

Study on mobility patterns and career paths of EU researchers

**REPORT 2: Second (final) update of IISER Indicators
(deliverable 5)**

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WIFO 

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INTRODUCTORY NOTE

Main objective of current report

The main objective of this report, 'Report 2' (deliverable 5 related to work package 2), is to present the results of the second update of the IISER indicators (IISER 2007¹) based on data from the so-called official data providers (mainly Eurostat and OECD), and to discuss the shortcomings of the current IISER indicators².

Building on the tasks that have been carried out during the preparation of Report 1 (the first update of the IISER indicators in the context of the MORE project), the following activities were undertaken by the research team:

- Additional data collection and processing in order to:
 - Chronologically update the coverage of the IISER indicators,
 - Improve the geographical coverage of the IISER indicators (towards EU27)
- Provision of a technical background description of the current IISER indicators
- Analysis of the IISER indicators and their evolution over time
- Comparison of the IISER indicators over time and across countries
- Creation of 5-year forecasts for indicators related to the 'stock' (population) of researchers

This report consists of 11 chapters and 7 annexes. The first chapter introduces the 10 IISER indicators and the data sources used to identify and calculate them. The following chapters 1 to 9 describe the results of the individual indicators, updated both time-wise and geographically. Chapter 10 concludes by discussing the shortcomings of the current collection of the IISER indicators.

More information on the methodology and data collection is given in the annexes to the report. Annex 1 gives a bibliographical overview. Annex 2 focuses on providing technical information on indicator 1, especially on time and country coverage, the data and information sources, and the collection and estimation methods that have been applied. Annex 3 presents additional information and data from the Eurodoc survey, the Careers of Doctorate Holders (CDH) survey, the NetReAct and the Rescar surveys. Annex 4 gives additional information on data sources, availability and missing values in the data for each of the (sub-) indicators. Additional data for indicators 1, 5 and 7 are presented in Annex 5, Annex 6 and Annex 7 respectively.

¹ IISER 2007 refers to the following publication: IISER (2007), *Integrated Information System on European Researchers II*, Sixth Framework Programme Priority: Structuring the European Research Area, Human Resources and Mobility, November 2007

² The aim of the Integrated Information System on European Researchers (IISER) project has been to set up a sustainable European-wide information system to provide a dynamic overview of researchers' stocks, flows, mobility career development and motivations (see also: <http://ipts.jrc.ec.europa.eu/activities/research-and-innovation/iiser.cfm>).

Outlook on the final MORE report

Underlying report (and also deliverable 3 on the first IISER update within the MORE project) is based on the structure of the initial IISER report published in 2007³. One of the deliverables of the MORE study has been the update of this report in two subsequent rounds:

- The first in June 2009 (MORE Report 1: Update of IISER Indicators (Final version, August 2009) – being deliverable 3
- The second and final in February 2010 (MORE Report 2: Second (final) update of IISER Indicators (deliverable 5) – being deliverable 5

The objective of underlying report is to provide an update of the existing IISER indicators, i.e. on the indicators that were initially included in the IISER 2007 report. Within this report, there have been indicators for which no information was/is available (e.g. indicators 8, 9, 10). Underlying report does not address these missing indicators as this will be done in the final report, where the findings of the various MORE surveys will be included. As such the focus here lies on the update of the 'existing' IISER indicators and not the development of the 'missing' ones.

In order to make clear what the link is between the current report (final update of the IISER indicators) and the final MORE report, we highlight below the objectives of the final report.

The final report of the MORE project (linked to work package 8) will provide:

1. An overview of the objectives, the different tasks and the methodologies used for the MORE project (methodological sections).
2. An overview of the (new) MORE set of indicators (thereby addressing missing 'old' IISER indicators, but also developing new in indicators in line with the recent policy needs⁴).
3. A summary of the results of all data and information collected in the MORE project and its various surveys.

On the second point, the overview of the MORE set of indicators will address indicators developed within the MORE project in particular around the following main topics (for more information see also Part 3 of MORE Report 1):

- Stocks of researchers
- Stocks and flows of mobile researchers
- Influencing factors related to mobility
- Effects of mobility

This list of the MORE-set of indicators will be structured under the previously mentioned topics and will also include the main indicators on mobility proposed by the [ERA SGHRM indicators](#).

The sources for these indicators will be all data collected and analysed, i.e.:

- The indicators on the IISER update produced in the underlying report (MORE Report 2).

³ IISER (2007), *Integrated Information System on European Researchers II*, Sixth Framework Programme Priority: Structuring the European Research Area, Human Resources and Mobility, November 2007.

⁴ Please see the explanation around "IISER2" in the project proposal

- The indicators developed through the four MORE surveys.

The Final Report is therefore to use as a structure the four topics mentioned above and to build around these topics (updated) indicators from IISER, where relevant, and additional indicators from the MORE surveys. IISER and MORE data will thus be combined into what we will call the MORE-set of indicators (mentioned in the proposal as "IISER2").

Underlying report (Report 2), as all other MORE reports, will be included in the annex of the Final Report.

0 INTRODUCTION

The FP6 Specific Support Action “Integrated Information System on European Researchers” (IISER) aimed at setting up a sustainable European-wide system of indicators to provide a dynamic overview of researchers' stock, flow, career and mobility (Mogu rou and Di Pietrogiacomo, 2008). The project was undertaken under the coordination of the Institute for Prospective Technological Studies (European Commission, Joint Research Centre).

The project aimed at (i) collecting existing information at national level in order to provide a first dynamic, albeit partial, overview of the European scene in this area, and (ii) conducting an analysis of gaps and methodologies in order to derive a full-fledged information system. A list of indicators on researchers' stock, career and mobility has been proposed to be collected, clustered in the following three categories:

- Indicators on researchers' stock and career,
- Indicators on researchers' mobility,
- Qualitative indicators on researchers' motivation and satisfaction.

The main task of this work package has been to update the IISER 2007 indicators. These updated indicators are presented and described in chapters 1 to 9 of this report. In chapter 10, shortcomings and gaps of the current IISER indicators are discussed. Before reviewing the updated indicators however, we give an overview of the indicators and their data sources in the following paragraphs. More information on data availability and methodology is provided in the Annexes.

0.1 The ten (types of) indicators in the IISER report

In this section we present the 10 indicators in the IISER report (IISER 2007). The indicators are grouped into three main categories in this section, following the IISER-report (2007). In chapters 1 to 9 each one of the indicators is explained in greater detail. The primary data sources used to update the 10 indicators are Eurostat and OECD. Other, national statistical sources are also used (i.e. National Science Foundation – NSF (USA), National Bureau of Statistics of China, etc.).

Table 1: The 10 indicators in the IISER report, grouped into three main categories

A. Indicators on researchers' stock and career
Indicator 1: Number (and forecasting the number) of researchers in the European Union
Indicator 2: Number of researchers in the training phase and post-docs
B. Indicators on researchers' mobility
Indicator 3: Number of researchers recruited under a permanent contract in R&D
Indicator 4: Average time from graduation to a first regular employment contract in R&D
Indicator 5: Circulation of researchers within Europe
Indicator 6: Number of researchers leaving Europe
Indicator 7: Number of researchers coming into Europe
Indicator 8: Circulation of researchers between public and private sector
C. Qualitative indicators on researchers' motivation and satisfaction
Indicator 9 & 10: Motivations for R&D careers and satisfaction of researchers with their jobs and careers

In the Table above we use the formulation and structure that has also been used in IISER 2007.

0.2 Data sources

Data used in this report updating the existing IISER indicators are obtained from several sources. Here we describe the different data sources used for the update of each indicator.

Table 2: Data sources used in the current IISER-indicator update

	Indicator	Sources
A. Indicators on researchers' stock and career	Indicator 1: Number (and forecasting) of researchers in the European Union	<ul style="list-style-type: none"> - Eurostat - OECD - National Bureau of Statistics of China
	Indicator 2: Number of researchers in the training phase and post-docs	<ul style="list-style-type: none"> - Eurostat
B. Indicators on researchers' mobility	Indicator 3: Number of researchers recruited under a permanent contract in R&D	<ul style="list-style-type: none"> - RINDICATE SPA3 project (Rindicate 2008)
	Indicator 4: Average time from graduation to a first regular employment contract in R&D	<ul style="list-style-type: none"> - No data available
	Indicator 5: Circulation of researchers within Europe	<ul style="list-style-type: none"> - Eurostat
	Indicator 6: Number of researchers leaving Europe	<ul style="list-style-type: none"> - NSF/NIH/USED/NEH/US DA/NASA, 2006 Survey of Earned Doctorates - http://www.nsf.gov/statistics/nsf07305/pdf/tab11.pdf - Open Doors data
	Indicator 7: Number of researchers coming into Europe	<ul style="list-style-type: none"> - Eurostat
	Indicator 8: Circulation of researchers between public and private sector	<ul style="list-style-type: none"> - No data available
C. Qualitative indicators on researchers' motivation and satisfaction	Indicator 9 & 10: Motivations for R&D careers and satisfaction of researchers with their jobs and careers	<ul style="list-style-type: none"> - No data available

Notes:

This table describes the main sources of information used for the update of the current set of IISER indicators. More details about these sources are provided in the Annexes of this report.

Data, which will be derived from the MORE surveys (higher-institute, research-institute, industry, extra-EU mobility), will be used as sources of information for all 10 indicators, where possible, in order to provide the final MORE-set of indicators as an output of Work Package 8 of this project (MORE Final Report).

1 INDICATOR 1: NUMBER (AND FORECASTS) OF RESEARCHERS IN THE EUROPEAN UNION

In this and the next chapters of the current report, we present the update of the current IISER report (as structured in the version of 2007). Additional data on this indicator will be provided in the Final Report of the MORE project, where available. More details about the additional indicators will be provided in the MORE-set of indicators in the MORE Final Report.

1.1 Definition of indicator 1 in the present report

The basis for the definition of HRST applied in IISER (2007) is the Canberra Manual (OECD 1995), while the basis for the definitions of R&D personnel and researchers is the Frascati Manual (OECD 2002). Both the Canberra Manual and the Frascati Manual will be the basis for all definitions used in *this report* which updates the existing IISER indicators. In Section 1.1.1 we present the definitions of HRST and sub-groups of HRST. Then, in Section 1.1.2 we present the definitions of R&D personnel and researchers. In Section 1.1.3 we comment on the distinction between headcount (HC) and full-time equivalent (FTE) data. Finally, in Section 1.1.4 we present the R&D-performing sectors.

1.1.1 HRST

HRST are people who fulfil one or other of the following conditions (see Section 3.1.1 in OECD, 1995):

- a) Successfully completed education at the third level in an S&T field of study (HRSTE).
- b) Not formally qualified as above, but employed in a S&T occupation where the above qualifications are normally required (HRSTO).

Under this definition, people can be HRST on the basis of either a renewable event (occupation) or a non-renewable one (education). Once people have successfully completed education at the third level, they are HRST for life, whatever their occupation. The situation is different for people who are HRST on the basis of their current occupation, without being formally qualified. Their status as HRST ends as soon as they change to an occupation outside S&T, retire, become unemployed or inactive. They will become HRST again if they subsequently take up another S&T job.

The definition of HRST thus relies upon one mainly objective and one mainly subjective criterion. Generally, the completion of education can be readily measured. But data on occupation are often based on self-definition, which makes them less reliable. Nevertheless, both components appear to be essential to cover all aspects of HRST.

Two subsets within this broad population are:

- HRST core (HRSTC): HRST population with both tertiary-level education and an S&T occupation
- Scientists and engineers: generally defined as ISCO categories 21 (physical, mathematical and engineering science professionals) and 22 (life science and health professionals)

1.1.2 R&D personnel and researchers

The International Standard Classification of Occupations (ISCO) is a tool for organising jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job. Unfortunately, ISCO does not have a code that defines researchers. Consequently, we do not have a clear-cut definition that enables us to select and distinguish them from other types of skilled labour.

