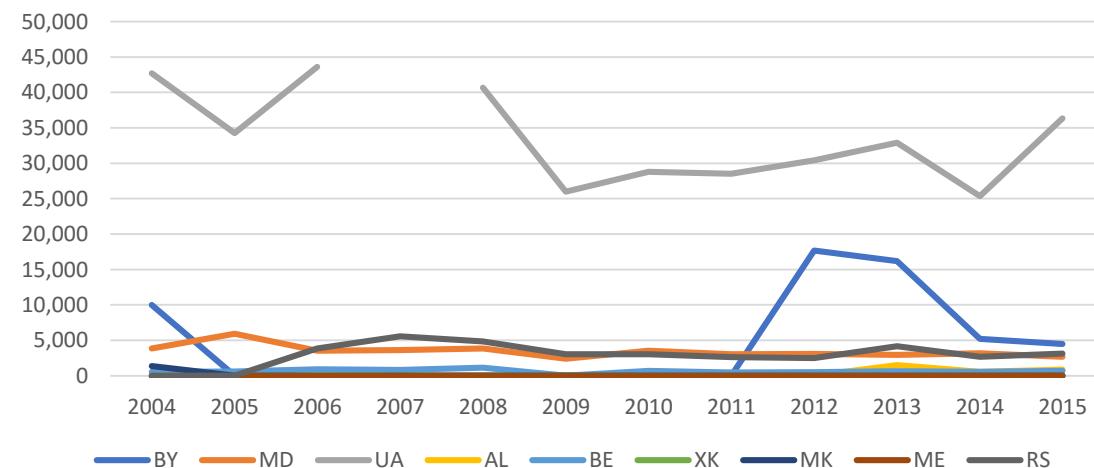
Trademark applications, resident



Trademark applications, nonresident,

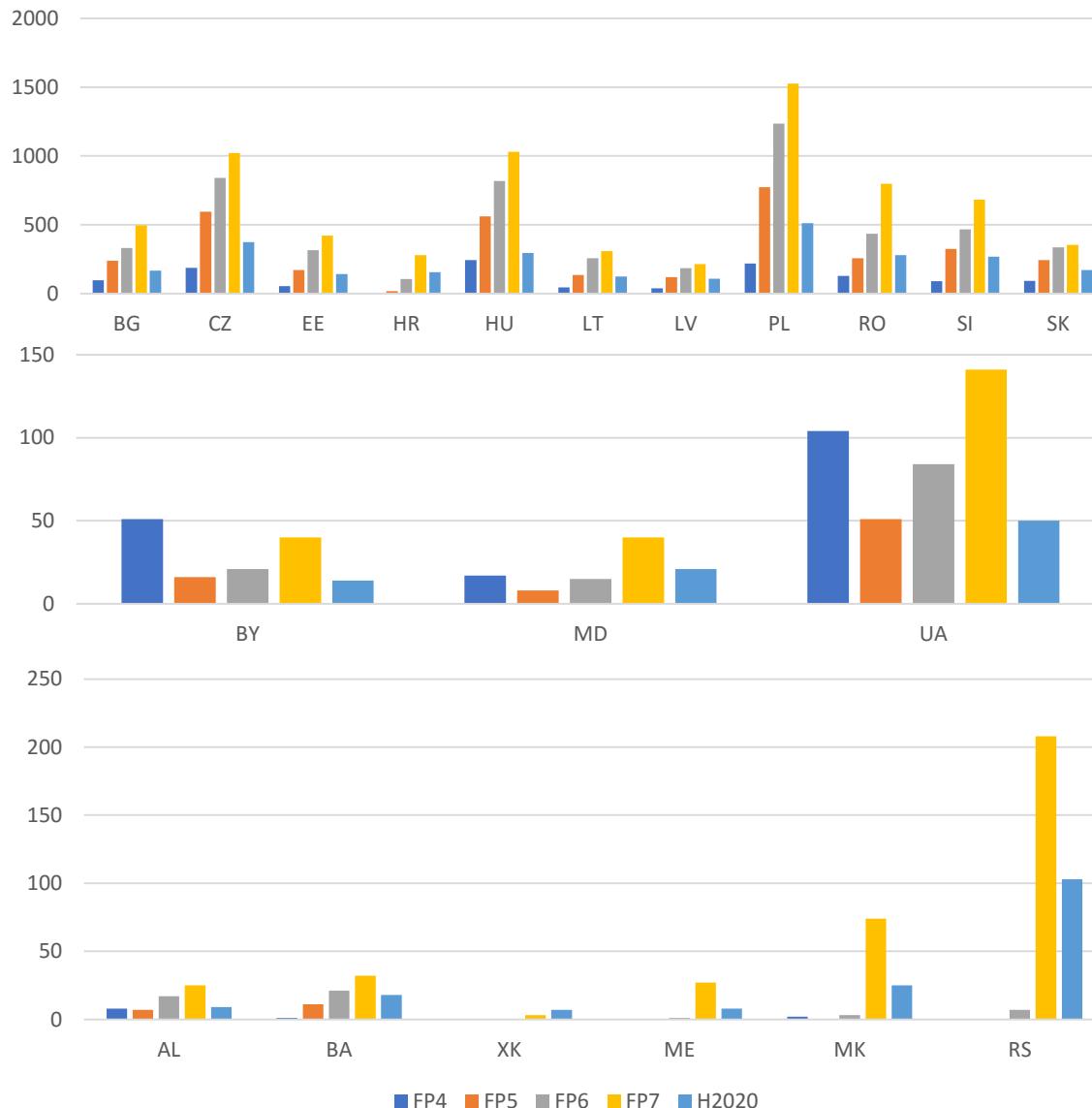


Trademark applications, resident



Findings (10) – Participation in FPs

Projects in which selected countries were partners

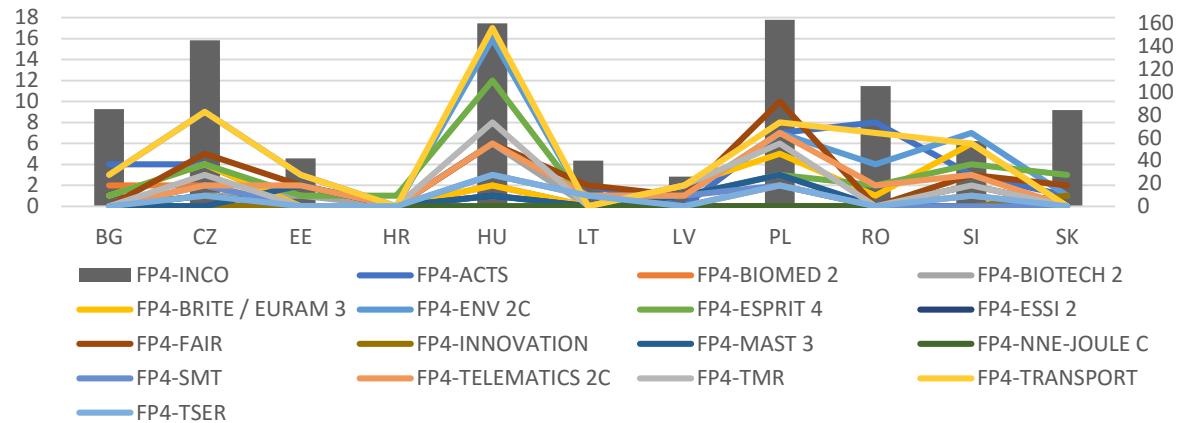


Projects in which selected countries were coordinators

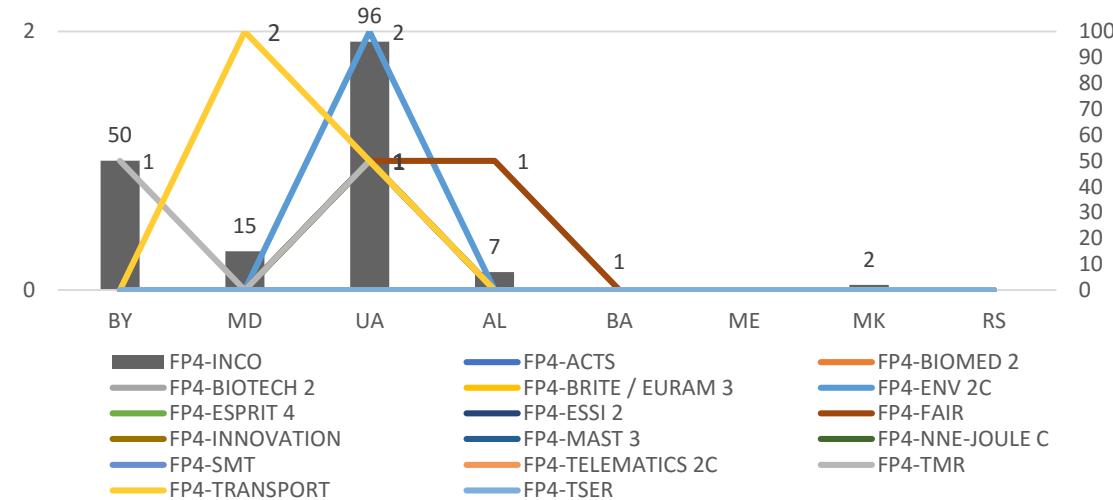


Findings (11) – Participation in FP4

Countries' participation in FP4 on topics

