

Croatian national innovation system and its performance

Innovation Policy Learning from Norway in Western Balkans (WBinNO)

Workshop 2: From National Innovation System to Innovation Policy in the Context of the Global Crisis

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Introduction

- During the period (2000-2008) – *progressive integration* in terms of international trade, foreign direct investments and integration of the financial markets vs. suboptimal integration in terms of markets for products/services, labor and capital indicate weak competitiveness and institutional underdevelopment;
- Global crisis has shaped the innovation performance in **last three years** (First phase of the global crisis and Second phase of the global crisis);

Objective of the report

- **The Objective to provide an overview of innovation and technological capabilities in the society;**
- Consists of:
 - Appropriate institutional embedding in the science and research sector
 - Competitive economy - analysis enhanced to include these factors.
- Emphasis on comparative analysis between Croatia and SEE countries (WB countries represent the 'inner circle') on the one hand and Norway on the other;

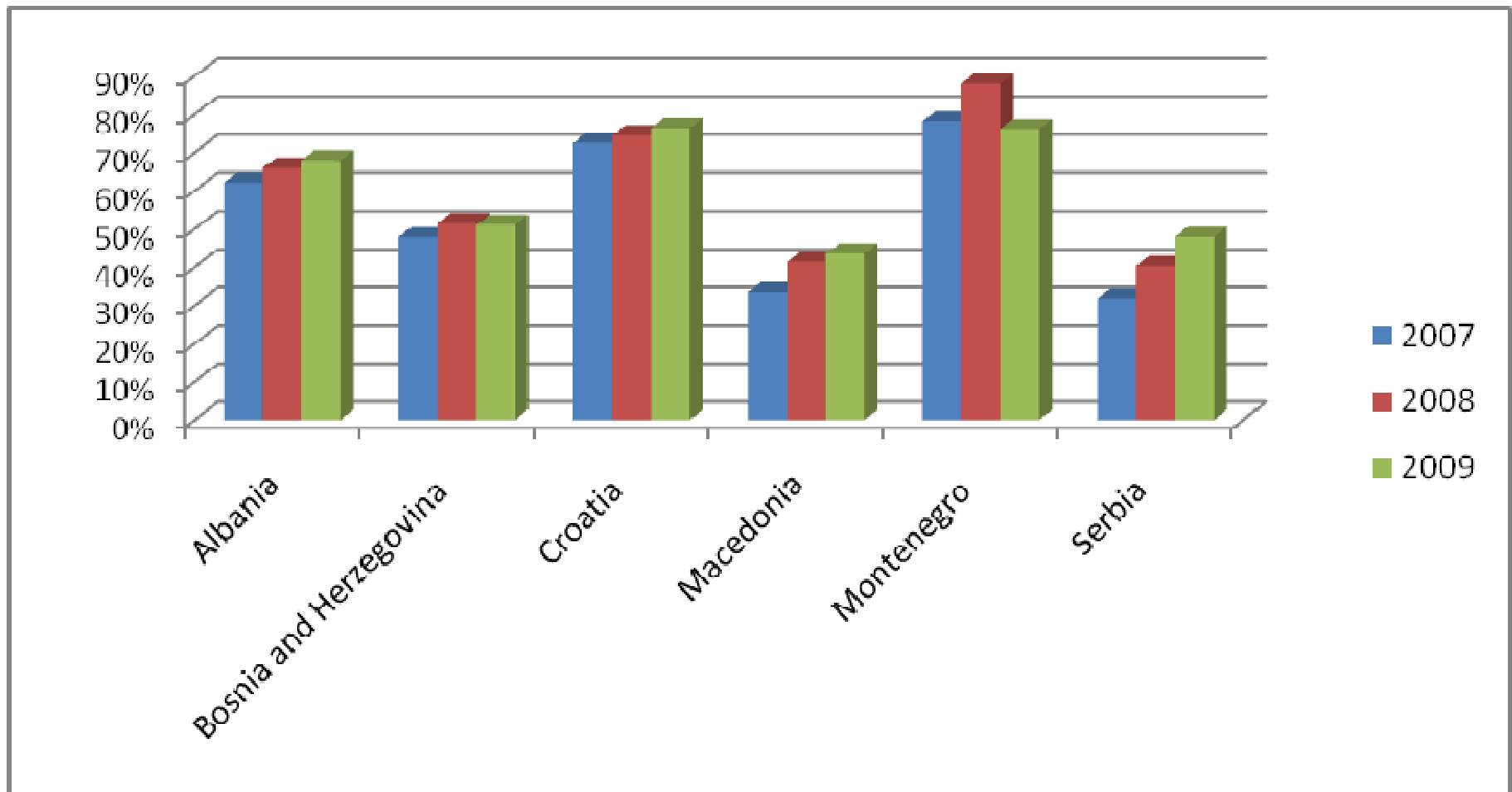
Macroeconomic model affects on the science and technology sector

	2000.	2008.	2009.
GDP/capita, (EUR at exchange rate)	5200	10700	10100
Population	4497735	4436401	4435056
GDP, real change in %	3.8	2.2	-6
Unemployment rate, reg., % average	16.1	8.4	9.1
Gross fixed capital form. (EUR mn, nom)	4359.6	13052.5	11207.3
Manufacturing Gross Value Added as a percent of GDP, %	17.6	9.3	9.2
Exports of goods, EUR, mn	4976.5	9814.0	7690.5
Import of goods, EUR, mn	8468.7	20607.8	15088.5
Exports of services	4442.0	10090.6	8453.9
Imports of services	1971.5	3132.7	2778.3
FDI inflow, EUR mn	1140.6	4195.4	2096.0
FDI outflow, EUR mn	5.0	988.8	918.7
Total expenditure on R&D as percentage of GDP	1,23	0.9	0.84

GDP, real change in % WB countries

	2007	2008	2009	2010	2011	2012
Albania	5.9	7.5	3.3	3	4.1	3.9
Bosnia and Herzegovina	6.2	5.7	-3	0.8	2.2	3
Croatia	5.1	2.2	-6	-1.2	1	2
Macedonia	6.1	5	-0.9	0.8	2	3
Montenegro	10.7	6.9	-5.7	1.1	2	3
Serbia	6,9	5.5	-3.1	1.8	2.5	3