The Frascati Manual proposes the following definitions of research and experimental development (R&D) and R&D personnel:

- **Research and experimental development (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" (Section 2.1 in OECD 2002).
- **R&D personnel:** "All persons employed directly on R&D should be counted, as well as those providing direct services such as R&D managers, administrators, and clerical staff" (Section 5.2.1 in OECD 2002).

The term R&D covers three activities (Section 2.1 in OECD 2002):

- Basic research: "Experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view."
- Applied research: "Original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective."
- Experimental development: "Systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed."

The Frascati Manual contains a definition of R&D personnel for both a classification by occupation and a classification by level of formal qualification (Section 5.2.2 in OECD 2002). Both IISER (2007) and the MORE project use the classification by occupation (Section 5.2.3), and not the classification by level of formal qualification (Section 5.2.4). The standard international occupational classification used is the ISCO classification (Section 5.2.3). The following definitions of occupations are (Section 5.2.3):

- **Researchers:** "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."
- **Technicians and equivalent staff:** "Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities."
- **Other supporting staff:** "Other supporting staff includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects."

IISER (2007) only focuses on the group of researchers, and not technicians and equivalent staff or other supporting staff. This will also be the focus in this report which updates the existing IISER indicators.

1.1.3 Headcount (HC) and full-time equivalence (FTE) data

The number of researchers may be measured in headcounts (HC) or full-time equivalence (person-years) (FTE). See Section 5.3 in OECD (2002). According to the Frascati Manual, there are several reasons for using headcounts (Section 5.3.2 in OECD 2002). First, headcount data can be linked to other data series, for example education or employment data. Second, headcount data are the most appropriate measure for collecting additional information about researchers, for example information about individual characteristics such as age, gender, educational, citizenship, etc.

While data series measuring the number of R&D staff, and notably researchers, have many important uses, they are not a substitute for a series based on the number of full-time equivalent staff (Section 5.3.3 in OECD 2002). The latter is a true measure of the volume of R&D. "The number of persons engaged in R&D must, therefore, also be expressed in full-time equivalents on R&D activities" (OECD 2002, p. 99).

1.1.4 R&D-performing sectors

The Frascati Manual groups the number of researchers into four R&D-performing sectors (Section 3.3 in OECD 2002):

- Business enterprise sector
- Government sector
- Higher education sector
- Private non-profit sector

Business enterprise sector

The business enterprise sector includes (Section 3.4 in OECD 2002):

- 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 private non-profit institutions mainly serving them.

Government sector

The government sector is composed of (Section 3.5 in OECD 2002):

- All departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which 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.)
- Non-profit institutions (NPIs) controlled and mainly financed by government, but not administered by the higher education sector.

Higher education sector

The higher education sector is composed of (Section 3.7 in OECD 2002):

- 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.

Private non-profit sector

The private non-profit sector includes (Section 3.6 in OECD 2002):

- Non-market, private non-profit institutions serving households (i.e. the general public).
- Private individuals or households.

The role of this sector in R&D is very small (Section 3.6.3 in OECD 2002).

1.1.5 Methodological comment on indicator 1

The consortium (and in particular NIFU STEP) has used Eurostat's total numbers for EU27 researchers (HC and FTE) as the starting point of all estimations. However, in EUROSTAT statistics, total EU27 sector numbers (HC and FTE) do not always equal the sum of the respective HC and FTE figures by country due to the inclusion in EU27 aggregates of estimated values for the missing data done by EUROSTAT, which are not presented at individual country level. This was clearly a challenge for the estimation process used by the MORE consortium. The general strategy for solving this sort of difficulties was the following one:

1. We estimated missing countries' data on number of researchers in both HC and FTE *by R&D performing sector* and then we add all these up to all sectors EU27 HC and FTE.
2. We applied total EU27 HC and FTE numbers from EUROSTAT in three of four R&D performing sectors (Government, Business and Private non-profit) for the years 2000 - 2007 as our basis for all subsequent country estimations within each one of these three sectors.
3. Furthermore, and for the Higher education sector only, we applied EUROSTAT total EU27 figures for HC and FTE in 2005-2007. These are the years with most complete R&D statistics for most of the EU27 countries and in particular for the UK in the Higher education sector. Our estimations of EU27 HES country sums for the years 2000-2004 do not necessarily add up to EUROSTAT total HES figures for these years, as we had to extrapolate backwards datapoint 2005 for the UK. The figures from this extrapolation were added up with figures from other EU27 countries, which resulted in significant deviations from EUROSTAT-figures for HES (again this is only for the years 2000-2004). We added up 1-3 for calculating total sector EU27 HC and FTE estimates.

Therefore, as a consequence of our estimation methodology, our total EU27 of HC and FTE estimates for the years 2000-2004 deviate from those of EUROSTAT.

However, in all Tables and Figures of this report we do use *only EUROSTAT figures* for total sector HC and FTE, and for EU27 HC and FTE in the Higher Education Sector, also for the years 2000-2004.

1.2 The stock of researchers⁵

This section provides an overall picture of Human resources in S&T in 2007 for the EU. It continues focusing on data on the number of researchers and concludes with the provision of forecasts for the number of researchers for 2008-2011.

⁵ As mentioned already in paragraph 0.2 of this report, for the current update of the IISER indicators presented in this report, we have based any estimation made on Eurostat data. However, the estimation methods used by the MORE consortium and those used by Eurostat are not identical resulting in differences in the aggregate numbers of the variables estimated (see Box 1 in Annex 2 for more details).

1.2.1 The overall picture in 2007

The following table gives a general picture on the human resources in S&T in the EU27; it provides data on HRST and its sub-groups, Scientists and Engineers and Researchers. In Annex 5 we provide data on the same variables by Member State (Table A.5.1 to Table A.5.3). Also note that Figure 1 to Figure 11 are linked to tables in the same annex; Table A.5.4-Table A.5.14.

Table 3: HRST, sub-groups of HRST, scientists and engineers, R&D personnel and researchers in the EU27 in 2007⁶

	in thousands	% of active population	% of total employment
Active population in the EU27	235 842	100.0	
Total employment in the EU27	219 050	92.9	100.0
HRST Human Resources in Science and Technology	99 570	42.2	45.5
HRSTE Human Resources in Science and Technology – Education	71 828	30.5	32.8
HRSTO Human Resources in Science and Technology – Occupation	65 120	27.6	29.7
HRSTC Human Resources in Science and Technology – Core	37 378	15.8	17.1
SE Scientists and Engineers	11 272	4.8	5.1
Total R&D personnel (HC)	3 438	1.46	1.57
Researchers (HC)	2 158	0.91	0.99
Researchers (FTE)	1 448	0.61	0.66

Source: NIFU STEP based on Eurostat data.

- a) Active population and total employment: LFS statistics.
- b) HRST, HRSTE, HRSTO, HRSTC and SE: Human Resources in Science & Technology statistics.
- c) R&D personnel and researchers (HC and FTE): R&D statistics.

Notes Table 3:

- 1) The total numbers of researchers in HC and FTE are based on Table A.2.5 and Table A.2.10.
- 2) The remaining variables in the table are observed values.

The active population (referring to the total labour force, which includes both employed and unemployed persons) for the EU27 in 2007 is about 236 millions, and the total employment is about 219 millions. Human resources in science and technology account for 42.2% of the active population and 45.5% of the total employment. Those who have successfully completed a tertiary level education in a S&T (Science and Technology) field of study (HRSTE) account for 30.5% of the active population and 32.8% of the total employment, while those who are employed in an S&T occupation (HRSTO) represent a slightly lower share, 27.6% and 29.7% respectively. The share of the active population having both completed a tertiary level education and being employed in an S&T occupation (HRSTC) account for 15.8%, while the corresponding share of the total employment is 17.1%. This indicates that almost half of the tertiary education graduates in an S&T field of study are employed in S&T occupations.

Scientists and engineers account for 4.8% of the active population and 5.1% of the total employment. Total R&D personnel accounts for 1.46% of the active population and 1.57% of the total employment, or around 3.4 million. Research-

⁶ Downloaded data from Eurostat: January 2010.

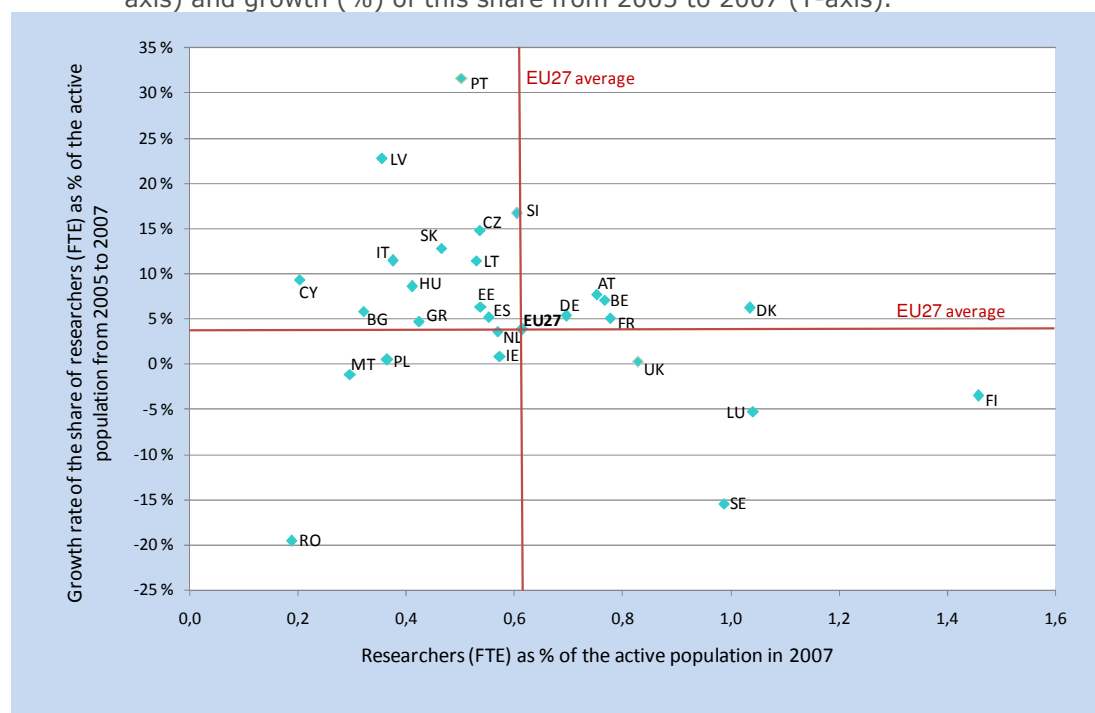
ers in headcounts are estimated to be more than 2.1 million or 0.91% of the active population and 0.99% of the total employment, while researchers in FTEs account for 1.4 million or 0.61% of the active population and 0.66% of the total employment.

Figure 1 shows that the Nordic countries have the highest share of researchers (FTE) as a share of active population in the EU27 (horizontal axis): Finland 1.5%, Sweden 1.0% and Denmark 1.0%. This share is lowest in Romania (0.2%), Cyprus (0.2%), Bulgaria (0.3%) and Malta (0.3%). On the other hand, we find the strongest increase of this share from 2005 to 2007 (vertical axis) in Portugal (31.6%), Latvia (22.8%), Slovenia (16.7), Czech Republic (14.8%), and Slovakia (12.8%). This share actually decreased in Romania (-19.5), Sweden⁷ (-15.5%), Luxembourg (-5.3%), Finland (-3.5%) and Malta (-1.2%).