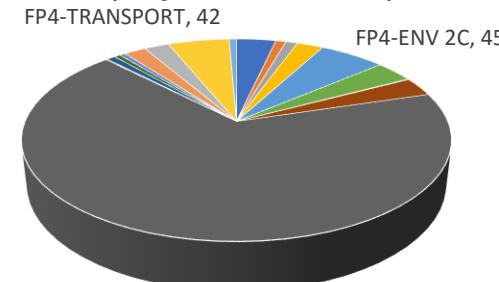


Countries' participation in FP4 on topics

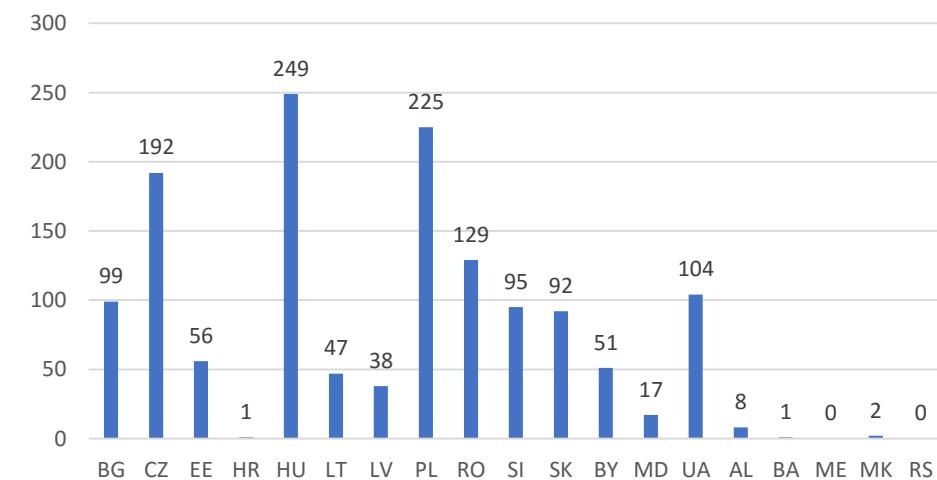


FP4 INCO - Cooperation with Third Countries and International Organisations
 FP4 ENV – Environment and Climate
 FP4 TRANSPORT - Transport Research Programme

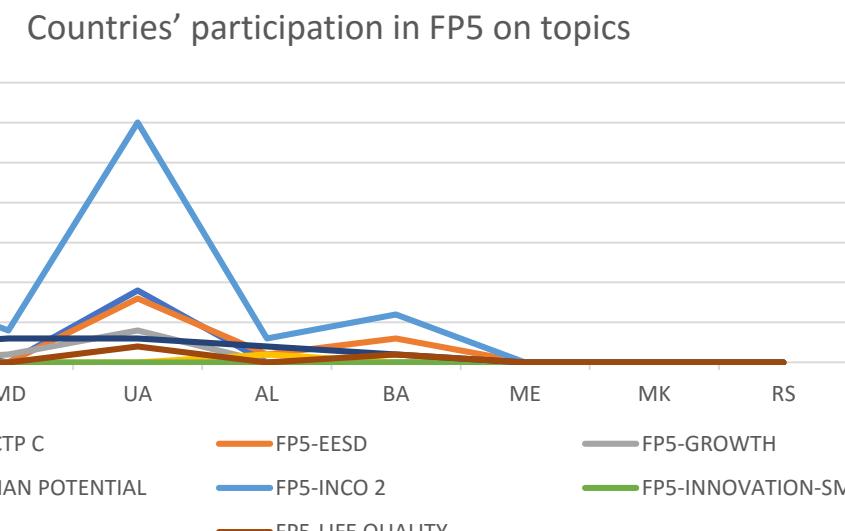
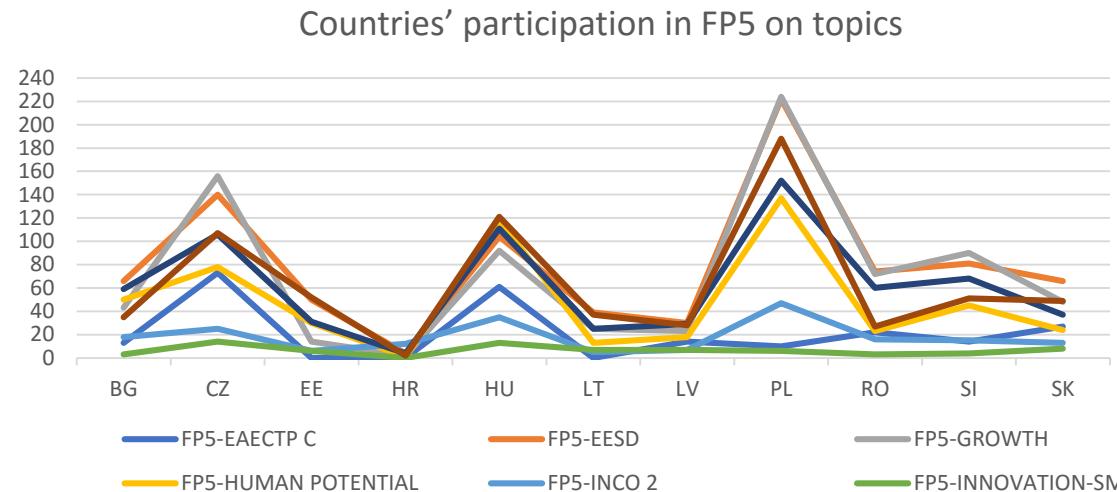
Total projects on FP4 topics



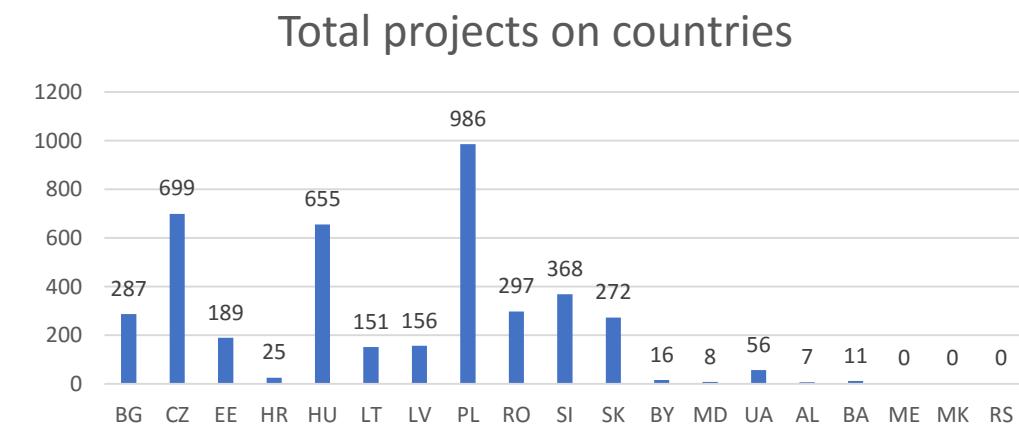
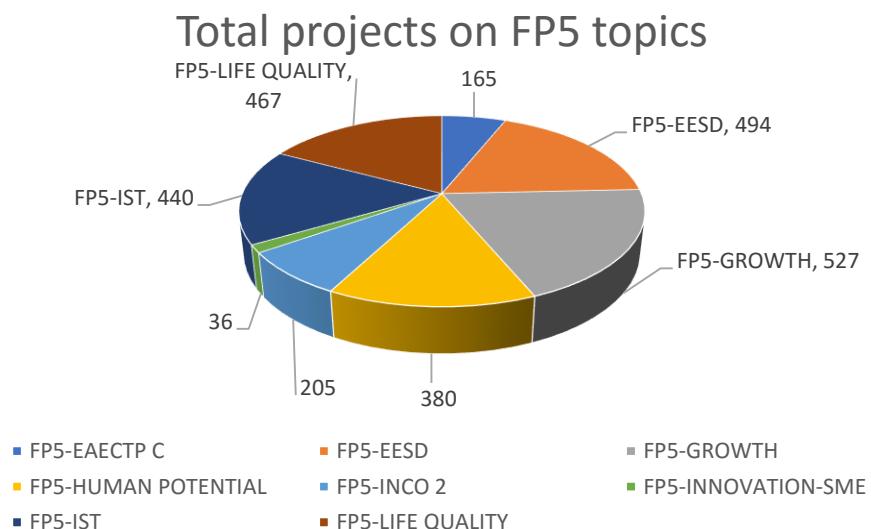
Total projects on countries