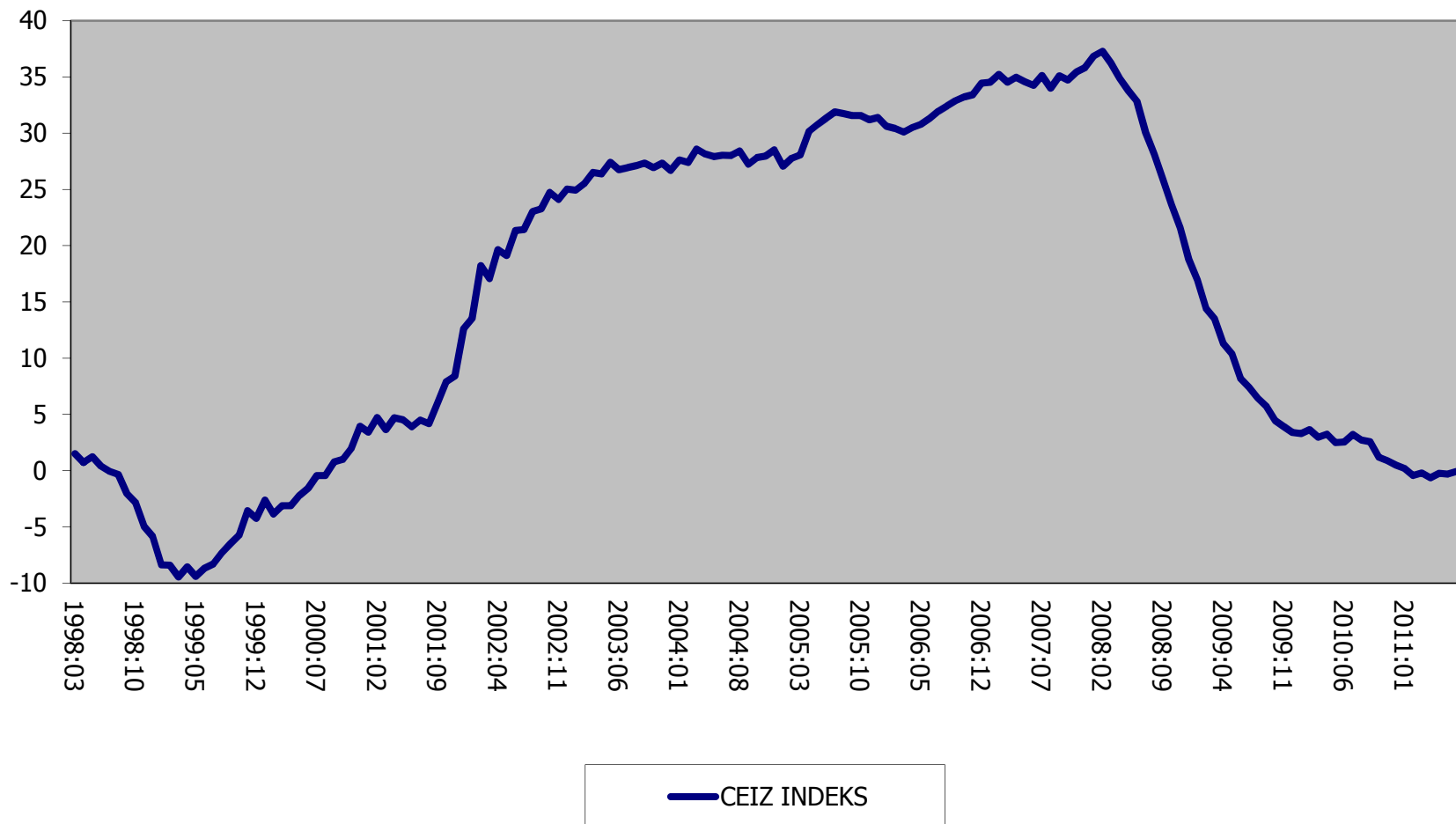
Domestic credit as % of Gross Domestic Product in WB Countries



Source: IMF Statistics, WIIW (value for Montenegro's GDP in 2009)

The fall in economic activity (Vizek et al., 2011)

Coincident indicator of croatian business cycle



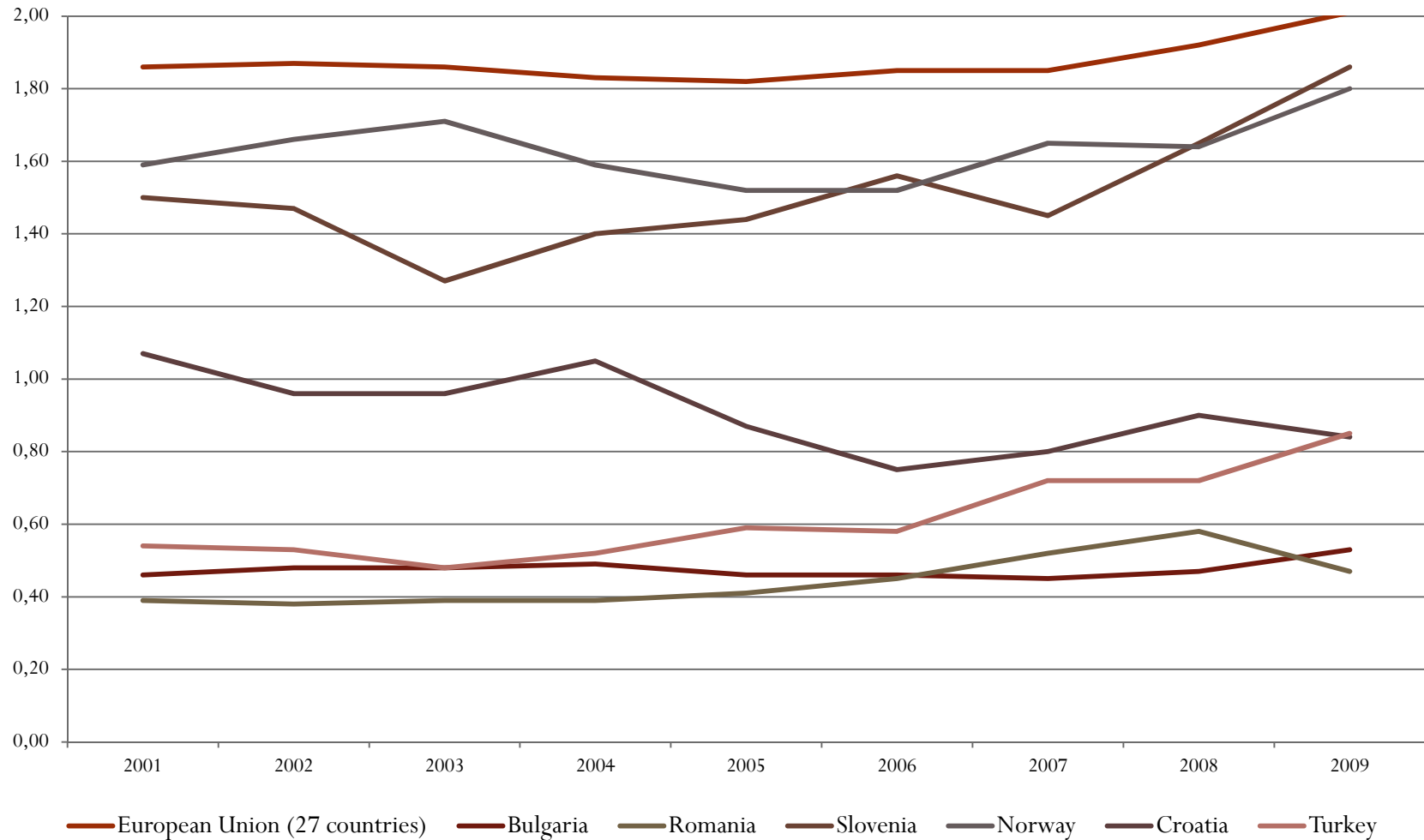
WB countries - Science technology sector characteristics (cf. UNESCO, 2010) in the context of the global crisis