Denmark, Austria, Belgium, France and Germany all belong to the group of countries with both the number of researchers as percentage of the active population and the growth of this share (2005-2007) being equal to or above the EU27 average (upper right quadrant in the Figure 1). Finland, Sweden, Luxembourg and UK form the group of countries with above-the-EU27-average level of the share of researchers in the active population but below-the-EU27-average levels of the annual growth of this share (lower right quadrant in the Figure 1). Many of the new Member States belong to the group of countries with the share of researchers in active population lower than the EU27 average. Among them, Romania, Poland along with Malta, the Netherlands and Ireland, exhibit also growth rates of this share below the EU27 (lower left quadrant in the Figure 1). The rest of the new Member States belong to the group of countries with below-the-EU27-average share of researchers in active population but with above-the-EU27 average annual growth of this share, along with Portugal, Italy, Greece and Spain from the EU15.

⁷ The decrease of this share in Sweden is large and it remains large even when instead of full time equivalent (FTE) we use head count indicators (HC). There is certainly a need to look closer to the Eurostat figures for Sweden in the respective years.

Figure 1: The number of researchers (FTE) in per cent of active population in 2007 (X-axis) and growth (%) of this share from 2005 to 2007 (Y-axis).



Source: NIFU STEP based on Eurostat data: Eurostat R&D statistics. Active population data: Eurostat LFS statistics.

Note: The growth rate measures the growth (in per cent) of the share of researchers (FTE) as % of active population from 2005 to 2007, and not the average annual growth rate in this period.

Stock of researchers: overall picture in 2007

- HRST account for 42.2% of the active population and 45.5% of the total employment in the EU27.
- Almost one half of tertiary education graduates in an S&T field of study are employed in S&T occupations.
- Scientists and engineers account for 4.8% of the active population (5.1% of the total employment); total R&D personnel for 1.46% (1.57%); researchers in headcounts for 0.91% (0.99%).
- Denmark, Austria, Belgium, France and Germany belong to the group of countries with both the number of researchers as percentage of the active population and the growth of this share (2005-2007) being equal to or above the EU27 average.
- Many of the new Member States belong to the group of countries with the share of researchers in active population lower than the EU27 average.

1.2.2 Researchers in the EU27

1.2.2.1 Number of researchers: international comparison

This section examines the number of researchers in the EU27 compared with OECD, US, Japan, and China.

In 2007 there were about 1.45 million researchers (FTE) in the EU27, about 1.41 million in the US, 710 000 in Japan and 1.42 million in China. In total, there were 4.13 million researchers reported in the OECD area. Researchers in the US and Japan represent a similar share of the active population, about 1%, while in China the respective share is only 0.18%. The number of researchers in the

EU27 accounts for 0.61% of researchers over the total active population. In the OECD area, the respective share is 0.73%.

The share of business researchers to total researchers differs significantly between the EU27 and other major economies. In the EU27, 45.9% of researchers are employed in the business sector; this share is significantly higher in the US (79.1%) and Japan (68.1%). In addition, according to data from Eurostat, 66.4% of all Chinese researchers work in the business sector; the respective share in the OECD area is 62.9%.

Table 4: Researchers (FTE) and researchers in the business enterprise sector (FTE), number and percentage of the active population, in the EU27, U.S., Japan, China and OECD in 2007

	Researchers in total		Business researchers		% of business researchers in total
	in thousands	% of active population	in thousands	% of active population	
EU27	1 448	0.61	664	0.28	45.9
United States	1 411	0.93	1 117	0.74	79.1
Japan	710	1.06	484	0.73	68.1
China (economically active population)	1 423	0.18	944	0.12	66.4
OECD	4 126	0.73	2 594	0.46	62.9

Source: NIFU STEP based on OECD statistics, Eurostat data and data from the National Bureau of Statistics of China.

- a) Researchers data: Eurostat R&D statistics, except for OECD where we use a combination of OECD statistics and Eurostat R&D statistics.
- b) Active population data: For EU27 Eurostat LFS statistics are used, for China data from the National Bureau of Statistics of China, while for US, Japan and OECD OECD statistics (labour force data) are used.

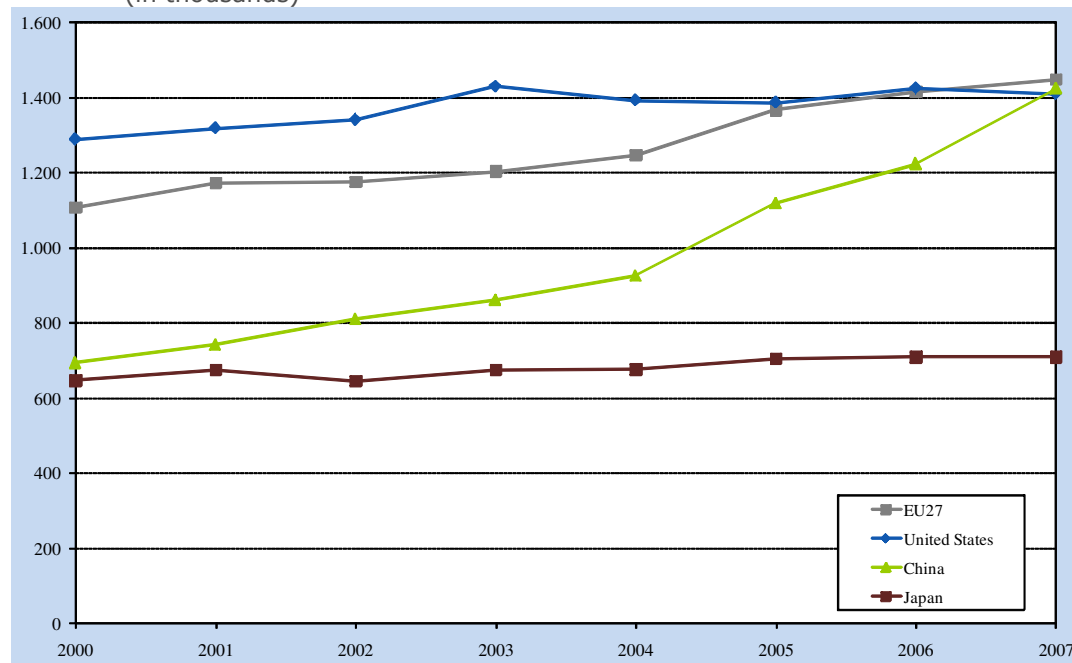
Notes Table 4:

- 1) The total numbers of researchers in the EU27, United States, Japan, China and OECD are based on Table A.2.10, and are therefore estimated values.
- 2) The numbers of researchers in the business enterprise sector in the EU27, United States, Japan, China and OECD are based on Table A.2.6.
- 3) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
- 4) There is a missing value for the number of persons in the active population in United States. In this case we have estimated this number based on observed values.
- 5) For information about the active population in different countries, see Sub-indicators 13 and 14 in Annex 4.

Figure 2 and Figure 3 present the pattern over time of the number of researchers, measured as full time equivalent (FTE) and the number of researchers in FTES in the business sector respectively for the period 2000-2007 in the EU, US, China and Japan. Since 2000, the number of researchers in FTES in the EU27 has increased from 1.1 million to 1.45 million in 2007 (3.9% p.a.). The respective increase in the US was from 1.3 to 1.41 million (1.3% p.a.). In Japan, the number of researchers in FTES increased approximately 1.3% per year as well (from 0.6 to 0.7 million). China experienced the largest increase in the number of researchers in FTES, from 0.7 to 1.42 million (10.8% p.a.).

The annual growth rate of the number of business researchers in FTES has been higher in the EU27 (3.4% p.a., from 0.53 to 0.66 million) than in the US (1.0% p.a., from 1 to 1.1 million) or Japan (2.0% p.a., from 0.42 to 0.48 million). However, the increase of business researchers in China has been significantly stronger, equal to a 15.1% growth per year (from 0.35 to 0.94 million).

Figure 2: Number of researchers (FTE), in the EU27, U.S., Japan and China, 2000-2007 (in thousands)

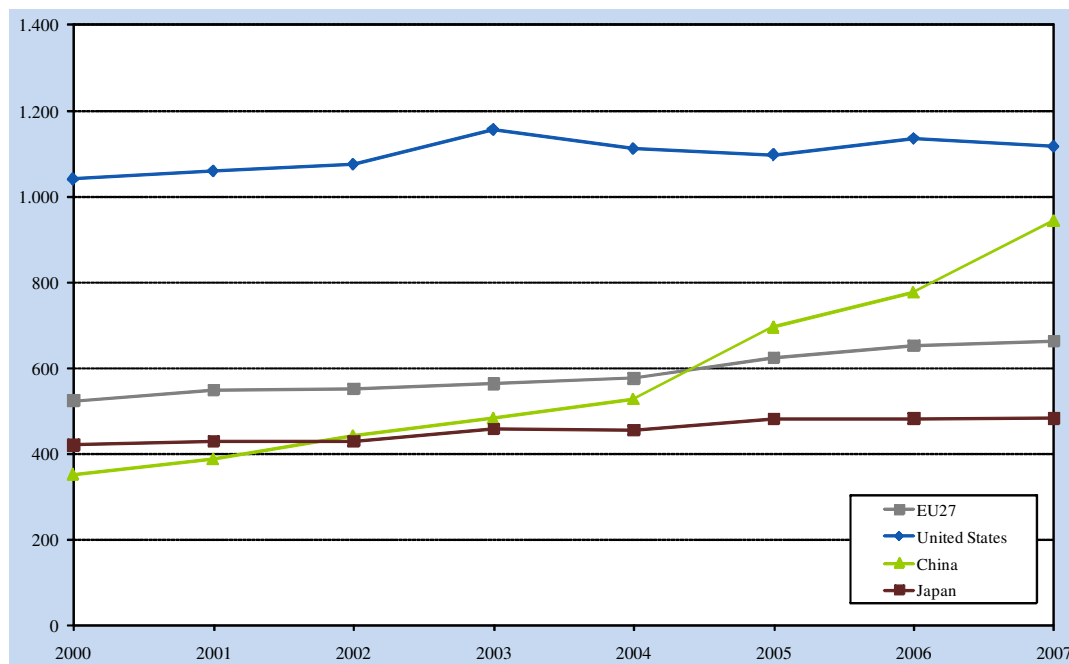


Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Figure 2 (see also Table A.5.5):

The total numbers of researchers in the EU27, United States, Japan and China are based on Table A.2.10.

Figure 3: Number of business researchers (FTE), in the EU27, U.S., Japan and China, 2000-2007 (in thousands)



Source: NIFU STEP with Eurostat data (R&D Statistics).