Findings (12) – Participation in FP5

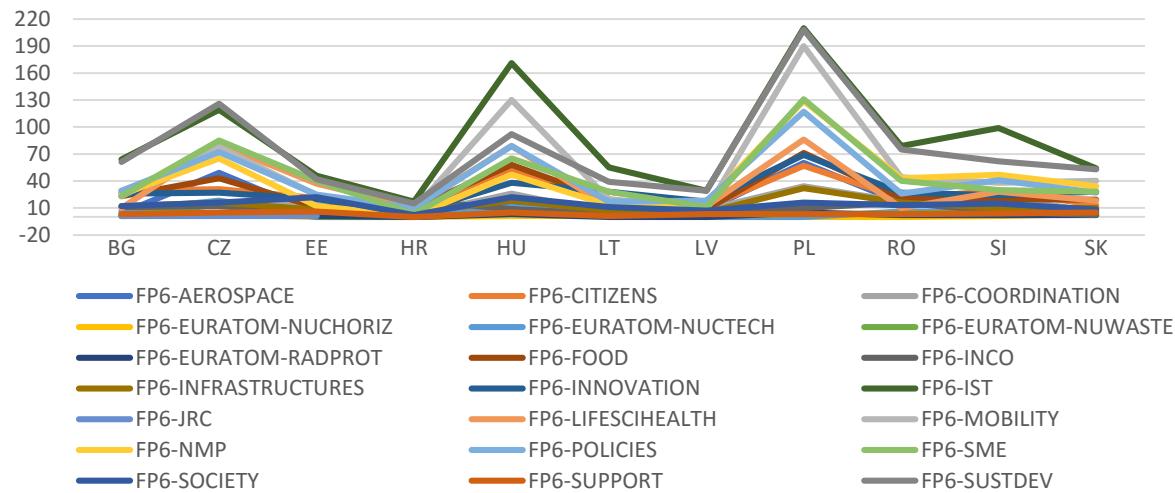


FP5 GROWTH - Competitive and sustainable growth
 FP5 EESD - Energy, environment and sustainable development
 FP5 LIFE QUALITY – Quality of life and management of living resources
 FP5 IST – Information Society Technologies