- Low R&D demand, weak business R&D investments, low level of inventive activities, brain drain as well as limitation utilization of ICT;
- New moments in socio-economic performances results of the global crises (from second half of 2008 - onwards)
 1. Contraction of their foreign trade, mainly with European countries
 2. Decline of credit growth;
 3. A rapid fall in inflow of FDI;
 4. Decline in remittances from migrant workers for WB countries, except Croatia
 5. Functioning of institutions;
 6. Public investments into research and development, education, innovation under threat of reduction;
- **Sustainable economic growth in SEE under threat by the global crisis;**

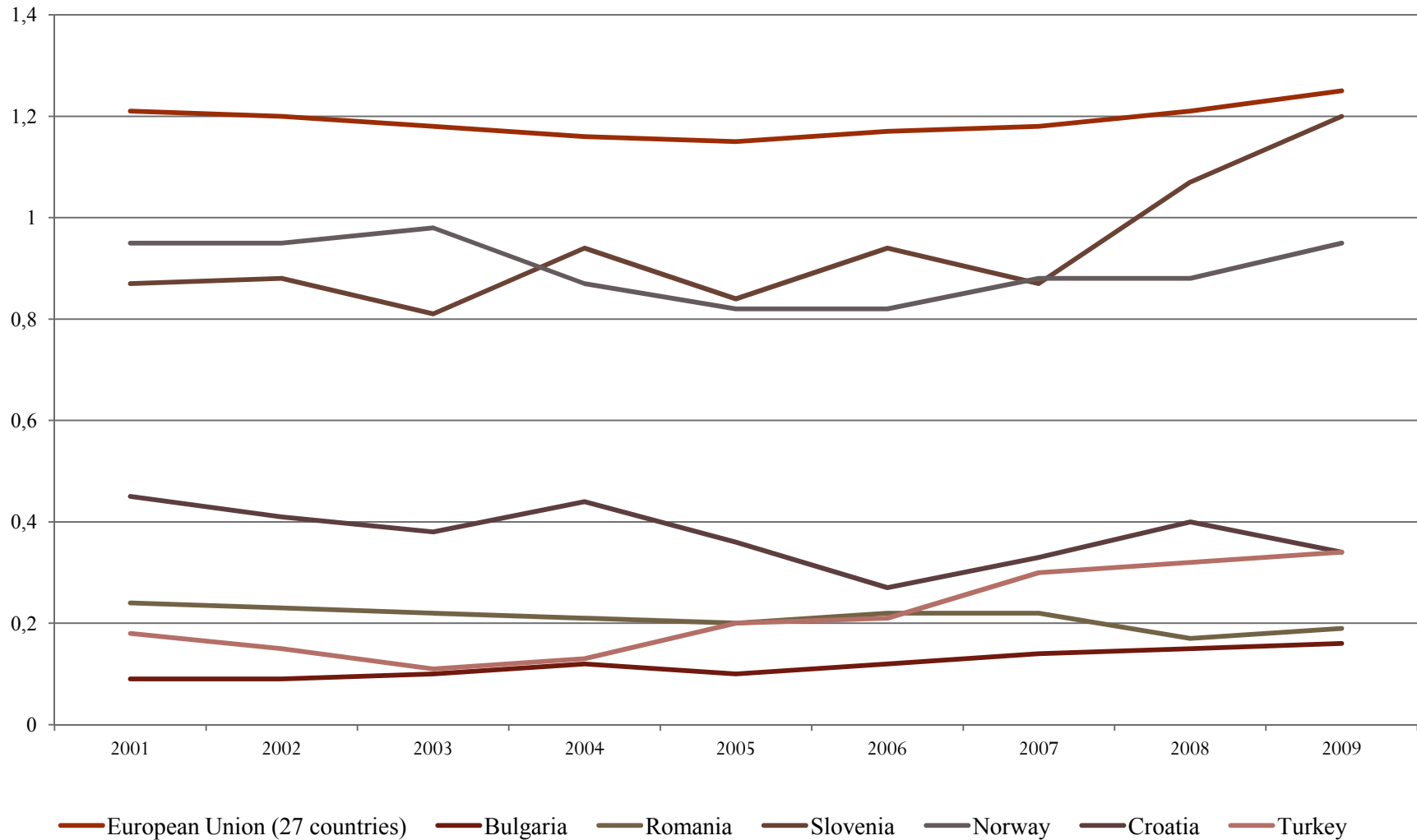
Croatia vs. the EU main education indicators during the period 2007-2009

	2007		2008		2009	
	Croatia	EU - 27	Croatia	EU - 27	Croatia	EU - 27
Annual expenditure on public and private educational institutions compared to GDP per capita	24.9	24.9	26.4	25.6	N.A	N.A
Science and technology graduates by gender	6.8	13.8	10.1	14.5	12.8	14.3
Total population having completed at least upper secondary education	75.3	70.7	75.9	71.4	76.8	72
Life-long learning by gender	2.4	9.4	2.2	9.4	2.3	9.3

