University of Rome "Tor Vergata"
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Second Semester

Master of Science in Business Administration

Course:
Innovation and Cognitive Economics

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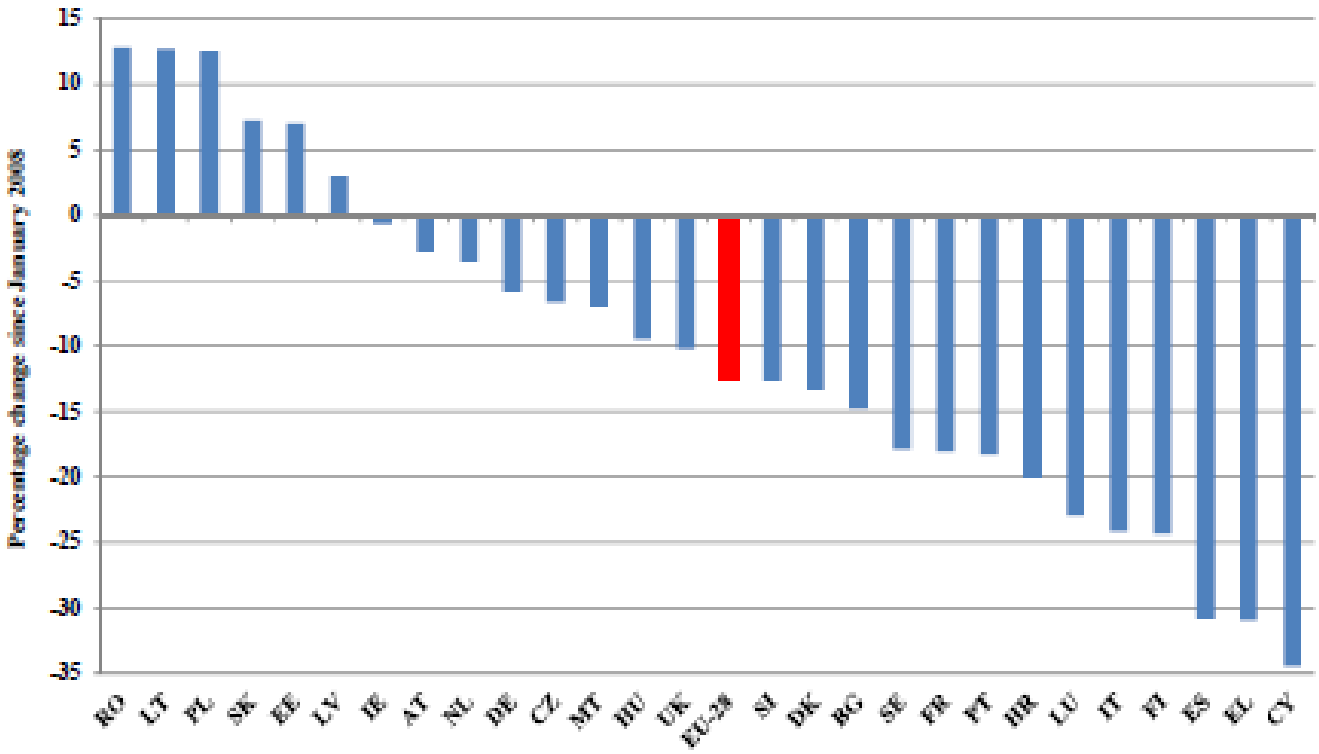
LECTURE 2

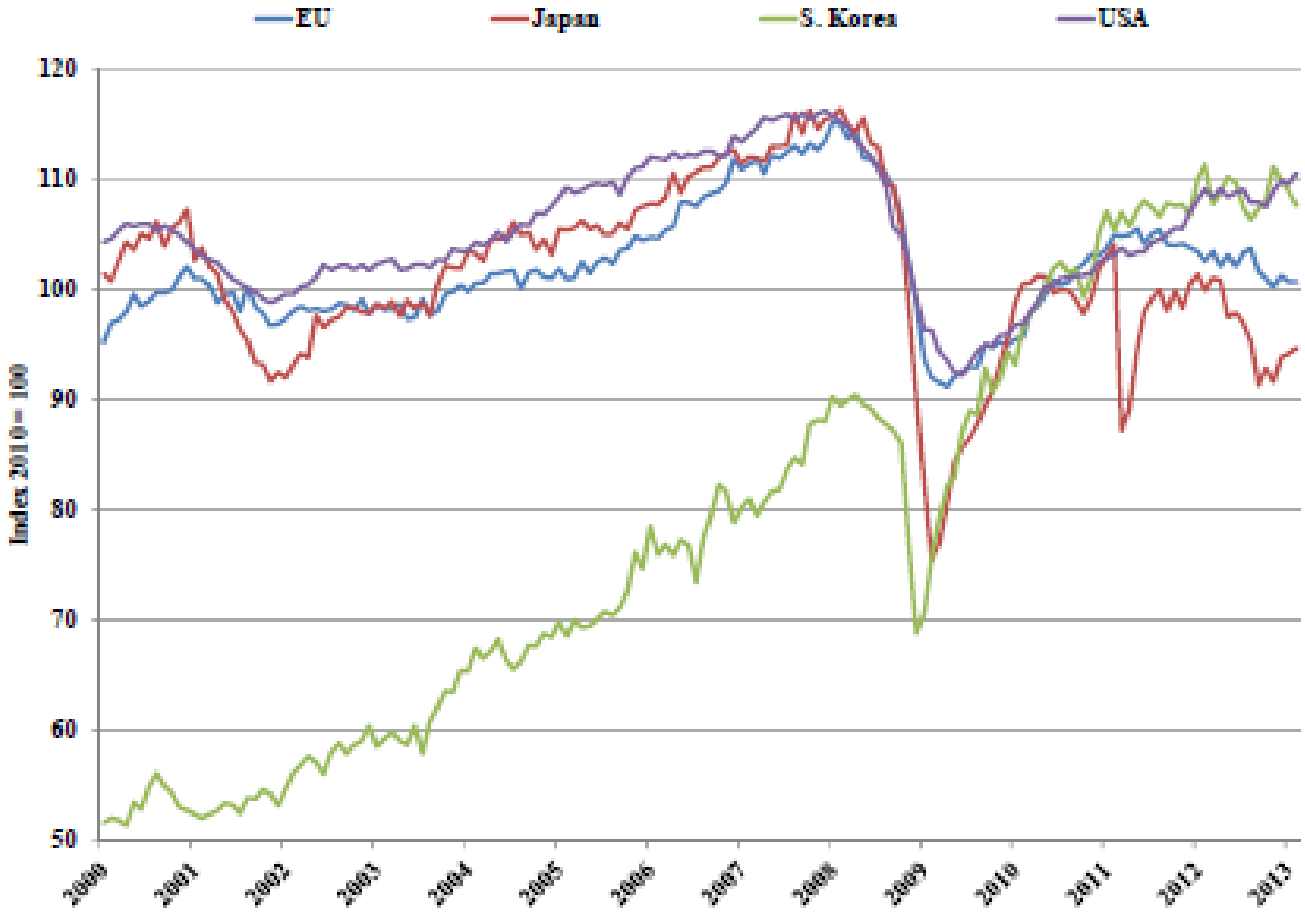
AN INTERNATIONAL COMPARISON OF THE KNOWLEDGE AND INNOVATION INDICATORS

Figure 1.2. EU manufacturing recovery by Member State



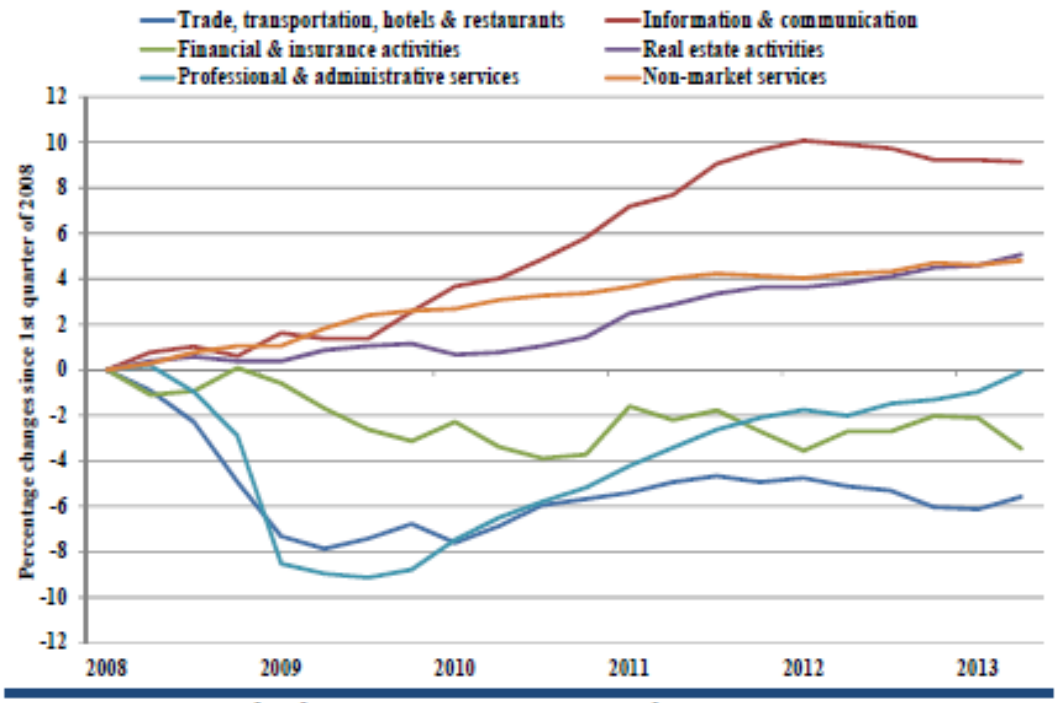
Source: Own calculations using Eurostat manufacturing data. Developments are shown since January 2008 until March 2013.

Figure 1.5. EU recovery in comparative perspective



Source: Own calculations using Eurostat and OECD data.

Figure 1.7. Services developments since 2008



Source: Own calculations using Eurostat data.

Table 2.1. Share in GDP in 2012 and change in shares of GDP between 2000 and 2012

Sectors	Agriculture, forestry and fishing		Mining and quarrying		Manufacturing		Electricity, gas and water supply		Construction		Market services		Non-market services	
Country (Y1-Y2)	change	share	change	share	change	share	change	share	change	share	change	share	change	share
AT (00-12)	-0.3	1.6	0.2	0.5	-1.9	18.2	-0.2	3.0	-0.9	6.8	2.4	49.3	0.7	20.5
BE (00-12)	-0.6	0.7	-0.1	0.1	-5.9	12.8	0.0	3.1	0.6	5.9	2.8	52.5	3.1	24.9
BG (00-12)	-6.2	6.4	0.5	2.4	2.8	16.7	-0.1	5.4	0.9	5.9	4.1	47.9	-2.0	15.3
CY (00-12)	-1.3	2.5	-0.1	0.2	-4.0	5.7	1.0	3.2	-2.9	5.8	2.7	56.4	4.6	26.2
CZ (00-12)	-1.2	2.4	-0.1	1.2	-1.2	24.7	1.3	5.1	-0.3	6.3	0.7	42.8	0.8	17.5
DE (00-12)	-0.3	0.8	0.0	0.2	0.1	22.4	0.5	3.2	-0.6	4.7	-0.7	45.7	1.0	22.9
DK (00-12)	-1.1	1.4	0.6	3.6	-4.3	11.0	-0.3	2.4	-0.7	4.8	3.9	49.4	1.9	27.3
EE (00-12)	-0.6	4.1	0.2	1.3	-1.7	15.4	1.0	4.5	1.9	7.8	-0.7	50.2	0.0	16.7
EL (00-11)	-3.2	3.4	-0.3	0.3	-1.7	9.2	1.2	3.9	-4.7	2.5	3.1	55.3	5.5	25.5
ES (00-11)	-1.7	2.5	-0.1	0.2	-4.4	13.5	0.6	3.2	-0.2	10.1	3.5	48.6	2.3	21.9
FI (00-12)	-0.7	2.8	0.2	0.4	-10.3	15.4	1.1	3.2	0.6	6.9	4.6	46.1	4.5	25.1
FR (00-12)	-0.5	2.0	0.0	0.1	-5.3	10.0	0.0	2.4	1.3	6.3	2.6	53.2	1.9	26.0
HU (00-12)	-1.1	4.7	0.0	0.3	-0.2	22.7	-0.1	3.9	-1.5	3.8	3.9	44.6	-0.9	20.0
IE (00-12)	-2.0	1.6	-0.2	0.4	-2.5	23.3	1.0	2.6	-5.8	1.6	4.5	50.6	5.0	19.9
IT (00-12)	-0.8	2.0	-0.1	0.4	-4.5	15.6	0.3	2.3	0.8	5.9	2.6	53.1	1.7	20.6
LT (00-12)	-2.3	4.0	-0.3	0.4	2.0	20.8	-0.3	3.9	0.0	6.0	5.5	49.5	-4.5	15.5
LU (00-12)	-0.3	0.3	-0.1	0.1	-5.6	5.3	-0.4	1.3	-0.3	6.2	3.6	69.0	3.0	17.8
LV (00-12)	0.5	5.0	0.5	0.6	0.1	14.5	0.4	4.5	-0.6	6.2	3.4	53.7	-4.2	15.6
MT (00-12)	-0.7	1.5	0.0	0.1	-8.0	12.8	n.a.	n.a.	-1.3	4.0	1.1	51.9	10.7	29.3
NL (00-12)	-0.8	1.7	1.4	3.8	-2.0	12.6	0.9	2.9	-0.8	4.9	-2.9	48.7	4.2	25.3
PL (00-12)	-1.0	3.9	0.1	2.5	0.0	17.3	1.2	4.9	0.0	7.8	0.1	47.3	-0.4	16.4
PT (00-11)	-1.4	2.2	-0.1	0.4	-3.3	13.8	1.3	4.0	-2.4	5.8	4.2	50.1	1.6	23.7
RO (00-11)	-4.6	7.5	-0.8	1.5	2.8	24.8	3.3	6.6	3.5	9.2	-5.4	35.7	1.3	14.7
SE (00-12)	-0.3	1.7	0.6	0.9	-4.7	16.6	1.0	3.6	1.3	5.6	-1.1	45.1	3.2	26.5
SI (00-12)	-0.7	2.7	-0.2	0.4	-3.6	20.8	0.9	3.9	-0.7	5.9	3.2	45.7	1.0	20.5
SK (00-12)	-1.3	3.1	-0.3	0.5	-2.1	21.7	0.5	4.7	1.0	8.2	2.1	45.0	0.1	16.7
UK (00-11)	-0.2	0.7	-0.5	2.3	-5.3	10.3	0.0	2.4	0.4	6.4	3.3	55.4	2.3	22.4
EU-27 (00-12)	-0.5	1.7	0.0	0.9	-3.3	15.2	0.5	3.0	-0.1	5.9	1.7	50.5	1.8	22.9

Source: own calculation based on Eurostat data.
Note: Change is the difference between the shares at the end and beginning of the period.

Box 3.3. Using ISCED to define skill categories

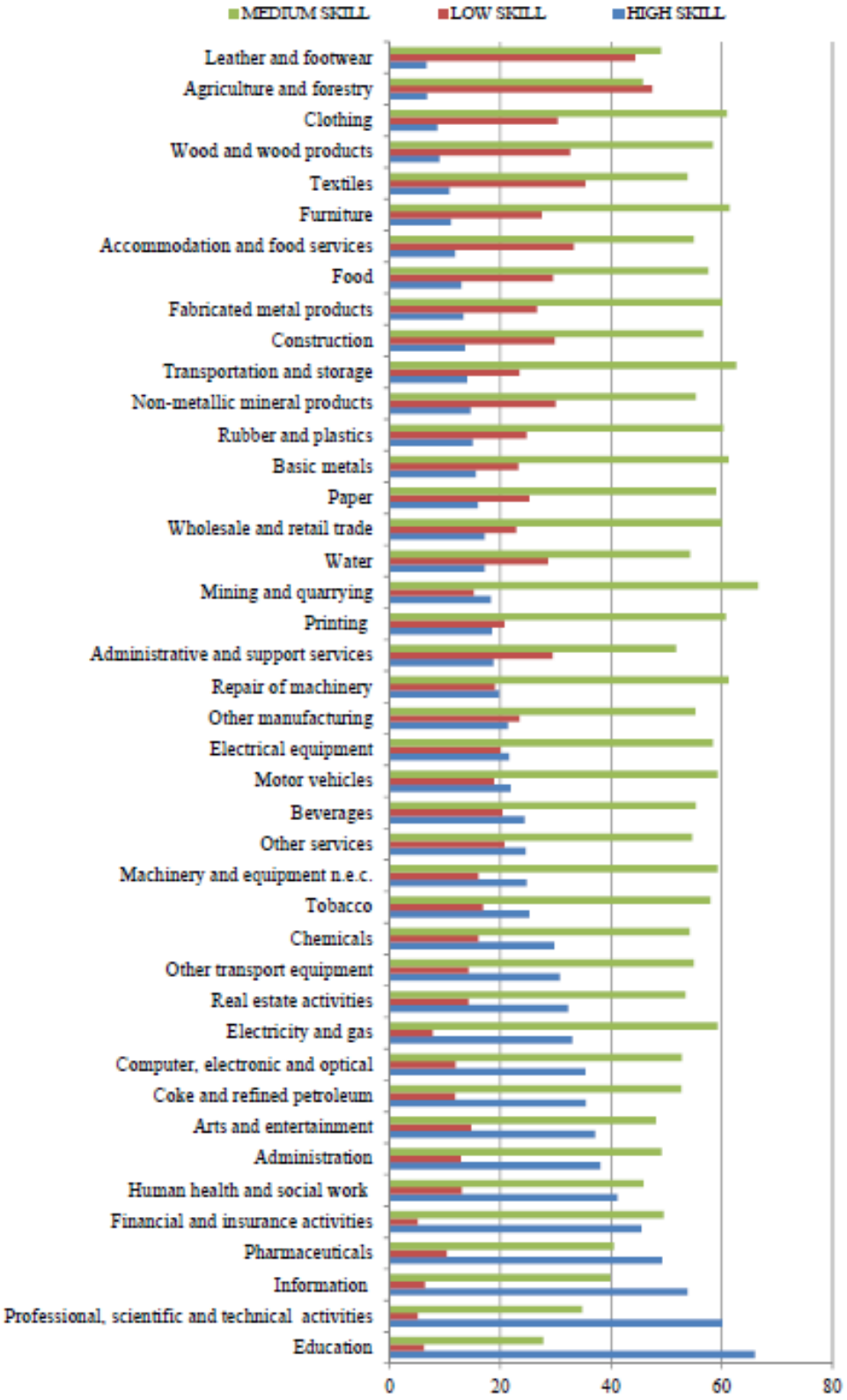
The International Standard Classification of Education (ISCED) distinguishes seven levels of education:

- Level 0: pre-primary
- Level 1: primary
- Level 2: lower secondary
- Level 3: upper secondary
- Level 4: post-secondary (non-tertiary)
- Level 5: first stage of tertiary
- Level 6: second stage of tertiary.

In this publication, we aggregate the levels in three categories, breaking down total employment in each sector into three skill categories:

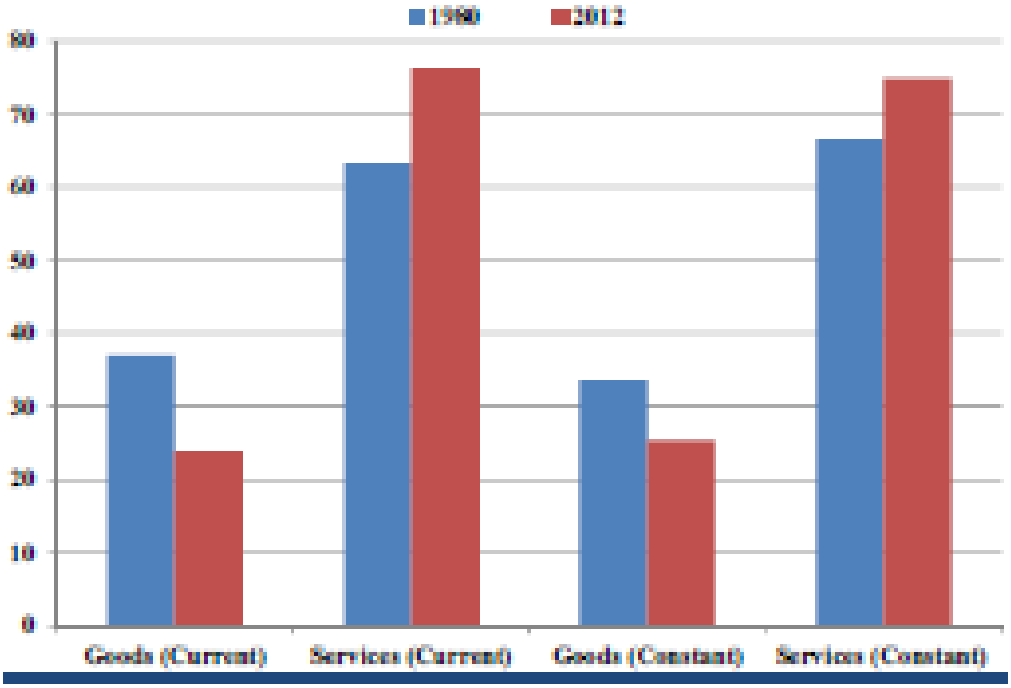
- Low skilled: Levels 0, 1 and 2
- Medium skilled: Levels 3 and 4
- High-skilled: Levels 5 and 6

Figure 3.18. Highly educated workforce in knowledge-intensive sectors



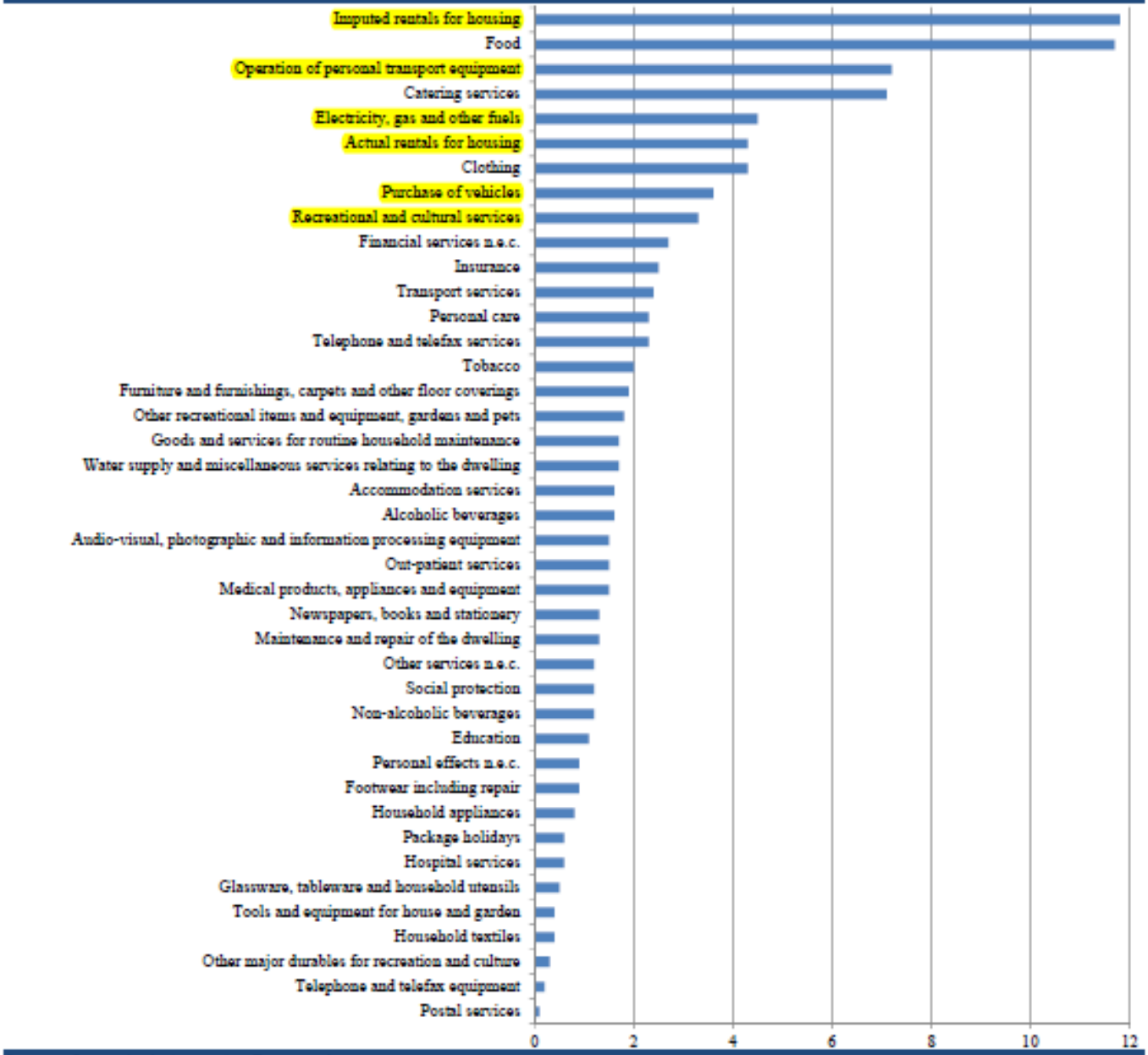
Source: Own calculations using Eurostat's labour force survey data.
Note: Percentages of total employment in the sectors.

Figure 3.25. Declining proportion of consumption made up by manufacturing products



Source: Own calculations using Eurostat data.

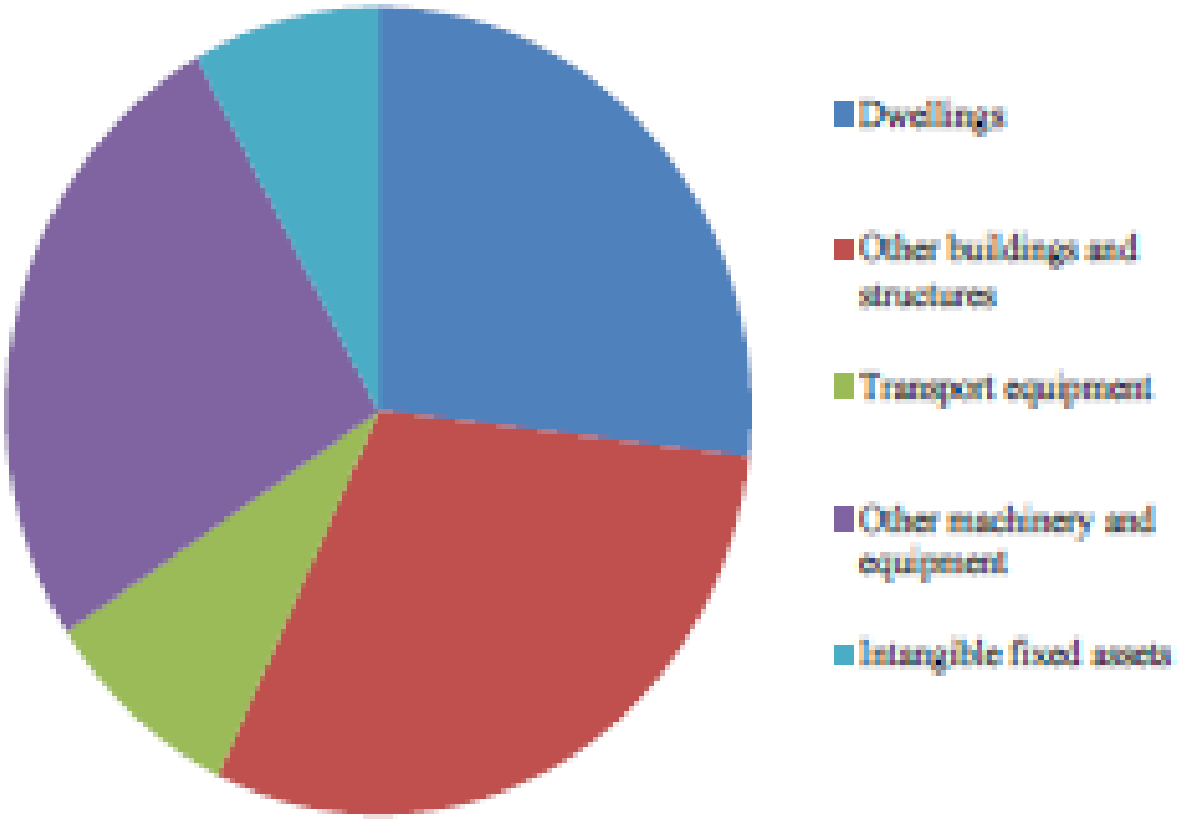
Figure 3.26. Necessity goods account for the lion's share of household consumption expenditure



Source: Own calculations using Eurostat data.

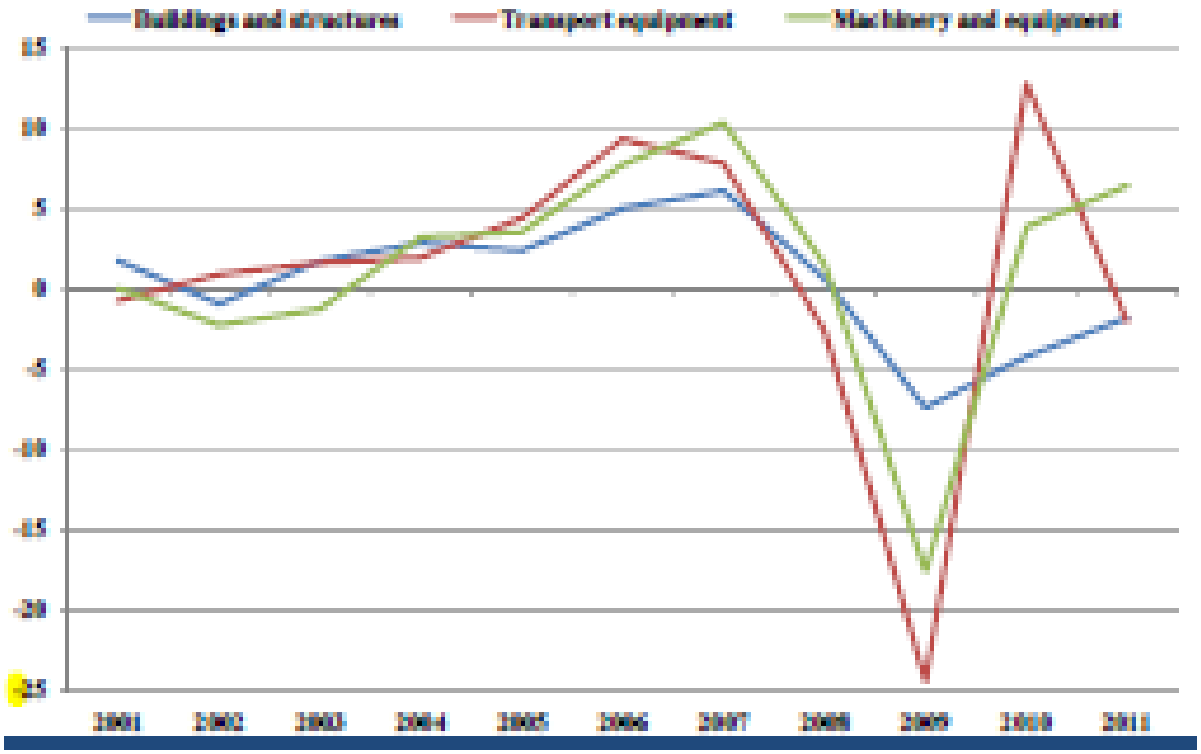
Note: Final consumption expenditure of households is classified according to consumption purpose (COICOP) for different goods and services. Percentage shares of total household consumption in 2012.