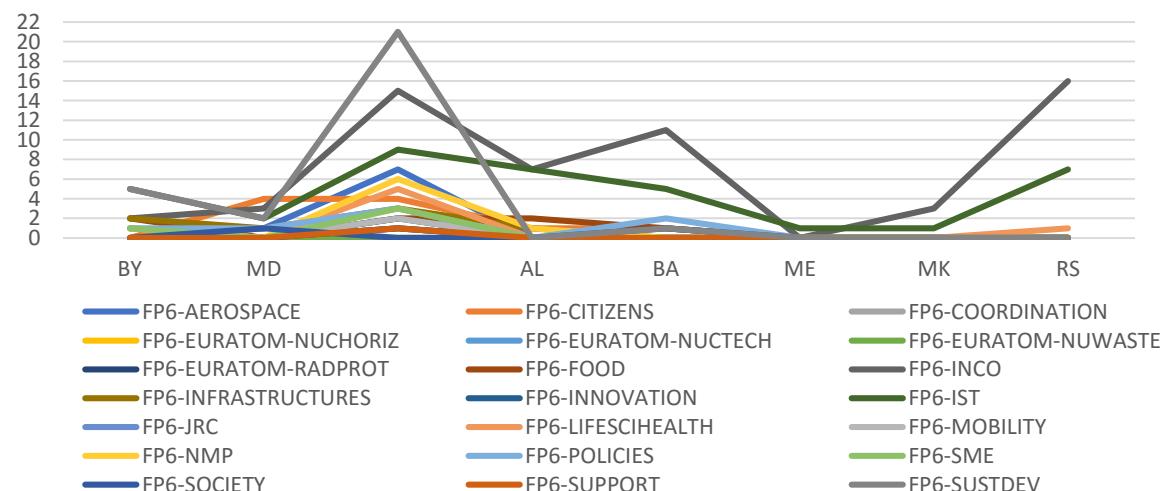


Findings (13) – Participation in FP6

Countries' participation in FP6 on topics



Countries' participation in FP6 on topics

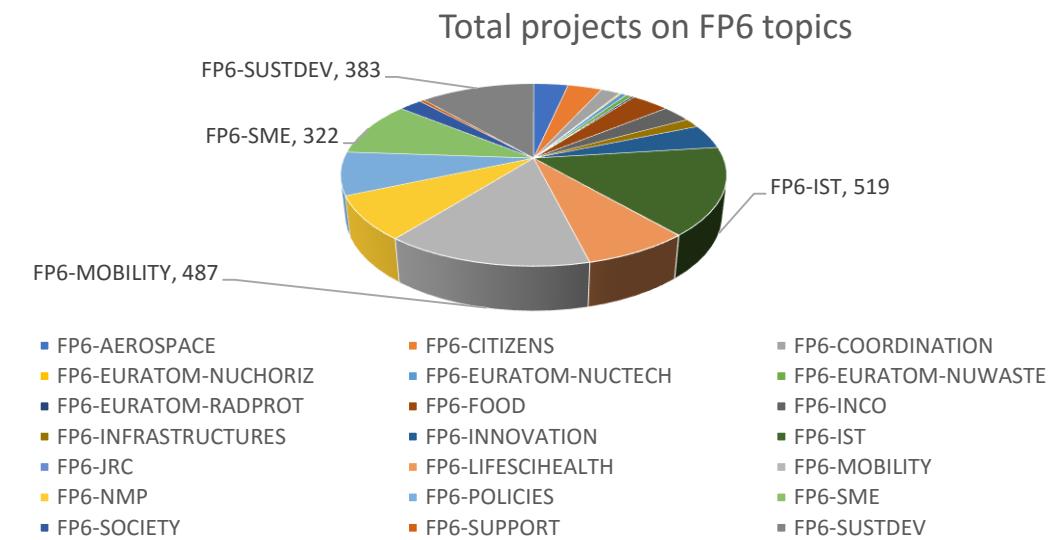


FP6 IST - Information society technologies

FP6 MOBILITY - Marie Curie Actions - Human resources and mobility

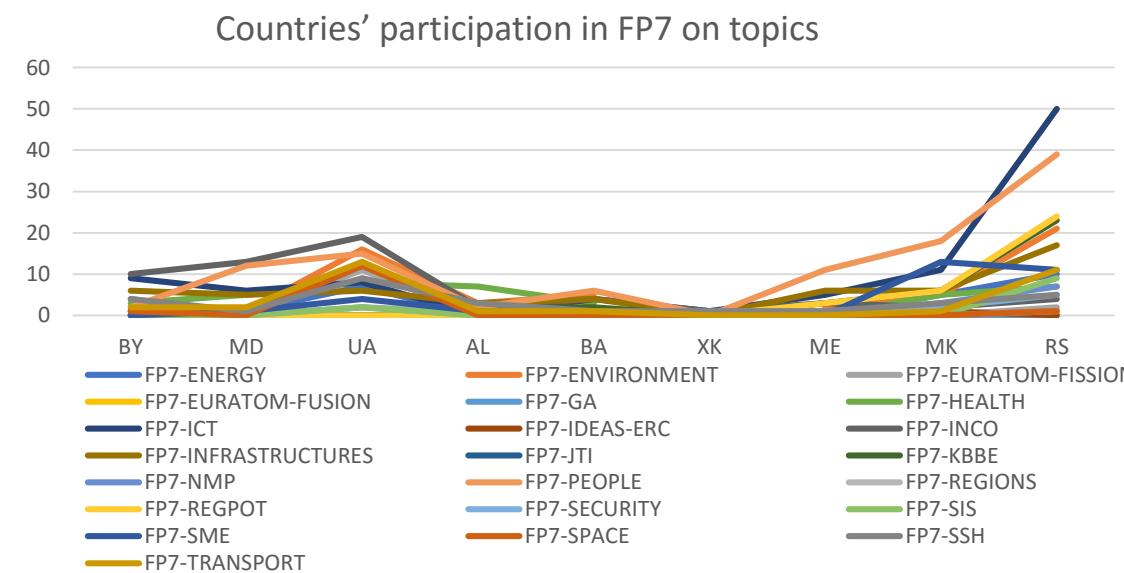
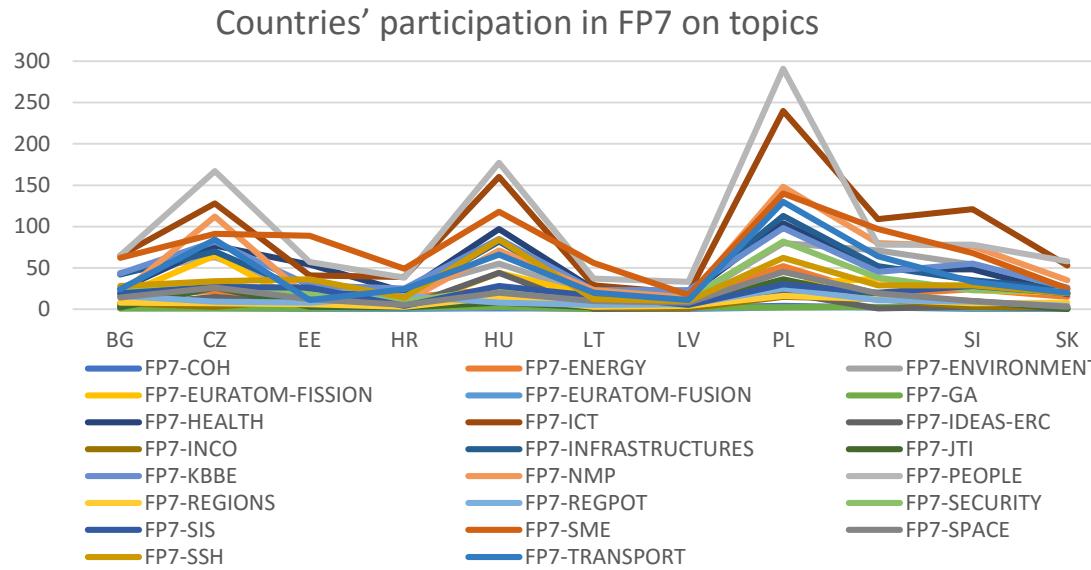
FP6 SUSTDEV - Sustainable development, global change and ecosystems

FP6 SME – SME activities

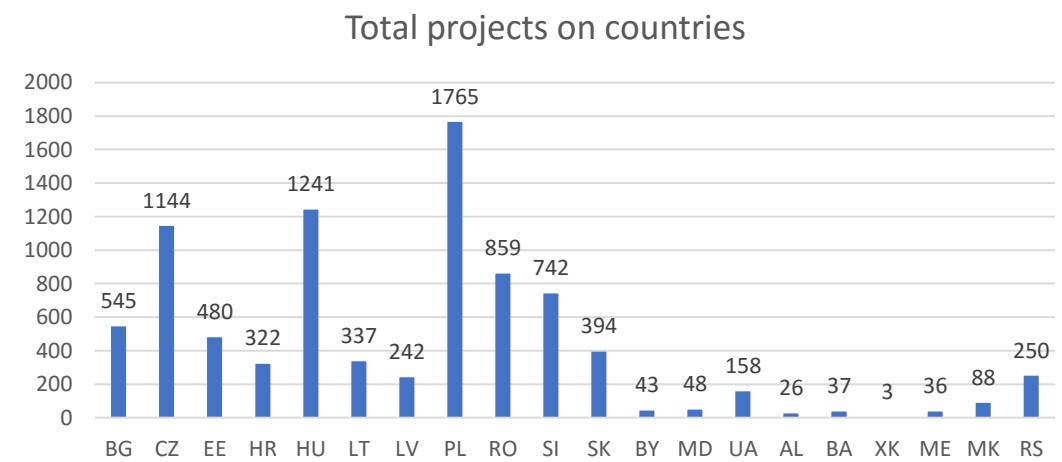
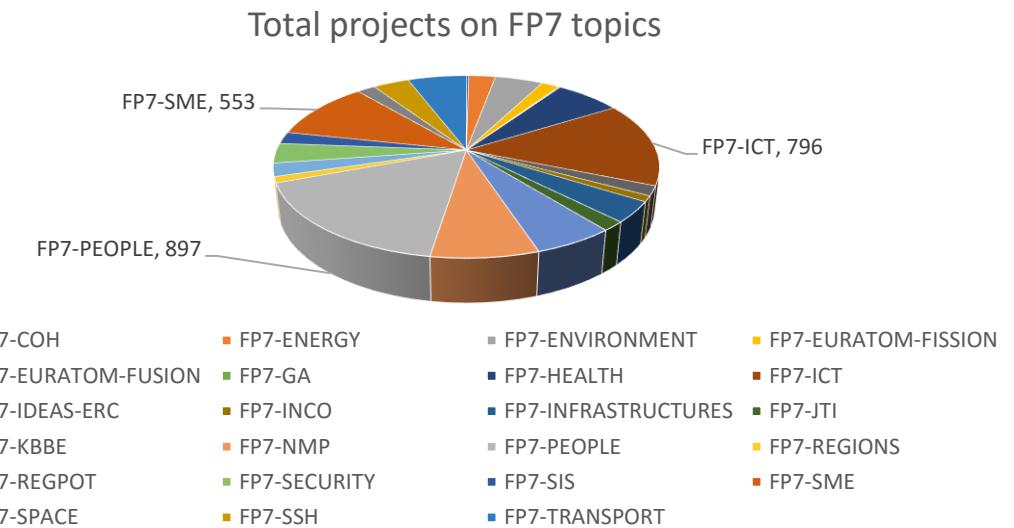