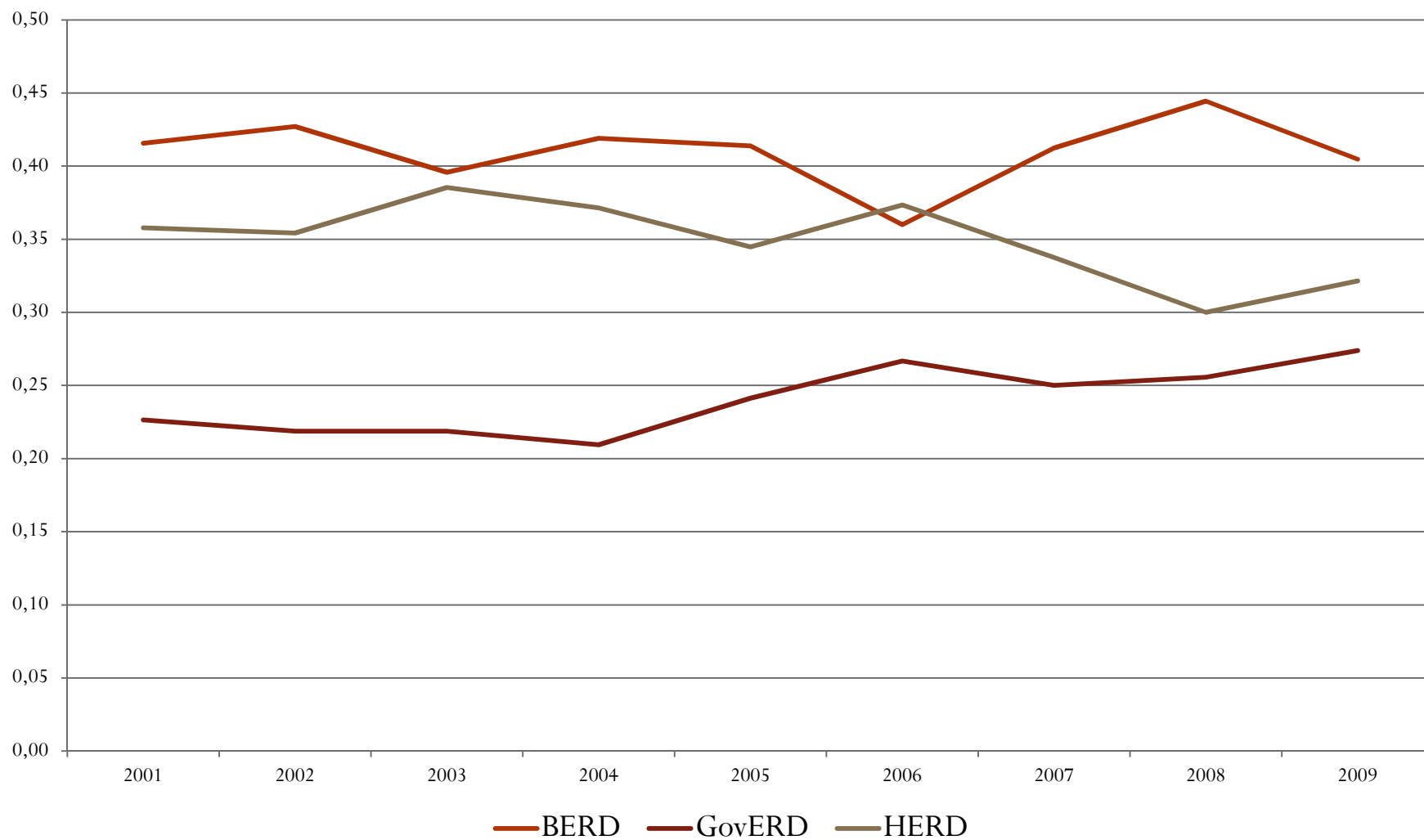
Gross expenditure on research and development (% GDP) during the period 2001-2009



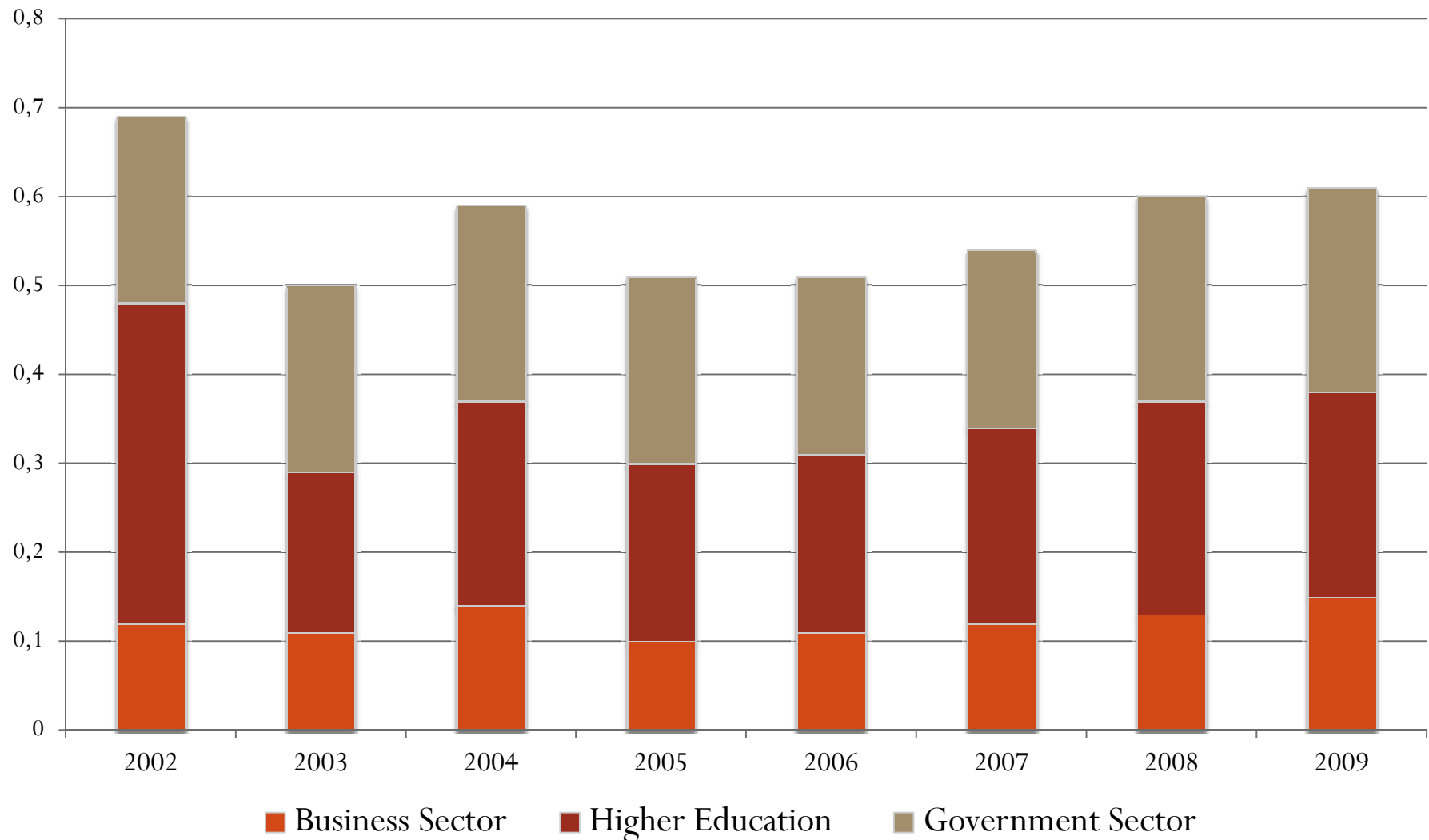
Business expenditure on research and development (% GDP) during the period 2001-2009