Figure 3.28. Investment breakdown (2012)



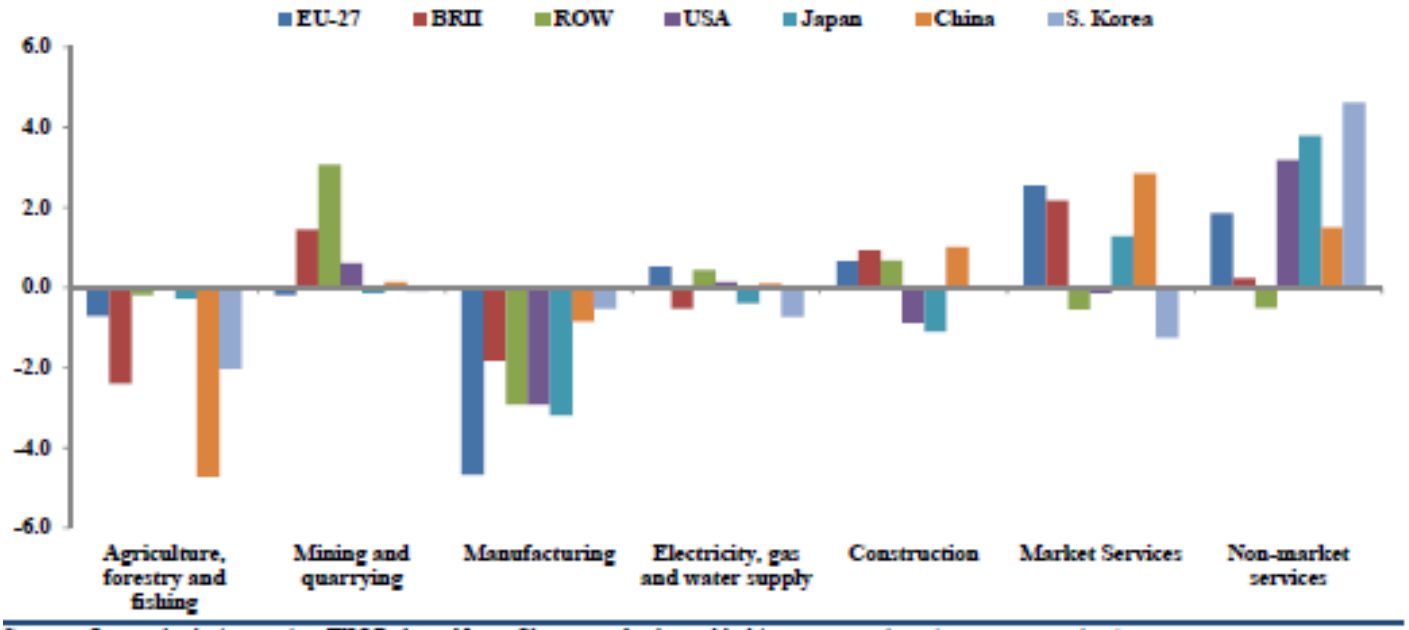
Source: Own calculations using Eurostat data.
Note: Investments in cultivated assets that make up 0.3% of total GFCF are not included.

Figure 3.27. Strong impact of the crisis on EU investments in machinery and transport equipment



Source: Own calculations using Eurostat data.
Note: Annual percentage changes.

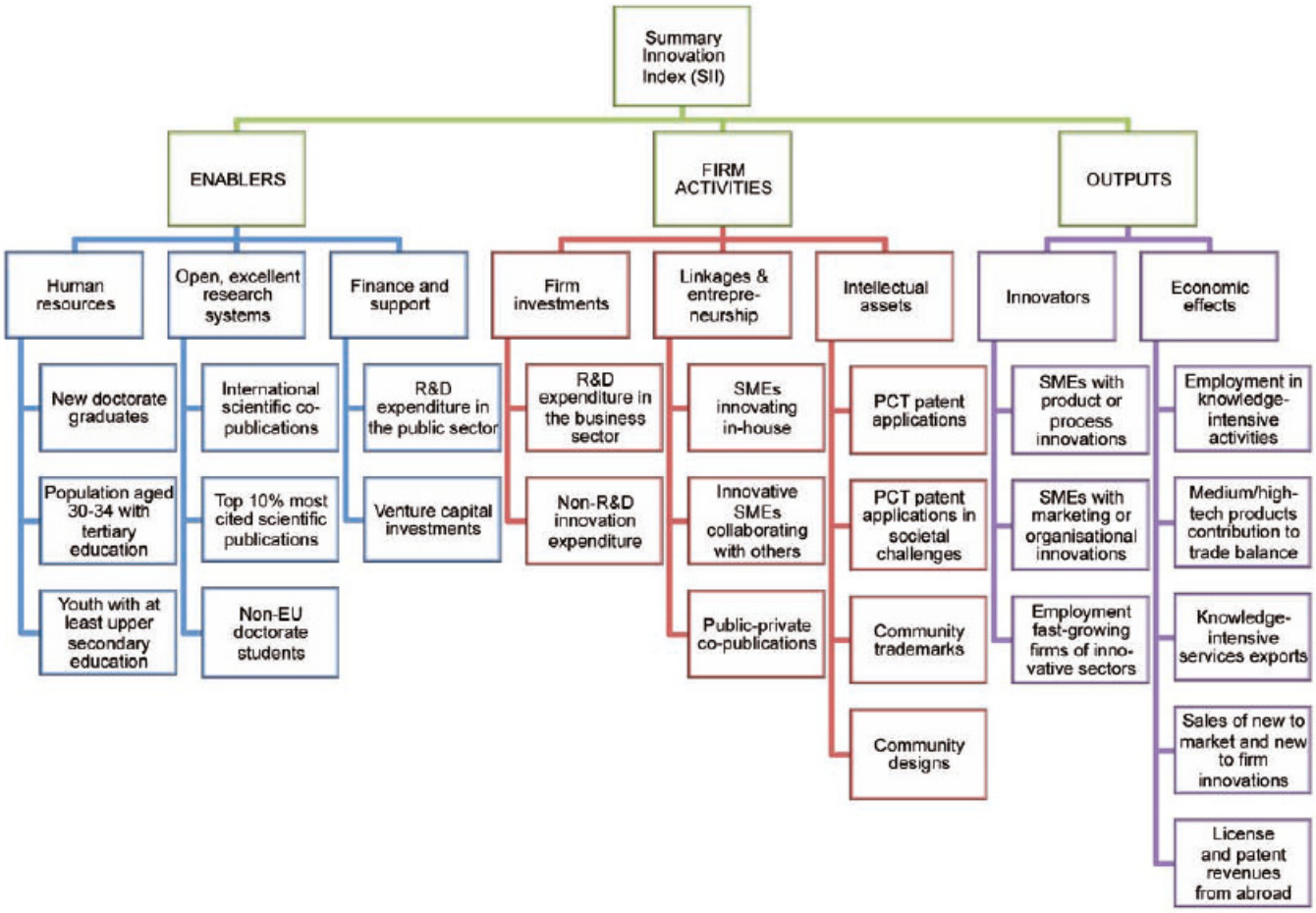
Figure 2.6. Structural changes in the world (2000-2009)



Source: Own calculations using WIOD data. Note: Changes of value added in current prices (percentage points).

http://ec.europa.eu/enterprise/policies/innovation/policy/innovation-scoreboard/index_en.htm

Figure 2: Measurement framework of the Innovation Union Scoreboard



ENABLERS
Human resources
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1.1.2 Population completed tertiary education
1.1.3 Youth with upper secondary level education
Open, excellent and attractive research systems
1.2.1 International scientific co-publications
1.2.2 Scientific publications among top 10% most cited
1.2.3 Non-EU doctorate students
Finance and support
1.3.1 Public R&D expenditure
1.3.2 Venture capital
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2.1.2 Non-R&D innovation expenditure
Linkages & entrepreneurship
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2.2.3 Public-private co-publications
Intellectual Assets
2.3.1 PCT patent applications
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3.1.2 SMEs introducing marketing/organisational innovations
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3.2.1 Employment in knowledge-intensive activities
3.2.2 Contribution of MHT product exports to trade balance
3.2.3 Knowledge-intensive services exports
3.2.4 Sales of new to market and new to firm innovations
3.2.5 Licence and patent revenues from abroad

Annex C: Definitions of indicators

INDICATOR	DEFINITION NUMERATOR	DEFINITION DENOMINATOR	INTERPRETATION
	Source	Source	
1.1.1 New doctorate graduates (ISCED 6) per 1000 population aged 25-34	Number doctorate graduates (ISCED 6)	Population between 25 and 34 years	The indicator is a measure of the supply of new second-stage tertiary graduates in all fields of training. For most countries ISCED 6 captures PhD graduates only, with the exception of Finland, Portugal and Sweden where also non-PhD degrees leading to an award of an advanced research qualification are included.
	Eurostat	Eurostat	
1.1.2 Percentage population aged 30-34 having completed tertiary education	Number of persons in age class with some form of post-secondary education (ISCED 5 and 6)	Population between 30 and 34 years	This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. International comparisons of educational levels however are difficult due to large discrepancies in educational systems, access, and the level of attainment that is required to receive a tertiary degree. The indicator focuses on a narrow share of the population aged 30 to 34 and it will more easily and quickly reflect changes in educational policies leading to more tertiary graduates.
	Eurostat	Eurostat	
1.1.3 Percentage youth aged 20-24 having attained at least upper secondary education	Number of young people aged 20-24 years having attained at least upper secondary education attainment level, i.e. with an education level ISCED 3a, 3b or 3c long minimum	Population between 20 and 24 years	The indicator measures the qualification level of the population aged 20-24 years in terms of formal educational degrees. It provides a measure for the "supply" of human capital of that age group and for the output of education systems in terms of graduates. Completed upper secondary education is generally considered to be the minimum level required for successful participation in a knowledge-based society and is positively linked with economic growth.
	Eurostat	Eurostat	
1.2.1 International scientific co-publications per million population	Number of scientific publications with at least one co-author based abroad (where abroad is non-EU for the EU27)	Total population	International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity.
	Science-Metrix (Scopus)	Eurostat	
1.2.2 Scientific publications among the top-10% most cited publications worldwide as % of total scientific publications of the country	Number of scientific publications among the top-10% most cited publications worldwide	Total number of scientific publications	The indicator is a proxy for the efficiency of the research system as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English speaking countries given the coverage of Scopus' publication data. Countries like France and Germany, where researchers publish relatively more in their own language, are more likely to underperform on this indicator as compared to their real academic excellence.
	Science-Metrix (Scopus)	Science-Metrix (Scopus)	
1.2.3 Non-EU doctorate students as a % of all doctorate holders	For EU Member States: number of doctorate students from non-EU countries (for non-EU countries: number of non-national doctorate students)	Total number of doctorate students	The share of non-EU doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will add to creating a net brain gain and will secure a continuous supply of researchers.
	Eurostat	Eurostat	

INDICATOR	DEFINITION NUMERATOR	DEFINITION DENOMINATOR	INTERPRETATION
	Source	Source	
1.3.1 R&D expenditure in the public sector (% of GDP)	All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD)	Gross Domestic Product	R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth.
	Eurostat	Eurostat	
1.3.2 Venture capital (% of GDP)	Venture capital investment is defined as private equity being raised for investment in companies. Management buyouts, management buyins, and venture purchase of quoted shares are excluded. Venture capital includes early stage (seed + start-up) and expansion and replacement capital	Gross Domestic Product	The amount of venture capital is a proxy for the relative dynamism of new business creation. In particular for enterprises using or developing new (risky) technologies venture capital is often the only available means of financing their (expanding) business.
	Eurostat	Eurostat	Comment: Two-year averages have been used
2.1.1 R&D expenditure in the business sector (% of GDP)	All R&D expenditures in the business sector (BERD)	Gross Domestic Product	The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sector (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories.
	Eurostat	Eurostat	
2.1.2 Non-R&D innovation expenditures (% of turnover)	Sum of total innovation expenditure for enterprises, in thousand Euros and current prices excluding intramural and extramural R&D expenditures	Total turnover for all enterprises	This indicator measures non-R&D innovation expenditure as percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas.
	Eurostat (CIS)	Eurostat (CIS)	
2.2.1 SMEs innovating in-house (% of SMEs) [13]	Sum of SMEs with in-house innovation activities. Innovative firms are defined as those firms which have introduced new products or processes either 1) in-house or 2) in combination with other firms	Total number of SMEs	This indicator measures the degree to which SMEs, that have introduced any new or significantly improved products or production processes, have innovated in-house. The indicator is limited to SMEs because almost all large firms innovate and because countries with an industrial structure weighted towards larger firms tend to do better.
	Eurostat (CIS)	Eurostat (CIS)	
2.2.2 Innovative SMEs collaborating with others (% of SMEs)	Sum of SMEs with innovation co-operation activities, i.e. those firms that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period	Total number of SMEs	This indicator measures the degree to which SMEs are involved in innovation co-operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge, or to collaborate on the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms and between firms and other firms. The indicator is limited to SMEs because almost all large firms are involved in innovation co-operation.
	Eurostat (CIS)	Eurostat (CIS)	

INDICATOR	DEFINITION NUMERATOR	DEFINITION DENOMINATOR	INTERPRETATION
	Source	Source	
2.2.3 Public-private co-publications per million population	Number of public-private co-authored research publications. The definition of the 'private sector' excludes the private medical and health sector. Publications are assigned to the country/countries in which the business companies or other private sector organisations are located	Total population	This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications.
	CWTS (Thomson Reuters)	Eurostat	
2.3.1 PCT patent applications per billion GDP (in PPS€)	Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO). Patent counts are based on the priority date, the inventor's country of residence and fractional counts	Gross Domestic Product in Purchasing Power Standards	The capacity of firms to develop new products will determine their competitive advantage. One indicator of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications.
	OECD	Eurostat	
2.3.2 PCT patent applications in societal challenges per billion GDP (in PPS€)	Number of PCT patent applications in Environment-related technologies and Health. Patents in Environment-related technologies include those in General Environmental Management (air, water, waste), Energy generation from renewable and non-fossil sources, Combustion technologies with mitigation potential (e.g. using fossil fuels, biomass, waste, etc.), Technologies specific to climate change mitigation, Technologies with potential or indirect contribution to emissions mitigation, Emissions abatement and fuel efficiency in transportation and Energy efficiency in buildings and lighting. Patents in health-related technologies include those in Medical technology (IPC codes (8th edition) A61[B, C, D, F, G, H, J, L, M, N], H05G) and Pharmaceuticals (IPC codes A61K excluding A61K8)	Gross Domestic Product in Purchasing Power Standards	This indicator measures PCT applications in health technology and environment-related technologies and is relevant as increased numbers of patent applications in health technology and environment-related technologies will be necessary to meet the societal needs of an ageing European society and sustainable growth.
	OECD	Eurostat	
2.3.3 Community trademarks per billion GDP (in PPS€)	Number of new community trademarks applications	Gross Domestic Product in Purchasing Power Standards	Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and is a form of communication, a basis for publicity and advertising.
	Office for Harmonization in the Internal Market	Eurostat	Comment: two-year averages have been used

INDICATOR	DEFINITION NUMERATOR	DEFINITION DENOMINATOR	INTERPRETATION
	Source	Source	
2.3.4 Community designs per billion GDP (in PPS€)	Number of new community designs applications	Gross Domestic Product in Purchasing Power Standards	A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programs. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States.
	Office for Harmonization in the Internal Market	Eurostat	Comment: two-year averages have been used
3.1.1 SMEs introducing product or process innovations (% of SMEs)	Number of SMEs who introduced a new product or a new process to one of their markets	Total number of SMEs	Technological innovation, as measured by the introduction of new products (goods or services) and processes, is a key ingredient to innovation in manufacturing activities. Higher shares of technological innovators should reflect a higher level of innovation activities.
	Eurostat (CIS)	Eurostat (CIS)	
3.1.2 SMEs introducing marketing or organisational innovations (% of SMEs)	Number of SMEs who introduced a new marketing innovation or organisational innovation to one of their markets	Total number of SMEs	The Community Innovation Survey mainly asks firms about their technological innovation. Many firms, in particular in the services sectors, innovate through other non-technological forms of innovation. Examples of these are marketing and organisational innovations. This indicator tries to capture the extent that SMEs innovate through non-technological innovation.
	Eurostat (CIS)	Eurostat (CIS)	
3.1.3 Employment in fast-growing enterprises in innovative sectors (% of total employment)	The sum of sectoral results for the employment in fast-growing enterprises by economic sector multiplied by the innovation coefficients of these sectors. Fast-growing enterprises are defined as firms with average annualised growth in employees of more than 10 % a year, over a three-year period, and with 10 or more employees at the beginning of the observation period.	Total employment in fast-growing enterprises in the business economy (without financial sector)	The indicator shows the degree of innovativeness of successful entrepreneurial activities. It captures the capacity of a country to transform its economy rapidly to take advantage of emerging demand.
	Eurostat	Eurostat	
3.2.1 Employment in knowledge-intensive activities (% of total employment)	Number of employed persons in knowledge-intensive activities in business industries. Knowledge-intensive activities are defined, based on EU Labour Force Survey data, as all NACE Rev.2 industries at 2-digit level where at least 33% of employment has a higher education degree (ISCED5 or ISCED6)	Total employment	Knowledge-intensive activities provide services directly to consumers, such as telecommunications, and provide inputs to the innovative activities of other firms in all sectors of the economy.
	Eurostat	Eurostat	

INDICATOR	DEFINITION NUMERATOR	DEFINITION DENOMINATOR	INTERPRETATION
	Source	Source	
3.2.2 Contribution of medium and high-tech products exports to the trade balance	The contribution to the trade balance is calculated as follows: (XMHT-MMHT) - (X-M)*[(XMHT+MMHT) / (X+M)], where (XMHT-MMHT) is the observed trade balance for medium and high-tech products and (X-M)*[(XMHT +MMHT) / (X+M)] is the theoretical trade balance (where X denotes exports and M denotes imports of resp. MHT products and all products). MHT exports include exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891	Value of total exports	The manufacturing trade balance reveals an economy's structural strengths and weaknesses in terms of technological intensity. It indicates whether an industry performs relatively better (or worse) than total manufacturing and can be interpreted as an indicator of revealed comparative advantage that is based on countries' trade specialisation. A positive value indicates a structural surplus, while a negative value indicates a structural deficit. The indicator is expressed as a percentage of total trade in order to eliminate business cycle variations.
	UN Comtrade	UN Comtrade	
3.2.3 Knowledge-intensive services exports as % of total services exports	Exports of knowledge-intensive services are measured by the sum of credits in EBOPS (Extended Balance of Payments Services Classification) 207, 208, 211, 212, 218, 228, 229, 245, 253, 260, 263, 272, 274, 278, 279, 280 and 284	Total services exports as measured by credits in EBOPS 200	The indicator measures the competitiveness of the knowledge-intensive services sector. Knowledge-intensive services are defined as NACE classes 61-62 and 64-72. These can be related to the above-mentioned EBOPS classes using the correspondence table between NACE, ISIC and EBOPS as provided in the UN Manual on Statistics of International Trade in Services (UN, 2002).
	Eurostat	Eurostat	
3.2.4 Sales of new-to-market and new-to-firm innovations as % of turnover	Sum of total turnover of new or significantly improved products, either new to the firm or new to the market, for all enterprises	Total turnover for all enterprises	This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the firm and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new to market products) and the diffusion of these technologies (new to firm products).
	Eurostat (CIS)	Eurostat (CIS)	
3.2.5 License and patent revenues from abroad as % of GDP	Export part of the international transactions in royalties and license fees	Gross Domestic Product	Trade in technology comprises four main categories: Transfer of techniques (through patents and licences, disclosure of know-how); Transfer (sale, licensing, franchising) of designs, trademarks and patterns; Services with a technical content, including technical and engineering studies, as well as technical assistance; and Industrial R&D. TBP receipts capture disembodied technology exports.
	Eurostat	Eurostat	

	EU	DE	FR	ES	UK	IT
ENABLERS						
Human resources						
1.1.1 New doctorate graduates	1,7	2,8	1,6	1,2	2,4	1,5
1.1.2 Population completed tertiary education	35,8	31,9	43,6	40,1	47,1	21,7
1.1.3 Youth with upper secondary level education	80,2	76,2	84,4	62,8	81,8	77,6
Open, excellent and attractive research systems						
1.2.1 International scientific co-publications	343,2	745,7	706,9	631,2	1021,3	532,4
1.2.2 Scientific publications among top 10% most cited	11,0	11,6	10,4	10,4	13,4	10,4
1.2.3 Non-EU doctorate students	24,2	11,2	31,5	18,0	30,6	8,4
Finance and support						
1.3.1 Public R&D expenditure	0,75	0,96	0,78	0,61	0,60	0,53
1.3.2 Venture capital	0,277	0,223	0,307	0,192	0,419	0,138
FIRM ACTIVITIES						
Firm investments						
2.1.1 Business R&D expenditure	1,31	1,95	1,45	0,68	1,14	0,69
2.1.2 Non-R&D innovation expenditure	0,56	0,88	0,25	0,39		0,59
Linkages & entrepreneurship						
2.2.1 SMEs innovating in-house	31,8	45,2	29,9	22,1		34,8
2.2.2 Innovative SMEs collaborating with others	11,7	14,0	11,1	5,8	22,3	4,4
2.2.3 Public-private co-publications	7,3	8,7	7,0	5,4	8,9	5,8
Intellectual Assets						
2.3.1 PCT patent applications	1,98	2,74	2,05	1,28	1,81	1,45
2.3.2 PCT patent applications in societal challenges	0,92	1,22	0,90	0,68	0,90	0,69
2.3.3 Community trademarks	5,91	7,90	4,13	7,14	5,59	5,29
2.3.4 Community designs	4,75	7,42	3,70	3,49	2,95	6,23

	EU	DE	FR	ES	UK	IT
OUTPUTS						
Innovators						
3.1.1 SMEs introducing product or process innovations	38,4	57,0	32,7	28,1	21,3	39,8
3.1.2 SMEs introducing marketing/organisational innovations	40,3	60,5	42,8	27,7	30,6	43,0
3.1.3 Employment fast-growing firms of innovative sectors	16,2	18,3	18,2	15,5	15,8	14,4
Economic effects						
3.2.1 Employment in knowledge-intensive activities	13,9	15,8	14,3	11,9	17,8	13,2
3.2.2 Contribution of MHT product exports to trade balance	1,27	9,24	5,23	3,31	4,25	4,82
3.2.3 Knowledge-intensive services exports	45,3	55,6	33,7	21,6	61,2	27,5
3.2.4 Sales of new to market and new to firm innovations	14,4	15,5	14,7	19,0	7,3	14,9
3.2.5 Licence and patent revenues from abroad	0,77	0,64	0,70	0,31	0,68	0,45

Annex D: Country abbreviations

AT	Austria	IT	Italy
AU	Australia	JP	Japan
BE	Belgium	KR	South Korea
BG	Bulgaria	LT	Lithuania
BR	Brazil	LU	Luxembourg
CA	Canada	LV	Latvia
CH	Switzerland	MK	Former Yugoslav Republic of Macedonia
CN	China	MT	Malta
CY	Cyprus	NL	Netherlands
CZ	Czech Republic	NO	Norway
DE	Germany	PL	Poland
DK	Denmark	PT	Portugal
EL	Greece	RO	Romania
EE	Estonia	RS	Serbia
ES	Spain	RU	Russia
FI	Finland	SA	South Africa
FR	France	SE	Sweden
HR	Croatia	SI	Slovenia
HU	Hungary	SK	Slovakia
IE	Ireland	TR	Turkey
IN	India	UK	United Kingdom
IS	Iceland	US	United States

Figure 13: Innovation leaders

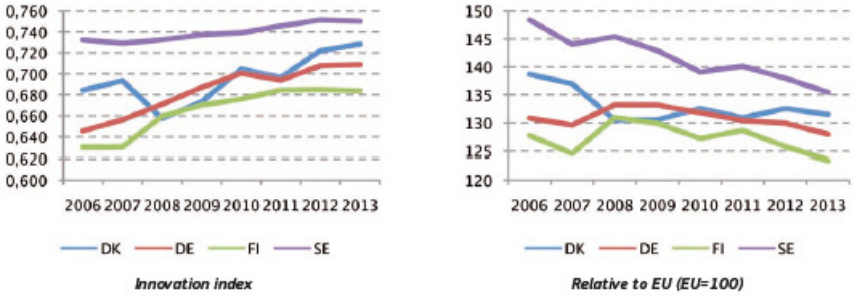


Figure 14: Innovation followers

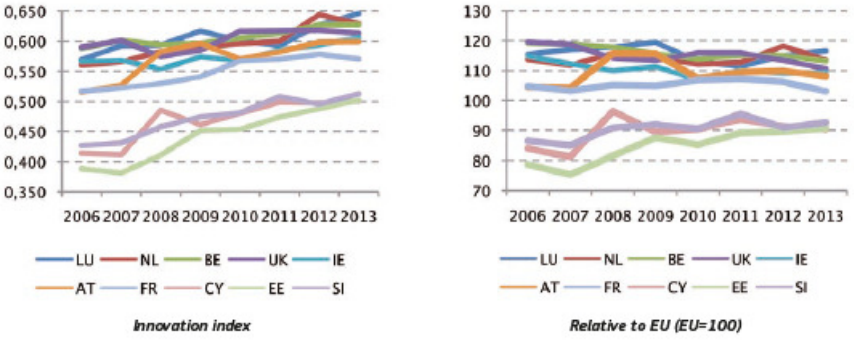


Figure 15: Moderate innovators

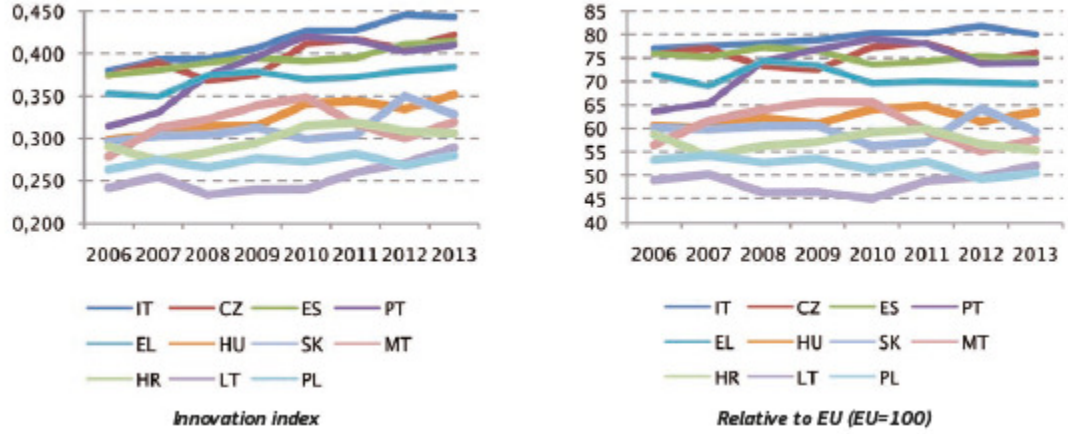
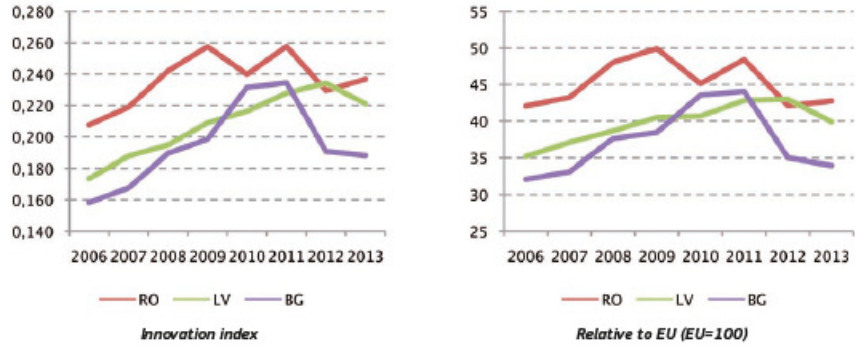


Figure 16: Modest innovators



http://ec.europa.eu/enterprise/policies/innovation/files/ius-2011_en.pdf

Innovation **Union** Scoreboard 2011

Research and Innovation Union scoreboard

Riccardo Cappellin, Course: Innovation and Cognitive Economics, Università di Roma "Tor Vergata".

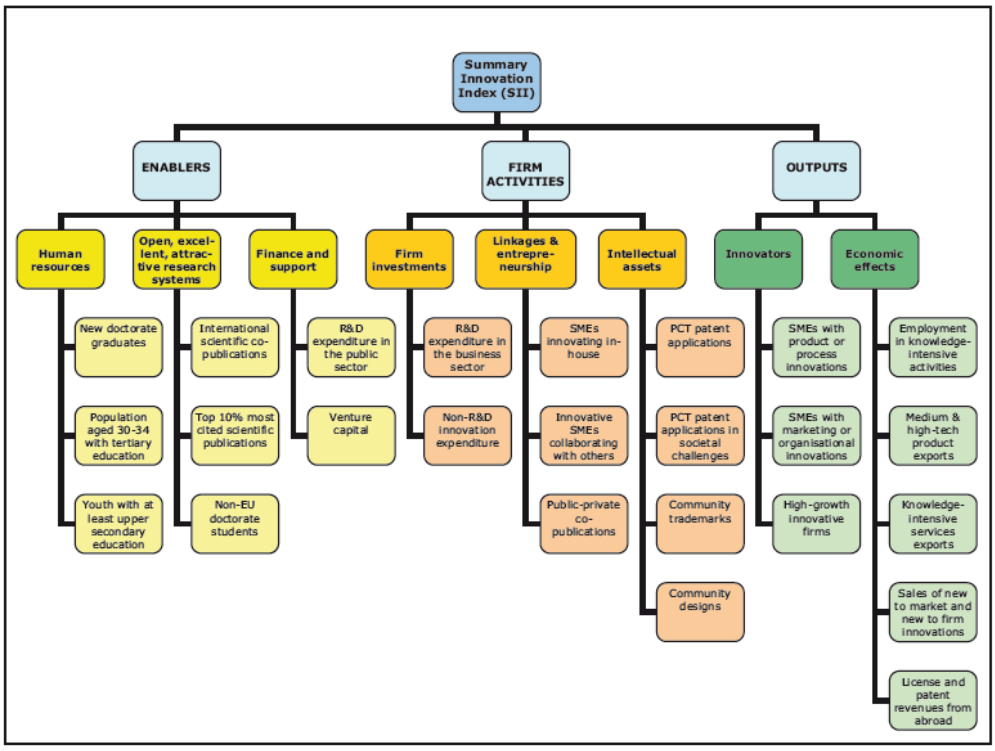
1. Executive summary

This is the second edition of the Innovation Union Scoreboard (IUS). Based on the previous European Innovation Scoreboard (EIS), the tool is meant to help monitor the implementation of the Europe 2020 Innovation Union[1] flagship by providing a comparative assessment of the innovation performance of the EU27 Member States and the relative strengths and weaknesses of their research and innovation systems.

The IUS includes innovation indicators and trend analyses for the EU27 Member States, as well as for Croatia, Iceland, the Former Yugoslav Republic of Macedonia, Norway, Serbia, Switzerland and Turkey. It also includes comparisons based on a more reduced set of indicators between the EU27 and 10 global competitors.

The IUS 2011 distinguishes between 3 main types of indicators and 8 innovation dimensions, capturing in total 25 different indicators (cf. Figure 1).

FIGURE 1: FRAMEWORK OF THE INNOVATION UNION SCOREBOARD



The **Enablers** capture the main drivers of innovation performance external to the firm and cover 3 innovation dimensions: 'Human resources', 'Open, excellent and attractive research systems' as well as 'Finance and support'. **Firm activities** capture the innovation efforts at the level of the firm, grouped in 3 innovation dimensions: 'Firm investments', 'Linkages & entrepreneurship' and 'Intellectual assets'. **Outputs** cover the effects of firms' innovation activities in 2 innovation dimensions: 'Innovators' and 'Economic effects'.