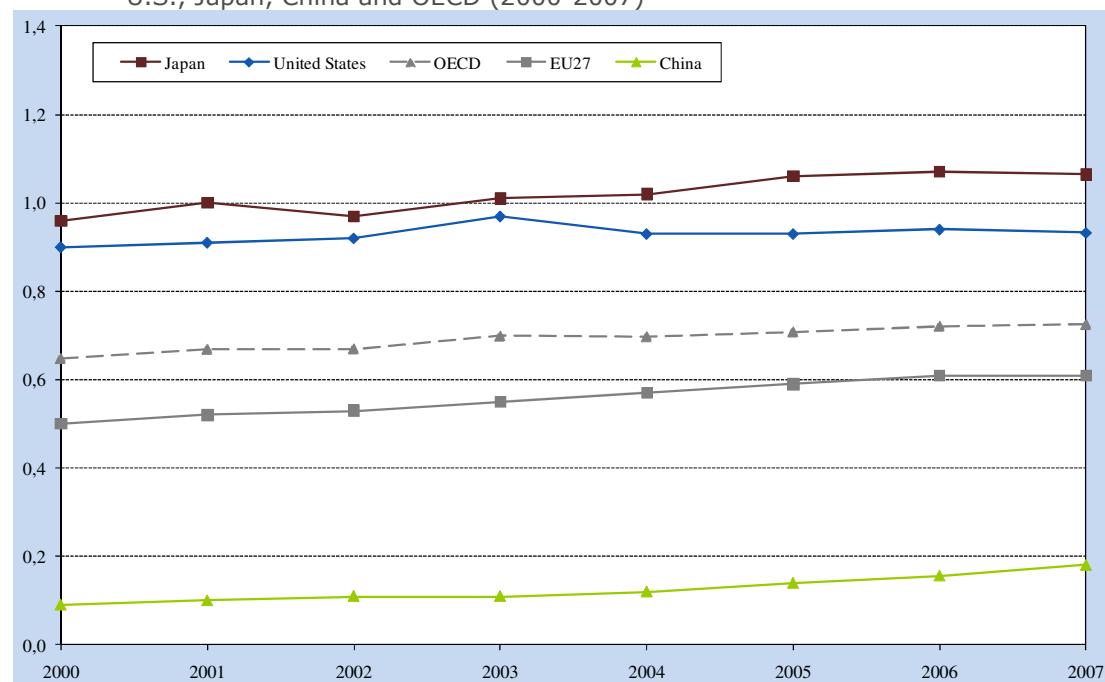
Note Figure 3 (see also Table A.5.6):

The numbers of researchers in the business enterprise sector in the EU27, United States, Japan and China are based on Table A.2.6.

Figure 4 and Figure 5 describe the evolution of the share of researchers and business researchers as percentage of the active population for the period 2000-

2007 for EU27, the US, Japan, China and the OECD area. The total number of researchers as percentage of the active population in the EU27 has increased from 0.50% in 2000 to 0.61% in 2007 (2.9% p.a.), stronger than the respective growth rate for Japan (1.5%) and the US (0.5%). The number of researchers in the OECD area increased from 0.65% to 0.73% corresponding to an annual increase of 1.6%. In China a remarkable (average annual) growth rate is again observed from 0.09% to 0.18% (10.5% p.a.).

Figure 4: Number of researchers (FTE) as per cent of the active population in the EU27, U.S., Japan, China and OECD (2000-2007)



Source: NIFU STEP based on OECD statistics, Eurostat data and data from the National Bureau of Statistics of China.

- Eurostat data for FTE researchers as % of active population (table rd_p_perslf) for EU27 for the period 2000-2007, for United States and Japan for the period 2000-2006, and for China for the period 2000-2005.
- Researchers data from Eurostat R&D statistics for United States and Japan for 2007, and for China for 2006 and 2007. For OECD we use a combination of OECD statistics and Eurostat R&D statistics for the period 2000-2007.
- Active population data: For China for 2006 and 2007 we use data from the National Bureau of Statistics of China. For United States and Japan for 2007, and OECD for the period 2000-2007, we use OECD statistics (labour force data).

Notes

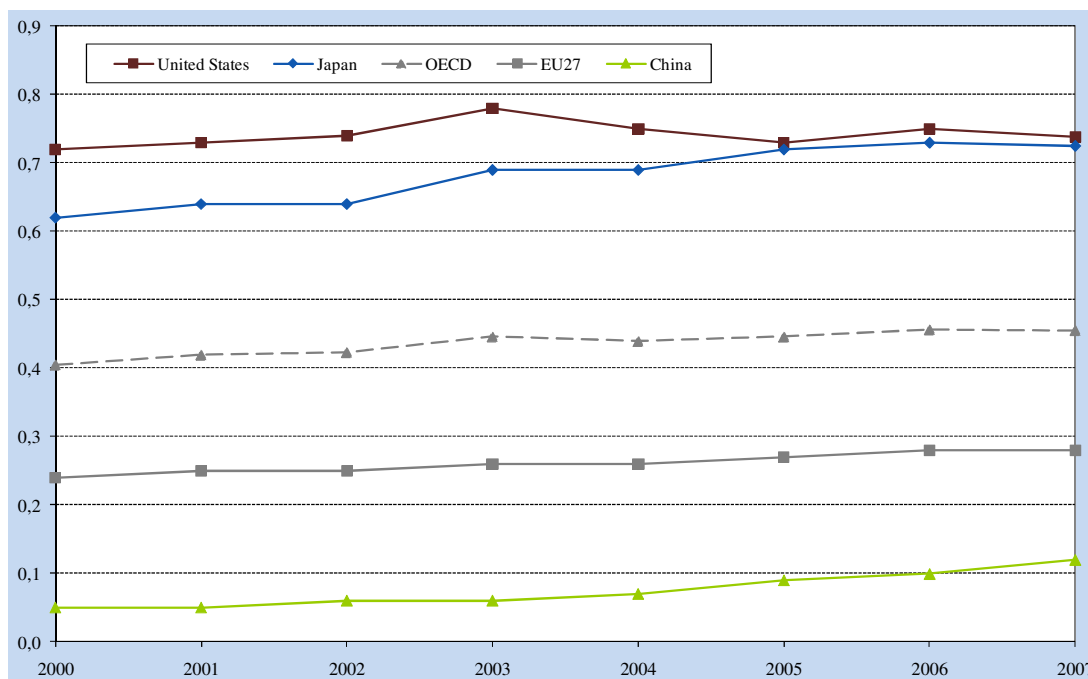
Figure 4 (see also Table A.5.7):

- The total numbers of researchers in United States and Japan for 2007, China for 2006 and 2007, and OECD for the period 2000-2007, are based on Table A.2.10.
- The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
- There are missing values for the number of persons in the active population in United States in 2007. For this year we have estimated the number based on observed values.
- For information about the active population in different countries, see Sub-indicators 13 and 14 in Annex 4.
- Eurostat data for FTE researchers as % of active population (table rd_p_perslf) are downloaded on April 2010.

Within the EU27 as well as in the OECD area, the share of business researchers has been slowly increasing since 2000 from 0.24% to 0.28% in 2007 and from 0.40% to 0.46% respectively. In the US the share of business researchers in the

total active population has first increased from 0.72% in 2000 to 0.78% in 2003 and thereafter decreased to 0.74% in 2007, while in Japan it has increased from 0.62% in 2000 to 0.73% in 2007. The respective share for China, although starting from a relatively lower level in 2000 (0.05%) had more than doubled by 2007 (0.12%).

Figure 5: Number of business researchers (FTE) as % of the active population in the EU27, U.S., Japan, China and OECD (2000-2007)



Source: NIFU STEP based on OECD statistics, Eurostat data and data from the National Bureau of Statistics of China.

- Eurostat data for business FTE researchers as % of active population (table rd_p_perslf) for EU27 for the period 2000-2007, for United States and Japan for the period 2000-2006, and for China for the period 2000-2005.
- Researchers' data from Eurostat R&D statistics for United States and Japan for 2007, and for China for 2006 and 2007. For OECD we use a combination of OECD statistics and Eurostat R&D statistics for the period 2000-2007.
- Active population data: For China for 2006 and 2007 we use data from the National Bureau of Statistics of China. For United States and Japan for 2007, and OECD for the period 2000-2007, we use OECD statistics (labour force data).

Notes Figure 5 (see also Table A.5.8):

- The numbers of researchers in the business enterprise sector in United States and Japan for 2007, China for 2006 and 2007, and OECD for the period 2000-2007, are based on Table A.2.6.
- The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
- There are missing values for the number of persons in the active population in United States in 2007. For this year we have estimated the number based on observed values.
- For information about the active population in different countries, see Sub-indicators 13 and 14 in Annex 4.
- Eurostat data for business FTE researchers as % of active population (table rd_p_perslf) are downloaded on April 2010.

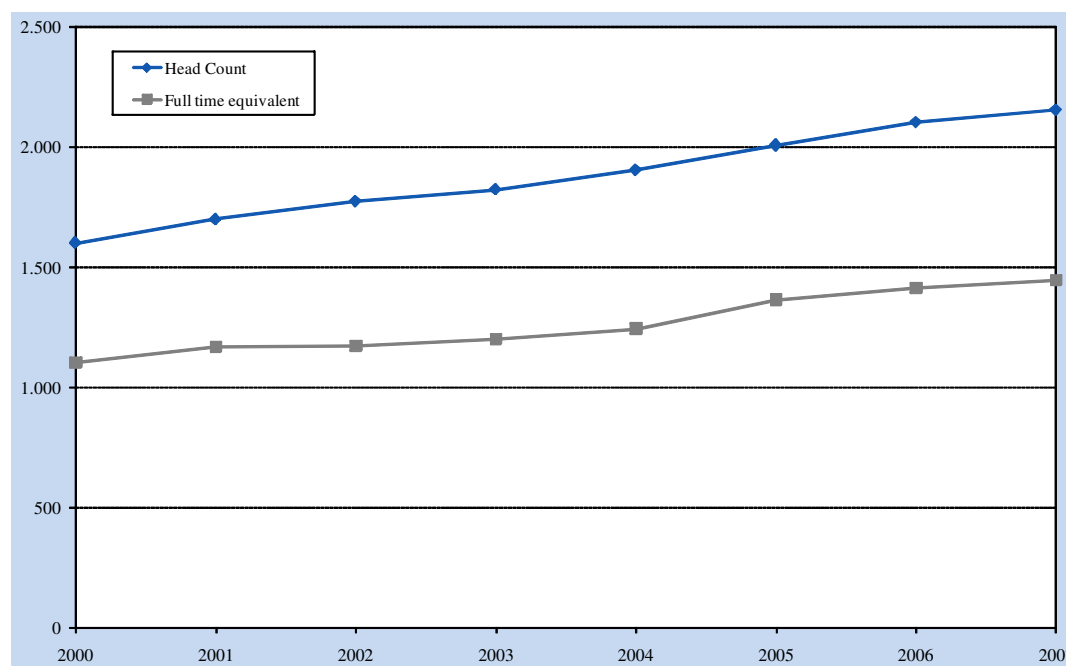
Stock of researchers: Researchers in the EU27 - international comparison

- In the EU27 less than one out of two researchers are employed in the business sector; in the US this accounts for four out of five researchers and in Japan and China approximately two out of three researchers are employed in the business sector.
- In 2007 there were 1.45 million in FTE researchers in the EU27 compared to 1.41 million in the US, 0.71 million in Japan and 1.42 million in China.
- The number of researchers (FTEs) in the EU27 as share of the active population (0.61%) was less than the share found in US and Japan (approximately 1%).

1.2.2.2 Number of researchers: evolution over time

Figure 6 presents the number of researchers in the EU27 in both head counts and FTEs over the period 2000-2007. The number of researchers in the EU27 in head counts has increased from 1.60 million (equivalent to 1.11 million in FTEs) in 2000 to 2.16 million (equivalent to 1.45 million in FTEs) in 2007, corresponding to an annual growth rate of 4.3% (3.9% in FTEs). This represents an increase of about 79 000 researchers per year (in head counts) or about 49 000 researchers in terms of FTEs.