The structure of the research and development activities as a percentage of GDP during the period 2001-2009



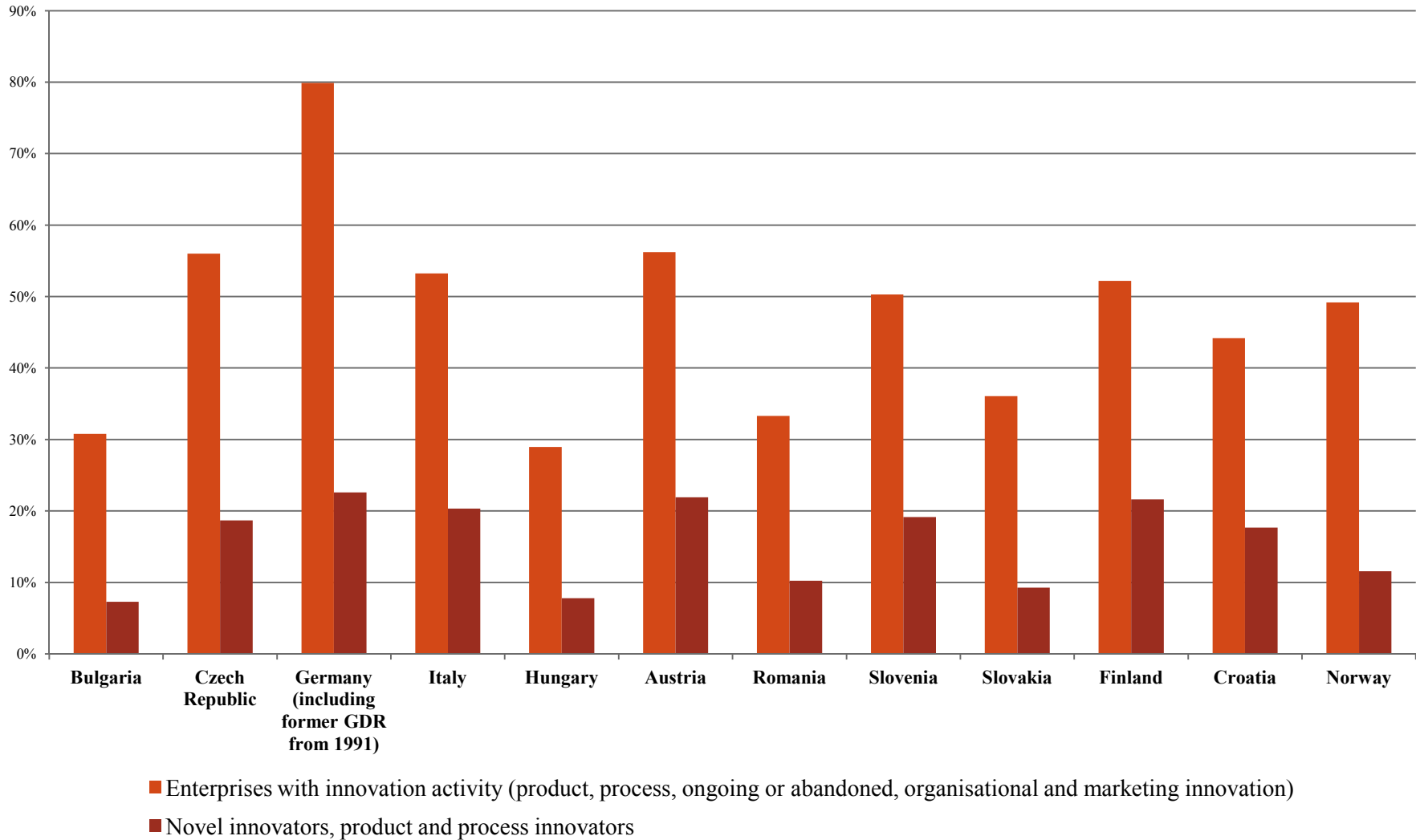
The structure of the research and development personnel (% of the labor force) during the period 2002-2009



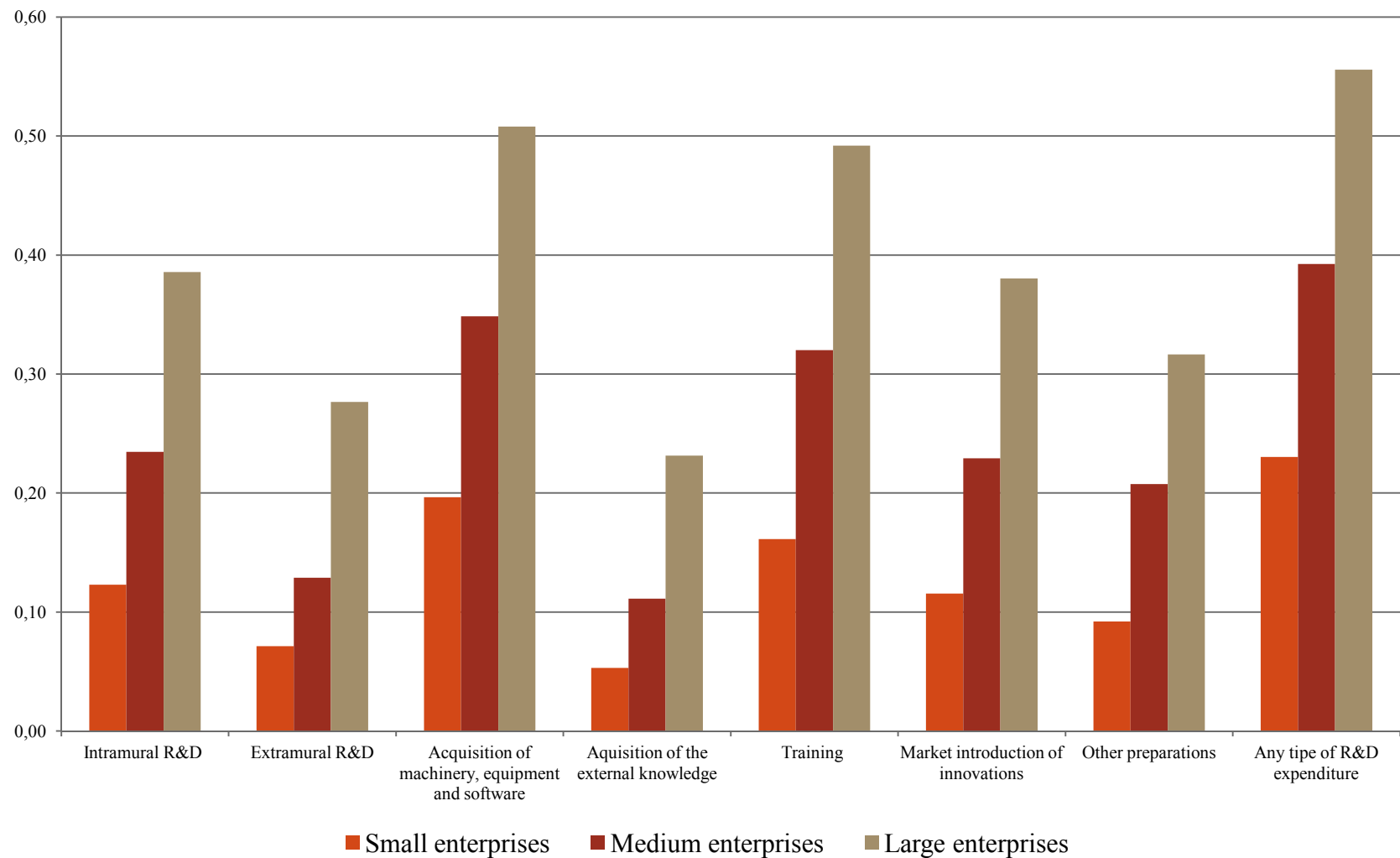
R&D output in the selected countries in terms of high tech export, patent applications, and royalty and licences fees