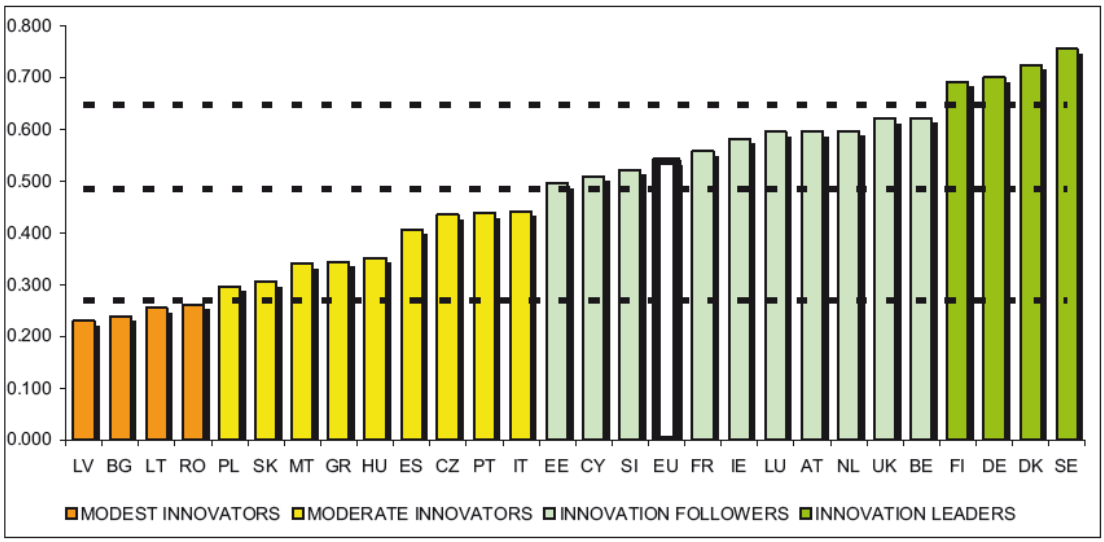
The 25 indicators better capture the performance of national research and innovation systems considered as a whole[2]. While some of the indicators of the IUS (such as public R&D expenditure) can be more easily influenced by policy intervention than others (such as SMEs innovating in-house), the overall ambition of the Innovation Union Scoreboard is to inform policy discussions at national and EU level, by tracking progress in innovation performance within and outside the EU over time.

The IUS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to improve comparability

[1] *See http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf*
[2] *See Annex C for the definition of indicators*

between countries. The IUS 2011 may not fully capture the impact of the economic and financial crisis on innovation performance as there is a delay in data availability where data refer to 2009 or 2010 for 14 indicators and to 2007 or 2008 for 10 indicators. The current composite indicator consists of 24 individual indicators since the last indicator on "High-growth innovative enterprises as a percentage of all enterprises" is being developed.

FIGURE 2: EU MEMBER STATES' INNOVATION PERFORMANCE



Note: Average performance is measured using a composite indicator building on data for 24 indicators going from a lowest possible performance of 0 to a maximum possible performance of 1. Average performance in 2011 reflects performance in 2009/2010 due to a lag in data availability.

Performance groups

Based on their average innovation performance, the Member States fall into **four performance groups** (see section 3.1):

- The performance of Denmark, Finland, Germany and Sweden is well above that of the EU27 average. These countries are the **'Innovation leaders'.**
- Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Netherlands, Slovenia and the UK all show a performance close to that of the EU27 average. These countries are the **'Innovation followers'.**
- The performance of Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia and Spain is below that of the EU27 average. These countries are **'Moderate innovators'.**
- The performance of Bulgaria, Latvia, Lithuania and Romania is well below that of the EU27 average. These countries are **'Modest innovators'.**

Bulgaria, Estonia, Romania, Portugal and Slovenia are the growth leaders with an average annual growth rate well above 5%. There continues to be **a steady convergence,** where less innovative Member States have – on average – been growing faster than the more innovative Member States. This convergence process however seems to be slowing down (see section 3.2). While the Moderate and Modest innovators clearly catch-up to the higher performance level of both the Innovation leaders and Innovation followers, there is no convergence between the different Member States within the Moderate innovators. Convergence between the Member States does take place within the Innovation leaders, Innovation followers and Modest innovators.

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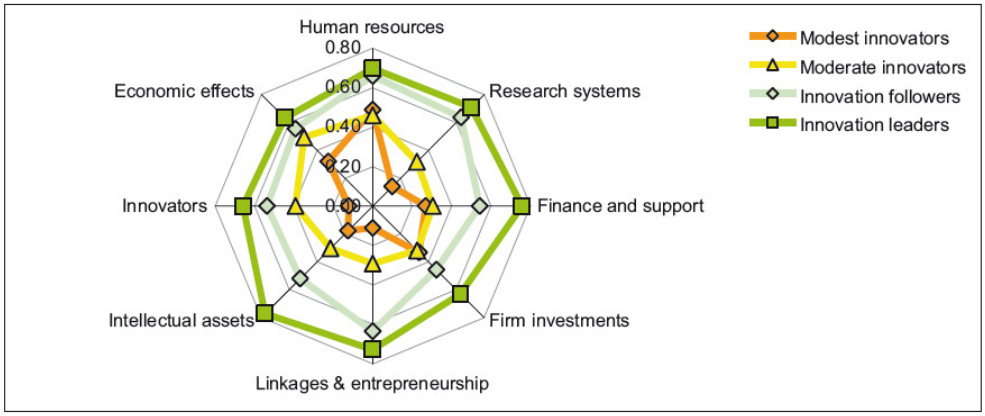
FIGURE 3: COUNTRY GROUPS: INNOVATION PERFORMANCE PER DIMENSION



What do innovation leaders have in common?

Countries at the top of the ranking for the composite innovation indicator share a number of strengths **in their national research and innovation systems with a key role of business activity and public-private collaboration.** While there is not one single way to reach top innovation performance, it is clear that all innovation leaders, Finland, Sweden, Denmark and Germany, perform very well in **Business R&D expenditures. Most of the innovation leaders also perform very well in other innovation indicators related to firm activities** The top EU innovator Sweden dominates in three out of 8 innovation dimensions: Human resources, Finance and support, and Firm investments; while Germany and Denmark perform best in two innovation dimensions each.

All of the innovation leaders have higher than average scores in Public-private co-publications per million populations, which suggests good linkages between the science base and enterprises. All European top innovators also excel in the commercialisation of their technological knowledge, as demonstrated by their good performance on the indicator License and patent revenues from abroad.

The overall good performance of the innovation leaders reflects **a balanced national research and innovation system.** It means that the innovation leaders as well as the innovation followers have the smallest variance in their performance across all the 8 innovation dimensions.

While each country has its own specificities, policy responses should attempt not only to address relative weaknesses in national research and innovation systems, but also to have more balanced performances across all categories of indicators.

It is evident that the moderate and modest innovators are characterised by an unbalanced research and innovation systems. This is particularly clear in the 'Innovators' dimension with very low shares of SMEs introducing product or process innovations as well as SMEs introducing marketing and organisation innovations. At the same time, the growth rates of most of the modest and moderate innovators are the highest among the EU27 which indicates a convergence process with Bulgaria as a EU catching-up leader, followed by Romania and Estonia.

International comparison

A comparison with other European countries not belonging to the European Union shows that Switzerland is the overall Innovation leader continuously outperforming all EU27 countries. Iceland is part of the Innovation followers, Croatia, Norway and Serbia of the Moderate innovators and the Former Yugoslav Republic of Macedonia and Turkey of the Modest innovators. For Croatia, Serbia and Turkey growth has been well above the EU27 average.

Comparing the EU27 with a selected group of major global competitors shows that the US, Japan and South Korea have a performance lead over

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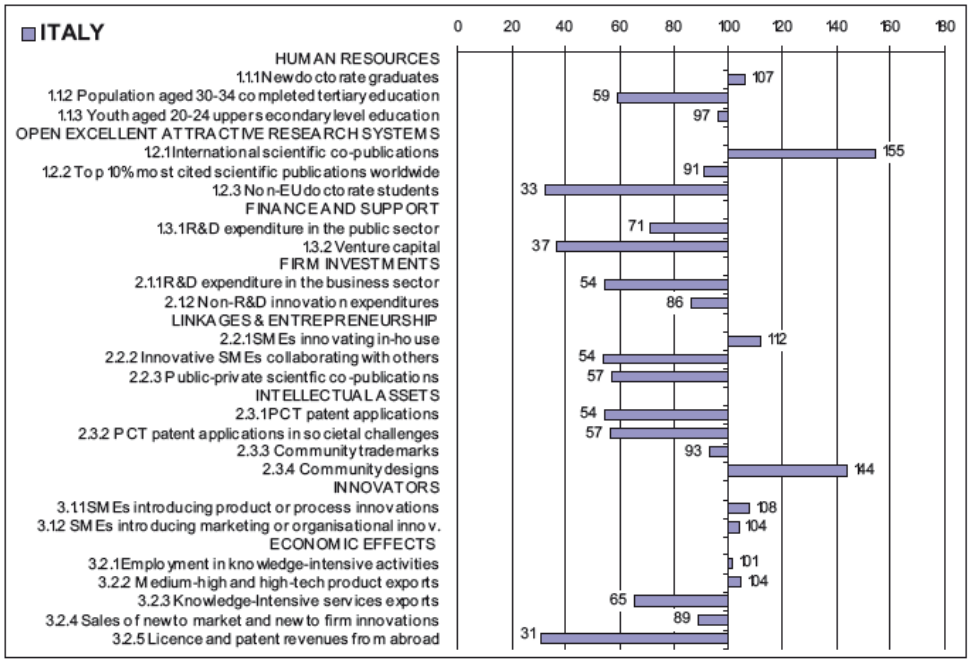
the EU27. This lead has been increasing for South Korea, has remained stable for the US and has been decreasing for Japan. The global innovation leaders US and Japan are particularly dominating the EU27 in indicators capturing business activity and public-private cooperation: 'R&D expenditure in the business sector', 'Public-private co-publications', 'License and patent revenues from abroad' and 'PCT patent applications'. South Korea which is increasingly outperforming the EU27 is again having its biggest lead in R&D expenditures in the business sector.

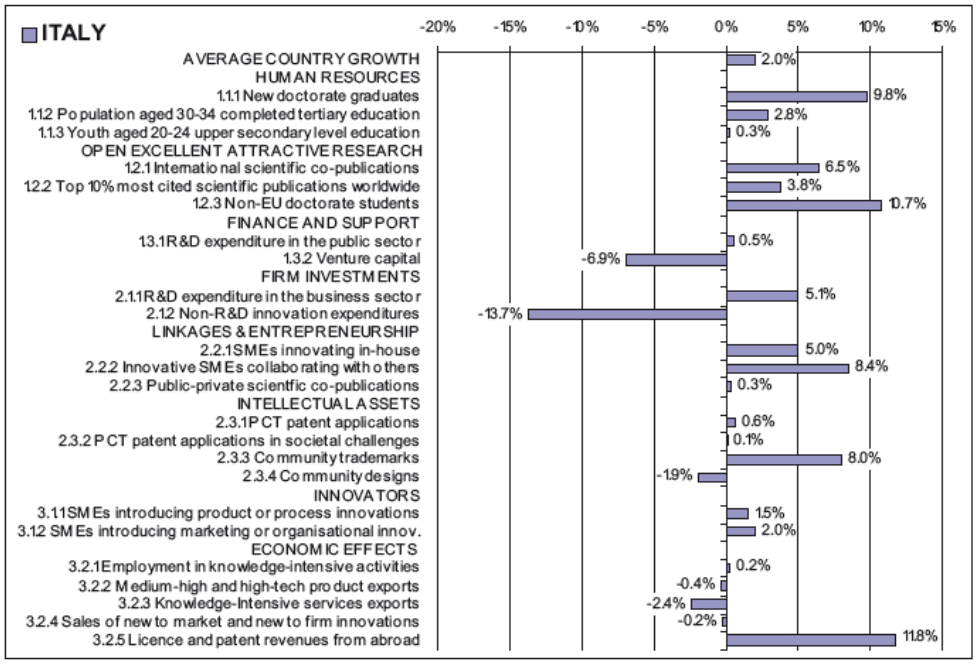
The EU27 has a performance lead over Australia, Canada and all BRICS countries (Brazil, Russia, India, China and South Africa). This lead has been increasing compared to Canada, Russia and South Africa, has remained stable to Australia and has been decreasing to Brazil and in particular to China and India. China has been closing the innovation gap to Europe continuously in the last few years.

Italy is one of the moderate innovators with a below average performance.
Relative strengths are in Intellectual assets and Innovators. Relative weaknesses are in Firm investments and Linkages & entrepreneurship.



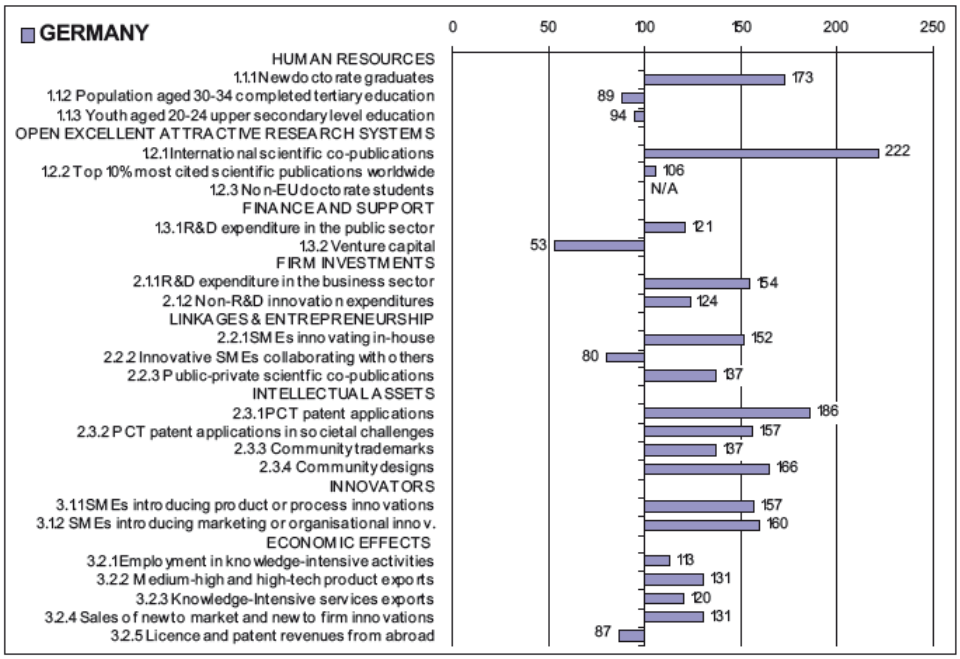
Indicator values relative to the EU27 (EU27=100).

High growth is observed for New doctorate graduates, Non-EU doctoral students and License and patent revenues from abroad. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Human resources, Open, excellent and attractive research systems and Linkages & entrepreneurship is well above average.



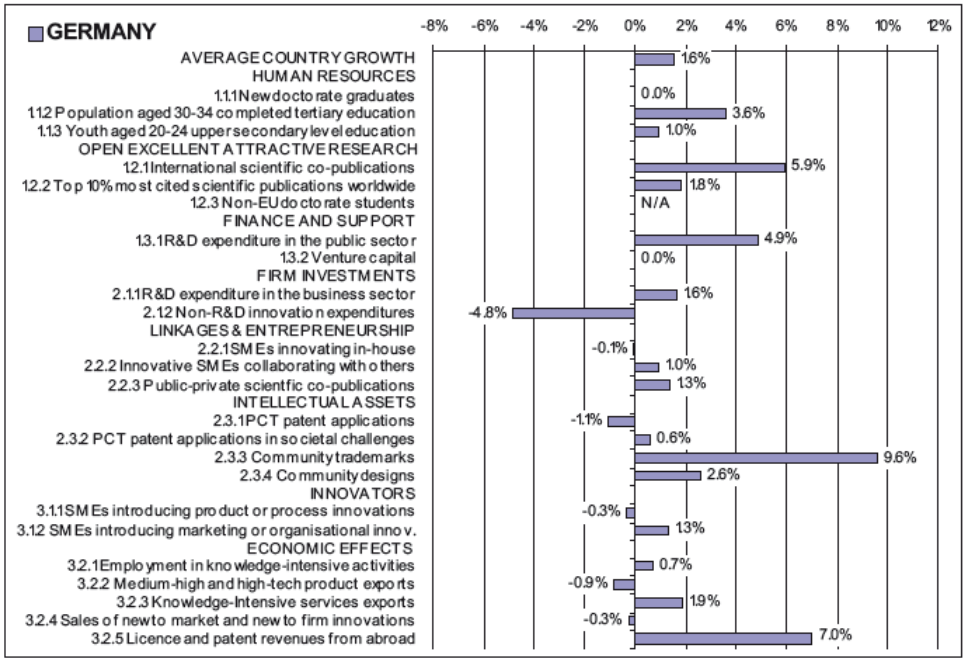
Annual average growth per indicator and average country growth

Germany is one of the innovation leaders with an above average performance.
Relative strengths are in Intellectual assets and Innovators. Relative weaknesses are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship.



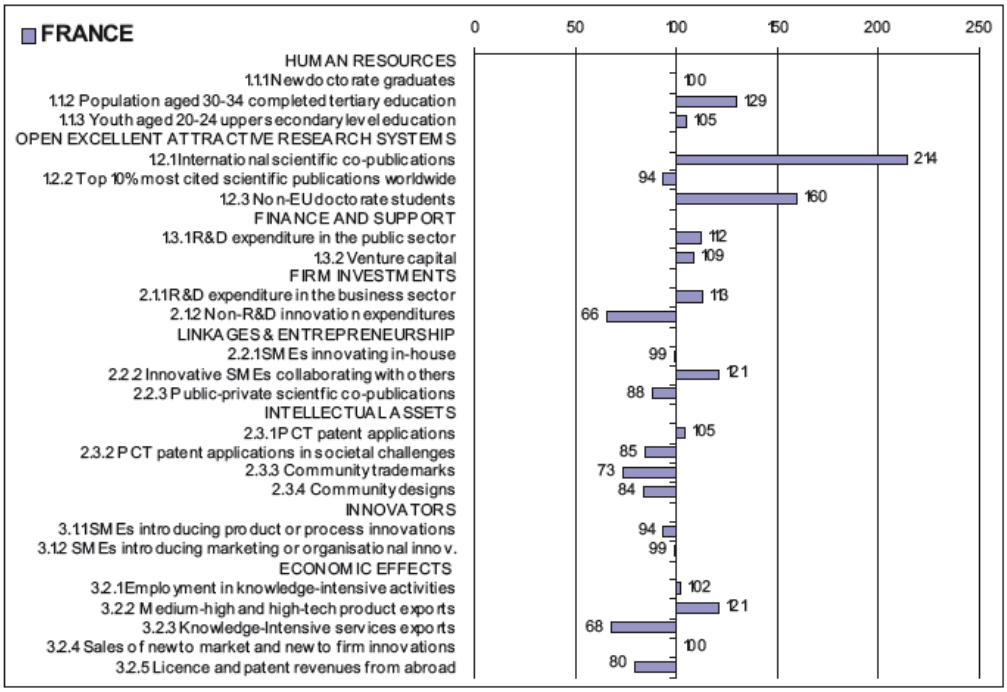
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Community trademarks, License and patent revenues from abroad and International scientific co-publications. A strong decline is observed for Non-R&D innovation expenditure. Growth performance in Open, excellent and attractive research systems and Intellectual assets is well above average.



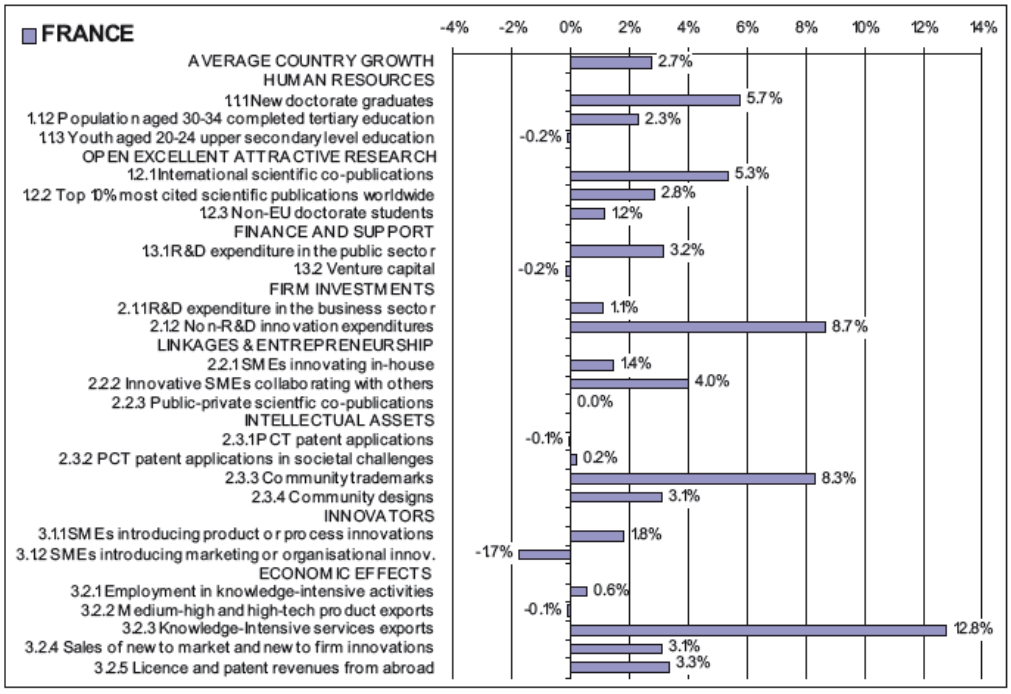
Annual average growth per indicator and average country growth

France is one of the innovation followers with an above average performance.
Relative strengths are in Human resources, Open, excellent and attractive research systems and Finance and support. Relative weaknesses are in Firm investments, Intellectual assets and Innovators.



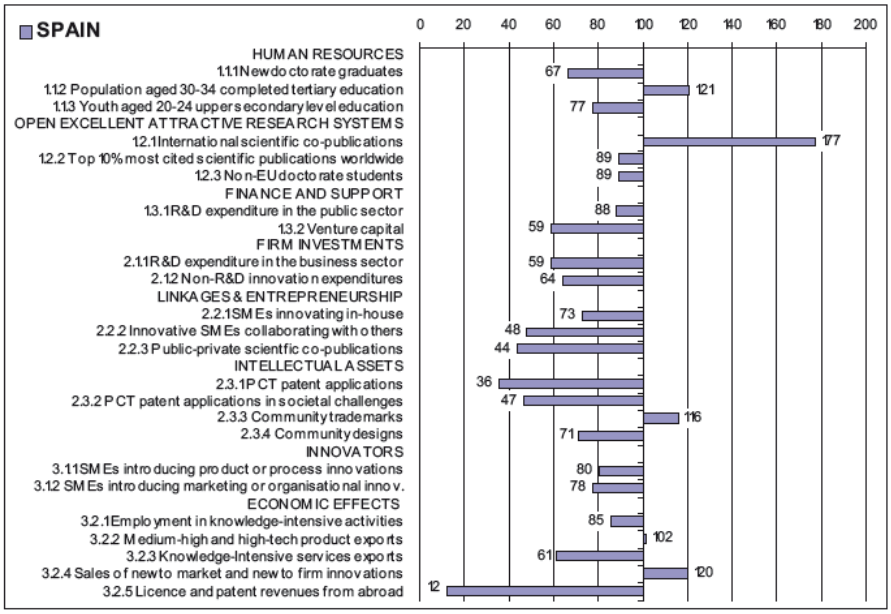
Indicator values relative to the EU27 (EU27=100).

High growth is observed for Non-R&D innovation expenditure, Community trademarks and Knowledge-intensive services exports. Growth performance in Firm investments and Economic effects is well above average.



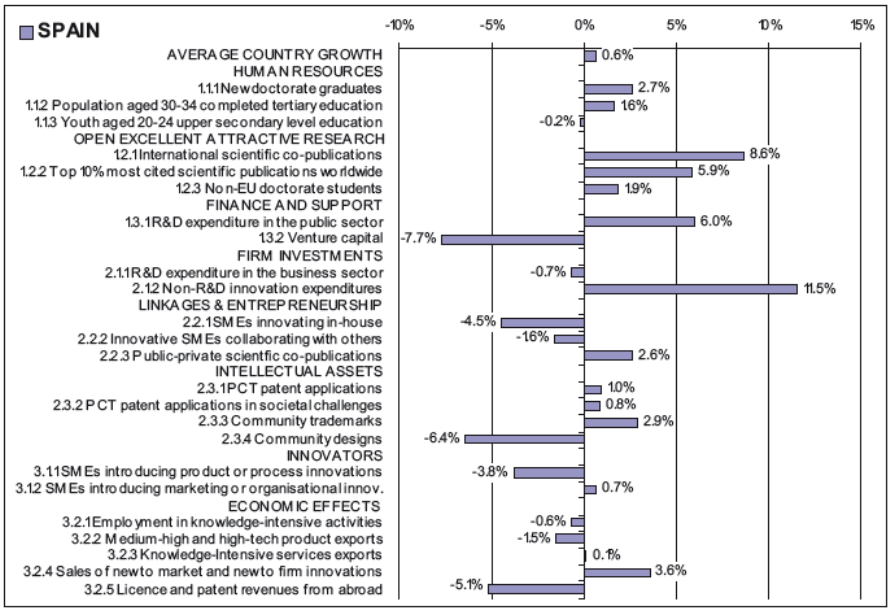
Annual average growth per indicator and average country growth

Spain is one of the moderate innovators with a below average performance.
Relative strengths are in Open, excellent and attractive research systems (in particular international scientific co-publications) Finance and support and Economic effects (except on License and patent revenues from abroad). Relative weaknesses are in Firm investments, Linkages & entrepreneurship and Innovators.



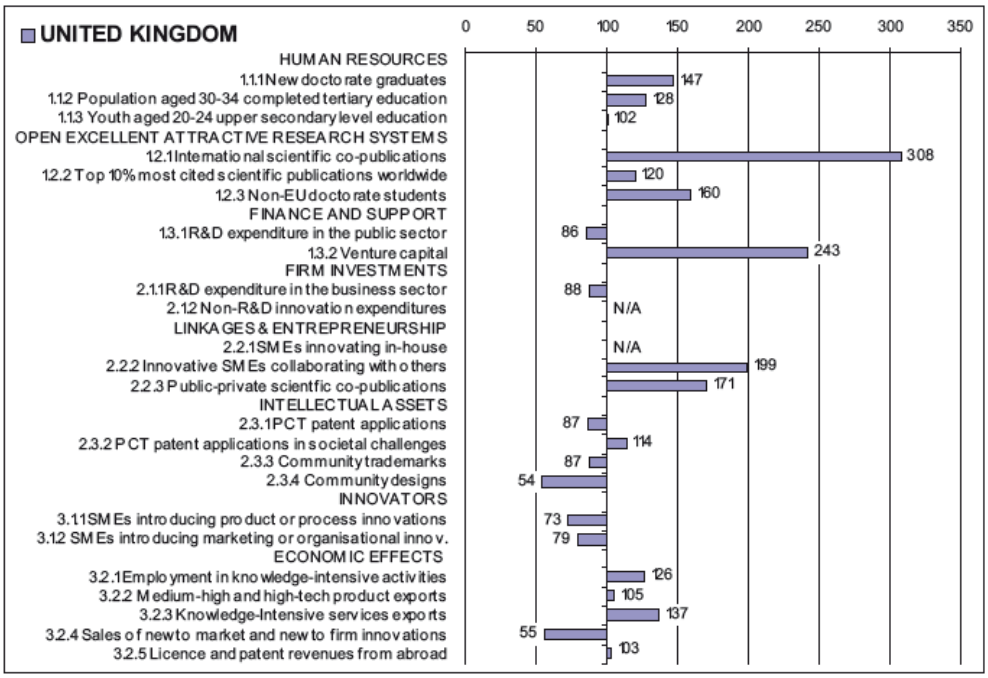
Indicator values relative to the EU27 (EU27=100).

High growth is observed for International scientific co-publications and Non-R&D innovation expenditure. The strongest decline is observed for Venture capital and Community designs. Growth performance in Open, excellent and attractive research systems and Firm investments is well above average.



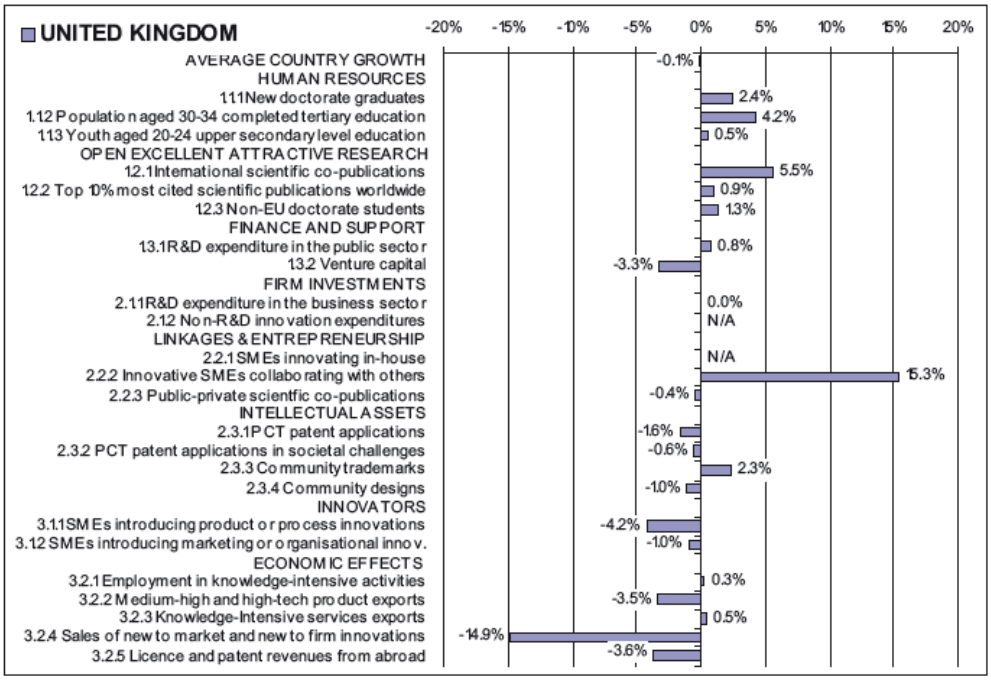
Annual average growth per indicator and average country growth

The **United Kingdom** is one of the innovation followers with an above average performance. Relative strengths are in Human resources, Open, excellent and attractive research systems, Finance and support and Linkages & entrepreneurship. Relative weaknesses are in Firm investments, Intellectual assets and Innovators.



Indicator values relative to the EU27 (EU27=100).

High growth is observed for Innovative SMEs collaborating with others. A strong decline is observed for Sales of new products. Growth performance in Human resources, Open, excellent and attractive research systems, Firm investments and Linkages & entrepreneurship is well above average.



Annual average growth per indicator and average country growth

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Statistical books

The EU in the world

A statistical portrait

Table 1.1: Land and population

	Land area (1 000 km²) (1)	Population (1 000) (2)		Population density (inhabitants/km²) (3)	
		1960	2010	1960	2010
Austria	83.2	7 030	*8 375*	84.5	*100.6*
Belgium	30.3	9 129	*10 827*	301.5	*357.6*
Czech Republic	77.2	9 638	*10 507*	124.8	*136.0*
France	632.8	45 465	*64 714*	83.6	*102.3*
Germany	357.1	72 543	*81 802*	203.1	*229.1*
Greece	130.8	8 300	*11 295*	63.4	*86.3*
Hungary	93.0	9 961	*10 013*	107.1	*107.6*
Italy	295.1	50 026	*60 340*	169.5	*204.5*
Netherlands	33.8	11 417	*16 578*	338.2	*491.1*
Poland	312.7	29 480	*38 167*	94.3	*122.1*
Portugal	92.1	8 826	*10 638*	95.8	*115.5*
Romania	229.9	18 319	*21 462*	79.7	*93.4*
Spain	506.0	30 327	*45 989*	59.9	*90.9*
Sweden	410.3	7 471	*9 341*	18.2	*22.8*
United Kingdom	243.2	52 200	*62 008*	214.7	*255.0*
EU-27	4 303.6	402 607	*501 064*	93.6	*116.4*
Argentina	2 791.8	20 685	*40 666*	7.4	*14.6*
Australia	7 692.0	10 276	*21 512*	1.3	*2.8*
Brazil	8 514.0	72 744	*195 423*	8.5	*23.0*
Canada	9 093.5	17 909	*33 890*	1.8	*3.7*
China	9 597.0	645 927	*1 354 146*	67.3	*141.1*
India	3 287.3	448 314	*1 214 464*	136.4	*369.4*
Indonesia	1 860.4	93 058	*232 517*	48.9	*122.0*
Japan	376.8	93 189	*126 995*	246.6	*336.0*
Rep. of Korea	96.5	25 068	*48 501*	251.8	*487.0*
Mexico	1 959.2	37 910	*110 645*	19.4	*56.5*
Russia	16 377.7	119 906	*140 367*	7.0	*8.6*
Saudi Arabia	2 149.7	4 075	*26 246*	1.9	*12.2*
South Africa	1 219.1	17 396	*50 492*	14.2	*41.4*
Turkey	769.6	28 233	*75 705*	36.0	*97.0*
United States	9 159.0	186 326	*317 641*	19.4	*33.0*
World	:	3 023 358	*6 908 688*	22.0	*51.0*

(1) Spain, Austria, Poland, Portugal, Argentina, China and India: total surface area instead of land area.
(2) For EU-27 Member States, national reported values of population on 1 January; France, excluding overseas departments and territories in 1960.
(3) See footnotes 1 and 2 for details of exceptions.