Figure 6: Number of researchers (HC, FTE) in the EU27 (2000-2007), in thousands

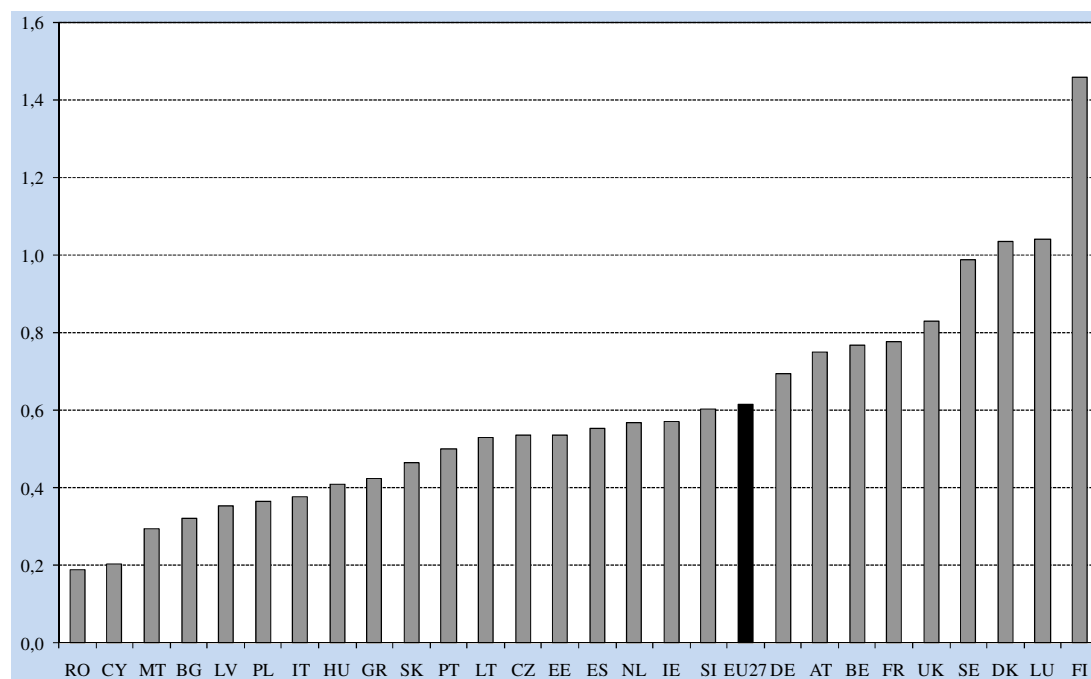


Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Figure 6 (see also Table A.5.9): The total numbers of researchers in the EU27 are based on Table A.2.5 and Table A.2.10.

Figure 7 presents the number of researchers in FTE in the EU27 as a percentage of the active population, by country, in 2007. The Scandinavian countries lead the EU27 in the number of R&D man-years as a percentage of the active population. The highest shares are observed in Finland (1.46%), Denmark (1.04%), Sweden (0.99%) followed by United Kingdom (0.83%), France (0.78%) and Belgium (0.77%), Austria (0.75%) and Germany (0.70%). Romania, Cyprus, Malta, Bulgaria, Latvia, Poland, Italy all report shares below 0.40%.

Figure 7: Number of researchers (FTE) as per cent of the active population in the EU27 in 2007 by country



Source: NIFU STEP based on Eurostat data (R&D Statistics data and LFS).

Notes Figure 7 (see also Table A.5.10):

1) The numbers of researchers in the EU27 by country are based on Table A.2.10.

2) For information about the active population in different countries in EU27, see Sub-indicator 13 in Annex 4.

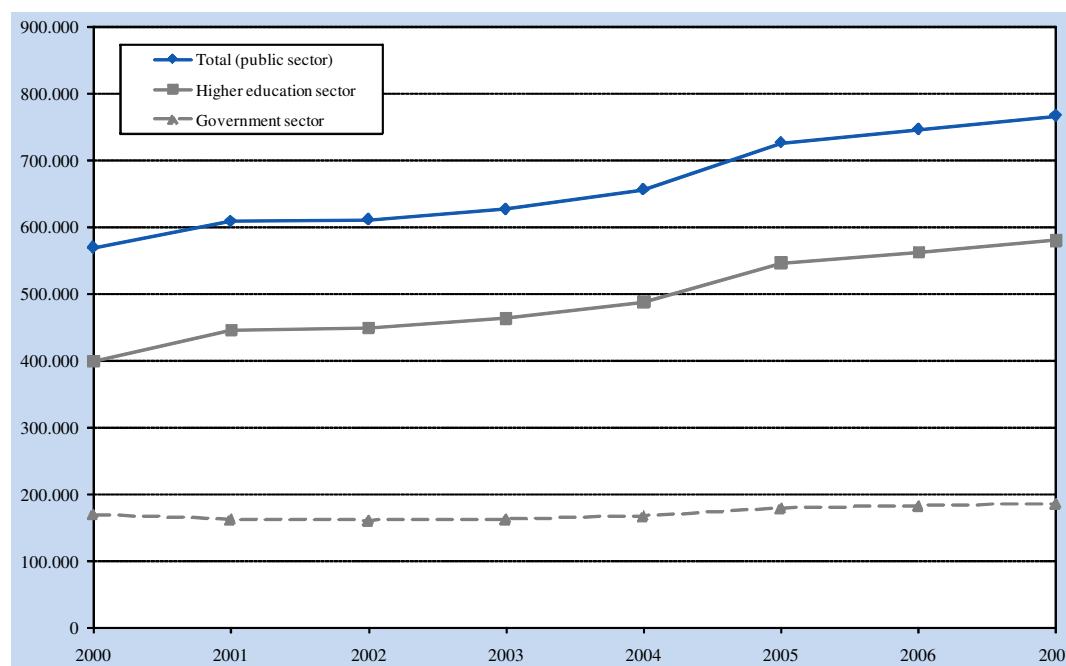
Stock of researchers: Researchers in the EU27 – evolution over time

- The increase of the number of researchers in EU27 from 1.60 to 2.16 (million) headcounts in 2000-2007, corresponds to an average annual increase of about 79 000 researchers in head counts (about 49 000 in FTEs).
- The number of researchers from all sectors in 2000-2007 in the EU27 grew faster (3.9% p.a.) for FTEs than the number of business researchers (3.4% p.a.) for FTEs.

1.2.2.3 Researchers in the public sector

Figure 8 presents the number of researchers (in FTEs) in the public sector including both the higher education and government sectors, in the EU27. The number of researchers in FTEs in the public sector has increased from about 570 000 in 2000 to about 767 000 in 2007, equivalent to an average annual growth rate of 4.3%. This increase has mainly been driven by the growth of researchers in the higher education sector rather than from researchers working in government. The number of researchers in FTEs in the higher education sector has increased from about 400 000 to about 581 000 in 2000-2007 (5.5% p.a.) whereas researchers in FTEs in government increased from 171 000 to 186 000 (1.3% p.a.).

Figure 8: Researchers (FTE) in the public sector (higher education sector and government sector) in the EU27 (2000-2007)



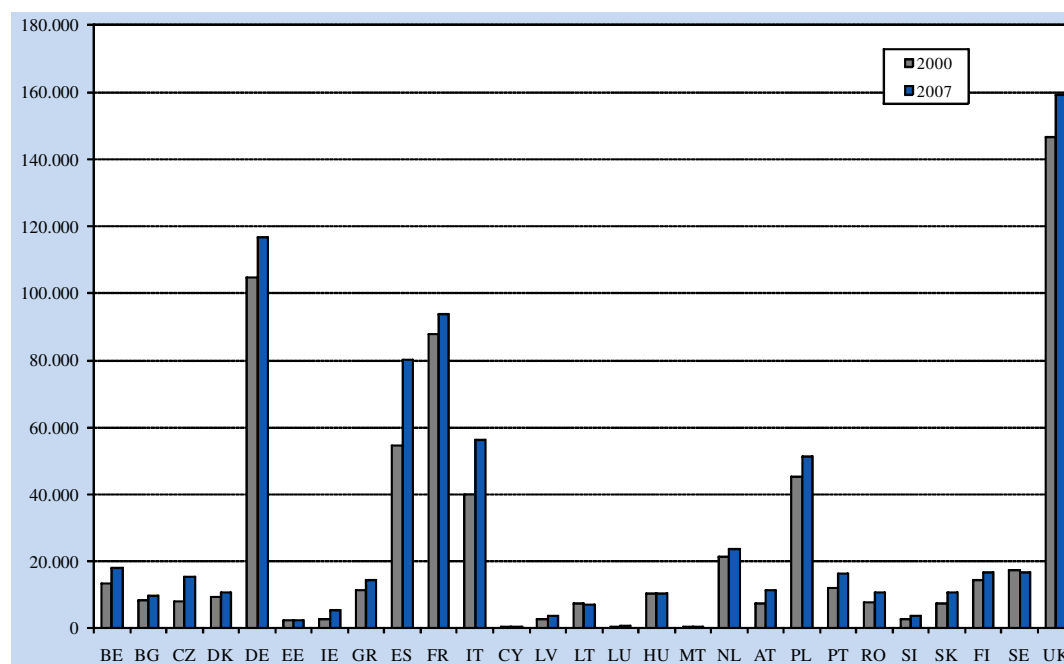
Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Figure 8 (see also Table A.5.11):

The numbers of researchers in the public sector in the EU27 are based on Table A.2.7 and Table A.2.8.

Figure 9 presents the number of researchers in FTEs in the public sector (higher education and government) by country over the period 2000-2007. In almost all EU27 countries, there has been an increase in the number of researchers (FTEs) in the public sector. Exceptions are Lithuania, Hungary and Sweden. Furthermore, the largest increases in percentage terms from 2000 to 2007 have been in Luxemburg (175%) and in two new Member States, Cyprus (173%) and the Czech Republic (90%). In Cyprus, Malta and Luxemburg the number of researchers in the public sector are very low in 2000 and in 2007.

Figure 9: Researchers (FTE) in the public sector (higher education sector and government sector) in the EU27 by country (2000 and 2007)



Source: NIFU STEP with Eurostat data (R&D Statistics).

Note Figure 9 (see also Table A.5.12):

The numbers of researchers in the public sector in the EU27 are based on Table A.2.7 and Table A.2.8.

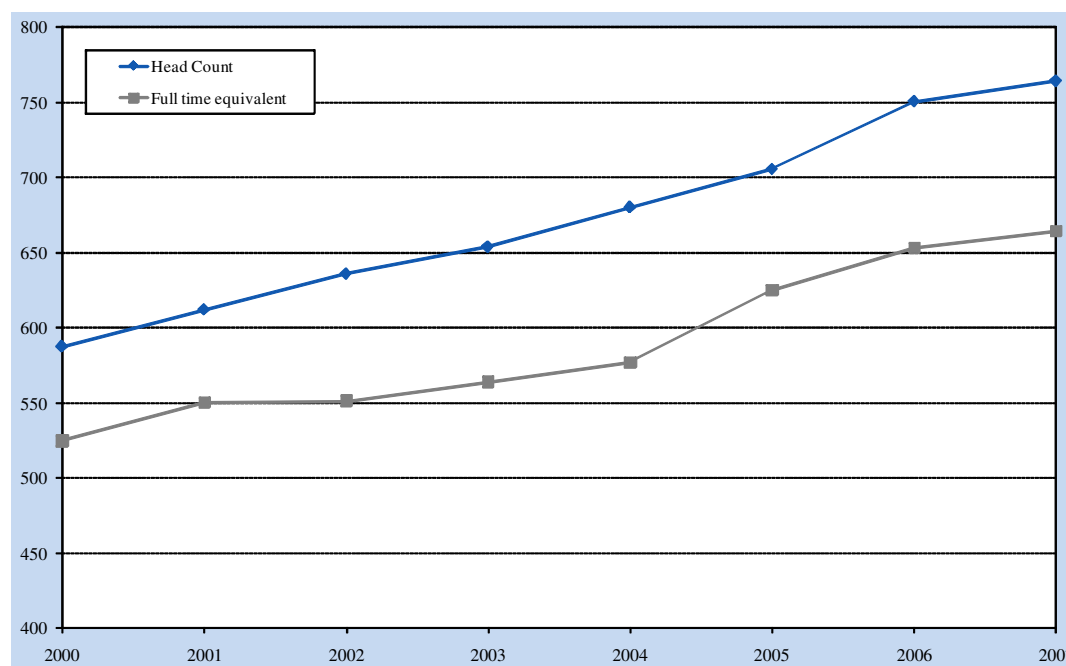
Stock of researchers: Researchers in the EU27 in the public sector

- The increase in the number of researchers (in FTEs) in the public sector in the EU27 (approximately 4.3% p.a.) is mainly driven by the increase in the number of researchers in the higher education sector (5.5% p.a.), not the number of researchers in the government sector.