Total projects on countries

Findings (14) – Participation in FP7

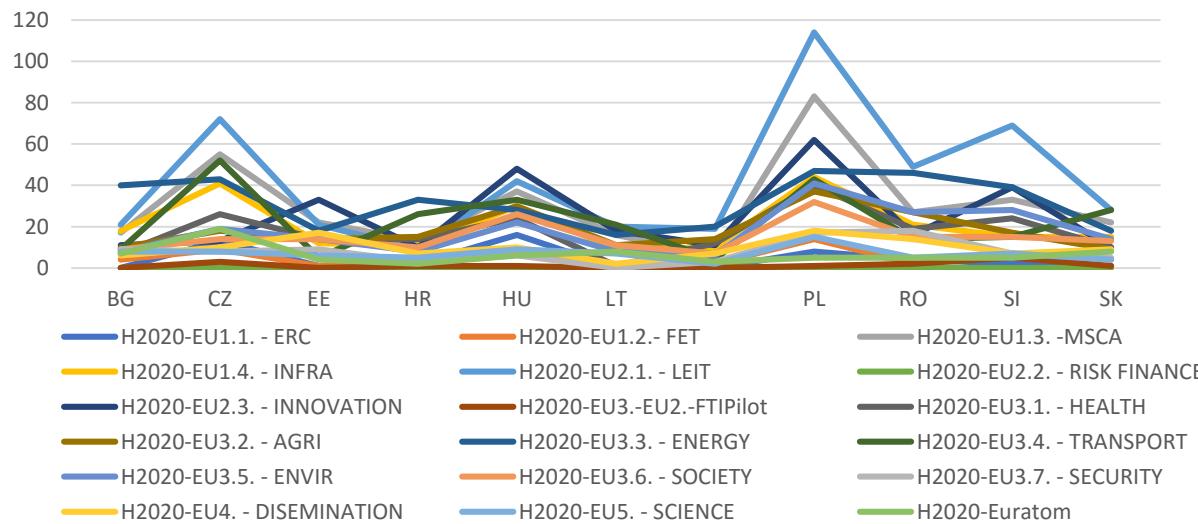


FP7 PEOPLE - support for researcher mobility and career development – Marie Curie actions
 FP7 ICT - Information and communication technologies (COOPERATION)
 FP7 SME – Research for the benefit of SME (CAPACITIES)

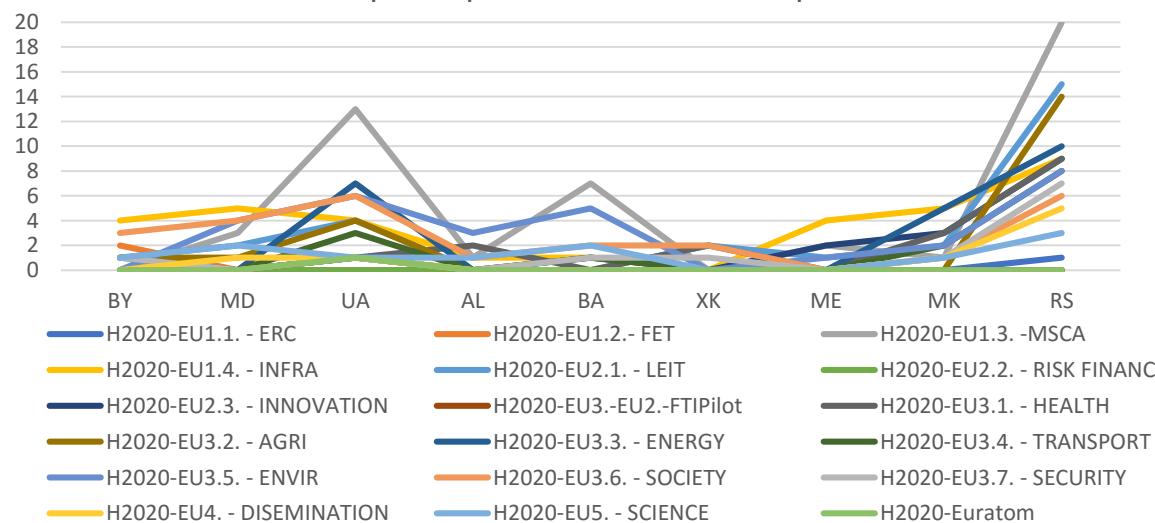


Findings (15) – Participation in H2020

Countries' participation in H2020 on topics

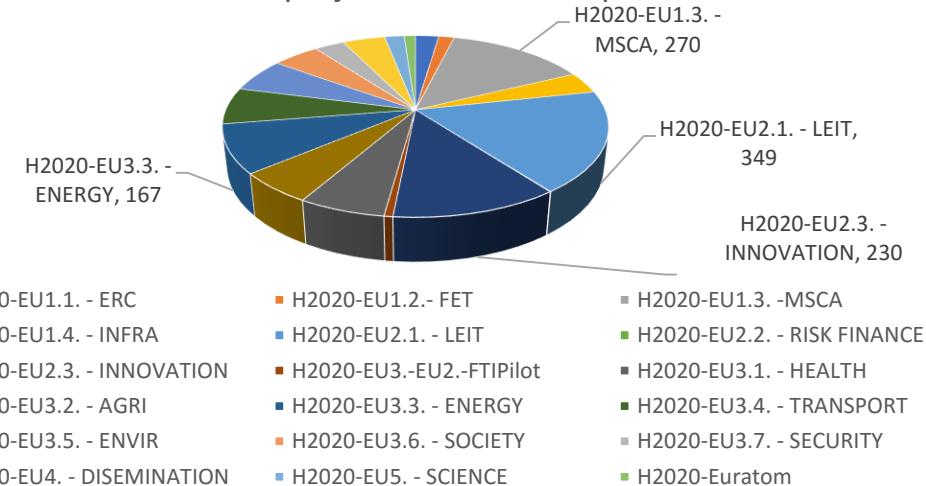


Countries' participation in H2020 on topics

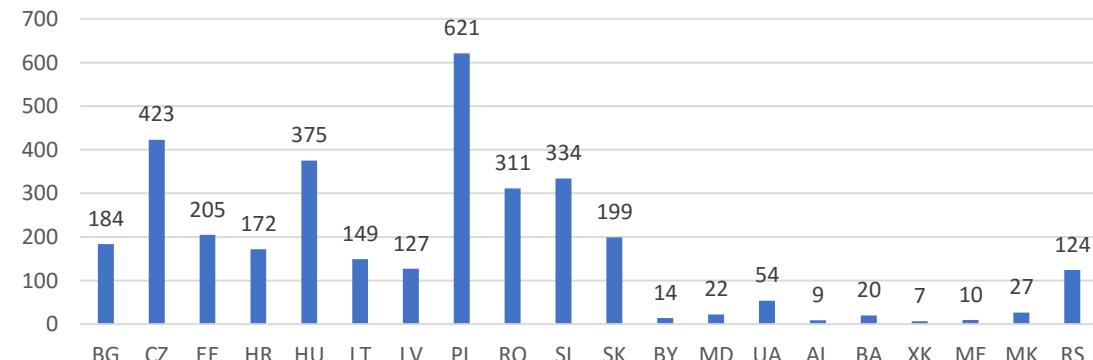


H2020 LEIT – ***Leadership in enabling and industrial technologies*** (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)
H2020 MSCA - ***Marie Skłodowska-Curie actions*** - Opportunities for training and career development
H2020 INNOVATION – ***Innovation in SMEs*** - Fostering all forms of innovation in all types of SMEs
H2020 ENERGY – ***Secure, clean and efficient energy***