	2008	2009	2008	2009	2008	2009
	High Technology Export (GDP current price)		Patent Applications (per capita)		Total royalty payments (per capita)	
Bosnia and Herzegovina	0.68	0.44	15.64	N.A	2.9	1.6
Bulgaria	1.46	1.47	43.29	32.96	12.5	15.5
Croatia	1.28	1.19	56.16	54.60	58.1	48.0
Romania	1.37	2.01	46.25	0.05	16.1	15.8
Slovenia	2.85	2.57	190.96	156.12	126.0	141.8
Serbia	N.A	N.A	4.07	4.99	26.5	19.6
Turkey	0.25	0.24	30.04	34.15	9.9	8.7
Norway	1.28	1.24	239.08	N.A.	16.1	114.5

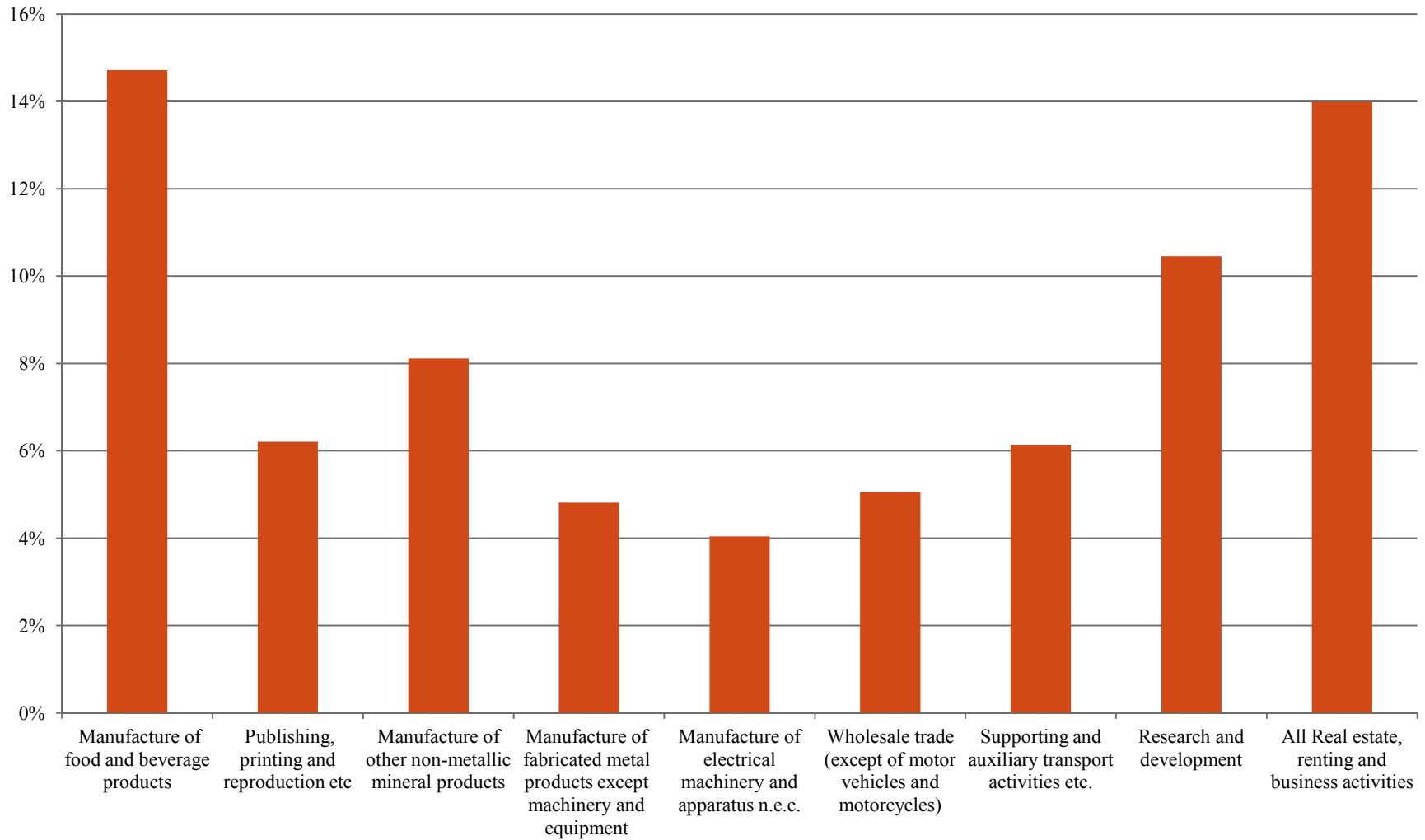
Shares of enterprises with innovation activity and novel innovators in Croatia and selected countries