1.2.2.4 Researchers in the business sector

Figure 10 presents the number of researchers, both in head counts and FTEs, in the business enterprise sector in the EU27 in the period 2000-2007. The number of researchers (both in head counts and in FTEs) in the business enterprise sector shows a steady increase in the EU27. Researchers in head counts and FTEs in the business sector have increased from about 588 000 to about 764 000 in Head Counts and from about 525 000 to about 664 000 in FTEs. The corresponding annual growth rate for head counts is 3.8% and for FTEs 3.4%. Comparing to the 3.9% annual growth rate for researchers in FTEs in all sectors, the 4.3% and 3.4% of the respective rate for respectively the public sector and the business sector, it is evident that the growth in the number of researchers in the EU27 is, to a considerable extent, being driven by the growth in the number of researchers in the public sector.

Figure 10: Researchers (HC, FTE) in the business enterprise sector in the EU27 (2000-2007) (in thousands)



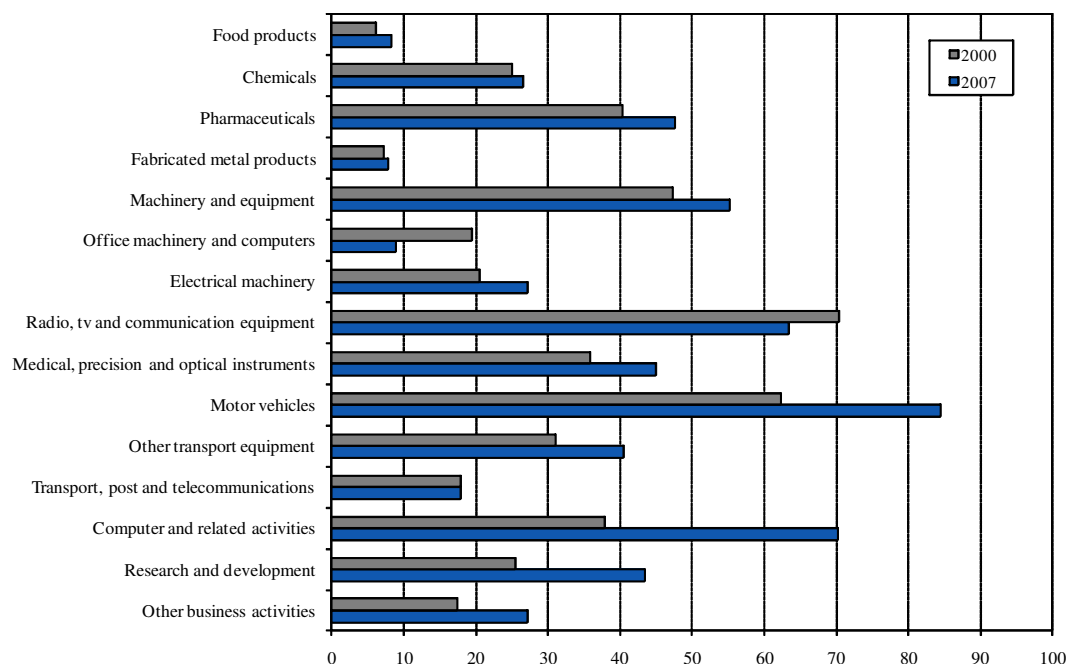
Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Figure 10 (see also Table A.5.13):

The numbers of researchers in the business enterprise sector in the EU27 are based on Table A.2.1 and Table A.2.6.

The number of researchers in FTEs in the business sector by selected NACE Rev.1.1 sectors in 2000 and 2007 is presented in Figure 11. The stock of researchers in the business enterprise sector grows unevenly among the various sectors of economic activity. Most sectors have experienced an increase in the number of researchers employed, except for Office machinery and computers and for Radio, tv and communication equipment. Other sectors however have increased substantially the stock of researchers: in Computer and related activities, Research and development, and Other business activities, the increase, overall in the period 2000 to 2007, is substantial (86%, 71%, 56%).

Figure 11: Researchers (FTE) in the business enterprise sector by selected NACE sectors in the EU27 (2000 and 2007) (in thousands)



Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Figure 11 (see also Table A.5.14):

There are missing values for several countries for certain NACE sectors and years, see Sub-indicators 15 and 16 in Annex 4. The values in Figure 11 are estimates. These estimates are calculated in three steps: In step 1 we aggregate the values for each year based on all EU27 countries. For countries with missing values for at least one of the selected NACE sectors in 2007, we estimate the stock of researchers in each of these sectors in each country by using the corresponding distribution for a previous year with non-missing values for the selected NACE sectors, and in most cases we use the corresponding distribution for 2006 or 2005. For example, the stock of researchers in the chemicals sector in Italy in 2007 is estimated by multiplying the stock of researchers in all sectors in Italy in 2007 by the share of researchers in the chemicals sector in Italy in 2006. The same procedure is used for countries with missing values for at least one of the selected NACE sectors in 2000: For each of these countries we estimate the stock of researchers in each of the selected NACE sectors in each country by using the corresponding distribution for later years with non-missing values for the selected NACE sectors. In step 2 we calculate the share of researchers in each of the selected NACE sectors in all EU27 countries for each year. In step 3 we multiply the shares in each year with the total number of researchers (FTE) in the corresponding year in Figure 10, which give us the estimates in Figure 11.

Stock of researchers: Researchers in the EU27 in the business sector

- Researchers in the business enterprise sector have increased by 3.8% in HCs and by 3.4% in FTEs.
- The growth in the number of researchers in the EU27 (3.9% in FTEs) is to a considerable extent driven by the growth in the number of researchers in the public sector.

1.2.3 Forecasts of researchers

This section provides forecasts for the total number of researchers and the number of researchers in the main sectors (measured in head counts) in the EU27 until 2011 through the application of the econometric models discussed in chapter 4 of Annex 2.

The estimation results shown in Table 5 suggest that the number of researchers in headcounts will increase to about 2 353 000 - 2 448 000 in 2011 (depending on which of the three econometric models was used). This increase corresponds to an overall increase of 9% - 13.4% or an average annual growth rate of about 2.2% - 3.2% in the period 2007-2011. This represents an increase of 195 000 -

286 000 researchers in headcounts or an increase of about 49 000 – 73 000 per year from 2007 to 2011.

Table 5: Number of researchers (HC) in 2000-2011 in the EU27

	Year	Model 1	Model 2	Model 3
Observations	2000	1 603 411	1 603 411	1 603 411
	2001	1 701 544	1 701 544	1 701 544
	2002	1 777 868	1 777 868	1 777 868
	2003	1 825 677	1 825 677	1 825 677
	2004	1 908 150	1 908 150	1 908 150
	2005	2 010 614	2 010 614	2 010 614
	2006	2 106 542	2 106 542	2 106 542
	2007	2 157 838	2 157 838	2 157 838
Forecasts	2008	2 193 000	2 241 000	2 239 000
	2009	2 248 000	2 310 000	2 307 000
	2010	2 292 000	2 378 000	2 375 000
	2011	2 353 000	2 448 000	2 444 000

Source: NIFU STEP based on Eurostat data (R&D Statistics).

Note Table 5:

- 1) The numbers of researchers in the EU27 in the period 2000-2007 are based on Table A.2.1 to Table A.2.5.
- 2) For all three models for the period 2008-2011, we have first estimated the number of researchers in each sector, and then aggregated the number of researchers for all four sectors. In Model 1 we assume that the number of researchers in a certain sector is a function of the gross domestic product (GDP) for all sectors, and total intramural R&D expenditure (GERD) in the certain sector. In Model 2 we assume that the number of researchers in a certain sector is a function of GDP for all sectors, total GERD in the certain sector, and a trend term (which is 2000 in 2000, 2001 in 2001, etc.). In Model 3 we assume that the number of researchers in a certain sector is a function of total GERD in the certain sector, and the trend term.
- 3) GDP is measured at market prices (price index, 2000=100, based on euro).
- 4) The data source for the GDP variable is the Eurostat database; we use observed values from Eurostat for the period 2000-2008, and Eurostat's forecast on GDP for the period 2009-2011. For the GERD variable for each sector, we use observed values from the Eurostat database for the period 2000-2008, and our own forecast on GERD for the period 2009-2011 based on trend extrapolation.
- 5) The estimation method for the period 2008-2011 is ordinary least squares (OLS).
- 6) For more details, see chapter 4 of Annex 2.

Table 6 presents the estimates for the number of researchers in head counts by sector of employment, distinguishing among the government, business enterprise, higher-education and private non-profit sectors.

Based on the estimates of Model 1 (see note 2 in Table 5), the number of researchers in the government sector is expected to reach about 240 000 in 2011, an overall increase of 5.6% since 2007 (1.4% p.a.). This results in about 13 000 more researchers over the entire period or an increase of about 3 200 per year. In the higher education sector, the forecasts suggest an increase to 1 259 000 researchers, representing an increase of about 10.1% over the period 2007-2011 (2.4% p.a.), or an increase of about 116 000 researchers overall (about 29 000 researchers p.a.). If we consider the public sector as a whole (i.e. the government sector and the higher education sector), then the forecasts indicate an increase to about 1 499 000 researchers in 2011, corresponding to a 9.4% increase since 2007 (2.3% p.a.) or an increase of 128 000 researchers overall (about 32 000 p.a.).

The increase in the business enterprise sector is estimated to be slightly lower than in the public sector. Here the forecasts indicate that the number of researchers will reach about 830 000 in 2011, an increase of 8.6% since 2007 (2.1% p.a.), representing an increase of about 66 000 researchers (16 400 p.a.). In the private non-profit sector the picture seems to be different, with a much lower percentage increase over the period 2007-2011 of 4.4% or 1.1% per year. This represents an increase in the number of researchers to about 24 000 (253 p.a.).

In the forecasts, it is important to bear in mind that the estimates are calculated on the basis of available data from Eurostat, including Eurostat's forecasts on GDP. This means that, as long as Eurostat's own forecasts do not capture non-linear (discontinuous) effects of the financial crisis on GDP and on the underlying R&D human capital trends, our forecasts presented above almost certainly underestimate the effects of the financial crisis as well.

It is expected that the effects of the crisis will most probably have a negative impact on the number of researchers in the business enterprise sector over the years 2009-2011; the effects on the number of researchers in the public sector are, however, more uncertain.

Table 6: Number of researchers (HC) in 2000-2011 by sector in the EU27 (Model 1)

	Year	All sectors	Government sector	Business enterprise sector	Higher education sector	Private non-profit sector
Observations	2000	1 603 411	202 098	587 539	797 441	16 333
	2001	1 701 544	192 402	612 065	880 432	16 645
	2002	1 777 868	197 424	636 047	925 238	19 159
	2003	1 825 677	202 185	653 851	951 234	18 406
	2004	1 908 150	209 686	680 088	999 223	19 152
	2005	2 010 614	216 599	705 566	1 067 335	21 115
	2006	2 106 542	223 764	750 710	1 108 730	23 337
	2007	2 157 838	227 183	764 267	1 143 399	22 990
Forecasts	2008	<i>2 193 000</i>	<i>236 000</i>	<i>767 000</i>	<i>1 167 000</i>	<i>23 000</i>
	2009	<i>2 248 000</i>	<i>237 000</i>	<i>789 000</i>	<i>1 198 000</i>	<i>23 000</i>
	2010	<i>2 292 000</i>	<i>238 000</i>	<i>806 000</i>	<i>1 224 000</i>	<i>24 000</i>
	2011	<i>2 353 000</i>	<i>240 000</i>	<i>830 000</i>	<i>1 259 000</i>	<i>24 000</i>

Source: NIFU STEP based on Eurostat data.