Source: World Population Prospects: The 2008 Revision | United Nations Population Division; Eurostat (dem_r_d3area and demo_pjan)

Table 1.4: GDP

	GDP at current prices (EUR million)	Share of world GDP (%)		GNI per capita in PPP (world=100)	
	2008	1998	2008	1998	2008 (1)
Austria	283 085	0.7	0.7	412.2	363.8
Belgium	345 006	0.9	0.8	395.0	335.6
Czech Republic	147 879	0.2	0.4	218.5	220.0
France	1 948 511	4.9	4.7	376.5	332.1
Germany	2 495 800	7.3	6.1	382.5	347.0
Greece	239 141	0.5	0.6	268.7	274.9
Hungary	105 536	0.2	0.3	156.2	171.8
Italy	1 567 851	4.1	3.8	375.7	292.1
Netherlands	596 226	1.3	1.4	402.1	402.3
Poland	362 415	0.6	0.9	148.4	167.1
Portugal	171 920	0.4	0.4	238.5	213.2
Romania	139 753	0.1	0.3	84.3	130.3
Spain	1 088 502	2.0	2.6	298.2	300.6
Sweden	334 227	0.8	0.8	381.3	368.6
United Kingdom	1 815 417	4.9	4.4	369.6	348.8
EU-27	12 506 172	30.5	30.4	:	:
Argentina	223 269	1.0	0.5	145.7	135.4
Australia	690 248	1.3	1.7	363.7	328.7
Brazil	1 096 369	2.8	2.7	103.8	97.2
Canada	951 925	2.1	2.3	392.6	349.7
China	2 941 384	3.4	7.1	31.1	58.1
India	827 774	1.4	2.0	21.5	28.6
Indonesia	349 734	0.3	0.8	33.8	37.0
Japan	3 337 824	12.9	8.1	387.5	340.1
Rep. of Korea	631 711	1.2	1.5	213.9	271.5
Mexico	738 341	1.4	1.8	125.6	137.8
Russia	1 093 157	0.9	2.7	95.5	150.9
Saudi Arabia	317 923	0.5	0.8	272.6	230.6
South Africa	188 173	0.4	0.5	98.2	94.4
Turkey	539 998	0.9	1.3	131.0	133.0
United States	9 657 548	29.0	23.4	504.5	453.5
World	41 193 239	100.0	100.0	100.0	100.0

(1) Saudi Arabia, 2007.

Source: World Development Indicators 2009 | The World Bank; Eurostat (nama_gdp_c)

Table 1.5: Economic indicators

	Inflation rate (% change on previous year)			Government surplus/deficit (% of GDP) (1)		Government debt (% of GDP)	
	2007	2008	2009	2004 (2)	2009 (3)	2004 (4)	2009 (5)
Austria	2.2	3.2	0.4	-4.4	-3.4	64.8	66.5
Belgium	1.8	4.5	0.0	-0.3	-6.0	94.2	96.7
Czech Republic	3.0	6.3	0.6	-3.0	-5.9	30.1	35.4
France	1.6	3.2	0.1	-3.6	-7.5	64.9	77.6
Germany	2.3	2.8	0.2	-3.8	-3.3	65.8	73.2
Greece	3.0	4.2	1.3	-7.5	-13.6	98.6	115.1
Hungary	7.9	6.0	4.0	-6.4	-4.0	59.1	78.3
Italy	2.0	3.5	0.8	-3.5	-5.3	103.8	115.8
Netherlands	1.6	2.2	1.0	-1.7	-5.3	52.4	60.9
Poland	2.6	4.2	4.0	-5.4	-7.1	45.7	51.0
Portugal	2.4	2.7	-0.9	-3.4	-9.4	58.3	76.8
Romania	4.9	7.9	5.6	-1.2	-8.3	18.7	23.7
Spain	2.8	4.1	-0.2	-0.3	-11.2	46.2	53.2
Sweden	1.7	3.3	1.9	0.8	-0.5	51.1	42.3
United Kingdom	2.3	3.6	2.2	-3.4	-11.5	40.9	68.1
EU-27 (6)	2.3	3.7	1.0	-2.9	-6.8	-2.9	-6.8
Argentina	8.8	8.6	6.3	-0.5	:	:	:
Australia	2.3	4.4	1.8	0.8	1.5	21.6	19.4
Brazil	3.6	5.7	4.9	0.0	-1.3	12.3	60.9
Canada	2.1	2.4	0.3	1.1	1.6	48.6	:
China	4.8	5.9	-0.7	-2.1	:	:	:
India	6.4	8.4	10.9	-3.3	-1.6	63.3	57.6
Indonesia	6.3	10.1	4.6	-1.1	:	28.8	:
Japan	0.1	1.4	-1.4	:	:	:	:
Rep. of Korea	2.5	4.7	2.8	0.1	4.3	:	:
Mexico	4.0	5.1	5.3	:	:	:	:
Russia	9.0	14.1	11.7	5.3	5.6	16.6	6.4
Saudi Arabia	4.2	9.9	5.1	:	:	:	:
South Africa	7.1	11.5	7.1	-2.0	-0.4	:	:
Turkey	8.8	10.4	6.3	1.9	-1.9	51.5	44.5
United States	2.9	3.8	-0.4	-3.7	-5.5	47.7	55.7
World	3.9	5.9	2.2	-2.4	-0.9	:	:

(1) EU Member States, general government; non-EU countries, central government.
(2) Brazil, 2005; Turkey, 2006.
(3) Non-EU countries, 2008, except Australia, Canada, the Republic of Korea and world total, 2007.
(4) Brazil and Russia, 2005.
(5) Non-EU countries, 2008, except Australia, 2007.
(6) For the inflation rate, data refer to the EICP (European index of consumer prices) which reflects changes in EU membership; there were 25 Member States from May 2004 until December 2006 and 27 Member States from January 2007 onwards (new Member States are integrated into the EICP using a chain index formula).

Source: International Financial Statistics | International Monetary Fund; World Development Indicators 2009 | The World Bank; Eurostat (prc_hicp_aind and gov_dd_edpt1)

Table 2.2.1: Trade in goods
(EUR million)

	Exports			Imports		
	1999	2004	2009	1999	2004	2009
Austria	61 982	95 165	98 650	66 918	96 395	102 795
Belgium	168 091	246 697	265 160	154 635	229 617	252 326
Czech Republic	24 917	55 460	81 213	26 706	56 248	75 267
France	305 429	363 458	341 566	296 255	378 603	396 109
Germany	509 982	731 479	803 899	444 780	575 401	668 104
Greece	10 386	12 306	14 377	28 644	42 415	42 881
Hungary	23 487	44 671	60 036	26 286	48 668	56 034
Italy	221 021	284 413	290 113	207 015	285 634	294 213
Netherlands	205 085	287 336	357 342	193 434	256 989	319 451
Poland	25 670	60 332	96 396	43 051	72 109	105 123
Portugal	23 026	28 770	31 085	37 506	44 174	50 074
Romania	7 992	18 935	29 116	9 774	26 281	38 891
Spain	97 985	146 815	156 645	126 990	207 678	206 170
Sweden	79 648	99 097	93 954	64 346	80 740	85 356
United Kingdom	255 364	279 358	252 256	304 841	378 353	344 874
EU-27	683 083	952 955	1 094 417	743 295	1 027 522	1 199 669
Argentina	21 892	27 796	39 912	23 933	18 044	28 888
Australia	51 168	69 489	109 980	61 174	83 414	113 939
Brazil	45 047	77 721	109 689	48 553	50 515	91 517
Canada	224 036	254 973	226 140	202 247	220 173	230 178
China	182 896	476 988	861 519	155 469	451 185	720 931
India	34 641	61 021	126 731	46 923	79 573	190 996
Indonesia	45 661	57 547	83 532	22 521	37 402	69 422
Japan	391 828	454 828	560 232	290 856	365 989	546 698
Rep. of Korea	134 815	204 072	302 555	112 358	180 449	312 067
Mexico	127 850	151 122	164 638	133 192	158 220	168 042
Russia	68 385	145 993	204 387	28 421	60 752	115 229
Saudi Arabia	47 564	101 292	168 448	26 301	35 972	64 679
South Africa	:	32 369	38 618	:	38 269	45 717
Turkey	24 946	50 744	73 228	38 175	78 414	100 996
United States	650 013	657 533	757 608	993 826	1 226 199	1 148 477

Source: Commodity Trade Statistics Database | United Nations Statistics Division; Eurostat (ext_lt_intertrd)

Table 2.2.2: Exports of goods by main products, 2009
(% of total exports)

	Total (EUR million)	Food, drinks & tobacco	Raw materials	Mineral fuels, lubricants	Chemicals & related prod.	Other manu-factured goods	Machinery & transport equip.
Austria	98 650	7.4	3.1	3.3	12.3	34.7	37.6
Belgium	265 160	9.4	2.6	7.1	30.4	25.8	21.6
Czech Republic	81 213	4.3	2.7	3.6	6.1	28.9	53.3
France	341 566	11.9	2.3	3.7	19.4	23.2	37.0
Germany	803 899	5.7	1.9	2.3	15.8	24.5	46.7
Greece	14 377	22.7	6.9	9.5	14.5	30.5	13.6
Hungary	60 036	7.0	2.0	2.6	8.4	17.0	60.2
Italy	290 113	7.6	1.6	3.8	10.9	36.2	36.9
Netherlands	357 342	13.5	5.8	13.4	14.0	18.5	30.3
Poland	96 396	10.9	2.0	3.1	7.6	32.3	43.1
Portugal	31 085	11.1	4.9	5.1	7.4	41.1	27.6
Romania	29 116	6.0	6.0	6.0	5.1	33.0	42.9
Spain	156 645	14.5	3.4	5.7	13.4	25.3	35.6
Sweden	93 954	4.8	6.2	6.6	13.3	29.4	38.7
United Kingdom	252 256	6.4	2.3	11.3	19.5	22.2	31.4
EU-27	1 094 417	5.7	2.5	5.2	17.1	23.4	41.5
Argentina	39 912	38.2	14.8	10.2	9.3	9.7	14.4
Australia	109 980	12.4	25.8	29.5	4.1	9.6	6.1
Brazil	109 689	25.4	23.1	8.9	6.9	15.8	17.2
Canada	226 140	8.6	8.2	22.8	8.9	18.3	26.7
China	861 519	2.8	0.7	1.7	5.2	40.3	49.2
India	126 731	7.3	6.0	13.6	10.5	42.9	15.2
Indonesia	83 532	6.6	20.8	28.3	5.0	24.8	13.8
Japan	560 232	0.5	1.3	2.4	8.8	19.6	62.0
Rep. of Korea	302 555	0.9	1.2	9.1	10.1	22.9	55.4
Mexico	164 638	6.4	1.5	13.3	4.4	17.8	54.3
Russia	204 387	2.9	3.5	66.7	4.4	13.8	3.8
Saudi Arabia	168 448	0.9	0.3	88.1	6.1	2.2	2.4
South Africa	38 618	9.8	15.9	11.2	7.6	35.2	20.0
Turkey	73 228	9.8	2.6	3.8	4.7	45.0	28.2
United States	757 608	7.2	6.2	5.2	15.1	20.3	34.7

Source: Eurostat (ext_lt_intertrd)

Table 2.2.3: Imports of goods by main products, 2009

(% of total imports)

	Total (EUR million)	Food, drinks & tobacco	Raw materials	Mineral fuels, lubricants	Chemicals & related prod.	Other manu-factured goods	Machinery & transport equip.
Austria	102 795	7.4	4.1	9.9	11.9	30.1	33.4
Belgium	252 326	8.3	3.9	11.8	24.2	23.9	24.2
Czech Republic	75 267	6.0	2.5	9.2	11.0	29.2	41.2
France	396 109	8.7	2.5	13.1	13.8	26.8	33.6
Germany	668 104	7.7	3.8	11.5	13.1	25.3	35.4
Greece	42 881	12.9	2.8	4.9	17.5	26.7	34.2
Hungary	56 034	5.3	1.8	11.0	10.6	19.9	49.4
Italy	294 213	9.3	4.2	17.7	13.4	24.8	27.9
Netherlands	319 451	9.6	4.6	16.5	11.7	21.9	31.5
Poland	105 123	7.4	3.0	9.6	13.6	27.5	35.2
Portugal	50 074	12.7	3.5	12.9	12.4	26.3	30.3
Romania	38 891	8.4	2.8	9.4	13.8	30.5	33.7
Spain	206 170	10.0	4.0	16.3	13.7	23.4	31.4
Sweden	85 356	9.6	3.3	11.6	12.1	26.2	35.9
United Kingdom	344 874	10.4	2.6	10.3	12.5	27.5	31.0
EU-27	1 199 669	6.0	3.9	24.2	8.8	24.4	28.5
Argentina	28 888	2.7	3.7	6.0	18.7	21.7	46.4
Australia	113 939	5.2	1.3	12.7	10.8	24.4	38.2
Brazil	91 517	4.8	2.7	14.8	19.8	18.1	39.9
Canada	230 178	7.5	2.8	9.4	11.4	25.2	40.3
China	720 931	1.7	14.8	12.3	11.1	19.2	40.6
India	190 996	1.9	6.3	31.0	10.3	17.9	21.8
Indonesia	69 422	7.9	5.3	19.7	12.2	17.9	37.0
Japan	546 698	7.9	7.4	35.1	7.2	19.9	20.8
Rep. of Korea	312 067	4.0	6.8	32.7	8.4	21.5	26.3
Mexico	168 042	5.9	3.3	6.7	11.8	23.2	47.0
Russia	115 229	15.8	4.0	1.5	14.0	23.2	39.4
Saudi Arabia	64 679	12.4	2.4	0.2	8.9	28.4	47.0
South Africa	45 717	5.6	2.9	21.4	10.5	19.4	34.8
Turkey	100 996	2.9	7.8	14.1	14.2	22.9	29.1
United States	1 148 477	5.1	1.6	17.4	9.6	26.0	36.2

Source: Eurostat (ext_lt_intertrd)

Table 2.2.4: Share of extra EU-27 trade by partner, EU-27

	Exports (%)			Imports (%)			Trade balance (EUR million)
	1999	2004	2009	1999	2004	2009	2009
Argentina	0.94	0.39	0.43	0.66	0.61	0.68	-3 430
Australia	2.03	2.09	1.99	0.96	0.86	0.67	13 739
Brazil	2.11	1.49	1.97	1.89	2.11	2.13	-4 027
Canada	2.47	2.32	2.05	1.88	1.60	1.48	4 644
China	5.20	7.09	9.25	8.55	13.50	18.70	-123 018
India	1.55	1.80	2.51	1.41	1.59	2.12	2 140
Indonesia	0.50	0.51	0.48	1.24	1.02	0.97	-6 399
Japan	5.22	4.56	3.29	10.15	7.27	4.65	-19 849
Rep. of Korea	1.71	1.88	1.97	2.76	2.98	2.67	-10 513
Mexico	1.55	1.55	1.45	0.67	0.67	0.82	5 982
Russia	2.47	4.83	6.00	4.83	8.17	9.62	-49 706
Saudi Arabia	1.52	1.33	1.78	1.14	1.58	0.92	8 457
South Africa	1.43	1.68	1.47	1.46	1.54	1.25	1 145
Turkey	3.17	4.21	4.01	2.15	3.19	3.01	7 792
United States	27.38	24.71	18.69	22.31	15.51	13.34	44 528

Source: Eurostat (ext_lt_maineu)

Table 2.2.9: Trade in services (1)

(EUR million)

	Credits			Debits		
	1999	2004	2009	1999	2004	2009
Austria	21 959	30 516	38 236	16 226	22 542	26 601
Belgium	:	42 396	58 063	:	39 475	53 380
Czech Republic	6 499	7 748	14 575	5 465	7 228	13 578
France	78 284	92 422	100 810	60 354	79 171	90 422
Germany	81 189	117 725	165 837	135 788	157 405	182 580
Greece	15 579	26 741	26 984	8 727	11 277	14 341
Hungary	5 285	8 665	13 061	4 449	8 180	11 586
Italy	55 105	68 193	73 448	54 001	67 000	83 569
Netherlands	50 804	68 262	66 876	48 463	64 097	61 233
Poland	7 847	10 765	20 687	6 551	10 758	17 231
Portugal	8 716	11 853	16 294	6 877	7 838	10 244
Romania	1 282	2 903	7 012	1 653	3 116	7 367
Spain	49 249	69 355	88 074	30 057	47 602	62 377
Sweden	19 181	31 336	43 831	21 377	26 617	33 299
United Kingdom	111 316	159 106	169 968	90 618	120 658	119 795
EU-27	:	365 630	480 805	:	321 013	415 495
Argentina	4 427	4 244	8 220	8 285	5 312	8 824
Australia	17 732	22 900	30 466	17 618	22 464	31 006
Brazil	6 745	10 116	20 700	13 297	13 876	32 035
Canada	33 888	39 993	44 951	38 068	47 424	59 301
China	24 628	50 192	100 022	29 639	57 989	108 053
India	13 613	30 775	70 146	16 205	28 652	36 231
Indonesia	4 315	9 684	10 364	11 612	16 767	19 026
Japan	57 232	78 472	97 704	108 048	108 943	112 587
Rep. of Korea	24 891	33 670	51 666	25 502	40 138	63 043
Mexico	11 010	11 292	12 670	13 578	15 901	17 214
Russia	8 507	16 557	34 883	12 526	26 760	51 915
Saudi Arabia	5 041	4 704	6 544	17 667	20 657	50 711
South Africa	4 888	7 783	8 522	5 403	8 303	11 425
Turkey	15 435	18 458	23 847	8 397	8 170	11 890
United States	262 348	278 350	371 951	186 906	234 918	275 870

(1) Non-EU countries, 2008 instead of 2009.

Source: Key Global Indicators | United Nations Statistics Division; Eurostat (bop_its_det and bop_its_deth)

Table 2.2.10: Credits of services, 2009 (1)

(% of total credits)

	Total (EUR million)	Transportation	Travel	Communications services	Construction services	Insurance services	Financial services	Computer & information services	Royalties & license fees	Other business services	Personal, cultural & recreational services	Government services, n.i.e.
Austria	38 236	19.9	36.4	2.9	2.6	2.2	2.0	3.8	1.4	27.2	0.5	1.1
Belgium	58 063	26.0	12.2	4.8	1.7	1.6	3.9	4.9	3.1	36.7	0.7	2.7
Czech Republic	14 575	26.8	31.8	2.6	2.2	0.8	0.3	6.3	0.5	27.8	0.7	0.2
France	100 810	22.8	34.6	3.3	4.9	0.5	1.4	1.1	6.5	22.8	1.3	0.7
Germany	165 837	22.5	15.0	2.1	5.6	2.2	5.1	6.3	6.0	32.8	0.5	2.0
Greece	26 984	50.2	38.5	1.1	1.0	1.2	0.4	1.1	0.1	5.4	0.6	0.3
Hungary	13 061	18.8	31.3	2.6	2.1	0.1	1.0	6.1	4.4	27.3	5.6	0.7
Italy	73 448	13.1	39.1	1.6	2.8	1.2	7.2	0.7	1.1	30.8	1.1	1.3
Netherlands	66 876	27.2	13.3	4.8	3.0	0.6	1.4	6.2	5.7	34.3	0.9	2.6
Poland	20 687	29.9	31.1	2.2	5.1	0.1	1.5	3.0	0.4	25.6	0.5	0.4
Portugal	16 294	25.4	42.5	3.0	3.1	0.7	0.9	1.6	0.7	19.8	1.4	1.0
Romania	7 012	29.4	12.6	8.9	5.1	0.5	1.8	10.1	1.9	28.4	0.8	0.4
Spain	88 074	14.6	43.3	1.7	3.4	1.5	3.7	4.9	0.8	24.0	1.4	0.7
Sweden	43 831	16.3	19.9	3.1	1.2	1.4	2.1	10.8	7.9	35.9	0.6	0.9
United Kingdom	169 968	14.1	12.8	3.4	1.0	5.6	22.0	4.9	5.4	27.8	1.5	1.4
EU-27	480 805	22.9	14.2	2.5	3.6	3.1	9.0	6.4	5.3	30.5	1.0	1.6
Argentina	8 220	15.4	38.5	2.9	0.2	:	0.1	6.4	0.9	30.8	3.5	1.3
Australia	30 466	17.4	55.2	1.7	0.2	1.4	2.0	3.1	1.5	14.4	1.5	1.6
Brazil	20 700	17.8	19.0	1.5	0.1	2.7	4.1	0.6	1.5	47.1	0.3	5.3
Canada	44 951	17.9	22.9	3.5	0.4	5.4	4.7	7.0	5.2	27.1	3.5	2.5
China	100 022	26.1	27.8	1.1	7.0	0.9	0.2	4.2	0.4	31.5	0.3	0.5
India	56 630	10.7	12.1	2.9	0.5	1.6	2.5	40.9	0.1	28.0	0.4	0.4
Indonesia	10 364	18.4	48.4	7.2	4.4	0.1	2.0	1.2	0.2	14.3	0.5	3.4
Japan	97 704	32.7	7.5	:	:	:	:	:	:	:	:	:
Rep. of Korea	51 666	57.3	11.9	0.9	0.3	0.5	5.0	0.4	3.2	17.3	0.7	2.5
Mexico	12 670	12.8	71.3	1.7	:	11.3	:	:	2.4	:	0.5	0.0
Russia	34 883	29.3	23.3	2.9	9.4	1.0	2.6	3.2	0.9	25.6	0.8	1.2
Saudi Arabia	6 544	25.6	61.4	4.1	:	1.5	4.5	:	:	:	:	2.5
South Africa	8 522	12.3	60.8	:	:	:	:	:	:	:	:	:
Turkey	23 847	22.2	62.8	2.1	3.3	2.1	2.4	0.0	:	0.3	3.5	1.3
United States	371 951	16.6	24.7	1.7	1.4	2.0	11.0	2.3	16.8	16.0	2.5	5.0

(1) Non-EU countries, 2008, except India, 2006.

Source: Key Global Indicators | United Nations Statistics Division; Eurostat (bop_its_det)

Table 2.2.11: Debits of services, 2009 (1)

(% of total debits)

	Total (EUR million)	Transportation	Travel	Communications services	Construction services	Insurance services	Financial services	Computer & information services	Royalties & license fees	Other business services	Personal, cultural & recreational services	Government services, n.i.e.
Austria	26 601	28.7	29.1	3.2	3.0	3.5	1.1	4.3	3.4	21.1	2.4	0.3
Belgium	53 380	23.9	24.0	4.2	1.3	1.6	2.8	3.8	3.9	30.4	0.9	0.4
Czech Republic	13 578	21.2	21.5	4.1	1.4	1.6	1.8	5.2	3.8	28.1	0.8	0.5
France	90 422	26.0	30.8	3.0	2.4	1.4	1.3	1.6	4.0	26.1	2.7	0.7
Germany	182 580	20.6	31.7	2.6	3.9	1.4	2.4	4.8	5.6	25.3	1.1	0.6
Greece	14 341	49.3	16.9	3.4	1.5	6.7	1.4	2.5	3.3	10.8	1.8	2.4
Hungary	11 586	17.7	22.5	2.9	1.8	1.8	1.5	4.4	8.3	32.2	5.5	1.3
Italy	83 569	19.6	23.8	1.8	4.4	2.5	2.7	1.5	1.6	38.8	1.7	1.8
Netherlands	61 233	21.5	24.2	4.9	2.5	1.2	1.6	6.4	4.5	31.1	1.1	1.0
Poland	17 231	21.5	30.3	3.3	4.1	1.9	3.8	3.5	6.4	22.1	1.4	1.7
Portugal	10 244	28.8	26.5	4.4	1.2	1.9	1.8	3.6	3.6	22.5	4.7	1.2
Romania	7 367	27.2	14.3	10.9	5.2	2.5	4.4	7.4	3.3	21.5	2.1	1.2
Spain	62 377	20.4	19.1	3.6	2.7	2.4	5.3	3.1	3.9	36.7	2.3	0.5
Sweden	33 299	15.7	27.3	4.5	1.7	1.0	1.2	6.0	4.2	37.2	0.7	0.4
United Kingdom	119 795	17.0	29.3	4.3	1.5	1.0	6.4	3.4	5.7	26.7	1.0	3.5
EU-27	415 495	21.3	20.8	2.9	2.8	1.7	4.1	3.1	9.4	28.1	1.4	1.8
Argentina	8 824	29.9	35.2	3.4	0.2	2.9	0.6	2.8	9.5	11.0	1.7	2.8
Australia	31 006	32.6	34.8	2.2	:	1.8	1.2	2.9	6.6	13.7	2.7	1.6
Brazil	32 035	22.0	23.3	0.6	0.0	3.5	2.4	5.9	5.7	28.8	1.8	5.8
Canada	59 301	23.2	30.9	2.2	0.3	6.8	4.3	2.5	10.1	15.8	2.6	1.3
China	108 053	31.7	22.8	1.0	2.7	8.0	0.4	2.0	6.5	24.3	0.2	0.6
India	27 282	20.7	17.0	1.5	2.0	2.1	3.0	4.9	2.1	45.4	0.3	1.2
Indonesia	19 026	49.3	19.3	2.8	2.7	2.4	1.2	2.5	4.7	13.7	0.4	0.9
Japan	112 587	32.7	16.9	:	:	:	:	:	:	:	:	:
Rep. of Korea	63 043	40.1	18.5	1.2	0.0	0.9	0.9	0.6	6.0	29.8	0.9	1.0
Mexico	17 214	14.2	33.7	0.4	:	48.3	0.5	:	:	:	0.9	2.1
Russia	51 915	17.0	32.6	2.5	11.6	1.4	2.7	1.9	6.0	20.9	1.1	2.3
Saudi Arabia	50 711	20.9	20.3	0.9	6.0	2.4	2.0	:	:	:	:	34.4
South Africa	11 425	44.7	25.2	:	:	:	:	:	:	:	:	:
Turkey	11 890	43.2	20.1	1.7	1.0	8.1	5.6	0.2	4.2	7.9	1.0	7.1
United States	275 870	25.8	21.1	1.9	0.5	10.6	4.7	4.0	6.6	14.4	0.5	10.0

(1) Non-EU countries, 2008, except India, 2006.

Source: Key Global Indicators | United Nations Statistics Division; Eurostat (bop_its_det)

Table 1.10: Education

	Public expenditure on education (% of GDP)		Pupil-teacher ratio in primary education (pupils per teacher)		School expectancy (years)		Tertiary education enrolment (%)	
	2000 (1)	2007 (2)	2000 (3)	2007 (4)	2000 (5)	2007 (6)	2000	2008 (7)
Austria	5.74	5.40	:	13.6	15.5	16.4	56	55
Belgium	:	6.02	:	12.6	18.6	19.6	58	63
Czech Republic	3.97	4.20	21.0	18.7	15.6	17.3	29	59
France	6.03	5.59	19.5	19.7	16.6	16.4	53	55
Germany	4.46	4.50	19.8	18.3	17.2	17.6	:	:
Greece	3.39	:	13.4	10.1	15.0	17.4	51	91
Hungary	4.42	5.20	10.9	10.2	16.1	17.8	37	65
Italy	4.55	4.29	11.0	10.5	16.1	17.0	49	67
Netherlands	4.96	5.32	16.8	15.6	17.2	17.7	52	61
Poland	4.89	4.91	12.7	11.0	16.4	17.9	50	67
Portugal	5.42	5.30	12.4	11.8	16.9	17.0	48	57
Romania	2.86	4.25	:	16.9	13.9	15.9	24	66
Spain	4.28	4.35	14.9	13.6	17.0	17.2	59	71
Sweden	7.21	6.69	12.8	12.3	19.9	19.7	67	71
United Kingdom	4.46	5.39	21.2	19.4	18.9	16.2	58	57
EU-27	*4.88*	*4.98*	:	:	16.7	17.2	:	:
Argentina	4.60	4.51	19.3	16.3	14.7	15.4	53	68
Australia	5.00	5.16	17.9	:	20.4	20.7	65	77
Brazil	4.01	5.05	24.8	23.9	14.5	13.8	16	34
Canada	5.56	4.93	17.4	:	16.1	:	59	:
China	1.91	:	19.4	17.7	10.2	11.4	8	23
India	4.41	3.23	40.0	:	8.4	10.0	10	13
Indonesia	2.46	3.60	22.4	18.8	10.8	12.3	:	21
Japan	3.67	3.48	:	:	14.6	15.0	48	58
Rep. of Korea	3.76	4.43	32.1	25.6	15.6	16.9	20	27
Mexico	4.86	5.46	27.2	28.0	12.0	13.6	78	98
Russia	2.94	3.87	17.6	17.1	:	13.7	:	77
Saudi Arabia	5.94	:	:	11.2	:	13.2	22	30
South Africa	5.58	5.40	33.5	31.0	12.8	13.1	:	:
Turkey	3.46	:	:	:	10.9	11.6	23	38
United States	5.08	5.69	15.0	13.8	15.4	15.8	68	83
World	:	:	:	:	9.8	11.0	:	:

(1) China, Republic of Korea and United States, 1999; Indonesia, 2001.
(2) Non-EU countries, 2006 except Canada, India and the Republic of Korea, 2005.
(3) Australia and China, 1999.
(4) Argentina, 2006.
(5) China, Indonesia and Turkey, 2001.
(6) Argentina, India and South Africa, 2006; Saudi Arabia, 2005.
(7) Greece, Italy, the Netherlands, Poland, Portugal, Argentina and India, 2007.