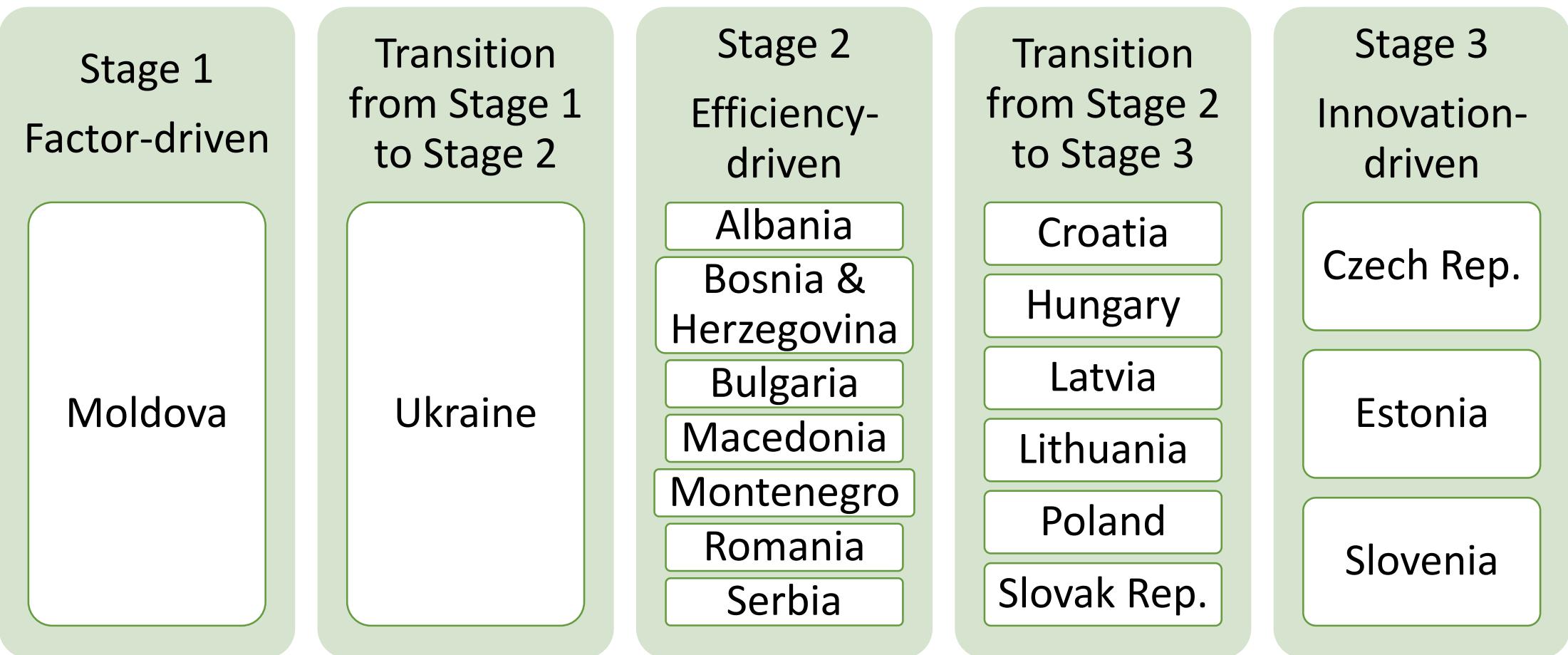
Total projects on H2020 topics



Total projects on countries



Findings (16) – WCR 2016-2017

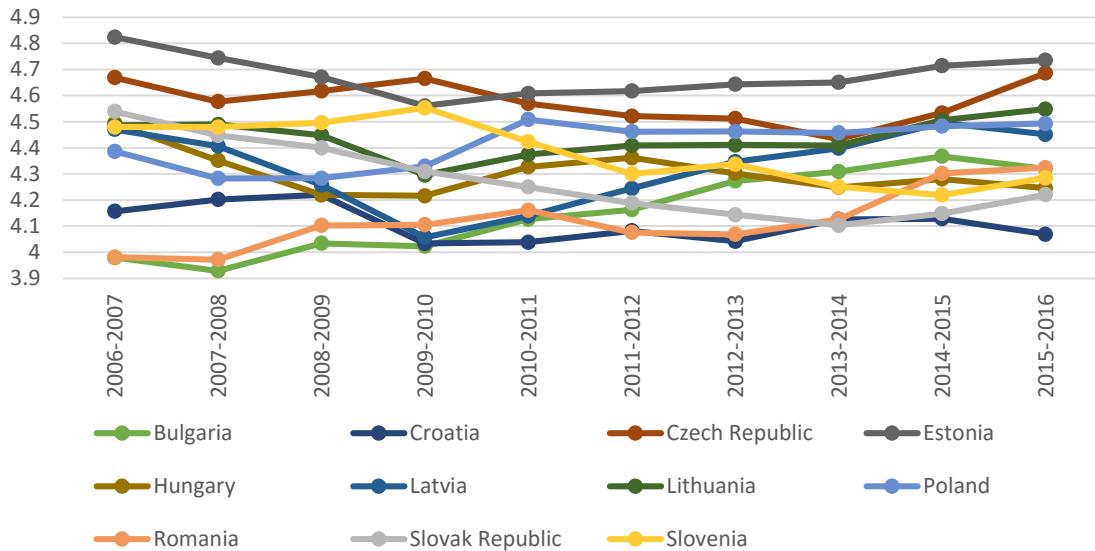


Compared to WCR 2013-2014:

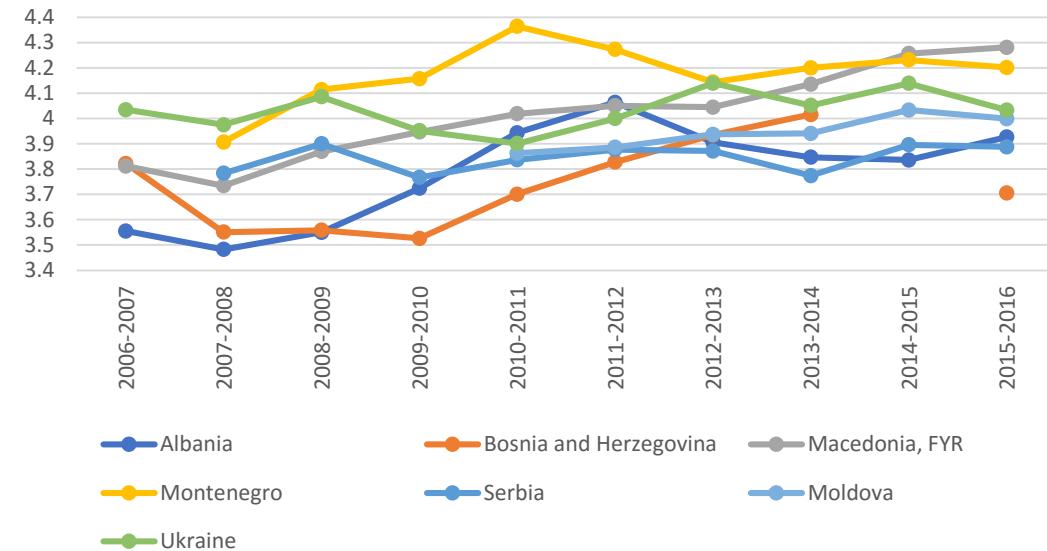
- Moldova and Ukraine regressed one step
- Estonia improved one step