Note Table 6:

1) The numbers of researchers in the EU27 in the period 2000-2007 are based on Table A.2.1 to Table A.2.5.

2) For Model 1 for the period 2008-2011, we have first estimated the number of researchers in each sector, and then aggregated the number of researchers for all four sectors. In Model 1 we assume that the number of researchers in a certain sector is a function of the gross domestic product (GDP) for all sectors, and total intramural R&D expenditure (GERD) in the certain sector.

3) GDP is measured at market prices (price index, 2000=100, based on euro).

4) The data source for the GDP variable is the Eurostat database; we use observed values from Eurostat for the period 2000-2008, and Eurostat's forecast on GDP for the period 2009-2011. For the GERD variable for each sector, we use observed values from the Eurostat database for the period 2000-2008, and our own forecast on GERD for the period 2009-2011 based on trend extrapolation.

5) The estimation method for the period 2008-2011 is ordinary least squares (OLS).

6) For more details, see chapter 4 of Annex 2.

Stock of researchers: Forecasts for the number of researchers in the EU27

- Based on modelling of historical data from EUROSTAT we forecast that the number of researchers in headcounts will increase to minimum 2 353 000 researchers or at maximum 2 448 000 researchers in 2011. However, this forecast does not take into account the possible adverse effects of the current economic crisis on the labour market for researchers and on the funding of R&D in Member States.
- This corresponds to an average annual growth rate of 2.2% – 3.2% or an increase of about 49 000 - 73 000 per year from 2007 to 2011.
- Among all sectors of performance, the higher education sector is expected to provide the highest increase in the number of researchers in percent until 2011, reaching 1 259 000 researchers, an increase of 2.4% per year (or 29 000 researchers per year) since 2007. The business enterprise sector has the second highest per annum growth rate over the period 2007-2011 (2.1%).
- The public sector as a whole (higher education and government) is expected to reach 1 499 000 researchers in 2011 corresponding to an increase of 2.3% per year (or 32 000 per year) since 2007.

2 INDICATOR 2: NUMBER OF RESEARCHERS IN THE TRAINING PHASE AND POST-DOCS

As in the previous chapters of the current report, here we present the update of the current IISER report (as structured in the version of 2007). Additional data on this indicator will be provided in the Final Report of the MORE project, where available. More details about the additional indicators will be provided in the MORE-set of indicators in the MORE Final Report.

2.1 Higher education graduates in the EU27

2.1.1 The general picture

This section presents the current picture on the number of tertiary degrees with academic orientation in the EU27 in the period 2000-2007. In particular the focus lies on the analysis of tertiary degrees with academic orientation (ISCED 5A) and to doctoral degrees (ISCED 6) given that these graduates provide the main 'pool' of potential employees meeting the demand for scientists and researchers.

Based on the International Standard Classification of Education (ISCED-97) terminology, ISCED level 5A programmes are tertiary programmes which are "largely theoretically based and are intended to provide sufficient qualifications for gaining entry into advanced research programmes and profession with high skills requirements". The ISCED 6 level, "second stage of tertiary education leading to an advanced research qualification", is reserved for tertiary programmes which "are devoted to advanced study and original research and are not based on course-work only"⁸.

In 2007, 3.3 million degrees with academic orientation have been awarded; the cumulative number of ISCED 5A degrees in the period 2000-2007 is 21.3 million. About 111 000 doctoral degrees were awarded in 2007, the cumulative number since 2000 is about 729 000. In Science, mathematics and computing in 2007, there were 327 158 degrees of academic orientation and 29 700 doctoral degrees awarded. In Engineering, manufacturing and construction the number of degrees with academic orientation and doctoral degrees in 2007 were 389 436 and 15 475, respectively.

Table 8 and Table 9 provide data on the number of tertiary degrees with academic orientation and on the number of doctoral degrees by field of education over the period 2000-2007.

⁸ For a documentation of ISCED 1997, see the following document:
http://www.uis.unesco.org/TEMPLATE/pdf/isced/ISCED_A.pdf

Table 7: Number of higher education graduates per 1 000 population aged 25-34 in the EU27 by country, educational level and gender in 2007

	Higher education graduates (note 1)	Tertiary degrees with academic orientation (note 2)	Doctoral degrees (note 3)	Males (note 4)	Females (note 5)
Belgium	45.4	44.2	1.3	40.9	50.1
Bulgaria	38.6	38.1	0.5	30.2	47.4
Czech Republic	40.2	38.9	1.3	34.5	46.1
Denmark	61.5	60.1	1.4	49.8	73.4
Germany	28.6	26.1	2.5	27.7	29.5
Estonia	43.0	42.2	0.8	27.2	59.0
Ireland	58.0	56.6	1.4	46.4	70.0
Greece	24.2	22.8	1.4	17.8	31.1
Spain	26.2	25.3	0.9	20.1	32.8
France	50.5	49.2	1.3	46.5	54.5
Italy	48.3	47.0	1.3	38.2	58.5
Cyprus	8.4	8.3	0.1	3.9	12.9
Latvia	71.8	71.3	0.5	39.2	105.2
Lithuania	68.5	67.7	0.8	45.4	91.9
Luxembourg					
Hungary	37.9	37.3	0.7	25.3	51.1
Malta	37.9	37.7	0.2	30.4	45.9
Netherlands	59.9	58.4	1.5	52.1	67.7
Austria	26.0	24.1	1.9	24.9	27.1
Poland	88.2	87.2	1.0	61.0	116.2
Portugal	45.4	41.7	3.7	34.9	56.0
Romania	56.6	55.7	0.9	44.4	69.3
Slovenia	25.8	24.4	1.4	18.2	34.0
Slovakia	49.8	48.3	1.5	37.6	62.5
Finland	65.3	62.3	3.0	46.5	85.1
Sweden	46.9	43.5	3.4	32.9	61.5
United Kingdom	66.0	63.7	2.2	57.8	74.1
EU27	48.3	46.7	1.6	39.3	57.5

Source: Eurostat (Education and Population Statistics).

- 1) The column "Higher Education Graduates" measures the number of higher education graduates per 1,000 population aged 25-34.
- 2) The column "Tertiary degrees with academic orientation" measures the number of tertiary degrees with academic orientation (ISCED 5A) per 1,000 population aged 25-34.
- 3) The column "Doctoral degrees" measures the number of doctoral degrees (second stage of tertiary education leading to an advanced research qualification, ISCED 6) per 1,000 population aged 25-34.
- 4) The column "Males" measures the number of male higher education graduates per 1,000 male population aged 25-34.

- 5) The column "Females" measures the number of female higher education graduates per 1,000 female population aged 25-34.
- 6) The first column (higher education graduates) is the sum of the second column (tertiary degrees with academic orientation, ISCED 5A) and the third column (doctoral degrees; second stage of tertiary education leading to an advanced research qualification, ISCED 6).
- 7) The two last columns show higher education graduates in per cent of the population by gender.
- 8) There are missing values for tertiary degrees with academic orientation and doctoral degrees (total and by gender) for Luxembourg. This country is not included in EU27.
- 9) The population size refers to 1. January 2007.
- 10) The data in the table are downloaded on August 2010.

Table 8: New higher education graduates in the EU27 (2000-2007): tertiary degrees with academic orientation (ISCED 5A)

	2000	2001	2002	2003	2004	2005	2006	2007
Teacher training and education science	243 287	277 677	253 076	303 020	296 165	332 770	356 019	363 492
Humanities and arts	290 497	296 208	237 552	314 921	278 866	381 291	413 300	433 629
Social sciences, business and law	776 963	823 046	731 211	913 334	882 221	1 158 224	1 156 931	1 214 893
Science, mathematics and computing	231 677	238 383	190 511	267 640	222 993	307 471	311 901	327 158
Engineering, manufacturing and construction	277 170	291 189	261 695	332 413	289 259	358 410	367 984	389 436
Agriculture and veterinary	39 824	38 451	40 180	42 860	42 175	47 949	46 650	51 094
Health and welfare	204 659	216 878	229 080	265 921	266 758	340 537	359 687	395 531
Services	52 142	70 846	63 044	82 622	73 503	101 361	99 857	110 558
Unknown or not specified	86 729	124 890	115 018	110 472	106 840	18 323	18 116	18 199
Total	2 202 948	2 377 568	2 121 367	2 633 203	2 458 780	3 046 336	3 130 445	3 303 990

Source: Eurostat (Education Statistics).

Table 9: New higher education graduates in the EU27 (2000-2007): doctoral degrees (second stage of tertiary education leading to an advanced research qualification) (ISCED 6)

	2000	2001	2002	2003	2004	2005	2006	2007
Teacher training and education science	1 881	2 087	2 198	2 864	2 769	3 016	3 619	4 170
Humanities and arts	8 698	10 260	8 681	11 862	10 884	12 725	13 353	14 307
Social sciences, business and law	12 379	13 378	11 550	15 616	15 491	18 179	18 921	19 615
Science, mathematics and computing	23 295	24 656	20 278	25 425	22 585	27 618	29 439	29 700
Engineering, manufacturing and construction	9 807	10 838	10 120	12 449	12 608	13 708	15 343	15 475
Agriculture and veterinary	2 750	3 113	3 259	3 977	3 615	4 039	4 641	3 952
Health and welfare	15 827	17 420	16 821	17 753	18 620	21 693	18 588	21 252
Services	525	682	732	926	883	1 057	1 054	1 477
Unknown or not specified	84	271	413	221	336	246	481	680
Total	75 246	82 705	74 052	91 093	87 791	102 281	105 439	110 628

Source: Eurostat (Education Statistics).

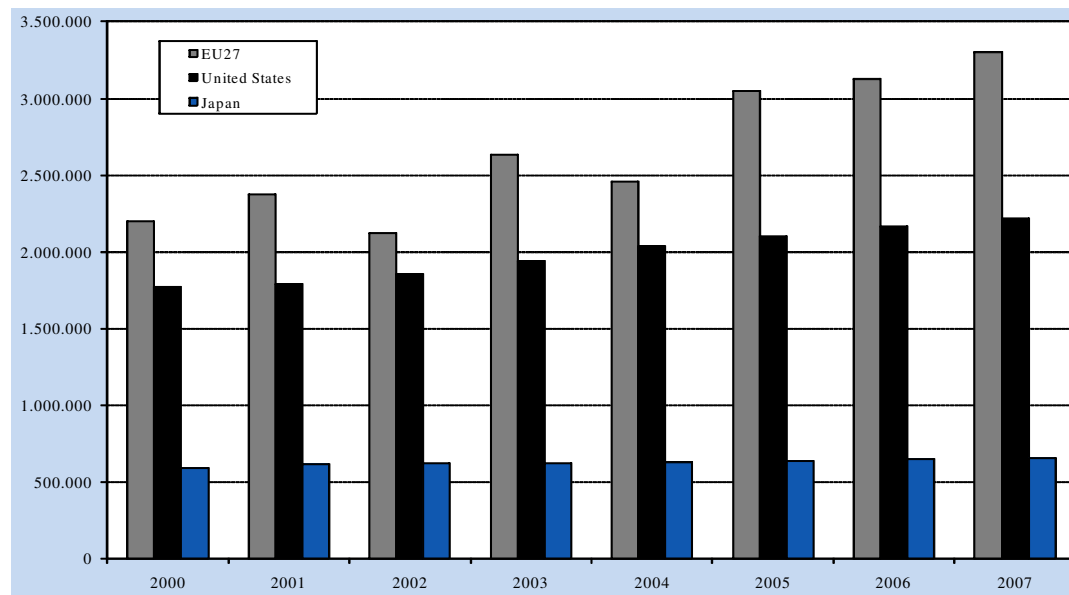
2.1.2 Tertiary degrees with academic orientation

2.1.2.1 International comparison

Figure 12 and Figure 13 provide a comparison among the EU27, the US and Japan on the number of tertiary degrees with academic orientation and the share of science and engineering tertiary degrees awarded in 2000-2007.