Source: UIS Data Centre | UNESCO Institute for Statistics; Eurostat (tsdsc510, educ_iste and tps00052)

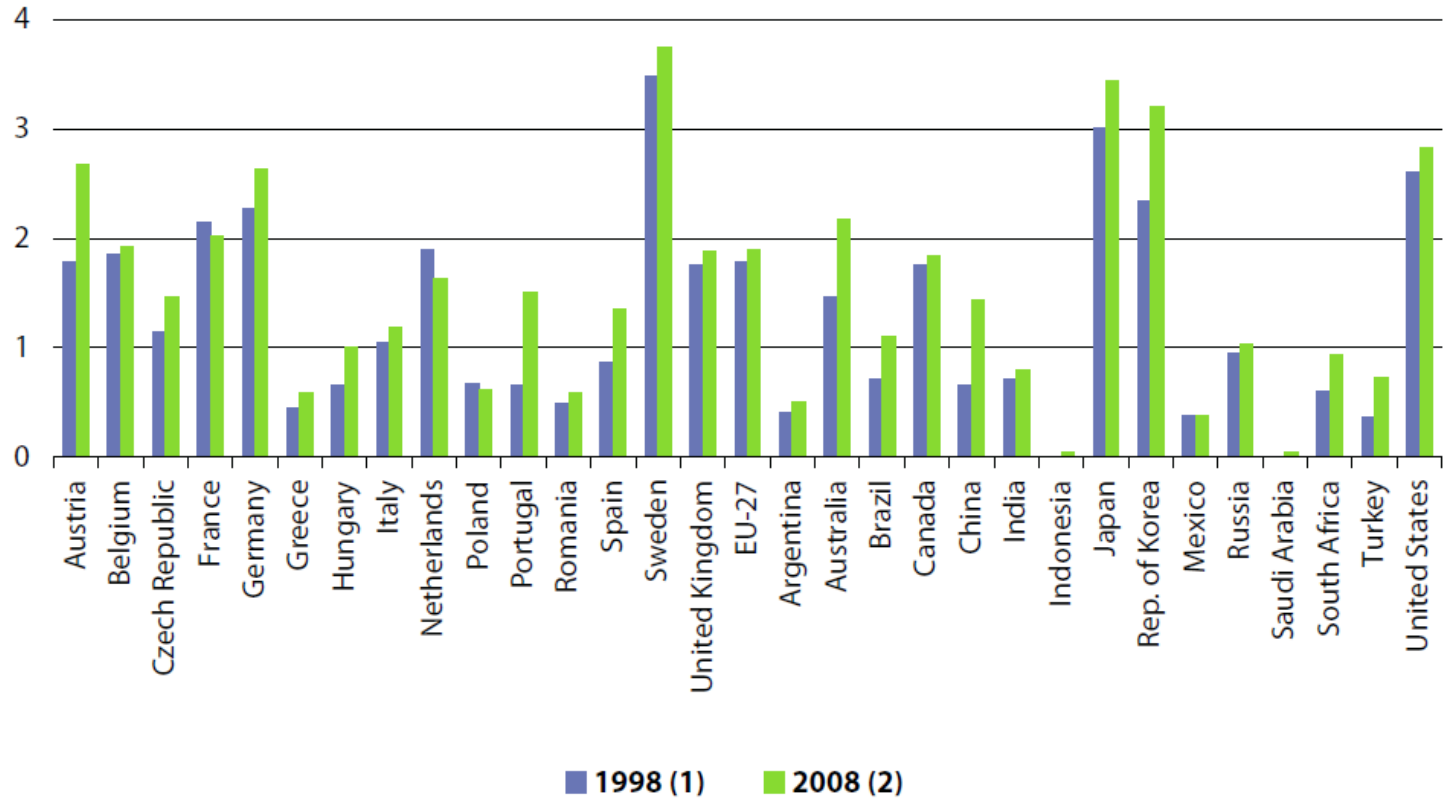
Table 1.11: Health

	Healthy life years at birth, 2007 (years)		Expenditure on health (% of GDP)		Number of physicians (per 100 000 inhabitants)	Causes of death - tuberculosis (per 100 000 inhabitants)
	Males	Females	2000 (1)	2007	2007 (2)	2008 (3)
Austria	58.4	61.1	:	9.8	374.2	0.4
Belgium	63.3	63.7	:	9.8	401.6	:
Czech Republic	61.3	63.2	7.2	6.5	355.7	0.4
France	63.1	64.2	10.6	10.7	335.5	0.6
Germany	58.8	58.4	10.4	10.1	378.1	0.3
Greece	65.9	67.1	:	:	:	0.4
Hungary	55.0	57.6	8.0	7.1	280.6	1.5
Italy	*62.8*	*62.0*	:	:	363.5	0.4
Netherlands	65.7	63.7	9.0	9.0	:	0.2
Poland	57.4	61.3	:	6.0	219.1	1.9
Portugal	58.3	57.3	9.2	:	:	1.5
Romania	60.4	62.4	5.2	5.1	222.0	7.1
Spain	63.2	62.9	7.9	8.2	368.3	0.5
Sweden	67.5	66.6	9.0	8.5	356.6	0.3
United Kingdom	*64.8*	*66.2*	:	:	248.5	0.4
EU-27	*61.6*	*62.3*	:	:	:	*1.0*
Argentina	64	69	9.0	10.0	320	3.1
Australia	72	75	8.3	8.9	100	0.4
Brazil	62	66	7.2	8.4	170	3.8
Canada	71	75	8.8	10.1	190	0.3
China	65	68	4.6	4.3	140	12.0
India	56	57	4.4	4.1	60	23.0
Indonesia	60	61	2.0	2.2	10	27.0
Japan	73	78	7.7	8.0	210	1.4
Rep. of Korea	68	74	4.7	6.3	170	5.5
Mexico	65	69	5.1	5.9	290	1.4
Russia	55	65	5.4	5.4	430	15.0
Saudi Arabia	61	64	3.7	3.4	160	1.2
South Africa	47	48	8.5	8.6	80	39.0
Turkey	64	67	4.9	5.0	150	3.2
United States	68	72	13.4	15.7	270	0.3
World	58	61	9.2	9.7	140	21.0

(1) EU Member States, 2003.
(2) EU Member States, data refer to practising physicians, except France and Italy, professionally active physicians; Czech Republic, France, Germany and Sweden, 2006.
(3) EU-27, France, Italy and the United Kingdom, 2007; for non-EU countries, the rate is for those who are HIV-negative.

Source: World Health Statistics 2010 | World Health Organization; Eurostat (tsdph100 and hlth_sha_hp)

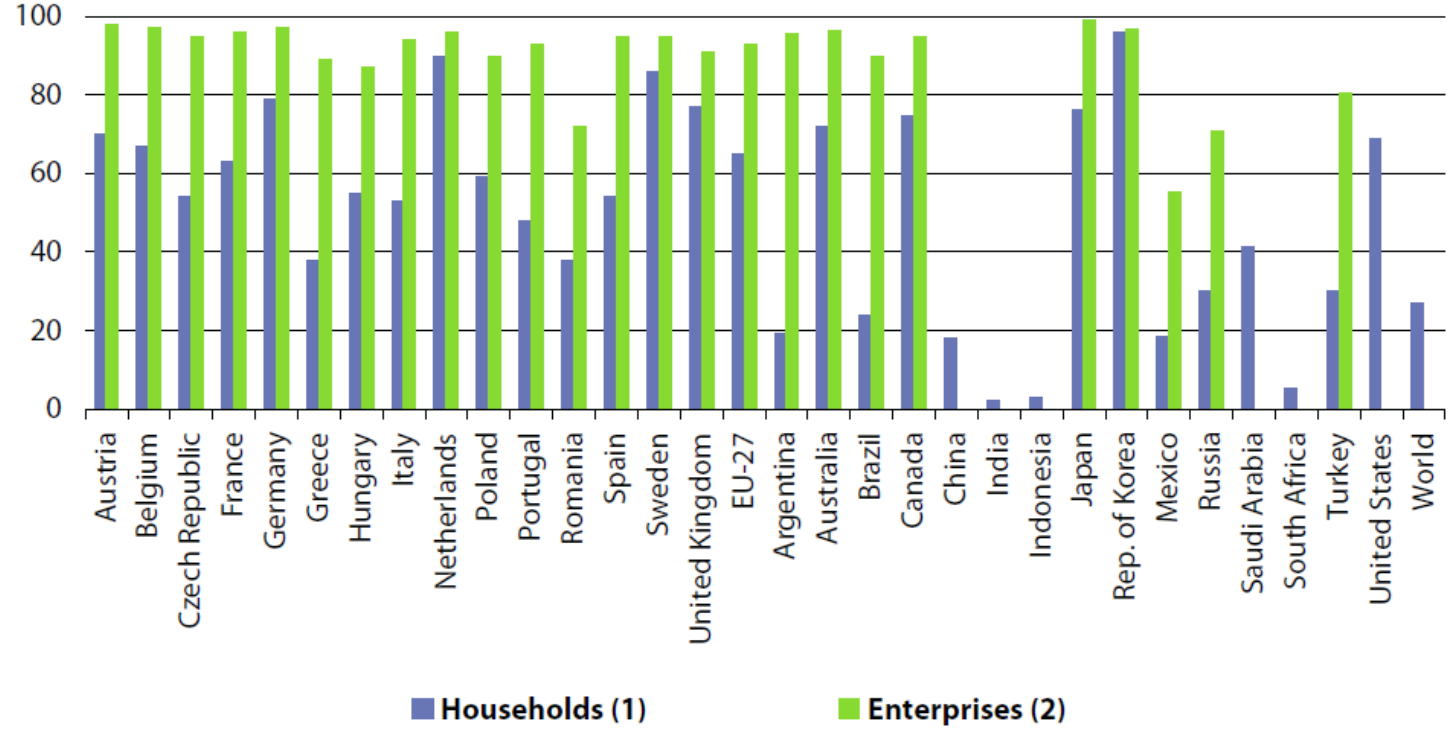
Figure 1.6: Gross domestic expenditure on research and development (GERD)
(% of GDP)



(1) Greece, Sweden and South Africa, 1997; Brazil, 1996; Indonesia and Saudi Arabia, not available.
(2) Australia, 2006; Indonesia, 2005; Greece and all other non-EU countries except for Canada, Russia and the United States, 2007.

Source: UNESCO - Science and Technology; Eurostat (rd_e_gerdtot)

Figure 1.7: Internet access, 2009
(%)



(1) Canada, China, India, Indonesia, Russia, South Africa, 2008; Argentina, China, Saudi Arabia, South Africa and world average, ITU estimates.
(2) Enterprises with 10 or more persons employed; Brazil and Japan, 2008; Australia, Canada and Russia, 2007; Argentina and the Republic of Korea, 2006; Turkey, 2004; Mexico, 2003; China, India, Indonesia, Saudi Arabia, South Africa, the United States and the world average, not available.

Table 1.12: Information and communication technology

	Mobile phone subscriptions (per 100 inhabitants)			Number of Internet users (per 100 inhabitants aged 16-74)		
	2000	2005	2008 (1)	2000	2005	2009 (2)
Austria	76	94	87	:	58	73
Belgium	51	84	102	:	60	76
Czech Republic	42	115	133	:	35	64
France	49	77	91	:	:	72
Germany	59	96	130	:	69	79
Greece	54	112	169	:	24	45
Hungary	30	92	122	:	39	62
Italy	77	122	152	:	35	49
Netherlands	68	97	123	:	81	90
Poland	17	76	116	:	39	59
Portugal	65	109	140	:	35	48
Romania	9	62	114	:	:	37
Spain	61	99	112	:	48	63
Sweden	72	101	119	:	85	91
United Kingdom	68	109	126	:	70	84
EU-27	53	96	106	:	54	67
Argentina	18	57	117	7	18	28
Australia	45	90	103	47	62	56
Brazil	13	46	78	3	21	36
Canada	28	53	64	42	68	73
China	7	30	48	2	9	22
India	0	8	30	1	4	7
Indonesia	2	21	62	1	4	11
Japan	53	76	86	30	67	69
Rep. of Korea	57	80	94	41	72	77
Mexico	14	46	71	5	19	22
Russia	2	84	132	2	15	21
Saudi Arabia	7	61	147	2	13	29
South Africa	19	72	92	0	4	7
Turkey	24	61	89	4	14	33
United States	39	72	89	44	70	72
World	12	34	60	7	16	21

(1) EU-27, 2006.
(2) Argentina, Australia, China, the Republic of Korea, Mexico, Saudi Arabia, Turkey and the United States, 2008; all other non-EU countries, 2007.

Source: World Development Indicators 2009 | The World Bank; International telecommunication union (tin00060); Eurostat (isoc_ci_ifp_iu)

Science, Technology and Competitiveness key figures report 2008/2009
http://ec.europa.eu/invest-in-research/monitoring/statistical01_en.htm

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For the data and tables see:
http://ec.europa.eu/invest-in-research/pdf/download_en/keyfigures_071030_web.pdf

A common policy trend across EU Member States concerns the important place of R&D and R&D investment in the overall policy agendas. Under the influence of the Lisbon Strategy (2000), the Barcelona '3%' objective (2002) for more invest - ment in research in Europe (with increased private sector funding) and the renewed Lisbon Strategy (2005), R&D is increasingly considered a key source for sustaining economic growth and welfare. Member States are developing commonly shared R&D policy objectives. Recently, and con sequent to the renewed Lisbon Strategy of mid-2005, 26 Member States have set targets for their R&D intensities (i.e. R&D expenditure as percentage of GDP – each target is not necessarily 3%) for 2010 or other years. Bulgaria is the only Member State which does not have a target. If the Member States reach their objectives, the overall EU R&D intensity will have increased substantially to about 2.6 % in 2010.

Turning to the aggregate picture, EU R&D inten sity, after a period of slow but continued growth between the mid-1990s and 2001, stagnated in 2001-2002 and even decreased slightly after that. In 2005, only 1.84 % of GDP was spent on R&D in EU-27. If the current -negative- trend continues, by 2010 Europe's R&D intensity will have declined to its mid-1990s level of less than 1.80 % of GDP.

These recent trends show that the commitments made by (almost) all Member States in mid-2005 to increase their R&D intensities significantly up to country-specific targets were more than appro - priate. The fact that, on the whole, no significant progress has yet been made should encourage the Member States to intensify and/or deepen the pace of Lisbon–driven reforms.

More than 85 % of the R&D intensity gap between EU-27 and its main competitors is caused by differences in the contributions from the business enterprise sector to the financing of R&D. There - fore, European Heads of State decided at the Barcelona Summit of March 2002 to increase not only the overall proportion of GDP devoted to R&D, but also to improve the private sector contribution to its financing. In particular they set the target of increasing the share of R&D expen - diture funded by the business enterprise sector to two-thirds by 2010. Despite increased policy attention, the private sector contribution to the financing of R&D has not increased substantially over the past 10 years in the EU. R&D financed by the business sector remained at about 1 % of GDP in the EU, without any noticeable variation over the decade.

In 2004, the private sector financed 64 % of total R&D in the US, 67 % in China and 75 % in both Japan and South Korea, but only 55 % in the EU. In the US, despite a reversal in 2001-2002 in privately funded R&D, the trend over the past decade is clearly positive. In China too (and to a lesser ex tent also in Japan), the private sector has increa sed its involvement in the financing of R&D at a much faster pace than in the EU. Moreover, since 2000, the private-sector contribution to the financing of R&D has even been decreasing in the EU.

In the US, manufacturing R&D is more con cen - trated in high-tech industries than in the EU. In 2003, 55 % of total manufacturing R&D in the EU and 70 % in the US was carried out in high-tech industries. European industrial R&D is more likely to be concentrated in medium-high-tech manufacturing.

Therefore, the higher concentration of business R&D in high-tech manufacturing industries in the US largely emanates from differences in industrial structure between the EU and the US. In the US, high-tech industries account for a much larger share of both industrial value added and GDP than in the EU. In the US, hightech manufacturing industries represent 28 % of indu strial value added (3.7 % of GDP) compared with 19 % (3.1 % of GDP) in the EU. Conversely, medium-high-tech industries in the EU account for 24 % of industrial value added (3.8 % of GDP) compared with 19 % (2.6 % of GDP) in the US. In the EU, the industrial texture is more con - centrated on medium-high-tech, medium-lowtech and low-tech activities.

Examining differences within high-tech industries between the EU and the US, it appears that ICT manufacturing industries explain almost the entire R&D funding gap between the EU and the US, not necessarily because they tend to be more R&D-intensive in the US, but mainly because of their larger size. Similarly, the higher concentration of R&D expenditure in medium-tech industries in the EU is primarily due to two sectors: 'Machinery and equipment' and, to a lesser extent, 'Elec - trical machinery and apparatus'. These two sectors have similar R&D intensities on both sides of the Atlantic, but they are twice as big in the

EU as in the US. Here again, structural differences and the larger size of the industrial sectors seem to account for the largest part of the differences between the EU and the US.

SMEs represent a higher share of total business R&D expenditure in the EU than in the US. However, after adjusting for differences in industrial structure between the EU and the US (i.e. correcting for the higher share of SMEs in GDP in the EU than in the US), it appears that the situation of European SMEs vis-à-vis their American counterparts in terms of average R&D intensity does not significantly differ from the situation of larger companies. In other words, from a static point of view, there is no *SME-specific* R&D intensity deficit.

R&D funded by government has remained very stable in both the EU and the US, but at a lower level in the EU (0.64 % of GDP) than in the US (0.83 % of GDP). Therefore, the overall public effort to fund R&D in the EU must be increased as well, in order for private R&D activities to develop further and grow on a solid science base.

The EU scores particularly well (i.e. fieldnormalised citation impact score above 1.0) in rather 'traditional' scientific fields, such as chemistry, astronomy, physics and the engi - neering sciences (i.e. civil engineering and materials sciences), while lagging most behind the US in new, fast-emerging fields. In nano - technology, for instance, the EU is the most active region (i.e. over the years 1998-2001, it had the largest world share of scientific publi - cations in nanotechnology, almost twice that of the US), but data on citation impact over the period 1991-2000 reveals again a clear US dominance.

Scientific output, as measured by scientific publications, appears to be more evenly distri - buted across all fields of science in the EU than in the US. This is a potentially rich resource in the medium and long term, but supplementary efforts are required to ensure that both public research and industrial R&D are not too fragmented.

The contribution of private companies to the production of scientific publications highly cited in patents is significantly lower in the EU than in the US. Compared to the US, the EU is characterised by a low degree of involvement of private companies in the conduct of research leading to publications cited in patents.

The current development of the nanotech market is a good illustration of Europe's diffi - culty in breaking through in new, high-tech industries. Notwithstanding the large public support for nanotech R&D in the EU (similar to or even larger than that of the US or Japan), private investment in nanotech R&D remains very low compared with the US and Japan: only one third of the total funding for nano - technology R&D in the EU stems from private sources, compared with 52 % in the US and two thirds in Japan. Private funding for nanotech R&D in the US is almost double that of the EU.

Moreover, the number of newly created nanotech companies, in particular the number of nanotech start-ups, has been significantly lower in Europe than in the US over recent years, leading to a much larger stock of companies currently operational in the US. Moreover, the majority of European nanotech companies are much smaller in terms of turnover than their US counterparts. With less and smaller nanotech companies, research efforts in the private sector are bound to be smaller in Europe than in America. It is not surprising therefore to find that America is by far the most active region in the world for registering patents in nanotechnology. In 2003, American applicants registered about 1200 nanotech patents, compared with slightly more than 400 from European applicants. Altogether, the European nanotech industry is clearly lagging behind.

In fact, the number of universities and research institutes active in nanotechnology in 2003 was substantially higher in Europe than in North America (US and Canada combined)(48). As for scientific output, over the years 1998-2001, Europe had the largest world share of scientific publications in nanotechnology (41 %), followed by North America (24%). In terms of impact of publications, as measured by the number of citations per paper over the period 1991-2000, however, the EU is clearly lagging behind the US (even though one Member State, the Netherlands, is ahead of the US).

Notwithstanding the large public support for European nanotechnology, private investment in nanotechnology R&D remains very low compared to Europe's main competitors. Only one third of the total funding for nanotechnology research in Europe stems from private sources (Figure I.6.1); in the US, private sources account for 52 % and in Japan for almost two thirds. In volume, private funding for nanotechnology R&D in Europe is equal to about half of private funding for nanotechnology R&D in the US.

Europe has missed the ICT wave and may now be about to miss the nanotechnology wave, in spite of a strong commitment from public authorities to finance and develop nanotech research in Europe. European industry has not yet been able to build upon the strong and competitive European science base in nanotech and to substantially increase its research efforts. The nanotechnology field is undoubtedly a very good example of Europe's difficulty in translating science into innovation and in creating innovative products and commercial activities from scientific results. This difficulty is revealed by the massive gap in Europe between the development of the science base and that of the nanotech industry.

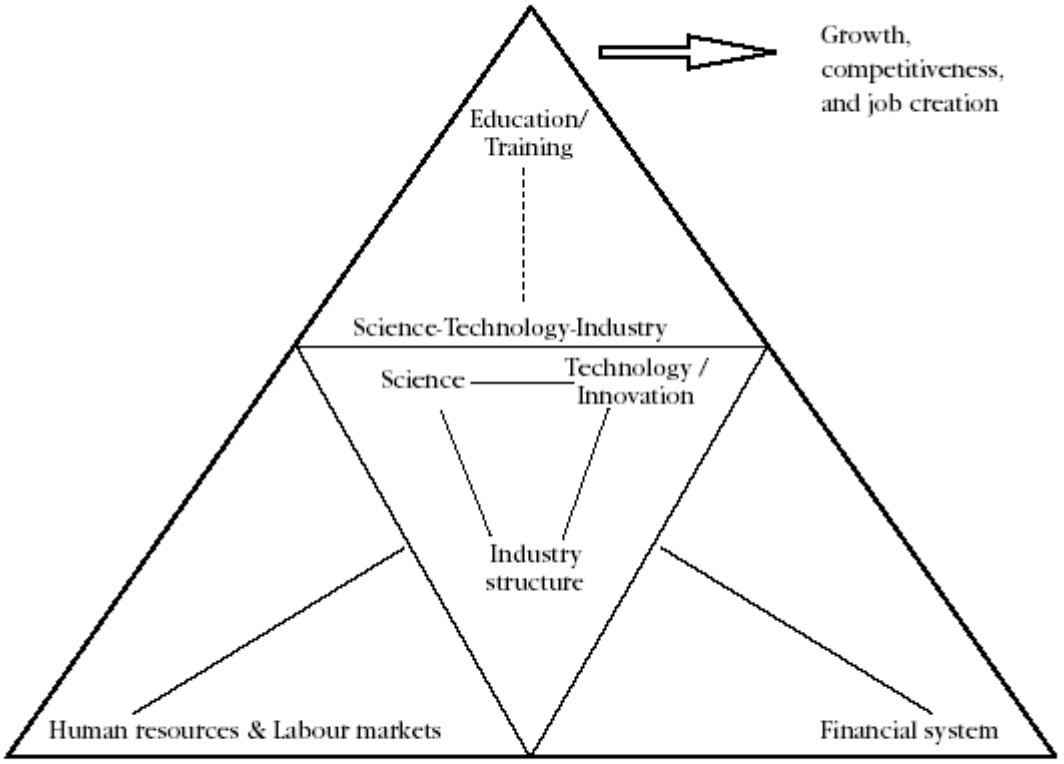
Knowledge is a key engine for productivity and long-term economic growth

Economic performance is determined by a variety of macroeconomic policies and structural conditions, and thus differs significantly across regions and countries. Stability-oriented macroeconomic policies (e.g. inflation, fiscal policy), trade policy, financial market conditions and labour market institutions impact heavily on the framework conditions that nurture higher growth regimes in a sustainable manner. In the long run, however, the economic performance of countries is also strongly determined by knowledge-related factors (e.g. technical change and human capital). In particular, R&D and technological innovation have contributed substantially to the strong US economic performance over recent years. More generally, the contribution of knowledge investments and activities to employment, productivity and economic growth has been emphasised in many studies(2).

'Activating' knowledge for more growth:the need for a systemic approach

However, the relationship between investment in knowledge and performance is complex and non-linear. What factors can explain the differences in innovative performance across countries with rather similar levels of knowledge investment? An important source of diversity between industrialised economies relates to the respective roles of the main actors (i.e. firms, universities, and government and other public research institutions) in the process of knowledge production, diffusion and utilisation, as well as to the forms, quality, and intensity of their interactions. These actors are influenced by a variety of factors that exhibit some degree of country specificity: industry structure, the education and training system, the human resources and labour market, the financial system, etc. Competition policy, public intervention and the further integration of the internal market should also be emphasised, as they play an across-theboard role with regard to the influence of the other institutions involved in the Science, Technology and Innovation system (STI system).

Figure 1 The Science,Technology and Innovation system and its constituting building blocks



Source: DG Research
Data: Adapted from Amable B., Barré R. and Boyer R., "Les systèmes d'innovation à l'ère de la globalisation", Economica, Paris, 1997, p. 127.

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From this perspective, the STI system covers infrastructure, the education system, legislation (e.g. IPRs, anti-trust policy, labour market) and, broadly speaking, corrective measures for market and system failures, as well as policies aimed at ensuring macroeconomic stability. By examining all the different institutions in a country that individually and jointly contribute to the production, diffusion and utilisation of knowledge, it is possible to identify the main building blocks of an STI system (see Figure 1). In this system, science, technology/innovation and industry are central but not sufficient to ensure economic growth, competitiveness and job creation. The education and training system, human resources and the labour market, and the financial system – all have a substantial impact on the performance of 'Science-Technology- Industry'. From this perspective, the performance of an economy depends not only on how the individual institutions perform in isolation, but also on how they interact with each other as elements of a collective system of knowledge creation, diffusion and use, and on their interplay with other institutions. Moreover, because national systems have developed at different times and under different conditions, the characteristics of the STI system of a country are often rather specific. These disparities between STI systems are, in part, a product of history and a legitimate expression of national preferences. However, it is crucial that unnecessary disparities do not hamper the development of integrated markets for research, technology and high-tech products towards a true 'European Area of Knowledge'. Business investment decisions are primarily determined by the size and dynamism of these markets, which are thus becoming a crucial factor of attractiveness in the global economy. Such interactions between policies and, above all, the need for better coherence between them, both at the Member State and European levels, have been stressed since the re-launch of the Lisbon Strategy in the "Integrated Guidelines for Growth and Jobs (2005-2008)" dealing with macroeconomic, microeconomic and employment issues as proposed by the European Commission in the framework of the revised Lisbon Strategy adopted by the Council of Ministers (see Box 1)(3).

Box 1: the Integrated Guidelines for Growth and Jobs (2005-2008)

On March 22-23 2005, the Heads of State and Government of the EU endorsed the revision of the Lisbon Strategy as proposed by the Commission. The Spring European Council approved the simplified governance arrangement with one set of Integrated Guidelines dealing with macroeconomic, micro economic and employment issues. Taking stock of the unsa tisfactory results half way to the 2010 target, the Commission proposed a fundamental revision of the original strategy. To overcome the rather limited implementation of reform in Member States so far, the Commission has proposed focusing partnership with Member States on growth and jobs, and has introduced a Lisbon Action Plan that outlines actions to be taken at the EU and national levels in three policy areas:

Making Europe a more attractive place to invest and work
(1) Extend and deepen the internal market
(2) Ensure open and competitive markets inside and outside Europe
(3) Improve European and national regulation
(4) Expand and improve European infrastructure

Knowledge and innovation for growth
(5) Increase and improve investment in Research and Development
(6) Facilitate innovation, the uptake of ICT and the sustainable use of resources
(7) Contribute to a strong European industrial base

Creating more and better jobs
(8) Attract more people into employment, increase labour supplì and modernise social protection systems
(9) Improve the adaptability of workers and enterprises
(10) Invest more in human capital through better education and skills.

The Commission proposal for the integrated guidelines package is mainly based on the priority action areas as identified in its Lisbon mid-term review. While the macroeconomic guidelines (covering for instance budgetary policy, reduction of public debts and EMU issues) have no counterpart in the Lisbon Action Programme, the micro - economic guidelines build on Lisbon action areas (1) to (7), and the employment guidelines build on Lisbon action areas (8) to (10). This integrated approach is intended to leverage the guidelines, which are the cornerstones of EU economic policy, and make them a driving force of the Lisbon Strategy. Modernising economic and employment coordination in the EU will help deliver on the new Lisbon objectives to create growth and jobs. The proposed integrated guidelines constitute the beginning of a new governance cycle. On the basis of the guidelines, Member States have in the course of 2005 drawn up three-year national reform programmes, and report on the implementation of these on a yearly basis in a single national Lisbon progress report. The Commission publishes its assessment of progress on implementation in its Annual Progress Report, indicating at the same time where it deems further action is necessary at Member State or Community level. On the basis of the Progress Report, the Commission can propose amendments to the integrated guidelines, if necessary. This integrated approach stimulates a policy-learning cycle at both the Member State level and the Community level that will enhance the quality of decision-making and implementation.

Intensifying the pace of reforms

The recent productivity growth performance of the EU in comparison with that of the US, together with the increasing presence of major new players, show that the 2005 relaunching of the Lisbon agenda was indeed appropriate. Many countries now accept that the solution to the EU's growth problem requires a longer-term policy perspective, and that a sustainable long-term recovery process needs to be built upon a Lisboninspired structural reform agenda aimed at effectively addressing the fundamental growth challenges posed by the accelerating pace of technological change, globalisation and ageing populations. In particular, it is essential that the transition of the EU economies towards a knowledge-driven economy – within which education and training, R&D and innovation, and ICTs play a critical role – is speeded up. Therefore, it is necessary to increase the efficiency of R&D, improve the transformation of new ideas into new products, processes, services and solutions, and make the overall environment more supportive of firms wanting to increase investment in R&D. While the policy challenge of implementing Lisbon-driven reforms remains a

serious one for a large number of EU Member States, it should be clear that the expected gains are considerable. For instance, a recent CBS study estimates that the introduction of five key measures of the Lisbon Strategy (i.e. the Services Directive, reduction of the administrative burden, improving human capital, 3 % R&D target, increase in the employment rate) can boost the EU's economic and employment growth rates by at least 0.8 % per year for more than a decade(4).

Box 2: Institutional classification of R&D

Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

R&D data are compiled in accordance with the guidelines laid down in the proposed standard practice for surveys of research and experimental development — Frascati Manual, OECD, 2002. R&D expenditure is broken down between the following sectors of performance: business enterprise (BES), government (GOV), higher education (HES), and private non-profit (PNP). It is further broken down into five sources of funds: BES, GOV, HES, PNP and abroad. In this publication, R&D expenditure funded from HES and PNP have been re-grouped under 'other national sources'.

The **business enterprise sector** (BES) includes all firms, organisations and institutions whose primary activity is the market production of goods or services (other than higher education) for sale to the general public at an economically significant price. The **government sector** is composed of all departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, that cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community. (Public enterprises are included in the business enterprise sector.) The **private non-profit sector** includes non-market, private non-profit institutions serving households (i.e. the general public), private individuals or households. The **higher education sector** consists of all universities, colleges of technology and other institutions of post-secondary education, whatever their source of finance or legal status. It also includes all research institutes, experimental stations and clinics operating under the direct control of or administered by or associated with higher education institutions. The **abroad sector** includes all institutions and individuals located outside the political borders of a country, except vehicles, ships, aircraft and space satellites operated by domestic entities and testing grounds acquired by such entities. It also includes all international organisations (except business enterprises), including facilities and operations within the country's borders.

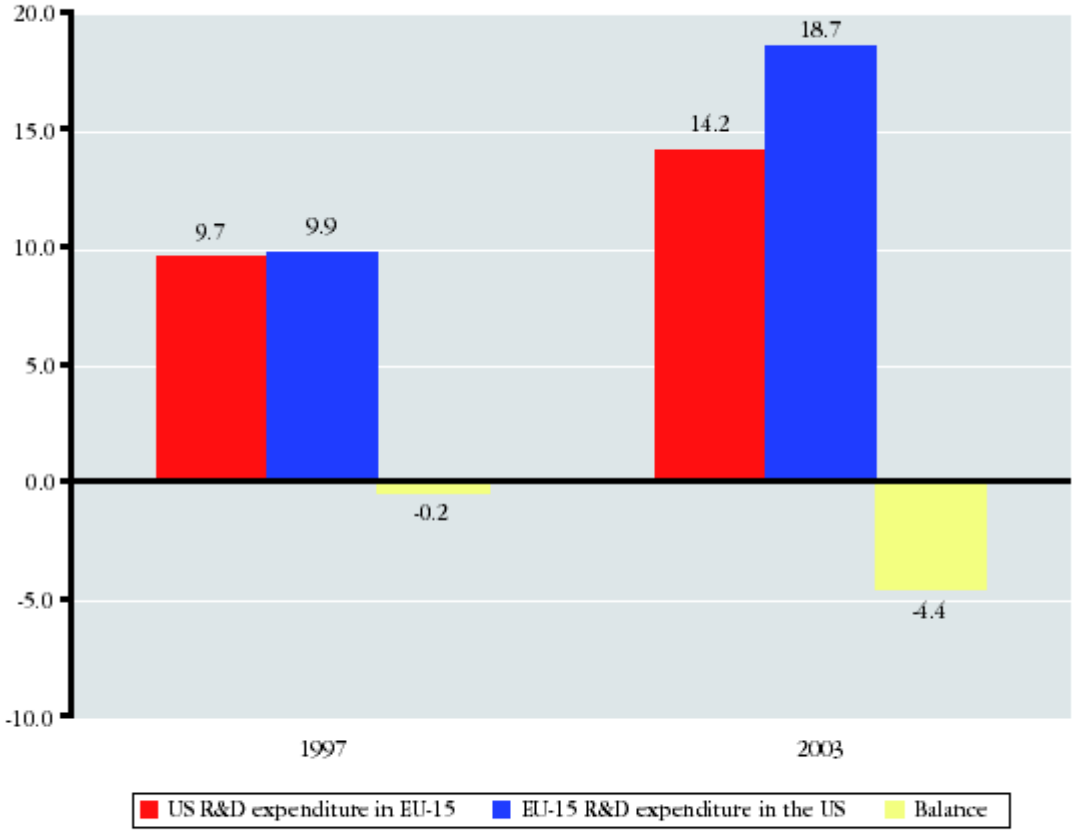
Table I.1.2 Contribution of the main funding sectors (business, government)[1] to the overall R&D intensity gap, 2005[2]

	R&D intensity (GERD as % of GDP)	Privately financed R&D intensity (GERD financed by business) as % of GDP)	Publicly financed R&D intensity (GERD financed by government) as % of GDP)
EU-27 [1]	1.84	1.00	0.64
US	2.67	1.70	0.83
Japan	3.17	2.37	0.57
South Korea	2.99	2.13	0.69
US - EU gap	0.83	0.70	0.19
Japan - EU gap	1.33	1.37	-0.07
South Korea - EU gap	1.15	1.13	0.05

Source: DG Research Key Figures 2007
Data: Eurostat, OECD
Notes: (1) Funding from abroad and from other national sources is not shown on the Table.
(2) US, JP: 2004.