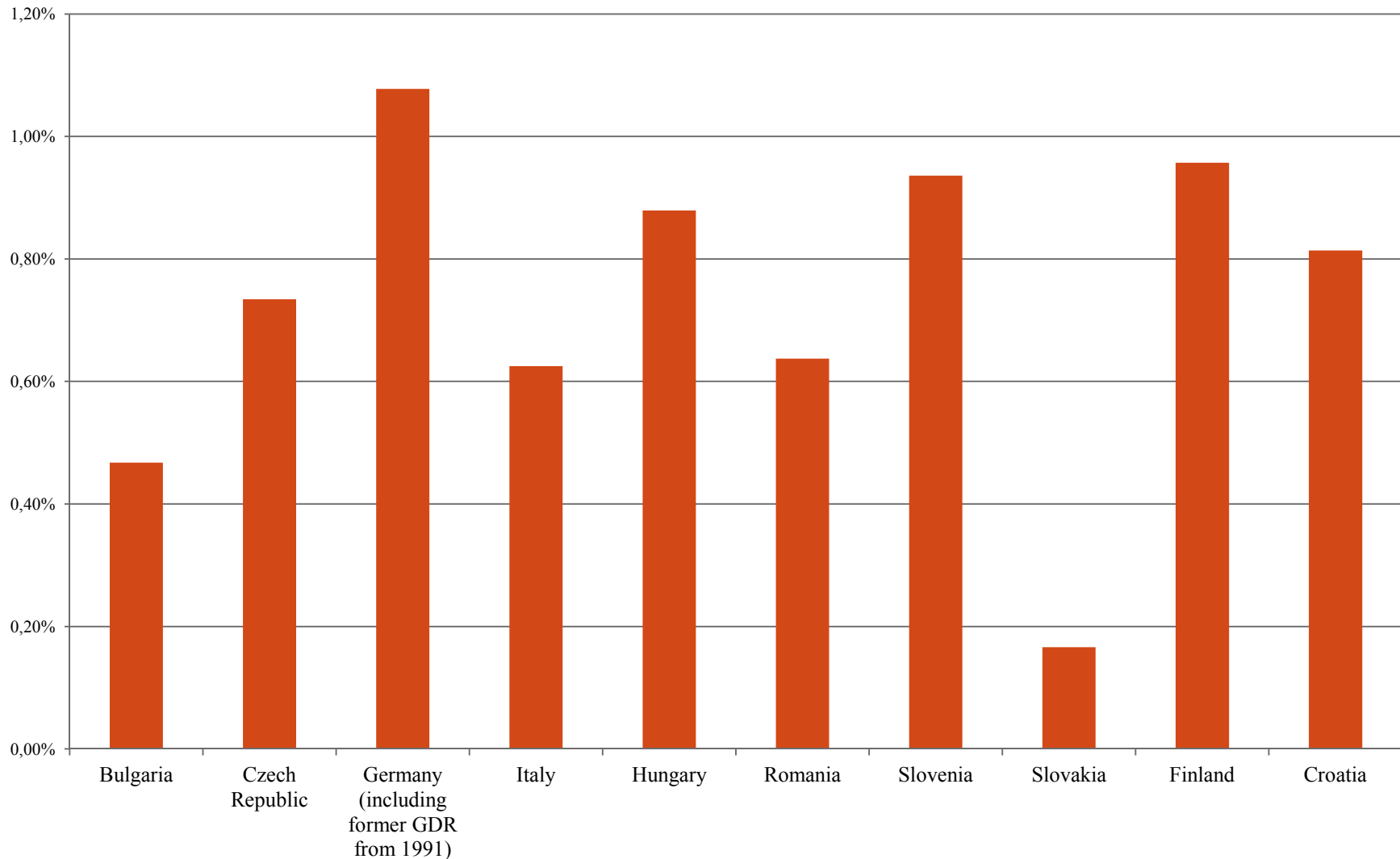
Shares of enterprises with the innovation expenditure as % of total number of enterprises in the population in 2006



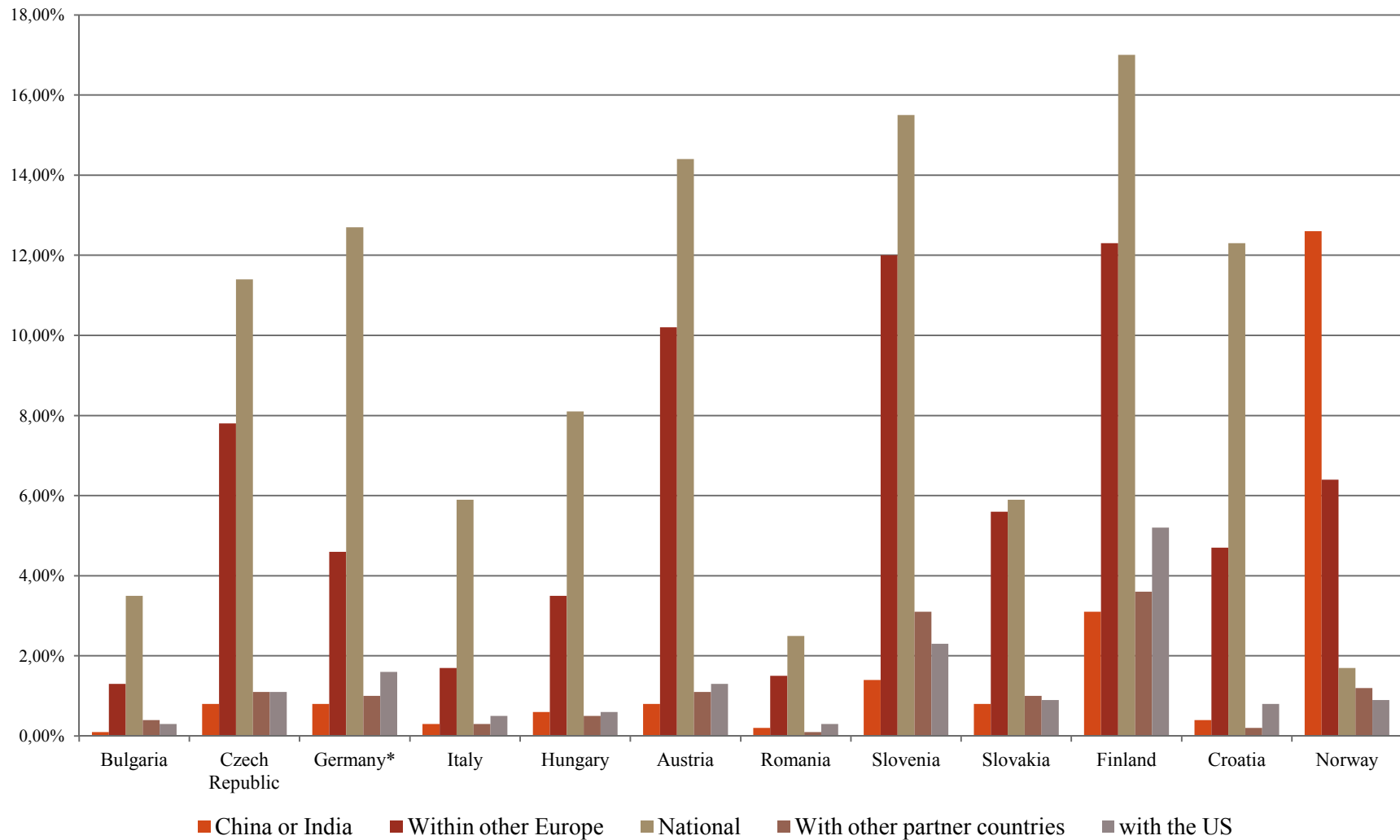
Main economic activities sectors as % of total amount of innovation expenditure in 2006