Findings (17) - GCI

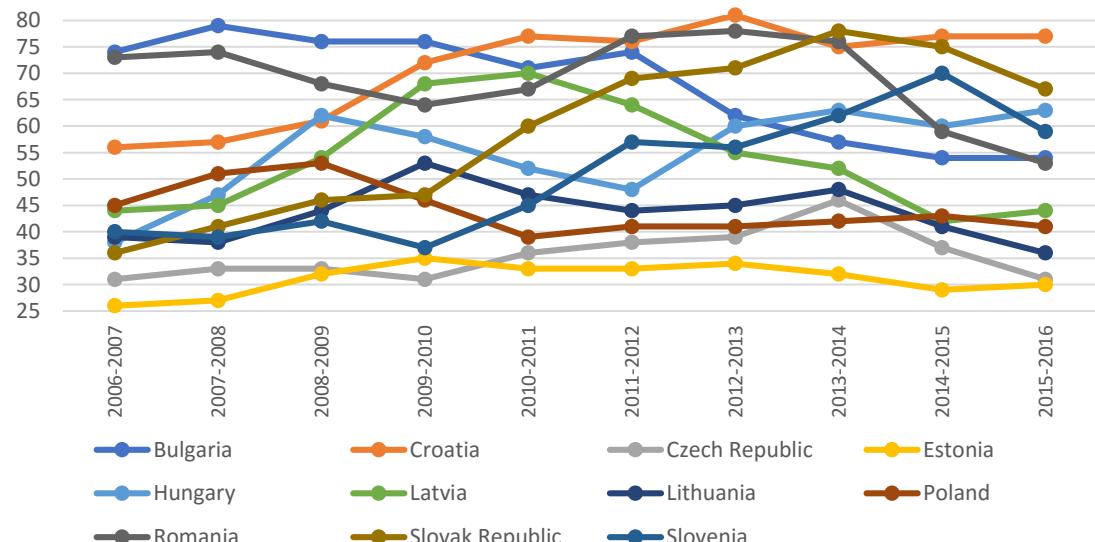
GCI score, 2006-2015 - EU members



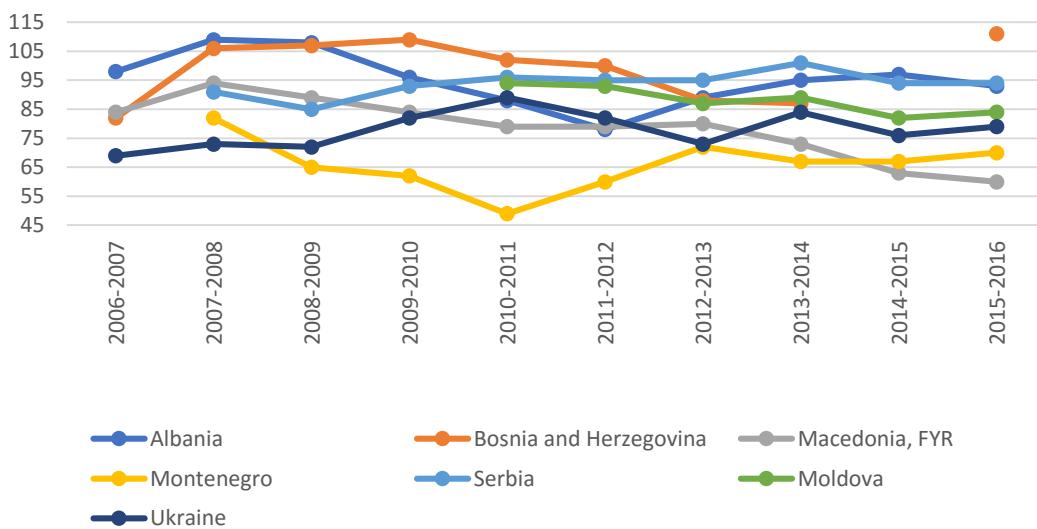
GCI score, 2006-2015 - EP&candidate countries



GCI rank, 2006-2015 - EU members

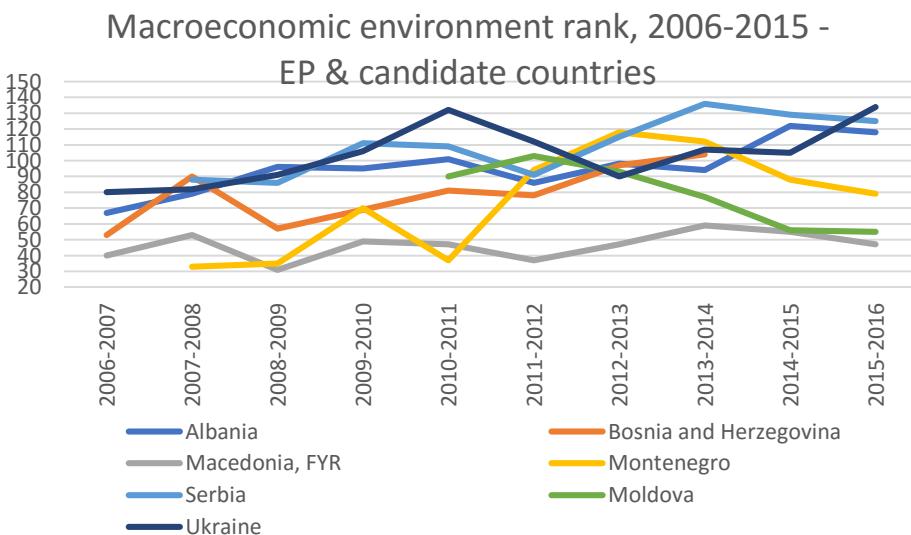
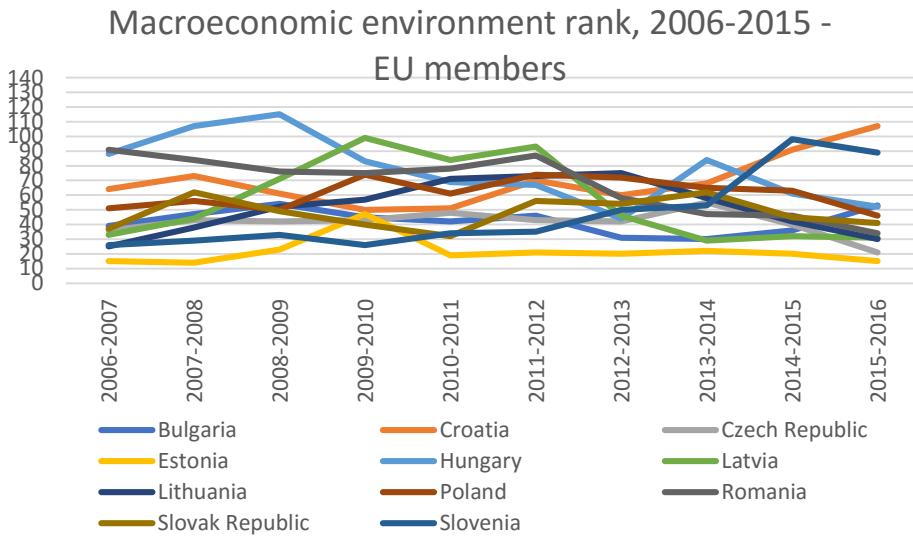


GCI rank, 2006-2015 - EP&candidate countries

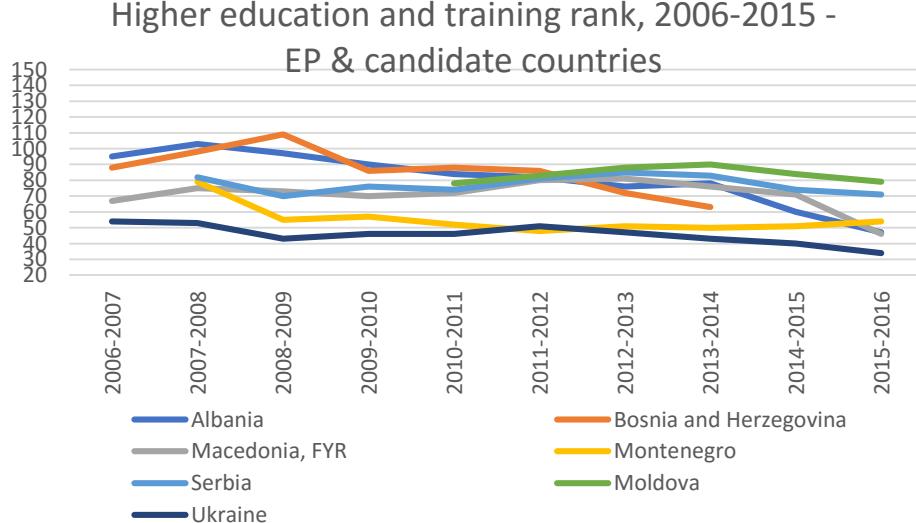
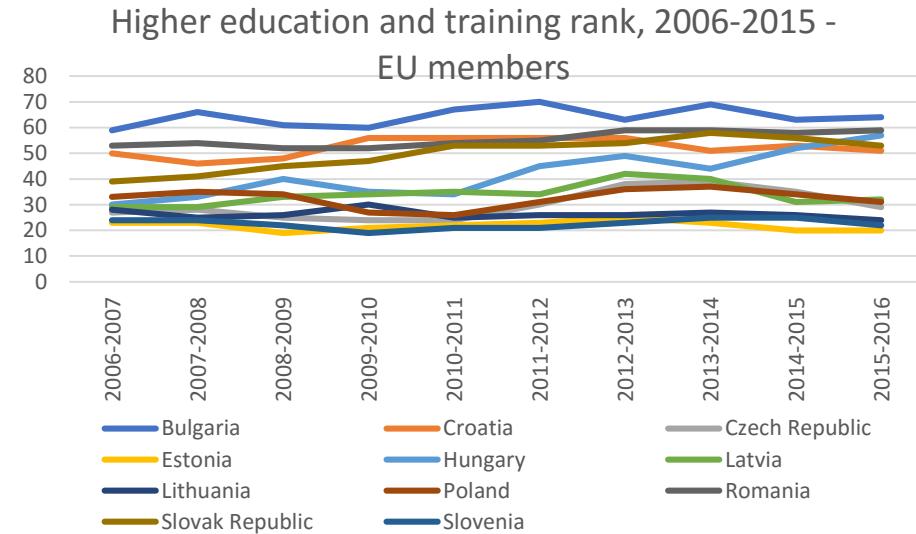