Traditionally, R&D internationalisation has been an intra-Triad pheno - menon with the EU, but especially the US, as major locations. One of the reasons for the EU's low R&D intensity, compared to the US, is the decision of large European companies to carry out R&D activities in the US rather than in the EU.These companies probably have good reasons for doing so: their principal market may be in the US or they may want to benefit from American technical expertise. Nevertheless, this phenomenon should normally be reciprocal, with US companies deciding to do research in the EU in order to benefit from local expertise or market openings. However, there is evidence that this is not the case. EU companies tend to invest more in R&D in the US than do their US counterparts in the EU. Between 1997 and 2003, US R&D spending in EU-15 increased from 9.7 to 14.2 billion PPP$, while EU-15 R&D spending in the US increased from 9.9 to 18.7 billion PPP$, turning a net outflow of 0.2 billion into one of 4.4 billion PPP$ (Figure I.2.2).

Figure I.2.2 R&D expenditure flows between EU-15 and the US (billion PPP$), 1997 and 2003



Source: DG Research
Data: OECD (Activities of Foreign Affiliates database).

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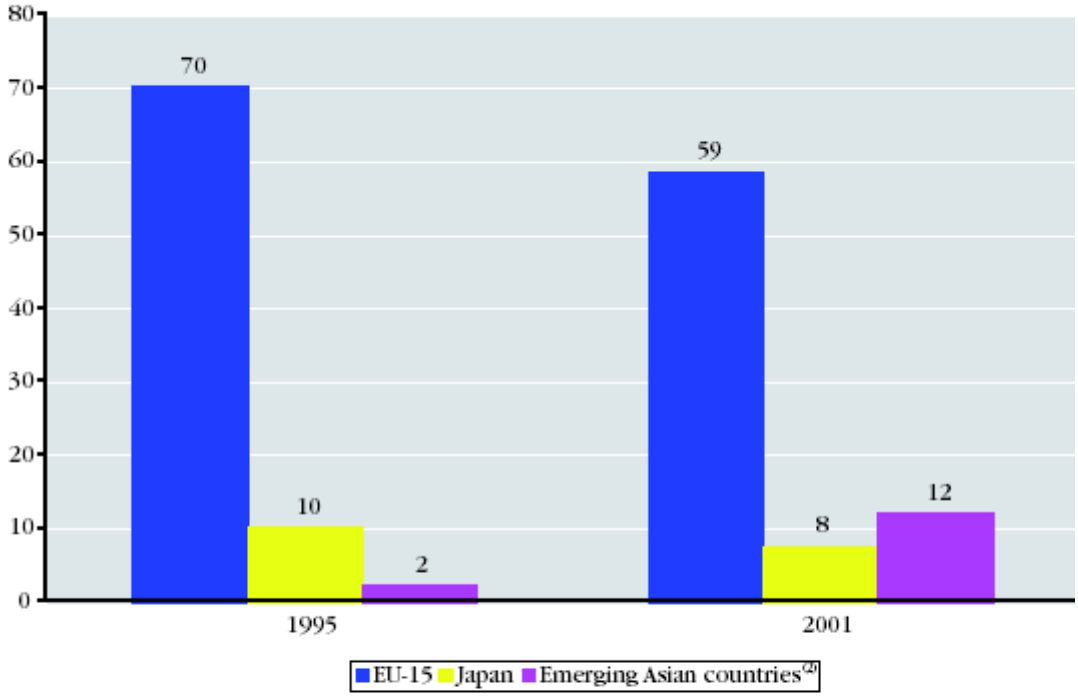
Figure I.2.3 Destination of US outward R&D spending(1) in 1995 and 2001
(% share of host region in total US outward R&D spending worldwide)



Source: DG Research Key Figures 2007

Data: US Bureau of Economic Analysis: US Direct Investment Abroad - Operations of US Parent Companies and Their Foreign Affilates (Washington DC, annual series)

Notes: (1) US outward R&D spending refers to R&D expenditure performed by majority-owned (more than 50% ownership) non-bank foreign affiliates of non-bank US parent companies. Data include R&D expenditures conducted by affiliates, whether for themselves or for others under contract; exclude R&D expenditures conducted by others for affiliates under contract.
(2) China, Hong Kong, India, Indonesia, South Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand.

In the EU, a smaller share of business R&D is taking place in high-tech sectors compared to the US

Despite comparability problems, one can estimate that at least three quarters of total business R&D is concentrated in manufacturing industries in both the EU and the US(14). A comparison of the distribution of manufacturing R&D across industrial sectors according to their level of technology intensity shows that in the US, manufacturing R&D is more concentrated in high-tech sectors than in the EU (see Table I.2.1). In 2003, 55 % of total EU manufacturing R&D occurred in high-tech sectors compared with 70 % in the US. European industrial R&D is more likely to be concentrated in medium-high-tech and, to a lesser extent, medium-low-tech manufacturing. As shown in Table I.2.1, high-tech industries show a slightly higher R&D intensity in the US than in the EU. This, however, may be due to the inclusion of the sector 'total chemicals' in the high-tech category (see note (1) under Table I.2.1). 'Total chemicals' is larger in the EU than in the US but in both the EU and the US it is also less R&D intensive than hightech industries. Medium-high-tech and medium-low-tech industries have very similar levels of R&D intensity in both the EU and the US. In conclusion, it appears that R&D intensity by type of industry is very similar in the EU and the US(15). Therefore, the higher concentration of business R&D in high-tech industries in the US largely emanates from differences in industrial

Table I.2.1 Manufacturing BERD and value added by type of industry, 2003(1)

	Total manufacturing	of which :			
		High-Tech	Medium-High-Tech	Medium-Low-Tech	Low-Tech
Manufacturing BERD as % of total GDP					
EU-27(2)	1.02	0.56	0.35	0.07	0.04
US	1.18	0.81	0.25	0.05	0.07
Ratio US / EU-27 (2)	115%	146%	70%	74%	154%
Value Added as % of total GDP					
EU-27 (2)	15.9	3.1	3.8	3.8	5.2
US	13.4	3.7	2.6	2.8	4.3
Ratio US / EU-27 (2)	84%	121%	68%	73%	83%
Manufacturing BERD as % of Value Added					
EU-27 (2)	6.4	18.1	9.3	1.8	0.9
US	8.8	21.9	9.5	1.8	1.6

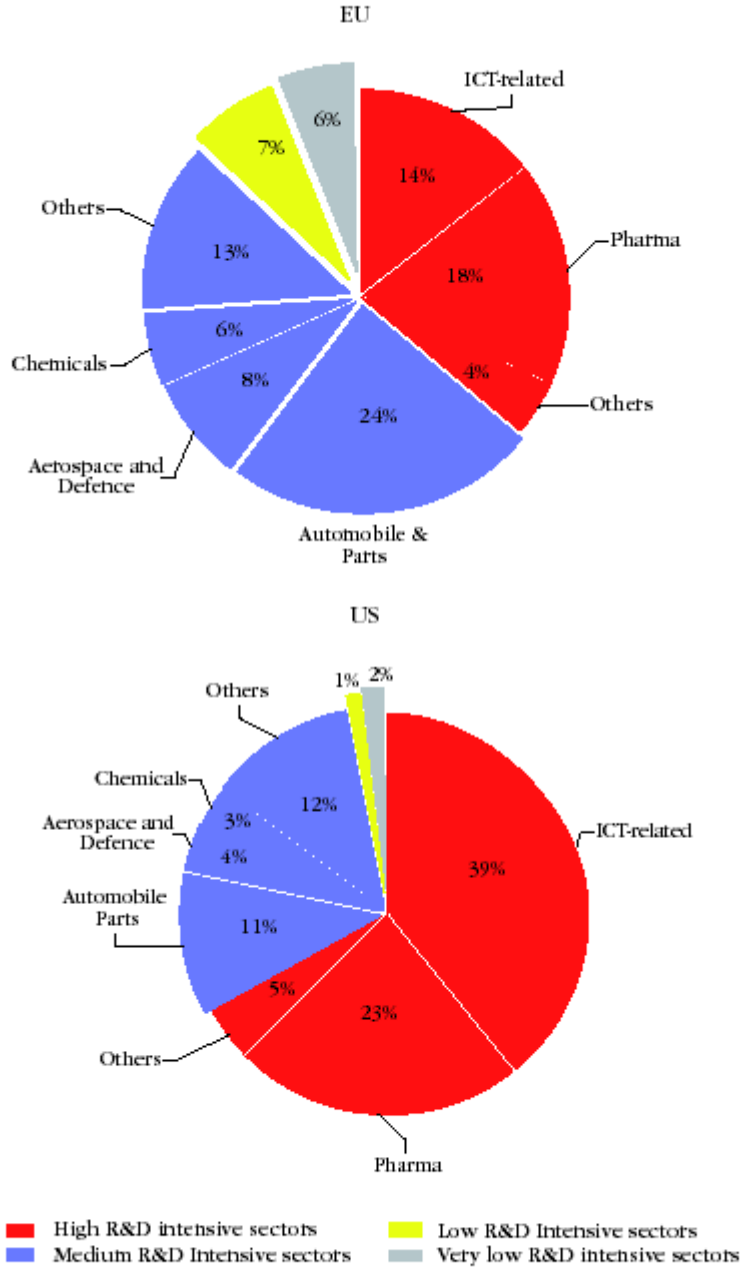
Source: DG Research Key Figures 2007

Data: Eurostat, OECD, Groningen Growth and Development Centre

Notes: (1) In the absence of a breakdown for value added between pharmaceuticals (high-tech) and other chemical products (medium-high-tech), total chemicals (i.e. pharmaceuticals + other chemical products) has been included in high-tech.

(2) EU-27 does not include: BG, EE, LV, LT, LU, CY, MT, AT, PT, RO, SI, SK.

Figure I.2.5 Sectoral composition of R&D investment by EU and US companies, 2005



Source: DG Research
Data: The 2006 EU Industrial R&D investment Scoreboard

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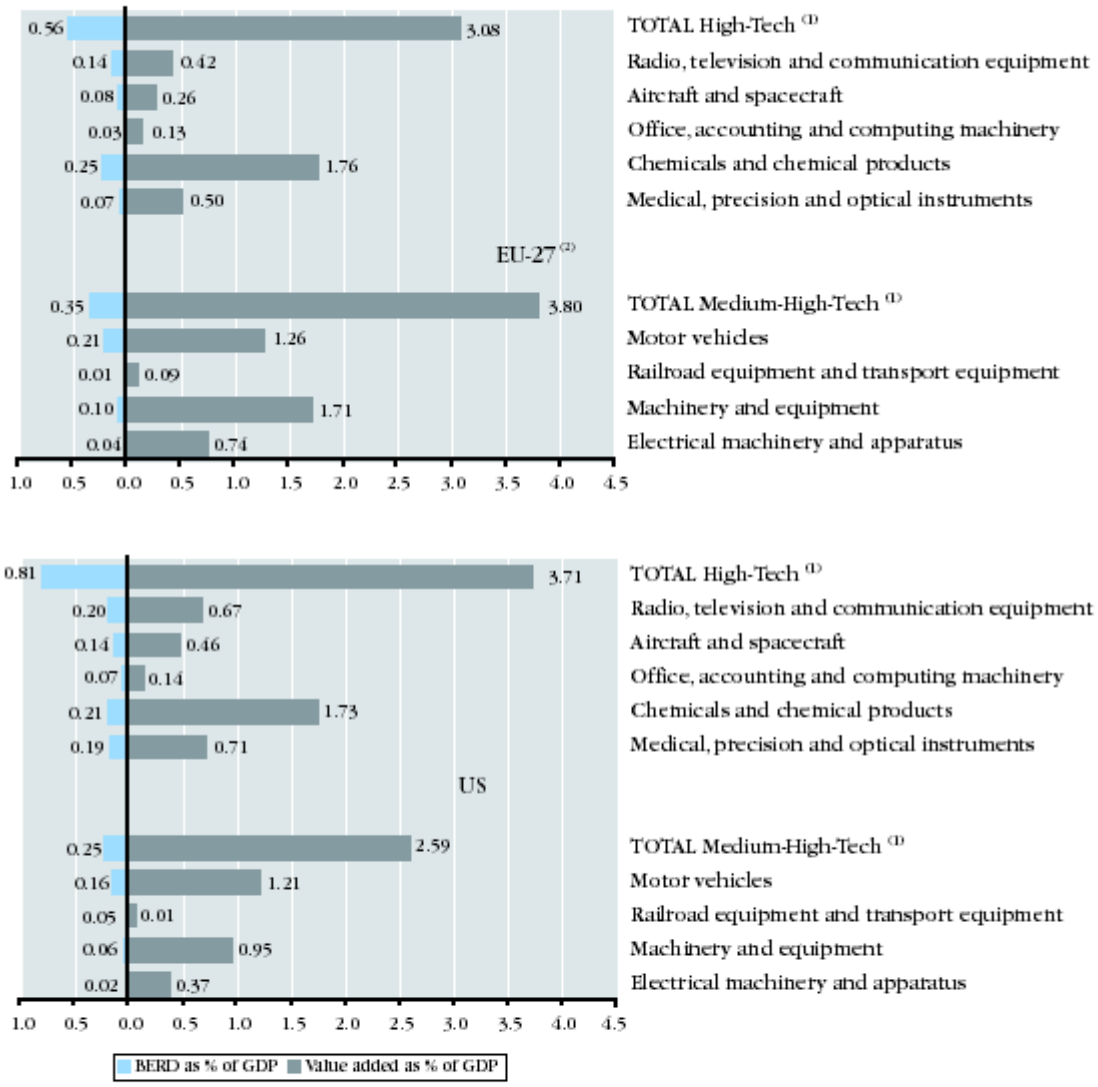
As shown in Table I.2.1, in the US, high-tech industries account for a much larger share of both industrial value added and GDP than in the EU. In the EU, the industrial texture is more concentrated on medium-high-tech, medium-low-tech and lowtech activities. Although not fully comparable with the ANBERD data used here to analyse the distribution of business R&D across sectors, data from the '2006 Industrial R&D Investment Scoreboard' on the composition of corporate investment made by the largest R&D spending companies worldwide confirm the differences between the EU and the US. According to the Scoreboard, EU companies considered sector by sector appear to be as R&D intensive as their US counterparts(16).The deficit in private R&D spending is mostly due to differences in industry structure and the smaller size of the high-tech sectors. As illustrated in Figure I.2.5, 67 % of US corporate R&D investment is made by companies belonging to high R&D intensity sectors, compared to just 36 % for EU companies. Figure I.2.5 also illustrates how the ICT sector accounts for a large part of the difference in the sectoral composition of R&D investment by US and EU companies(17).

Figure I.2.6 High-tech and medium-high-tech industries (1) - BERD as % of GDP and value added as % of GDP, EU-27 (2) and the US, 2003



Source: DG Research — Key Figures 2007

Data: Eurostat, OECD, Groningen Growth and Development Centre

Notes: (1) In the absence of a breakdown for value added between pharmaceuticals (high-tech) and other chemical products (medium-high-tech), total chemicals (i.e. pharmaceuticals + other chemical products) has been included in high-tech.
(2) EU-27 does not include: BG, EE, LV, LT, LU, CY, MT, AT, PT, RO, SI, SK.

Figure I.2.6 shows both the R&D expenditure and the value added (as percentage of GDP) for each sub-sector of the high-tech and mediumhigh- tech industries. Figure I.2.7 shows the R&D intensity of each individual sub-sector.The following observations can be made. The sector 'Chemicals' does not play a significant role in explaining differences between the EU and the US and the higher concentration of R&D in high-tech sectors in the US. This sector is equally large in both economies (somewhat bigger in the EU) and it is as R&D-intensive in the EU as in the US (even slightly more R&D-intensive in the EU). 'Aircraft and spacecraft' industries have equal R&D intensities on both sides of the Atlantic, but in the US this sector is almost twice as large as in the EU. It therefore contributes to the higher concentration of R&D in the high-tech sector in the US, but only because of its larger size. The 'ICT manufacturing industries'(18) largely explain the higher con - centration of R&D in the high-tech sectors in the US, by virtue both of their high R&D intensity and their larger size. 'Office, accounting and computing machinery' is much more R&D-intensive in the US than in the EU, but is equally small in both economies. 'Radio, television and communication equipment' is slightly less R&D-intensive in the US, but this industrial sector is 60 % bigger

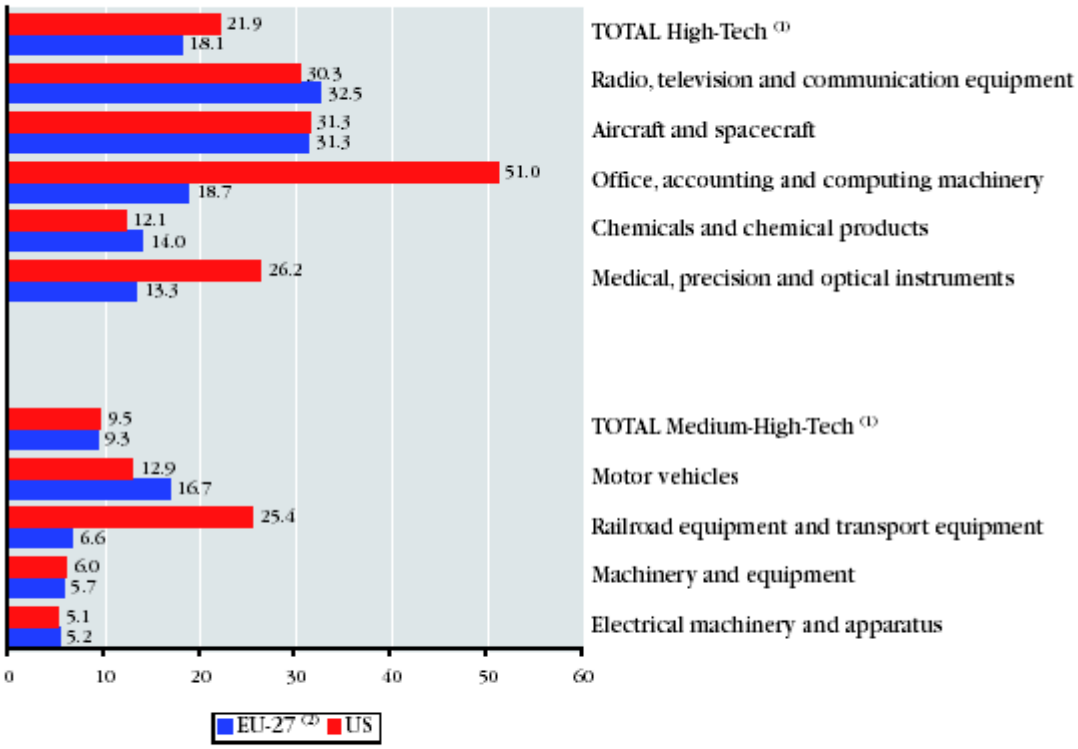
than in the EU. Finally, 'Medical, precision and optical instruments' is twice as R&D-intensive and almost 50 % bigger in the US than in the EU.

Two main conclusions can be drawn. First, it is clear that ICT manufa - cturing industries play a crucial role in explaining the R&D funding gap between the EU and the US, not only because they tend to be more R&Dintensive in the US, but also because of their larger size. To a much smaller extent, 'Aircraft and spacecraft' industries also contribute to the EU R&D deficit. Second, structural differences between the two economies (i.e. the larger share of both the ICT manufacturing industries and the 'Aircraft and spacecraft' industries in the industrial texture of the US) seem to be at least as important as the 'intrinsic effect' (i.e. sector-specific R&D intensities). Similarly, one can examine which sectors are responsible for the higher concentration of R&D expenditure in medium-high-tech sectors in the EU.

The sector 'Railroad and transport equipment' does not play any significant role in the explanation of the differences: this sector is much more R&D-intensive in the US than in the EU, but it is equally very small in both economies. 'Motor vehicles' also plays a rather limited role: it is only slightly bigger and more R&D-intensive in the EU. The major differences come from 'Machinery and equipment' and, to a lesser extent, 'Electrical machinery and apparatus'. These two sectors have similar R&D intensities in the EU and the US, but are twice as big in the EU as in the US.

Here again, structural differences and the larger size of sectors seem to account for the largest part of the differences between the EU and the US.

Figure I.2.7 High-tech and medium-high-tech industries(1) - BERD as % of value added, EU-27(2) and the US, 2003



Source: DG Research — Key Figures 2007

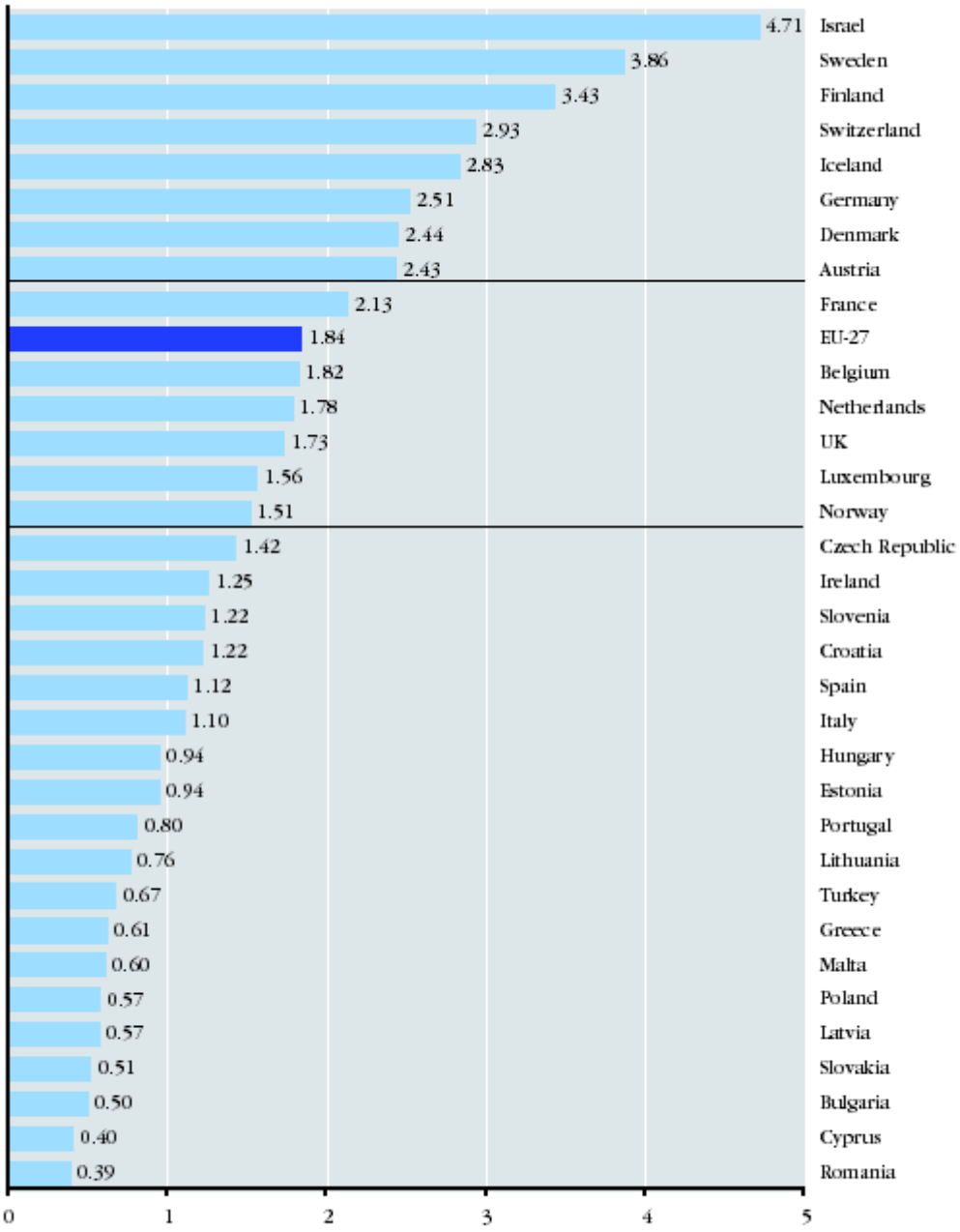
Data: Eurostat, OECD, Groningen Growth and Development Centre

Notes: (1) In the absence of a breakdown for value added between pharmaceuticals (high-tech) and other chemical products (medium-high-tech), total chemicals (i.e. pharmaceuticals + other chemical products) has been included in high-tech.

(2) EU-27 does not include: BG, EE, LV, LT, LU, CY, MT, AT, PT, RO, SI, SK.

R&D intensity in Europe: large disparities and limited convergence

Figure II.1.1 R&D intensity (GERD as % of GDP), 2005(1)



Source: DG Research
Data: Eurostat, OECD
Note: (1) IT, NL, RO, UK, HR, TR, IS, CH: 2004; AT, FI: 2006.

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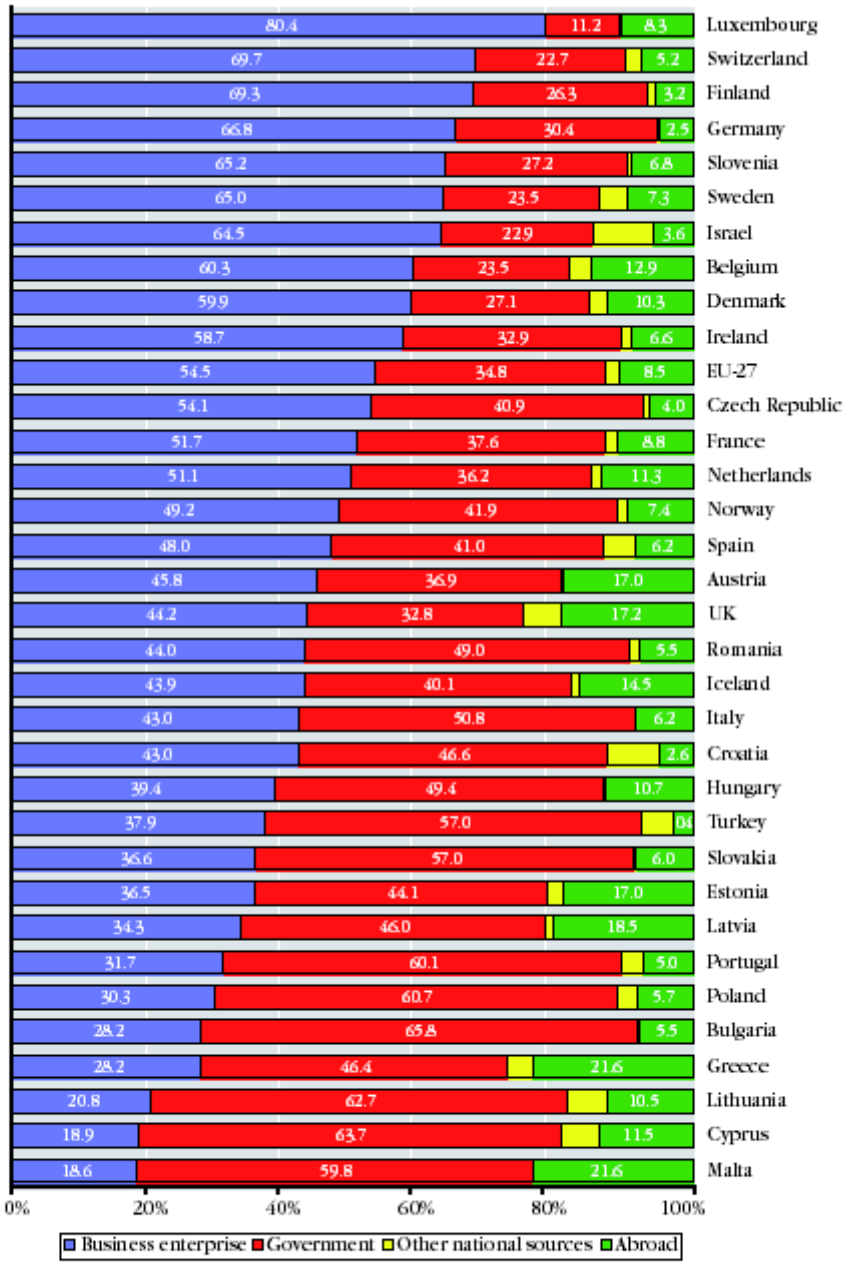
Figure II.1.4 R&D expenditure by main sources of funds (%), 2005(1)



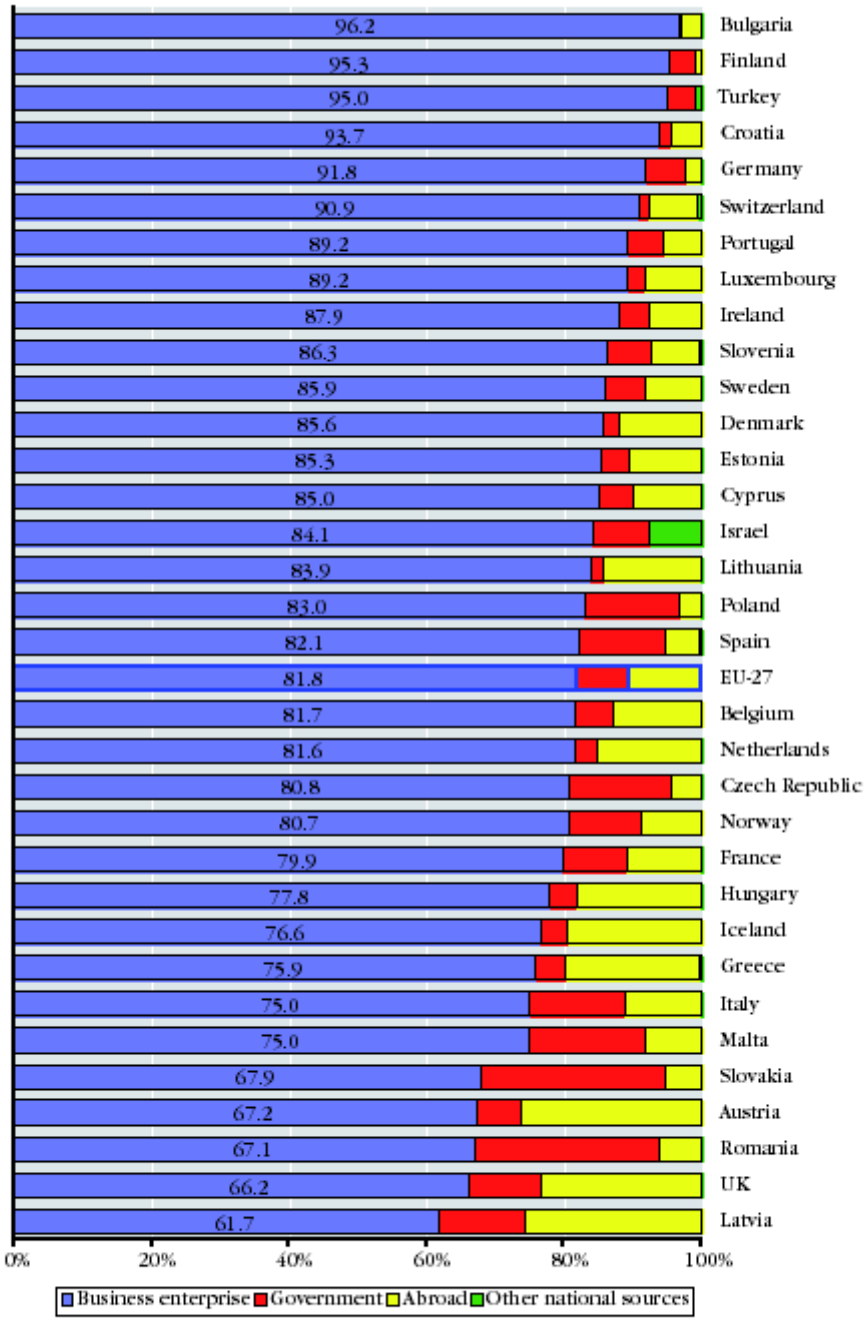
Source: DG Research Key Figures 2007
Data: Eurostat, OECD
Note: (1) IT: 1996; MT, IL: 2002; BE, DK, EL, LU, NL, PT, SE, IS, NO: 2003; BG, DE, EE, ES, FR, CY, RO, FI, UK, HR, TR: 2004; AT: 2006.