Government and public institutions as highly important source of information for innovation during 2006-2008 (% of total number of enterprises in the population in 2006)



Innovation cooperation in the selected countries - geographical structure



Four development phases of the national innovation system (cf. Švarc, 2006)

- **The first phase** (1991-1993) - a change of the social economic system, exaggerated by war conflicts implied institutional setback = innovative programmes became technical support;
- **The second phase** (1994-2000) - development of science and business infrastructure aimed at improving the commercialization of inventive and innovation activities (transfer and technological centres were established);
- **The third phase** (2001- first half of 2008) - strengthening of institutional capacities (ASHE, AMPEU, BICRO) as well as further strengthening of science and technological infrastructure
- **The fourth phase** (from the second half of 2008 onwards) - characterized by the global crisis and problem of financing institutional activities;

First phase 'Introduction of the neoliberal type of capitalism'

Fundamental socio economic change

- Croatia gained independence;
- Extensive privatisation programmes;
- Disintegration of large socialist companies;
- Capital Inflows from 1995;

Technical support programmes

(e.g. patent registration financed by German and Italian governments)

Second phase from 1994-2000

- Strong emphasis on commercialization of inventive and innovation activities;
- Development of science and business infrastructure (Technology and transfer centres in Zagreb, Rijeka and Split);
- Higher capability of public administration for policy implementation and cooperation with business and academic institutions;
- Nature of Innovation Policy became more integrative, facilitating effectiveness;

Third phase 2001- first half of 2008

- Strengthening Institutional Capacities;
 - HITRA;
 - Establishment of BICRO and HIT;
 - Science and Technology Policy 2006-2010;
 - Science and Technology Park in Rijeka (2007)
 - TERA Osijek;
- Ministry of Economy Labour and Entrepreneurship appeared as important player;
- Development of Four Levels of Institutional Settlements in the National Innovation System;

Main barriers to R&D investments and respective policy opportunities and risks before the crisis

Barriers to R&D investment	Opportunities and Risks generated by the policy mix
Low level of innovation performance in the national economy	Current policy package are more focused on increasing R&D investments within firms; policy programs should be more oriented toward firms not yet performing R&D activities
Very small amount of investments into business R&D	Policy has recognised this barrier, but more could be done (in terms of creating programs aimed at developing a new product and/or new process)
Low share of R&D personnel in total number of Employees	Policy has recognised this barrier, but more could be done (in terms of creating programs aimed at fostering studying in science and engineering)
Low level of cooperation between science and the business sector	Several programs schemes have been organized in the last few years by BICRO, MELE, UKF and NZZ

Fourth phase – global crisis

Sustainability of National Innovation System

- Decline of Croatia's GERD in 2009 (0.84%) in comparison to 2001 (1.07%);
- During the period 2001-2009 Croatia experienced severe decline in BERD (-24.4 percent points);

Stronger Internationalization of the National Innovation System due to Croatian approach into the EU;

- During the period 2007 -2010, 137 active participant in FP7 programmes (17.5 mil EUR)
- INTERREG projects;
- Beneficiary of the EU IPA programme since 2007;
- Regional cooperation in the field of Knowledge Based Economy:
 - Five projects in the field of innovation economics from 2005 and strong emphasis on ICT sector (e.g. eSEE Agenda eSEE Agenda plus)

Concluding Remarks

- consumption growth models have affected macroeconomic performance, with implications for the research and development sector
 - weak business R&D investments
 - low level of inventive activities
 - brain drain (cf. UNESCO, 2010)
- Low recognition of science and R&D as key strategic factors essential for long term economic development is evident by policy makers in Croatia
 - reduction of Gross Expenditure on Research and Development as a percentage of GDP, comparable to Bulgaria and Romania during the period 2001-2009
 - However, GERD as a percentage of the GDP increased over the same period in a group of analyzed countries (namely Norway, Slovenia and Turkey)

Concluding Remarks

- GERD decline – due to severe decline of BERD (-24.4 percent points)
- But - R&D personnel as a percentage of labor force increased (23.9 percent points) and amounted to 0.53% in 2009
- Croatia (0.65%) lags behind the EU-27 (1.48%) in terms of share of Government Budget Appropriations or Outlays for R&D (GBOARD) in GDP in 2009
- In terms of R&D outputs for High tech export, expressed in GDP in current prices, patent applications per capita and total royalty payments per capita in Croatia are far ahead of Serbia, Bosnia and Herzegovina and Turkey in all categories, but worse in comparison to Slovenia and Norway
- innovation cooperation showed that smaller countries (up to 10 million inhabitants), such as Finland (17.2%) and Austria (16.6%) ranked top, ahead of Croatia (13.1%), but Croatia still outperforms countries such as Slovakia (7.0%) and Bulgaria (4%)
- Slightly different environmental goals in comparison to the rest - the reduction of negative impacts of business activities, such as soil reduction, and water, noise or air pollution

Concluding Remarks

- Croatian integration into international trade of ICT goods in line with other similar countries, but Croatia lags slightly behind Western Economies in terms of ICT use.
- acquisition of machinery, equipment and software dominates as a form of innovation expenditure is marginally higher than training – however, low level of business enterprises engaged in R&D activities on a continuous base (3.7%)
- weak interdependence between research and development activities and above average firms' performance within foreign owned SME in Croatia - technology transfer from foreign sources to local subsidiaries is motivated by the desire to maintain their dominant market positions
 - This is pending on the results of the input-output table, which will provide more insight
- Sample shows that the majority of innovation cooperation is national
 - In Croatia, international innovation cooperation is focused on European partners whilst the cooperation with partners outside of Europe is rare

Concluding remarks

- progress in innovation policy practice evident
- institutional infrastructure has become increasingly complex
 - E.g. specialized agencies such as ASHE, AMPEU and BICRO have assumed a more important role in science and research sector development
- Next big task: the translation of policy into effective results
 - Requirement: an effective monitoring and evaluation mechanism