Findings (18) - Pillars

3rd pillar: Macroeconomic environment

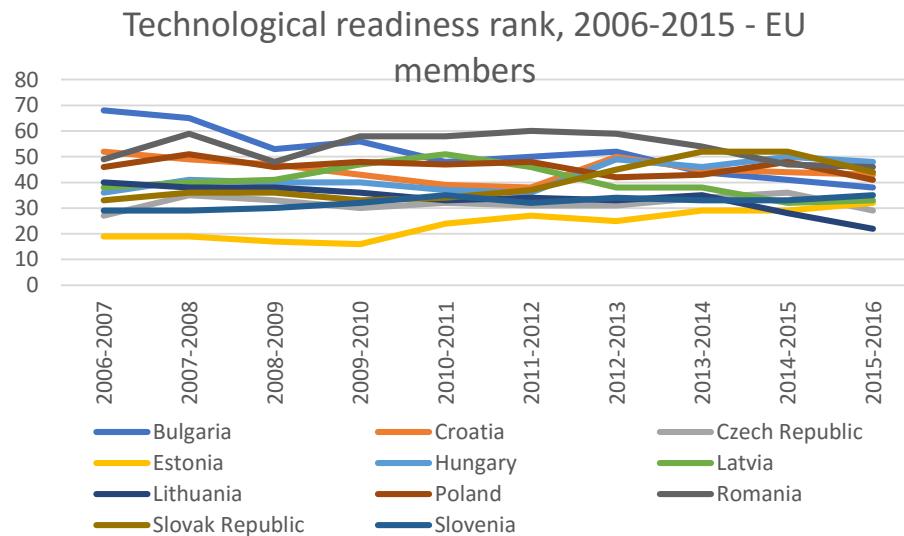


5th pillar: Higher education and training

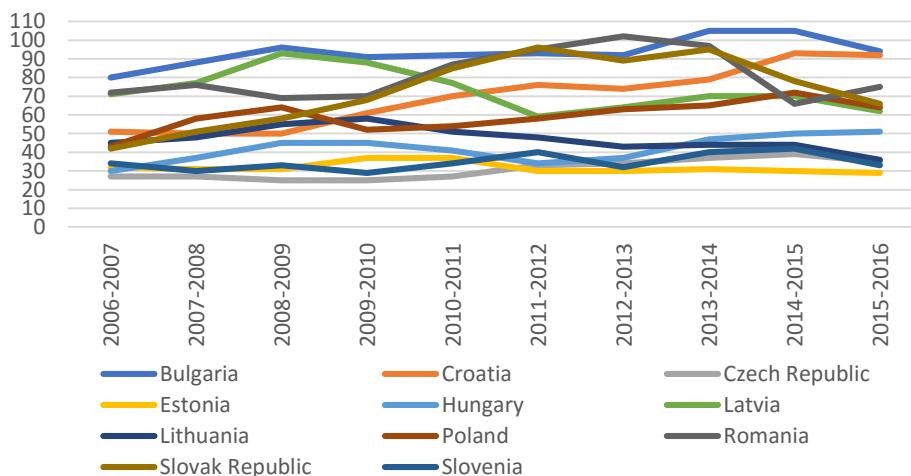


Findings (19) - Pillars

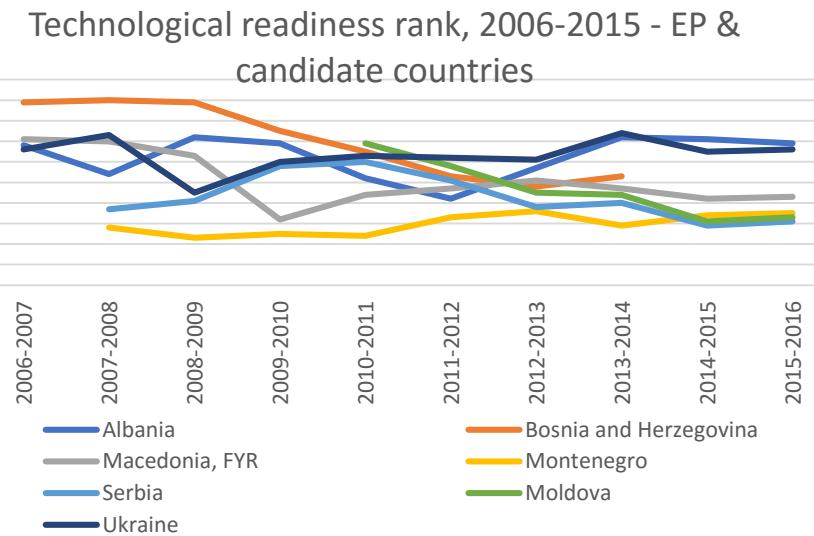
9th pillar: Technological readiness



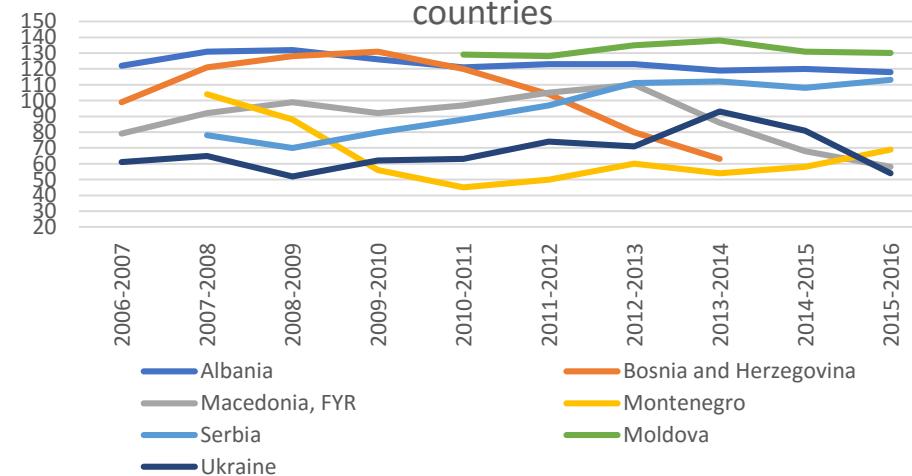
Innovation rank, 2006-2015 - EU members



12th pillar: Innovation



Innovation rank, 2006-2015 - EP & candidate countries



CONCLUSIONS (1) – GCI & all 4 pillars best performance

- in all EE, CZ (except for higher education) and LT (except for innovation)
- SI in higher education and innovation
- in all MK (except for technological readiness)
- in all ME (except for higher education)
- RS in technological readiness and AL in higher education
- UA in GCI + higher education and innovation
- MD in technological readiness and macroeconomic environment

CONCLUSIONS (2) – participation in FPs

- Most number of project with participation and/or coordination PL, HU, CZ, UA and RS
- Participation – PL, CZ and HU (PL first place in all FPs except FP4, where HU was first)
- Participation – UA in all FPs
- Participation – RS in last 3 FPs and AL in FP4 & BA in FP5
- Coordination – PL in all FPs, HU in all but FP4, CZ in FP5 and FP7, LV in FP4, RO in FP6, SI in H2020, UA, RS in last 3

CONCLUSIONS (3) – topics of interest in FPs

- FP4 INCO - Cooperation with Third Countries and International Organisations
- FP4 ENV – Environment and Climate
- FP4 TRANSPORT - Transport Research Programme
- FP5 GROWTH - Competitive and sustainable growth
- FP5 EESD - Energy, environment and sustainable development
- FP5 LIFE QUALITY – Quality of life and management of living resources
- **FP5 IST – Information Society Technologies**
- **FP6 IST - Information society technologies**
- FP6 MOBILITY - Marie Curie Actions - Human resources and mobility
- FP6 SUSTDEV - Sustainable development, global change and ecosystems
- FP6 SME – SME activities
- FP7 PEOPLE - support for researcher mobility and career development – Marie Curie actions
- **FP7 ICT - Information and communication technologies (COOPERATION)**
- **FP7 SME – Research for the benefit of SME (CAPACITIES)**
- **H2020 LEIT – Leadership in enabling and industrial technologies (ICT, nanotechnologies, materials, biotechnology, manufacturing, space)**
- H2020 MSCA - Marie Sk³odowska-Curie actions - Opportunities for training and career development
- H2020 INNOVATION – Innovation in SMEs - Fostering all forms of innovation in all types of SMEs
- H2020 ENERGY – Secure, clean and efficient energy

Thank you! ☺

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