Table II.1.1 Manufacturing BERD by type of industry, 2004(1)

	High-Tech	Medium-High-Tech	Medium-Low-Tech	Low-Tech
Lithuania	8.7	60.5	7.0	23.8
Czech Republic	18.8	66.6	10.8	3.9
Malta	28.5	42.8	14.3	14.3
Turkey	29.4	44.2	18.9	7.5
Poland	30.5	48.2	11.8	9.5
Norway	31.6	32.5	16.1	19.8
Germany	33.5	58.6	5.7	2.1
Spain	35.9	39.1	13.8	11.2
Croatia	37.7	19.5	20.8	22.1
Latvia	39.0	39.1	13.6	8.3
Iceland	45.1	29.8	6.2	18.9
Italy	46.5	41.0	6.7	5.8
EU-27 (2)	46.7	42.3	6.6	4.4
Greece	47.2	32.7	4.9	15.3
Belgium	49.5	29.9	14.1	6.5
Netherlands	50.9	36.9	4.2	8.0
Cyprus	51.0	23.3	2.4	23.3
France	51.8	34.8	8.8	4.6
Denmark	57.9	26.5	4.0	11.6
Sweden	58.5	34.1	3.9	3.5
Hungary	60.2	32.1	4.2	3.4
UK	62.5	28.2	5.6	3.6
Ireland	62.7	22.3	5.6	9.4
Finland	66.4	19.5	7.1	6.9
Slovenia	70.3	18.9	7.0	3.7

Source: DG Research — Key Figures 2007
Data: Eurostat, OECD
Notes: (1) MT, TR: 2002; EL, FR, CY, LV, LT, HU, SE, EU-27, HR, IS: 2003.
(2) EU-27 does not include: BG, EE, LU, MT, AT, PT, RO, SK.
(3) There is an element of estimation involved in the data for DK, LV and LT.

Figure II.1.10 BERD by main sources of funds, 2005 (1)



Source: DG Research

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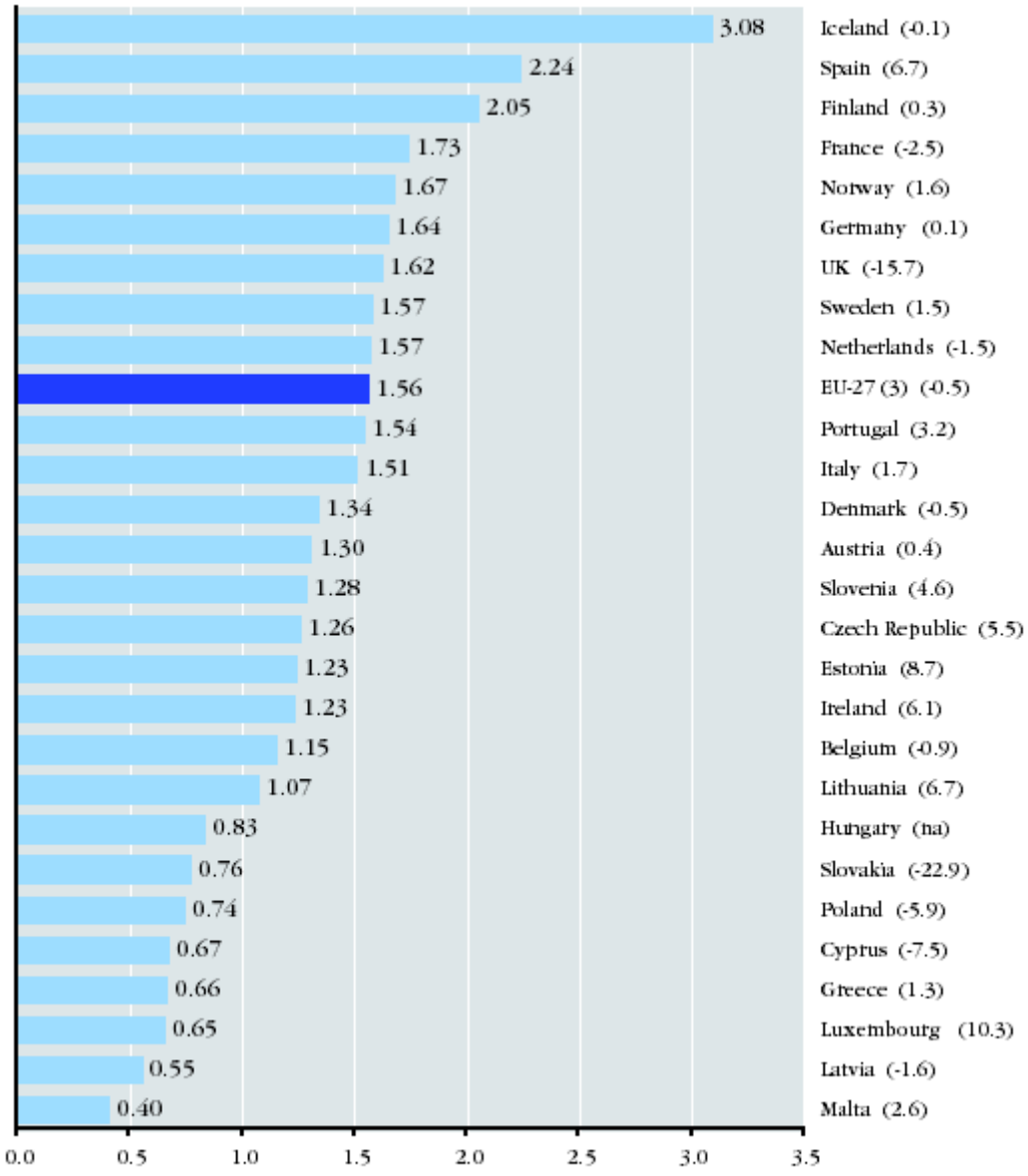
Data: Eurostat, OECD

Note: (1) MT, IL: 2002; BE, DK, EL, LU, NL, PT, SE, IS, NO: 2003; BG, DE, EE, ES, FR, IT, CY, AT, RO, FI, UK, HR, TR, CH: 2004

Declining government R&D budgets at EU level in spite of increased commitments by some Member States

In 2005, the EU Government Budget Appropriations or Outlays for R&D (GBAORD) amounted to 1.56 % of general government expenditure (Figure II.1.18). Over the period 2001-2005, the R&D share of the government budget slightly decreased in EU-27, with an annual growth rate of -0.5 % on average over this period. Fifteen European countries have a GBAORD of 1-2 % of the government budget, with a cluster of countries in the 1.5-1.7 % range. All new Member States devoted less than 1.3 % of their budgets to R&D. Among old Member States, only Ireland, Belgium, Greece and Luxembourg have R&D shares below 1.3 % of the government budget. In many European countries, the share of the government budget allocated to R&D has evolved considerably since 2001. Spain committed a much larger part of its government budget to R&D in 2005 than in 2001, and is now first in the EU. At the other end of the scale, Slovakia and the United Kingdom significantly cut their public R&D budgets, as did France to a much lesser extent.

Figure II.1.18 GBAORD as % of general government expenditure, 2005(1); in brackets: average annual growth rates (%), 2001-2005(2)



Source: DG Research
Data: Eurostat
Notes: (1) PL, IS, EU-27: 2004.
(2) PL, IS, EU-27: 2001-2004; CZ, SK: 2002-2005; CY, MT: 2004-2005.
(3) EU-27 does not include BG and RO.

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II.2 Human resources in Science and Technology

Introduction

R&D and other S&T activities are not possible without human resources. If the R&D expenditure target of 3 % of GDP is to be achieved, ensuring there are sufficient human resources for research is a preliminary step in the right direction. To this end, the European Commission advocates increasing the proportion of researchers in the labour force from five to eight per thousand. This section first analyses investment in education and, more specifically, investment in tertiary education. This is followed by an assessment of the number of graduates from tertiary education and the participation of foreign students in tertiary education. Finally, we provide an overview of human resources in science and technology and of R&D personnel and researchers.

Investment in education

Education and in particular tertiary education, not only renews stocks of human capital but also promotes economic growth. Therefore, investment in education can be seen much more as an investment in future economic well-being rather than as an investment in individual success. Within the EU, total public expenditure on education in 2003 amounted to 5.17 % of GDP. Only 1.14 % of GDP was allocated to tertiary education. However, wide differences exist between the EU Member States, both at all levels of education and specifically at the tertiary level. In terms of public expenditure as a percentage of GDP on tertiary education, the Nordic countries have the highest shares, with Denmark at the top (2.50%), followed by Sweden (2.16 %) and Finland (2.05 %). Public expenditure on tertiary education also accounts for more than 2 % of GDP in Norway (2.32 %). Expenditure on educational institutions from public sources represented 4.88 % of GDP in EU-27 in 2003, compared with 0.63 % of GDP for expenditure from private sources. Among Member States, Malta and Cyprus were the only countries where expenditure on educational institutions from private sources was higher than 1 %.

S&T labour Force

In 2006, highly-qualified S&T workers represented 15.4 % of the EU-27 labour force.At the national level, they accounted for more than one fifth of the labour force in Belgium, Denmark, Luxembourg, the Netherlands, Finland and Sweden, as well as in Norway. As one might expect, highly R&D-intensive countries have the largest shares of core S&T workers in the total labour force.

Table II.2.1 Expenditure on education as a % of GDP, 2003

	Total public expenditure on education as % of GDP		Expenditure on educational institutions by source as % of GDP	
	All levels	Tertiary	Public sources	Private sources
Belgium	6.06	1.31	5.74	0.35
Bulgaria	4.24	0.84	3.91	0.67
Czech Republic	4.51	0.94	4.30	0.37
Denmark	8.33	2.50	6.70	0.32
Germany	4.71	1.19	4.36	0.92
Estonia	5.43	1.05	5.11	:
Ireland	4.41	1.09	4.11	0.31
Greece	3.94	1.22	3.86	0.22
Spain	4.28	0.99	4.16	0.54
France	5.88	1.19	5.65	0.60
Italy	4.74	0.78	4.53	0.40
Cyprus	7.30	1.55	6.43	1.35
Latvia	5.32	0.74	4.90	0.83
Lithuania	5.18	1.00	4.81	0.46
Luxembourg	3.80	:	3.71	:
Hungary	5.85	1.21	5.46	0.56
Malta	4.78	0.83	4.33	1.42
Netherlands	5.07	1.33	4.50	0.48
Austria	5.50	1.29	5.21	0.30
Poland	5.62	1.03	5.57	0.66
Portugal	5.61	1.01	5.53	0.09
Romania	3.44	0.68	3.38	:
Slovenia	6.02	1.34	5.44	0.86
Slovakia	4.34	0.85	4.21	0.46
Finland	6.41	2.05	5.91	0.13
Sweden	7.47	2.16	6.55	0.19
UK	5.38	1.06	5.11	0.97
EU-27	5.17	1.14	4.88	0.63
Croatia	4.53	0.84	4.49	:
Turkey	3.74	1.21	3.56	0.05
Former Yugoslav Republic of Macedonia	3.39	0.51	3.31	:
Iceland	7.81	1.35	7.21	0.71
Norway	7.62	2.32	6.45	0.10
Switzerland	6.04	1.64	5.91	0.63

Source: DG Research
Data: Eurostat

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Table II.2.2 Number of graduates from tertiary education by field of education, 2004(1)

	All fields of education		Science		Engineering	
	Total (000s)	% women	Total (000s)	% women	Total (000s)	% women
Belgium	77	57.1	7	30.3	8	20.8
Bulgaria	46	58.3	2	56.4	7	37.2
Czech Republic	54	58.0	4	39.5	8	24.2
Denmark	47	58.8	4	33.5	5	31.1
Germany	320	52.7	32	34.9	54	17.1
Estonia	10	71.6	1	47.9	1	33.1
Ireland	56	57.0	8	43.0	7	17.5
Greece	48	60.9	8	41.9	5	38.0
Spain	298	57.7	33	37.2	50	25.8
France	585	56.6	76	41.0	95	21.7
Italy	325	58.1	24	53.7	50	28.7
Cyprus	4	59.7	0	42.9	0	20.2
Latvia	24	69.2	1	39.3	2	28.2
Lithuania	38	66.5	2	43.9	6	33.3
Luxembourg	:	:	:	:	:	:
Hungary	68	63.5	3	37.6	5	23.7
Malta	2	57.3	0	30.0	0	31.3
Netherlands	97	56.1	7	24.1	9	15.9
Austria	31	50.6	3	35.7	6	17.2
Poland	486	65.5	25	41.1	34	27.6
Portugal	69	65.9	7	50.8	10	33.9
Romania	147	57.3	8	58.8	26	32.4
Slovenia	15	60.4	1	40.0	2	21.2
Slovakia	35	56.7	3	41.1	5	31.6
Finland	39	62.0	3	48.8	8	21.8
Sweden	54	61.0	5	45.9	12	28.6
UK	596	57.7	87	37.4	48	20.1
EU-27	3570	58.7	355	40.3	465	24.3
Turkey	259	44.0	25	45.1	50	23.2
Iceland	3	66.6	0	42.0	0	29.7
Norway	32	60.3	3	26.2	3	22.7
Switzerland	60	44.1	6	21.8	7	11.4

Source: DG Research
Data: Eurostat,
Notes: (1) FR, MT, FI: 2003.

Key Figures 2007

Table II.2.4 Highly qualified scientific and technical workers (HRSTC)[1] as % of labour force and as % of total S&T human resources with tertiary education (HRSTE), share of women and age distribution, 2006[2]

	as % of labour force	as % of HRSTE	share of women (%)	Age distribution (%)		
				25-34	35-44	45-64
Belgium	21.1	46.9	53.0	31.9	30.6	30.9
Bulgaria	14.7	45.2	67.7	24.9	29.2	42.8
Czech Republic	10.8	59.3	45.6	31.6	25.8	37.8
Denmark	23.6	58.9	56.6	27.2	30.1	40.6
Germany	15.8	49.0	43.0	20.9	34.1	42.4
Estonia	16.8	41.7	71.6	27.6	25.9	36.2
Ireland	16.9	44.1	54.2	37.1	25.8	27.8
Greece	15.8	53.4	49.6	29.9	33.8	33.0
Spain	16.6	43.8	50.6	36.8	29.5	28.3
France	17.1	47.8	52.0	35.8	28.0	30.5
Italy	11.0	57.0	50.8	27.7	33.8	35.2
Cyprus	18.8	49.3	50.0	41.4	24.3	27.1
Latvia	13.8	50.0	71.1	29.6	24.5	32.7
Lithuania	16.6	45.3	71.2	35.2	27.7	28.8
Luxembourg	24.3	64.5	44.9	36.7	32.7	30.6
Hungary	14.1	53.2	57.2	34.3	23.6	37.6
Malta	12.0	58.8	50.0	45.0	20.0	25.0
Netherlands	20.4	54.7	48.1	28.6	28.4	37.8
Austria	11.2	48.2	46.6	28.0	33.2	35.6
Poland	13.7	53.7	59.1	43.1	23.6	28.1
Portugal	9.8	61.4	61.5	38.3	28.6	28.3
Romania	9.8	62.4	52.0	35.6	24.1	36.4
Slovenia	16.6	59.6	59.6	33.9	29.2	33.9
Slovakia	10.6	57.0	50.0	33.7	23.0	39.0
Finland	20.1	49.1	59.0	25.5	30.3	43.0
Sweden	21.6	62.5	59.0	28.9	25.7	41.8
UK	17.0	50.3	51.6	28.9	27.3	36.6
EU-27	15.4	50.6	51.4	30.6	29.3	35.3
Iceland	19.5	71.7	54.5	30.3	27.3	36.4
Norway	23.2	62.2	54.9	27.9	29.2	39.0
Switzerland	18.3	55.3	35.0	26.7	31.6	38.2

Source: DG Research Key Figures 2007
Data: Eurostat
Notes: (1) Highly qualified scientific and technical workers (HRSTC) refer to the group of people both educated AND employed in scientific and technical occupations (see box).
(2) LU, IS, CH: 2005.

Box 4: Researchers and human resources in science and technology

According to the OECD Frascati Manual, researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned. Researchers are classified in ISCO-88 Major Group 2 (sub-major groups 21, 22, 23, 24), 'Professionals', and in 'Research and Development Department Managers' (ISCO-88, 1237). Human resources in science and technology (HRST) comprise people who have successfully completed education at the third level in an S&T field of study (natural sciences, engineering and technology, medical sciences, agricultural sciences, social sciences and humanities – Canberra Manual, §71) and also people who, although not formally qualified in this way, are employed in an S&T occupation where such qualification is normally required (corresponding to professionals and technicians – ISCO-88 International Standard Classification of Occupations levels 2 and 3 and also certain managers, ISCO 121, 122 and 131). Human resources in science and technology – Core (HRSTC) comprise people who have successfully completed education at the third level in an S&T field of study and are employed in an S&T occupation. HRSTE refer to human resources educated in science and technology, but not necessarily employed in an S&T occupation.

Table II.2.5 Total R&D personnel and researchers (FTE), by sector of performance, 2004(1)

	All sectors		Business enterprise		Government		Higher education		Private non-profit	
	R&D personnel	Researchers	R&D personnel	Researchers	R&D personnel	Researchers	R&D personnel	Researchers	R&D personnel	Researchers
Belgium	52911	31465	31436	16322	3813	2124	17062	12742	600	277
Bulgaria	15647	9827	2158	1239	10384	6168	3036	2362	69	58
Czech Republic	28765	16300	15064	7297	7422	4661	6104	4274	175	68
Denmark(2)	42687	26167	28040	15877	3250	2287	11139	7846	258	157
Germany	470971	270749	298017	162339	76862	42646	96092	65764	:	:
Estonia	4735	3369	1083	661	810	486	2752	2162	90	60
Ireland	15713	10910	9650	6200	1222	559	4841	4151	:	:
Greece	34004	17024	11099	4328	5509	2307	17189	10251	206	138
Spain	161933	100994	71123	32054	27166	17151	63331	51616	313	173
France(3)	352485	200064	197223	106439	51931	24779	97036	65498	6295	3350
Italy	164026	72012	67519	27594	32401	14237	60694	28226	3412	1955
Cyprus	1017	583	224	108	352	104	368	349	72	22
Latvia	5103	3324	881	448	1013	490	3208	2385	1	1
Lithuania	10557	7356	981	484	3041	1676	6535	5196	:	:
Luxembourg	4318	2031	3655	1546	512	342	151	143	:	:
Hungary(3)	22826	14904	6704	4309	7595	4693	8527	5902	:	:
Malta	717	436	383	199	45	19	288	218	0	0
Netherlands	91594	:	49915	23158	13579	7752	28100	:	:	:
Austria	42891	25955	29143	16508	2035	1030	11502	8281	212	137
Poland	78362	60944	12978	8334	19685	12804	45572	39716	127	90
Portugal	25590	20623	6166	3954	4545	3194	11520	10600	3360	2875
Romania	33361	21257	16368	9092	9853	6326	6917	5654	223	185
Slovenia	7132	4030	3855	1657	1750	1124	1482	1204	45	45
Slovakia(3)	14329	10718	3473	1815	3493	2345	7285	6509	77	49
Finland	58281	41004	32612	23397	7337	4200	17822	13037	510	370
Sweden	77925	54041	56941	34055	3391	2844	17223	16792	370	350
UK	:	:	151908	96747	20796	9205	:	:	:	:
EU-27	2089675	1248608	1114016	609407	312422	172102	642266	453796	20972	13302
Croatia	11162	7140	2831	1015	3634	2420	4697	3705	:	:
Iceland	3050	1987	1422	879	794	479	746	576	88	54
Norway	29745	21161	16260	11061	4985	3300	8500	6800	:	:
Switzerland(4)	52250	25400	33085	12640	810	425	18355	12335	:	:

Source: DG Research — Key Figures 2007
Data: Eurostat
Notes: (1) EL, SE: 2005.
(2) DK: Data on researchers in the private non-profit sector refer to the number of university graduates.
(3) FR, HU, SK: Defence is not included in the data for the government sector.
(4) CH: Government sector refers to federal or central government only.

Table II.5.1 EU-27(1) - % distribution of value added by sector, 1997-2003

	1997	1998	1999	2000	2001	2002	2003
Manufacturing	20	20	20	19	19	18	18
Services	68	69	70	70	70	71	72
Other	11	11	11	11	11	11	11
TOTAL	100	100	100	100	100	100	100

Source: DG Research — Key Figures 2007
Data: Groningen Growth and Development Centre
Note: (1) EU-27 does not include BG, EE, CY, LV, LT, MT, RO and SI.

The high-tech component of manufacturing industry

At the EU level, 19 % of manufacturing value added is accounted for by high-tech industries. Ireland is at the top of the group, with more than half of manufacturing value added generated by high-tech industries (the industry sector of 'chemicals' – including pharmaceuticals – represents almost half of this). It is interesting to note that among the top performing countries there are countries with a relatively high overall share of manufacturing in their economic base (e.g. Ireland, Finland), as well as countries which are mainly service-based but have an important element of high-tech activity in their manufacturing (e.g. Belgium, the United Kingdom, the Netherlands, France). Conversely at the lower end of the range Luxembourg, as well as the southern European countries and the new Member States, are characterised by a weak presence of high-tech activities within their manufacturing industry. For Luxembourg and Greece, the low importance of manufacturing industry in the economy (10 % of total value added in both cases) should be borne in mind when considering these figures. For the other countries in this group, however, manufacturing industry represents a significant share (16-26 %) of the total economy and is primarily concentrated in medium-low-tech and low-tech activities. This explains the relatively low shares of Austria and Italy, which have higher concentrations of manufacturing value added in medium-lowtech and low-tech industry. Finally, the unexceptional shares of Germany and Sweden are due to the fact that medium-high-tech activities very clearly dominate manufacturing activities.

Manufacturing industry technology categories

Definition: The four manufacturing industry technology categories are defined as follows (NACE codes are given in brackets):

(1) High-tech: office machinery and computers (30), radio, television and communication equipment and apparatus (32), medical, precision and optical instruments, watches and clocks (33), aircraft and spacecraft (35.3), pharmaceuticals, medicinal chemicals and botanical products (24.4)

(2) Medium-high-tech: machinery and equipment (29), electrical machinery and apparatus (31), motor vehicles, trailers and semi-trailers (34), other transport equipment (35), chemicals and chemical products excluding pharmaceuticals, medicinal chemicals and botanical products (24 excluding 24.4)

(3) Medium-low-tech: coke, refined petroleum products and nuclear fuel (23), rubber and plastic products (25), non-metallic mineral products (26), basic metals (27), fabricated metal products except machinery and equipment (28), building and repairing of ships and boats (35.1)

(4) Low-tech: food products and beverages (15), tobacco products (16), textiles (17), wearing apparel; dressing and dyeing of fur (18), tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness (19), wood and products of wood and cork, except furniture (20), pulp, paper and paper products (21), publishing, printing and reproduction of recorded media (22), furniture and other manufacturing (36), recycling (37).

S&E graduates

Definitions: Graduates are defined by the levels of education classified in ISCED 1997. In these Key Figures graduates include all tertiary degrees (ISCED 5a and 5b) and PhDs (ISCED 6). The S&E fields of study are: life sciences (ISC42), physical sciences (ISC44), mathematics and statistics (ISC46), computing (ISC48), engineering and engineering trades (ISC52), manufacturing and processing (ISC54), architecture and building (ISC58). *Particularities*: BE: data for the Flemish community exclude second qualifications. CY: Data exclude tertiary students graduating abroad. The fields of study in Cyprus are limited. EE: Data exclude master degrees (ISCED 5A). LU: Luxembourg does not have a complete university system; data refer only to ISCED 5B first degree. *Sources*: Eurostat. *Classification*: ISCED: International Standard Classification of Education (1997 version).

High-Tech Knowledge intensive services

Definitions: High-Tech knowledge intensive services are defined according to the Eurostat definition as: post and telecommunications, computer and related activities, research and development (i.e. NACE Rev.1 codes 64, 72, 73). The output of knowledge intensive high-tech services is defined as the value added of knowledge intensive services. Total output is defined as total gross value added at basic prices according to the National Accounts definition. *Sources*: Eurostat (SBS, CLFS and National Accounts), OECD (Science, Technology and Industry Scoreboard).

Cappellin, R. and Wink, R. (2009), *International Knowledge and Innovation Networks: Knowledge Creation and Innovation in Medium Technology Clusters*. Edward Elgar Publishing, Cheltenham.

2. The role and characteristics of medium-tech sectors

Riccardo Cappellin

BOX 2.1 MANUFACTURING INDUSTRY TECHNOLOGY CATEGORIES

Definition: The four manufacturing industry technology categories are defined as follows (NACE codes are given in brackets):

1. High-tech: office machinery and computers (30), radio, television and communication equipment and apparatus (32), medical, precision and optical instruments, watches and clocks (33), aircraft and spacecraft (35.3), pharmaceuticals, medicinal chemicals and botanical products (24.4).

2. Medium-high-tech: machinery and equipment (29), electrical machinery and apparatus (31), motor vehicles, trailers and semi-trailers (34), other transport equipment (35), chemicals and chemical products excluding pharmaceuticals, medicinal chemicals and botanical products (24 excluding 24.4).

3. Medium-low-tech: coke, refined petroleum products and nuclear fuel (23), rubber and plastic products (25), non-metallic mineral products (26), basic metals (27), fabricated metal products except machinery and equipment (28), building and repairing of ships and boats (35.1).

4. Low-tech: food products and beverages (15), tobacco products (16), textiles (17), wearing apparel; dressing and dyeing of fur (18), tanning and dressing of leather; manufacture of luggage, handbags, saddlery and harness (19), wood and products of wood and cork, except furniture (20), pulp, paper and paper products (21), publishing, printing and reproduction of recorded media (22), furniture and other manufacturing (36), recycling (37).

Sources: European Commission, 2005; European Union, 2000; Felix, 2006.

Table 2.1 Structure of OECDa manufacturing tradeb by technology intensity

	Share in Total Manufacturing Trade (%)					
	2000	2001	2002	2003	2004	2005
High technology (HT)	26.7	25.8	25.2	24.5	24.4	24.1
Medium-high technology (MHT)	37.6	38.0	38.8	39.3	39.0	38.7
Medium-low technology (MLT)	15.1	15.0	14.9	15.5	16.5	17.6
Low technology (LT)	20.1	20.7	20.9	20.7	19.6	19.0

Notes:
a. Excludes Luxembourg and Slovak Republic.
b. Average value of total OECD exports and imports of goods.

Source: OECD, STAN Indicators database, March 2005, www.oecd.org/sti/stan/indicators/.

Table 2.2 Composition of manufacturing exports of goods by technology intensity (2003 shares and absolute change shares in the 2000–03 period) (%)

		HT	MHT	MLT	LT			HT	MHT	MLT	LT
	2003	19.11	52.5	14.6	13.79		2003	12.49	16.48	29.21	41.81
Germany	00/03	–1.04	1.44	–0.16	–0.23	Greece	00/03	2.76	2.06	–6.51	1.68
	2003	11.04	39.84	18.96	30.17		2003	53.62	30.28	2.59	13.51
Italy	00/03	–0.58	1.06	0.27	–0.74	Ireland	00/03	3.47	–0.68	–0.37	–2.43
	2003	32.9	37.7	13.12	15.82		2003	31.06	29.48	16.07	23.39
United Kingdom	00/03	–3.59	2.19	0.37	1.21	Netherlands	00/03	–1.53	2.17	–1.26	0.62
	2003	14.89	40.67	18.27	26.17		2003	11.81	30.85	15.55	41.78
Austria	00/03	–0.82	0.39	–0.53	0.96	Portugal	00/03	1.52	–0.59	1.41	–2.35
	2003	19.41	42.1	16.94	21.55		2003	10.82	47.0	18.95	23.22
Belgium	00/03	5.45	0.67	–2.73	–3.4	Spain	00/03	0.66	0.08	–1.57	0.82
	2003	21.54	29.07	13.07	36.32		2003	21.95	38.36	17.32	22.36
Denmark	00/03	0.88	1.2	–0.89	–1.18	Sweden	00/03	–6.86	4.62	0.8	1.42
	2003	23.97	24.53	21.07	30.42						
Finland	00/03	–3.36	0.78	3.64	–1.06						
	2003	22.47	42.05	15.25	20.23						
France	00/03	–3.16	2.61	0.09	0.47						

Source: OECD, STAN Indicators database.

Table 2.3 The competitiveness of the European economy in medium-technology sectors (in millions, US dollars, at current prices)

		European Union (27) external			United States			Japan			China		
		Exports	Imports	Net exports	Exports	Imports	Net exports	Exports	Imports	Net exports	Exports	Imports	Net exports
Manufactures	2000	666.608	608.538	58.070	648.907	968.207	–319.300	449.686	212.666	237.020	219.859	169.883	49.976
	2007	1406.496	1187.164	219.332	909.393	1409.631	–500.239	640.881	314.428	326.453	1 134.805	677.633	457.172
Office and Telecom Equipment (OTE)	2000	83.962	145.289	–61.327	153.399	215.544	–62.145	108.179	60.866	47.313	43.498	44.427	–929
	2007	117.920	238.606	–120.686	134.934	262.074	–127.140	103.124	69.680	33.444	347.113	226.279	120.834
Machinery and Transport Equipment except OTE	2000	278.629	189.413	89.216	258.801	348.408	–89.607	221.482	45.202	176.279	39.102	47.504	–8.402
	2007	625.079	327.546	297.533	401.475	491.377	–89.902	348.757	80.920	267.837	229.932	186.181	43.751
Machinery and Transport Equipment	2000	362.591	334.702	27.889	412.200	563.952	–151.752	329.661	106.068	223.593	82.600	91.931	–9.331
	2007	742.999	566.152	176.847	536.409	753.451	–217.042	451.881	150.599	301.282	577.045	412.460	164.585

Source: World Trade Organization (2008).

Table 2.4 A comparison between EU-15 and US foreign trade

(a)	Export Ratio	Export Share (%)		Trade Balance/ Import (%)	
	EU/US	EU	US	EU	US
	2005	2005	2005	2005	2005
High tech	166.56	17.09	19.02	–8.43	−48.64
Medium tech	178.40	59.06	61.36	65.36	−18.57
Low tech	225.25	23.84	19.62	−11.17	−66.09
TOTAL	185.34	100.00	100.00	23.11	−41.26

(b)	Export Change (%)		Import Change (%)		Trade Balance Change (%)	
	EU	US	EU	US	EU	US
	2000–2005	2000–2005	2000–2005	2000–2005	2000–2005	2000–2005
High tech	89.38	4.27	73.24	36.08	*−10.05*	*100.72*
Medium tech	78.57	14.64	51.91	18.74	144.12	*40.80*
Low tech	57.28	17.99	58.89	37.43	*72.97*	*50.12*
TOTAL	74.64	13.13	58.70	28.22	208.75	*58.27*

Source: Our elaborations on OECD International Trade by Commodities Statistics: United States – SITC Rev. 3, Vol. 2007; European Union – 15 Extra EU – SITC Rev. 3, Vol. 2006.

Table 2.5 Employment in manufacturing by firm size (%)

	Total	Small	Medium	Large
		(1–49 emp.)	(50–249 emp.)	(>250 emp.)
Belgium	100.00	26.83	25.19	47.98
Bulgaria	100.00	28.72	35.15	36.13
Denmark	100.00	26.18	27.34	46.48
Germany	100.00	21.75	24.27	53.98
Estonia	100.00	32.35	37.68	29.97
Ireland	100.00	21.90	30.91	47.19
Greece	100.00	46.20	23.98	29.82
Spain	100.00	48.35	24.50	27.15
France	100.00	29.70	22.61	47.69
Italy	100.00	48.70	24.99	26.31
Cyprus	100.00	63.19	22.14	14.68
Latvia	100.00	33.15	35.96	30.89
Lithuania	100.00	27.76	35.20	37.04
Luxembourg	100.00	16.48	21.73	61.79
Hungary	100.00	27.95	25.86	46.18
Netherlands	100.00	34.33	29.85	35.82
Austria	100.00	26.21	27.23	46.56
Poland	100.00	24.96	32.09	42.95
Portugal	100.00	51.30	29.47	19.24
Romania	100.00	21.66	28.04	50.30
Slovenia	100.00	23.18	28.08	48.73
Slovakia	100.00	15.40	27.41	57.19
Finland	100.00	23.14	23.73	53.13
Sweden	100.00	24.57	23.29	52.14
UK	100.00	27.97	26.22	45.82
Norway	100.00	33.87	28.18	37.95

Note: Annual enterprise statistics on manufacturing subsections DF-DN (incl. coke, chemicals, plastics, minerals, metals, machinery and transport equipment) and total manufacturing (NACE D) 2005.

Source: Our elaborations on the Eurostat database on Science and Technology.

Table 2.6 EU-27 – employment in technology and knowledge-intensive sectors (% shares of total employment)

	2000	2004	2005	2006
High-technology manufacturing sector	1.27	1.11	1.07	1.08
Medium-high-technology manufacturing sector	6.13	5.66	5.51	5.52
Medium-low-technology manufacturing sector	4.66	4.44	4.34	4.36
Low-technology manufacturing sector	8.23	7.75	7.55	7.25
Total manufacturing sector	20.3	18.96	18.46	18.21
Total knowledge-intensive services:				
NACE Rev. 1.1 codes 61, 62, 64 to 67, 70 to 74, 80, 85 and 92	30.34	32.18	32.36	32.78
Total less-knowledge-intensive services:				
NACE Rev. 1.1 codes 50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95 and 99	33.12	33.32	33.71	33.67
Other sectors	16.24	15.54	15.47	15.34
TOTAL	100	100	100	100

Source: Eurostat database in Science and Technology.

Table 2.7 Annual data on employment by technology intensive sectors at the national level (2000–2006 percentage change and 2006 share)

	High Tech Change	Medium High Change	Medium Low Change	Low Change	Total Manuf. Change	High Tech Share	Medium High Share	Medium Low Share	Low Share	Total Manuf. Share
EU-27	–3.37	3.10	6.86	0.65	2.56	5.90	30.35	23.94	39.81	100.0
Austria	–30.76	27.66	3.10	–15.33	–2.02	7.21	29.60	29.22	33.96	100.0
Belgium	–18.85	–5.45	–9.54	–6.31	–7.42	3.96	33.70	25.00	37.34	100.0
Bulgaria	–0.29	–6.09	–1.32	21.54	10.74	2.21	18.22	16.84	62.74	100.0
Croatia	–	–	–	–	–	2.60	21.96	22.30	53.13	100.0
Cyprus	98.46	–0.85	14.70	–6.23	–0.69	1.38	8.43	24.07	66.12	100.0
Czech Republic	39.90	16.30	10.56	–8.10	6.42	5.94	30.88	30.36	32.83	100.0
Denmark	–20.63	–0.60	–20.92	–15.38	–12.48	5.17	34.11	20.27	40.46	100.0
Estonia	–13.01	6.79	48.47	–3.64	4.50	5.00	12.77	20.19	62.05	100.0
Finland	9.44	–6.37	–6.78	–12.86	–7.63	11.53	26.22	23.00	39.25	100.0
France	–16.07	–10.52	–5.92	–17.79	–12.55	7.30	31.67	25.90	35.12	100.0
Germany	–5.11	–0.97	–9.03	–7.27	–5.03	7.76	41.02	22.07	29.15	100.0
Greece	7.37	16.82	5.88	–8.32	–1.73	1.89	16.07	22.17	59.87	100.0
Hungary	19.14	4.23	3.86	–19.43	–5.83	11.24	27.05	20.81	40.91	100.0
Ireland	–5.92	2.86	–18.69	–10.95	–8.68	19.97	22.78	17.17	40.08	100.0
Italy	39.03	4.78	9.58	–12.46	0.07	6.09	30.03	26.46	37.42	100.0
Latvia	22.05	264.67	160.86	–27.74	–7.83	0.96	10.75	17.41	70.88	100.0
Lithuania	1.16	–23.36	42.79	0.88	2.40	3.53	10.48	16.31	69.68	100.0
Luxembourg	–8.13	–37.26	–28.01	–3.83	–23.64	2.91	12.50	57.00	27.59	100.0
Malta	–18.66	–19.48	–21.15	–17.13	–18.53	17.96	19.61	15.77	46.67	100.0
Netherlands	–28.49	–26.37	4.87	6.16	–4.63	4.90	19.63	22.08	53.39	100.0

Table 2.7 (continued)

	High Tech Change	Medium High Change	Medium Low Change	Low Change	Total Manuf. Change	High Tech Share	Medium High Share	Medium Low Share	Low Share	Total Manuf. Share
Poland	–	–	–	–	–	2.84	22.27	24.61	50.28	100.0
Portugal	–7.77	–6.28	1.19	–13.73	–9.58	2.22	15.06	22.00	60.71	100.0
Romania	–9.26	–6.60	–23.32	8.87	–2.53	1.45	24.16	17.64	56.76	100.0
Slovakia	84.72	48.13	11.41	–9.18	13.16	6.74	29.41	26.73	37.12	100.0
Slovenia	33.85	4.17	30.50	–18.35	–0.26	3.92	27.02	28.77	40.30	100.0
Spain	–7.16	8.48	27.17	–0.91	8.21	2.80	25.44	29.06	42.70	100.0
Sweden	–34.96	–9.21	–3.46	–12.41	–11.17	6.03	36.42	23.75	33.80	100.0
Turkey	–	–	–	–	–	1.39	17.90	19.33	61.39	100.0
UK	–31.28	–18.18	–17.17	–21.08	–20.19	7.86	34.74	22.22	35.19	100.0

Source: Our elaborations on the Eurostat database on Science and Technology.

BOX 2.2 HUMAN RESOURCES IN SCIENCE AND TECHNOLOGY

Human resources in science and technology (HRST) indicate individuals who fulfil at least one of the following conditions: having successfully completed education at the third (tertiary) level (ISCED '97 version levels 5a, 5b or 6) in an ST (science and technology) field of study and/or working in an ST occupation where the above formal qualification is normally required (ISCO '88 COM codes 2 or 3). In particular, according the Canberra Manual (on human resources, 1995), the seven broad fields of study in ST are: natural sciences, engineering and technology, medical sciences, agricultural sciences, social sciences, humanities and other fields.

Table 2.8 EU-27 – share of HRST in total employment

		HRST			Employment			Share (%)		
		2004	2005	2006	2004	2005	2006	2004	2005	2006
Total	All NACE[a] branches – total	70636	73175	76096	205687	209353	213482	34.3	35.0	35.6
Manufacturing	Manufacturing sector	9894	9957	10263	39002	38657	38866	25.4	25.8	26.4
	High-technology manufacturing sector	1051	1062	1128	2271	2226	2295	46.3	47.7	49.2
	Medium-high-technology manufacturing sector	3971	3976	4116	11644	11526	11795	34.1	34.5	34.9
	Medium-low-technology manufacturing sector	1889	1870	1954	9137	9093	9304	20.7	20.6	21.0
	Low-technology manufacturing sector	2983	3049	3064	15951	15812	15473	18.7	19.3	19.8
Market services	Services: NACE Rev. 1.1 sections G to Q = 50 to 99	56287	58500	60884	134733	138311	141848	41.8	42.3	42.9
Knowledge intensive	Total knowledge-intensive services: NACE Rev. 1.1 codes 61, 62, 64 to 67, 70 to 74, 80, 85 and 92	38429	39615	41279	66194	67737	69975	58.1	58.5	59.0
	Knowledge-intensive high-technology services: NACE Rev. 1.1 codes 64, 72, 73	3677	3898	4096	6628	6839	7077	55.5	57.0	57.9
	Knowledge-intensive market services (excluding financial intermediation and high-tech services): NACE Rev. 1.1 codes 61, 62, 70, 71, 74	7867	8150	8742	15811	16255	17039	49.8	50.1	51.3

Knowledge intensive	Knowledge-intensive financial services: NACE Rev. 1.1 codes 65, 66, 67	3384	3545	3700	5944	6109	6285	56.9	58.0	58.9
	Other knowledge-intensive services: NACE Rev. 1.1 codes 80, 85, 92	23501	24022	24741	37811	38534	39575	62.2	62.3	62.5
Less knowledge intensive	Total less-knowledge-intensive services: NACE Rev. 1.1 codes 50, 51, 52, 55, 60, 63, 75, 90, 91, 93, 95 and 99	17858	18885	19605	68539	70574	71873	26.1	26.8	27.3
	Less-knowledge-intensive market services: NACE Rev. 1.1 codes 50, 51, 52, 55, 60, 63	8950	9476	9855	46222	47148	48197	19.4	20.1	20.4
	Other less-knowledge-intensive services: NACE Rev. 1.1 codes 75, 90, 91, 93, 95, 99	8909	9409	9750	22317	23426	23675	39.9	40.2	41.2
Other sectors		4455	4718	4949	31952	32385	32768	13.9	14.6	15.1

Note: [a]NACE–Nomenclatire Générase des Activités Économiques dans les Communautés Européennes.

Source: Our elaboration on Eurostat database.

Table 2.9 (a) Shares of key indicators and (b) relative intensity of indicators.

(a) Shares of key indicators in manufacturing sectors by technology intensity in the EU (%).

	Manufacturing	High Tech	Medium Tech	Low Tech
Export*	100.0	17.1	57.9	25.0
Value-added**	100.0	19.5	47.8	32.7
Employment***	100.0	5.8	53.3	40.9
Human resources in ST***	100.0	10.6	59.2	30.1
R&D****	100.0	46.7	48.9	4.4

b) Relative intensity of selected indicators with respect to total manufacturing of the various sectors (%) (*ratios between shares*)

	Manufacturing	High Tech	Medium Tech	Low Tech
Export/Value-added	100	87.6	121.1	76.5
Value-added/ Employment	100	336.2	89.7	80.0
HRST/Employment	100	182.4	111.2	73.7
HRST/Value-added	100	54.5	123.9	92.2
R&D/Value-added	100	239.5	102.3	13.5
HRST/R&D	100	22.7	121.1	685.2

Sources: *2005; OECD STAN Indicators, 2007; **2003; Key Figures 2007; ***2004; Eurostat database, Science and Technology; ****2004; Key Figures 2007.

Table 2.10 Shares of key indicators in manufacturing sectors by technology intensity in the United States (%)

	Manufacturing	HT	MT	LT
Export (2005)*	100.0	19.0	61.4	19.6
Value-added (2003)**	100.0	18.6	44.6	36.8
Employment in tot. manuf. (2003)***	100.0	12.6	44.7	42.7

Sources: * Our elaborations on OECD ITCS International Trade by Commodities Statistics – United States – SITC Rev. 3 Vol. 2007; ** our elaborations on OECD STAN Indicators database; *** our elaborations on OECD STAN Indicators database.

Table 2.11 Share of HRST employees by industry, 2004 (%)

	Manufacturing	Services	Ratio of Manufacturing: Services
France	26.0	35.3	73.5
Austria	26.0	37.2	70.0
Finland	27.2	39.1	69.5
United Kingdom	19.0	29.1	65.1
Ireland	19.2	29.8	64.4
Denmark	24.9	42.1	59.1
Sweden	26.1	44.4	58.9
Belgium	21.2	36.1	58.8
Germany	24.2	43.9	55.2
Switzerland	24.6	45.0	54.6
Spain	16.4	30.6	53.5
Netherlands	22.5	44.1	50.9
Norway	21.1	41.8	50.5
Czech Republic	19.9	40.2	49.5
Luxembourg	20.7	45.2	45.8
Italy	17.8	39.0	45.6
Australia	15.8	37.1	42.6
Slovak Republic	16.0	38.8	41.1
Poland	15.4	39.2	39.3
Greece	11.8	31.3	37.7
Hungary	13.3	36.3	36.7
Canada	13.0	36.0	36.1
Iceland	13.4	38.8	34.5
United States	14.1	41.7	33.8
Japan	7.1	21.0	33.8
Portugal	8.2	25.8	31.7

Source: OECD Science, Technology and Industry: Scoreboard 2007, ANSKILL database.

		R&D divided by value added	
	ISIC Rev. 3	Aggregate intensity[2]	Median intensity
High-technology industries			
Aircraft and spacecraft	353	29,1	27,5
Pharmaceuticals	2423	22,3	25,8
Office, accounting and computing machinery	30	25,8	15,1
Radio, TV and communciations equipment	32	17,9	22,4
Medical, precision and optical instruments	33	24,6	11,9
Medium-high-technology industries			
Electrical machinery and apparatus, n.e.c.	31	9,1	6,7
Motor vehicles, trailers and semi-trailers	34	13,3	11,7
Chemicals excluding pharmaceuticals	24 excl. 2423	8,3	7,1
Railroad equipment and transport equipment, n.e.c.	352 + 359	8,7	7,9
Machinery and equipment, n.e.c.	29	5,8	5,3

Medium-low-technology industries			
Building and repairing of ships and boats	351	3,1	2,9
Rubber and plastics products	25	2,7	3,0
Coke, refined petroleum products and nuclear fuel	23	1,9	2,7
Other non-metallic mineral products	26	1,9	1,3
Basic metals and fabricated metal products	27-28	1,6	1,4
Low-technology industries			
Manufacturing, n.e.c.; Recycling	36-37	1,3	1,2
Wood, pulp, paper, paper products, printing and publishing	20-22	1,0	0,3
Food products, beverages and tobacco	15-16	1,1	1,0
Textiles, textile products, leather and footwear	17-19	0,8	1,0
Total manufacturing	15-37	7,2	6,5

Source: OECD, STI Scoreboard 2003

	Average annual growth rate	Technology intensity
Pharmaceuticals	11,2	High-technology
Radio, TV, Comm.	10,2	High-technology
Computers	7,2	High-technology
Electrical machinery	6,9	Medium-high-technology
Scientific instruments	6,5	High-technology
Aircraft	6,3	High-technology
Petrol refining	5,3	Medium-low-technology
Motor vehicles	5,3	Medium-high-technology
Other manufacturing	5,1	Low-technology
Total manufacturing	**5,0**	
Other transport	4,7	Medium-high-technology
Rubber, plastics	4,7	Medium-low-technology
Chemicals	4,6	Medium-high-technology
Metal products	4,0	Medium-low-technology
Machinery, equipment	3,7	Medium-high-technology
Shipbuilding	3,6	Medium-low-technology
Wood	3,4	Low-technology
Paper, printing	2,9	Low-technology
Textiles, clothing	2,8	Low-technology
Non-metallic mineral	2,7	Medium-low-technology
Basic metals	2,5	Medium-low-technology
Food, drink, tobacco	2,0	Low-technology

Source: OECD, Growth of OECD manufacturing trade by industry and technology intensity, 1992-2001, STI Scoreboard 2003

NOTA: Il tasso di crescita del commercio mondiale è molto elevato in diversi settori a media tecnologia (come "electrical machinery") e persino a bassa tecnologia ("Other manufacturing").

Table 1:

OECD Total - Composition of manufacturing exports of goods

	2000	2001	2002	2003	2004	2005	2006	2007	2008
High-technology manufactures	27,0	26,2	25,4	24,5	24,4	24,2	24,2	22,5	21,7
Medium-high technology manufactures	39,9	40,2	41,1	41,6	41,8	41,6	41,1	44,2	43,5
Medium-low technology manufactures	14,9	14,9	14,8	15,4	16,3	17,3	18,5	19,6	21,1
Low technology manufactures	17,9	18,4	18,3	18,1	17,2	16,7	15,9	15,8	15,8

Source: OECD STAN Indicators ed. 2009 www.oecd.org/sti/stan/indicators/

Some key figures highlight the importance of medium technology sectors for the European economy. In fact, while innovation policies mainly focus on the development of high technologies and R&D investments, medium technology manufacturing sectors represent the largest component (64,6%) in the trade of OECD countries in 2008 and their share has continuously increased from 53,8% in 2000, while both the share of low technology and that of high technology products have respectively decreased from 17,9% to 15,8% and from 27,0% to 21,7% in the same period. The positive performance of the medium technology sector is especially determined by the large increase of the share the medium-low technology sectors.

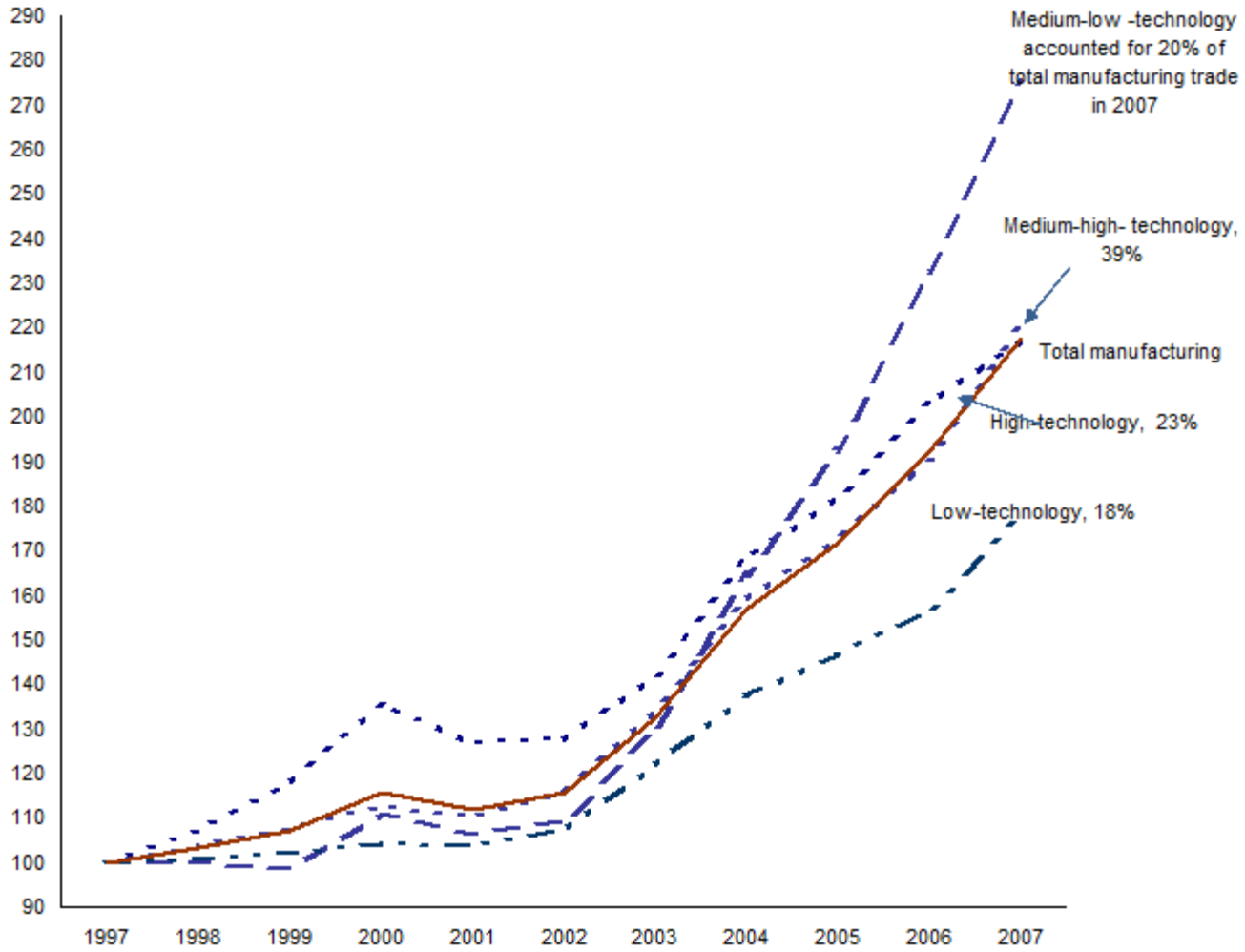
NOTA: Il commercio di prodotti High-Tech rappresenta circa un quinto del commercio mondiale e la sua crescita sembra essersi fermata. Più della metà del commercio mondiale avviene nella classe di prodotti a media tecnologia.

NOTA: I flussi commerciali di prodotti ICT sono cresciuti negli anni recenti in misura molto minore rispetto ad altri prodotti industriali. Questa evoluzione della domanda internazionale è certamente collegata allo scoppio

della bolla speculativa e ai sovra-investimenti in ICT oltre che alla domanda crescente di paesi a rapido sviluppo come la Cina

Chapter 3 - Indicator: 2 OECD manufacturing trade by technology intensity, 1997-2007
Version 1 - Last updated: 21-Sep-2009

Chapter 3 - Indicator: 2



The competitiveness of the European economy in medium-tech industries

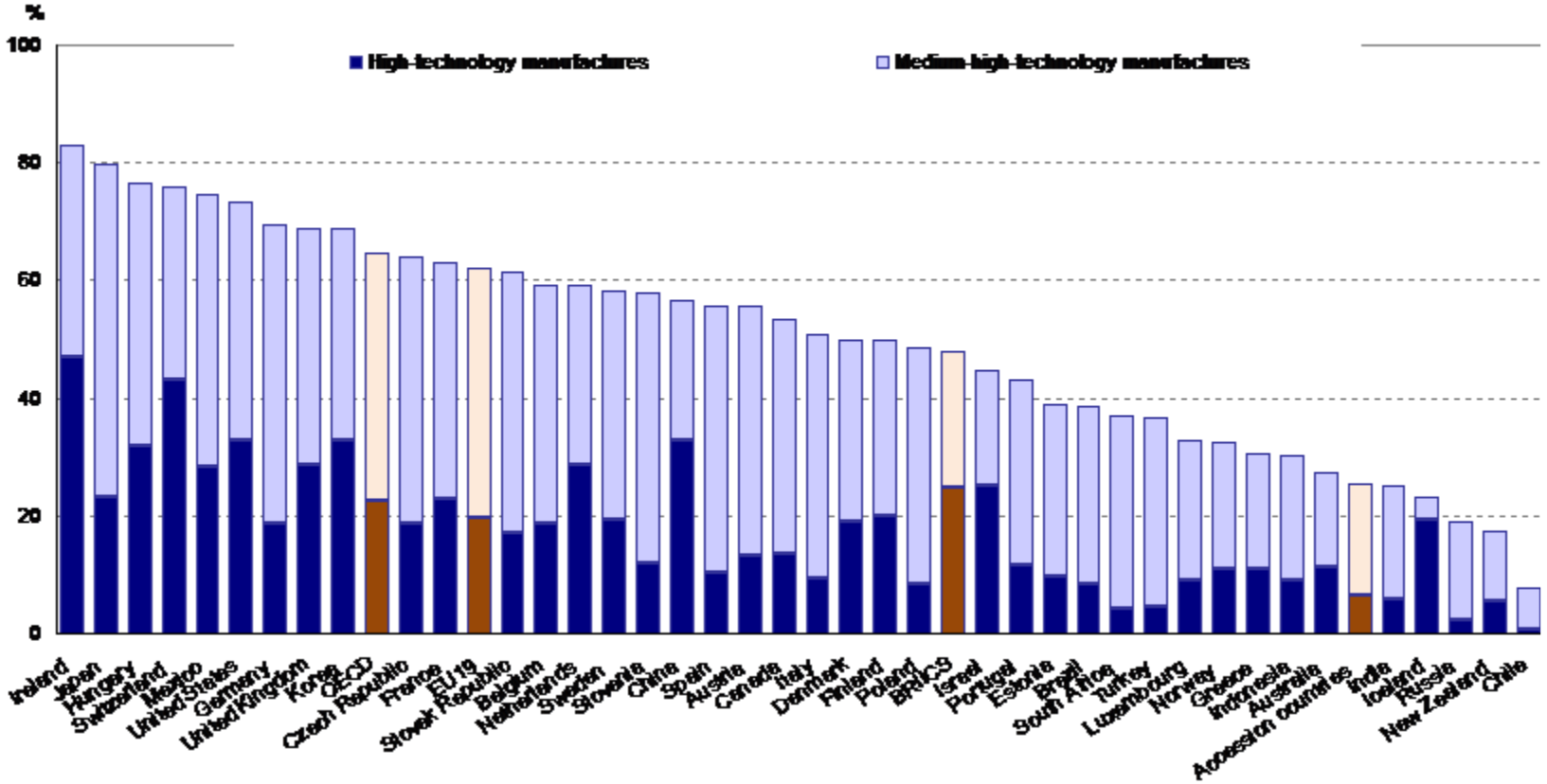
Table 2.3 The competitiveness of the European economy in medium-technology sectors (in millions, US dollars, at current prices)

		European Union (27) external			United States			Japan			China		
		Exports	Imports	Net exports	Exports	Imports	Net exports	Exports	Imports	Net exports	Exports	Imports	Net exports
Manufactures	2000	666.608	608.538	58.070	648.907	968.207	–319.300	449.686	212.666	237.020	219.859	169.883	49.976
	2007	1406.496	1187.164	219.332	909.393	1409.631	–500.239	640.881	314.428	326.453	1 134.805	677.633	457.172
Office and Telecom Equipment (OTE)	2000	83.962	145.289	–61.327	153.399	215.544	–62.145	108.179	60.866	47.313	43.498	44.427	–929
	2007	117.920	238.606	–120.686	134.934	262.074	–127.140	103.124	69.680	33.444	347.113	226.279	120.834
Machinery and Transport Equipment except OTE	2000	278.629	189.413	89.216	258.801	348.408	–89.607	221.482	45.202	176.279	39.102	47.504	–8.402
	2007	625.079	327.546	297.533	401.475	491.377	–89.902	348.757	80.920	267.837	229.932	186.181	43.751
Machinery and Transport Equipment	2000	362.591	334.702	27.889	412.200	563.952	–151.752	329.661	106.068	223.593	82.600	91.931	–9.331
	2007	742.999	566.152	176.847	536.409	753.451	–217.042	451.881	150.599	301.282	577.045	412.460	164.585

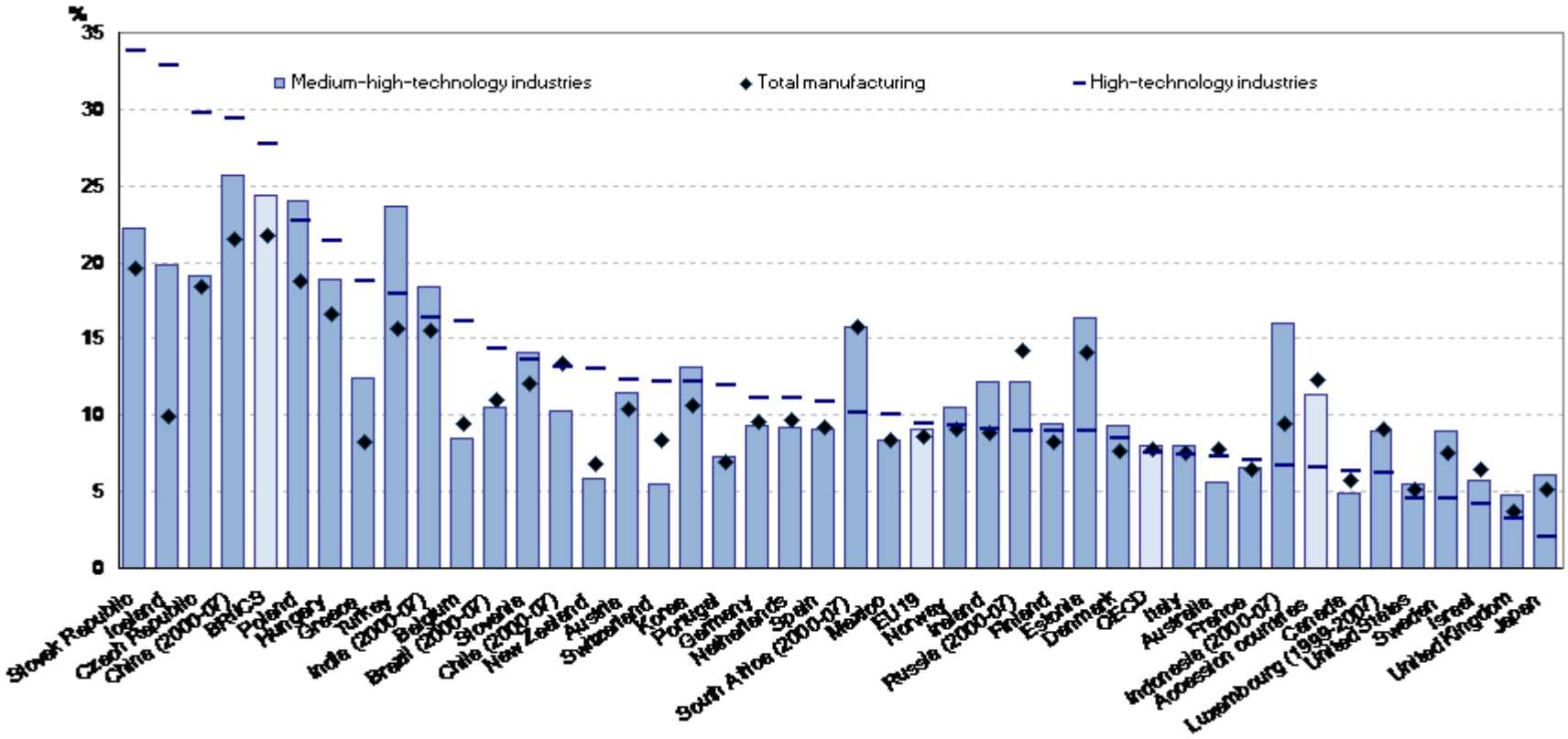
Source: World Trade Organization (2008).

Within the medium technology manufacturing sectors, the machinery and transport equipment sector is the most important component. Exports of machinery and transport equipment of the European Union are 3.7 time the exports of United States and 4.6 time the exports of China. Moreover, the trade balance of European Union in machinery and transport equipment is highly positive and it is still twice as high as of China, but lower than that of Japan.

Chapter 3 - Indicator: 2 Share of high and medium-high-technologies in manufacturing exports, 2007
Version 1 - Last updated: 21-Sep-2009



Chapter 3 - Indicator: 2 Growth of high- and medium-high-technology exports, 1997-2007
Version 1 - Last updated: 21-Sep-2009



Nota: La percentuale dei prodotti ad alta tecnologia sul totale delle esportazioni è un indicatore inappropriato di capacità innovativa. Infatti, percentuali molto elevate possono essere riscontrate non solo per Giappone e US ma anche per Messico e Ungheria, che superano paesi come la Svezia e la Finlandia.

Variable	Composition of manufacturing exports of goods				
Industry	C15T37 MANUFACTURING	HITECH High-technology manufactures	MHTECH Medium-high technology manufactures	MLTECH Medium-low technology manufactures	LOTECH Low technology manufactures
Time	2008				
Country					
Ireland	100	49,01	34,46	3,63	12,89
Switzerland	100	44,04	31,65	10,93	13,38
Hungary	100	30,96	45,88	12,98	11,08
United States	100	30,75	43,41	16,16	13,32
Mexico	100	30,17	44,43	14,01	11,38
Korea	100	29,14	34,32	31,44	5,10
NAFTA	100	27,61	42,62	18,00	14,24
United Kingdom	100	26,37	46,87	19,84	14,76
Netherlands	100	25,76	29,84	24,21	20,19
France	100	22,87	45,21	18,78	18,91
OECD Total	100	21,71	43,48	21,15	15,77
G7 countries	100	21,56	47,29	19,23	14,22
STAN country list	100	21,45	44,40	20,26	16,19
Japan	100	21,29	55,75	19,50	3,45
Finland	100	19,77	32,80	25,80	21,63
Slovak Republic	100	19,57	42,65	24,75	13,36
Czech Republic	100	19,40	44,94	20,94	14,72
European Union 14	100	19,33	44,45	20,66	18,41
European Union 19	100	19,23	44,25	20,85	18,28
Sweden	100	19,02	37,38	23,57	20,03
Germany	100	18,40	51,10	17,67	13,38
Belgium	100	18,22	52,33	23,27	18,35

Denmark		100	17,48	31,84	17,87	32,82
Canada		100	13,61	38,19	28,17	20,02
Austria		100	12,55	46,00	23,56	21,76
Greece		100	11,95	18,34	39,60	30,11
Australia		100	11,52	20,81	46,61	25,34
Norway		100	11,00	24,82	49,98	14,20
Iceland		100	10,54	5,33	46,72	37,42
Portugal		100	10,35	30,92	23,60	34,58
Spain		100	10,19	43,34	24,86	21,61
Poland		100	9,99	39,78	26,26	23,96
Italy		100	9,34	41,64	24,53	24,97
Luxembourg		100	6,83	23,18	51,72	17,95
New Zealand		100	5,50	11,28	11,73	71,49
Turkey		100	3,16	30,60	38,10	28,14