In 2007 3.3 million tertiary degrees with academic orientation (ISCED 5A) were awarded in the EU27 compared with 2.2 million in the US and about 657 000 in Japan. The average annual growth rate over the period 2000-2007 in the EU27 (6.0% p.a.) was considerably higher than in the US (3.2%) and Japan (1.4%).

Figure 12: Number of tertiary degrees with academic orientation in the EU27, U.S. and Japan (2000-2007)

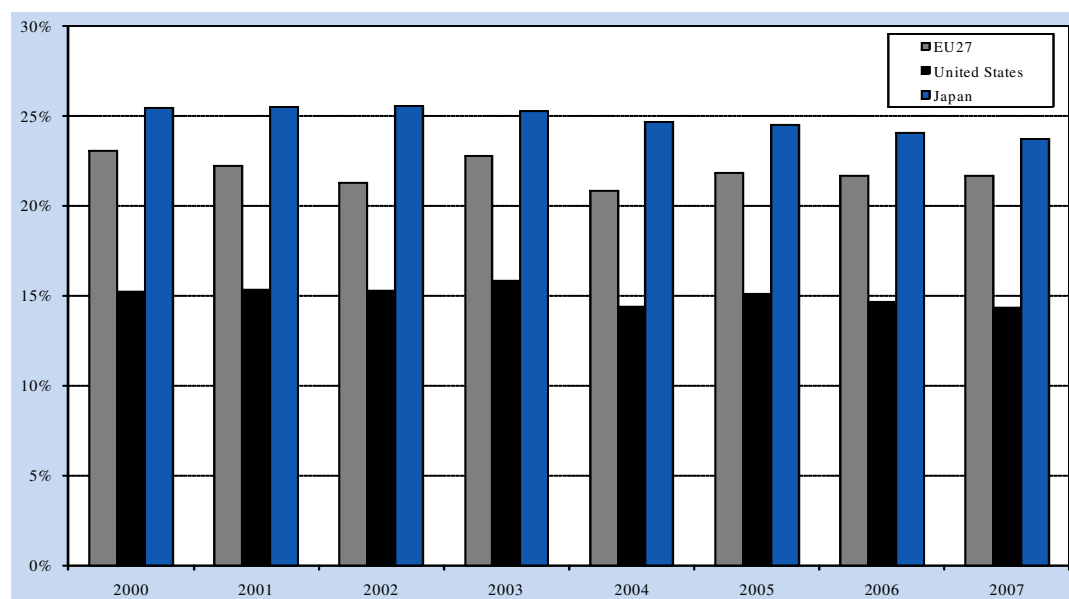


Source: Eurostat (Education Statistics).

The number of science and engineering degrees awarded in EU27 increased from about 509 thousand in 2000 to 717 thousand in 2007. EU27 exhibits a considerable larger production of science and engineering degrees compared to the US (319 thousand in 2007) and Japan (156 thousand in 2007). Furthermore, the increase of the production of science and engineering degrees in EU27 (+40%) is surprisingly larger than that of US (+18%) while we observe almost no increase in Japan (+3%) from 2000 to 2007.

The share of science and engineering degrees in the total number of degrees with academic orientation awarded has slightly decreased from 2000 to 2007 in the EU27 as well as in Japan and the US: for the EU27 the respective share has been 23% in 2000 and 22% in 2007; for Japan 25% and 24% respectively; and for the US 15% and 14% respectively.

Figure 13: Share of science and engineering tertiary degrees in the total number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, U.S. and Japan (2000-2007)



Source: Eurostat (Education Statistics).

Tertiary degrees with academic orientation: international comparison

- 3.3 million tertiary degrees with academic orientation were awarded in the EU27 in 2007 with an average annual growth rate since 2000 of 6.0%. This rate was higher than in the US (3.2%) and Japan (1.4%).
- Although the number of science and engineering degrees awarded in EU27 increased by 40% from 2000 to 2007, the share of such degrees in the total number of degrees with academic orientation awarded has not changed significantly during this period. No significant change was observed in either the US or Japan over this period.

2.1.2.2 The picture in the EU27

Between 2000 and 2007, the number of tertiary degrees with academic orientation in the EU27 has increased with an average annual rate of 6.0% per year (1 101 042 degrees in total). There is an increase in all fields of education; the highest annual growth rate occurred in the fields of Services (11.3%), Health and welfare (9.9%) and Social sciences, business and law (6.6%).

In Science, mathematics and computing, the annual growth rate (5.1%) was lower than the average for all fields (6.0%). In Engineering, manufacturing and construction, the respective growth rate (5.0%) has also been lower than the average growth rate.

The shares of degrees by disciplines over the total number of degrees in 2000-2007 have not changed considerably. The share of degrees in Health and welfare have increased most, namely from 9% in 2000 to 12% in 2007. Also, the share of degrees in Social sciences, business and law and Services have increased (from 35% to 37% and from 2% to 3% respectively). In Science, mathematics and computing, the share slightly decreased from 11% to 10%; In Engineering, manufacturing and construction, the share also decreased from 13% to 12%.

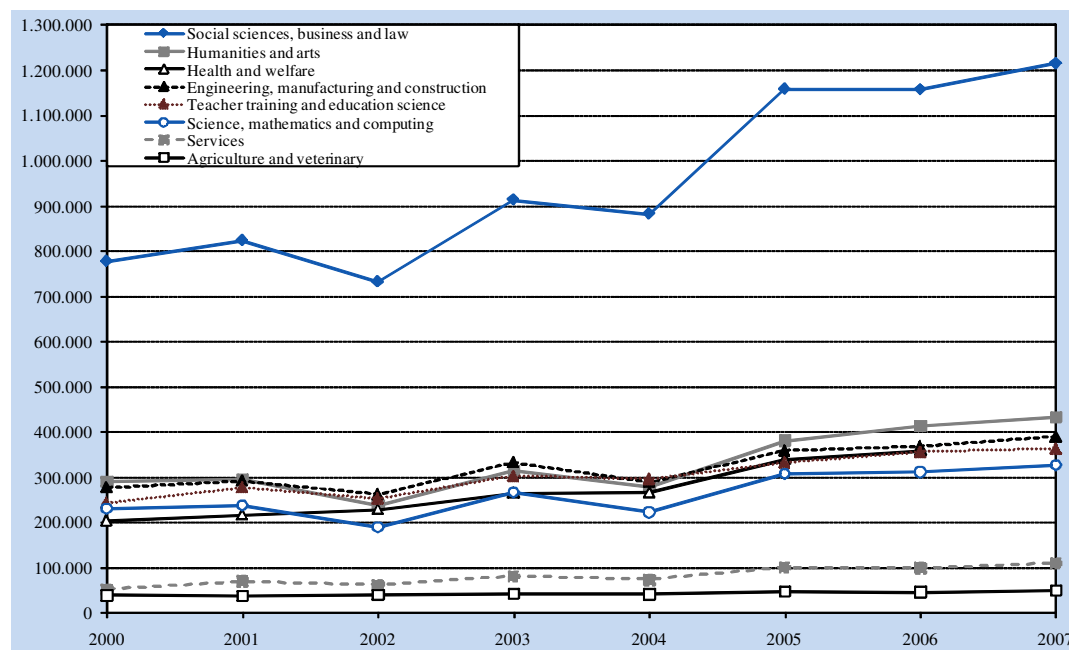
Table 10: Number of tertiary degrees with academic orientation (ISCED 5A) in EU27 by main fields (2000 and 2007)

Field of education	2000		2007		Change from 2000 to 2007	
	total	%	total	%	total	%
Teacher training and education science	243 287	11	363 492	11	120 205	49
Humanities and arts	290 497	13	433 629	13	143 132	49
Social sciences, business and law	776 963	35	1 214 893	37	437 930	56
Science, mathematics and computing	231 677	11	327 158	10	95 481	41
Engineering, manufacturing and construction	277 170	13	389 436	12	112 266	41
Agriculture and veterinary	39 824	2	51 094	2	11 270	28
Health and welfare	204 659	9	395 531	12	190 872	93
Services	52 142	2	110 558	3	58 416	112
Unknown or not specified	86 729	4	18 199	1	-68 530	-79
Total	2 202 948	100	3 303 990	100	1 101 042	50

Source: Eurostat (Education Statistics).

The following figure presents the information of Table 10 overall for the period 2000-2007.

Figure 14: Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27 by main fields (2000-2007)



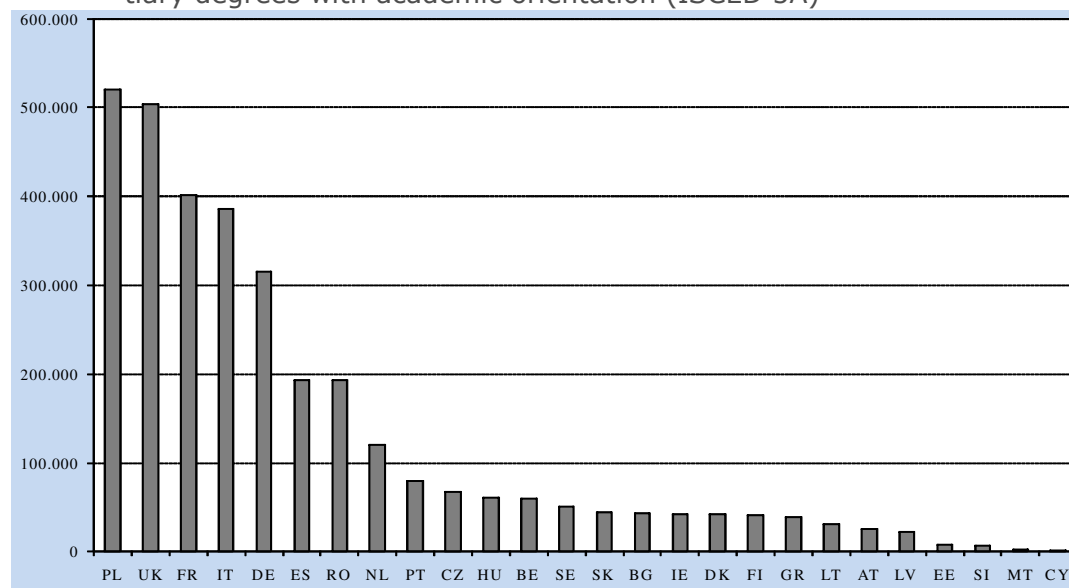
Source: Eurostat (Education Statistics).

Note Figure 14: The observed values in the figure for 2000 and 2007 are the same as the observed values in Table 10.

The next four figures (Figure 15, Figure 16, Figure 17, and Figure 18) display the total number of degrees with academic orientation awarded in 2007 in the EU27 by country as well as the shares of tertiary degrees (see Figure 19, Figure 20, and Figure 21) in two selected fields (Science, mathematics and computing and Engineering, manufacturing and construction). Science and engineering includes these two fields.

Across the EU27, Poland, UK, France and Italy have awarded the highest numbers of tertiary degrees with academic orientation, about 400 000 to 520 000 for each of the countries. Germany (315 000 degrees), Spain and Romania (each 193 000 degrees) follow. The top 6 countries account for about 70% of the total number of tertiary degrees with academic orientation awarded in the EU27 in 2007.

Figure 15: New higher education graduates in the EU27 by country in 2007: tertiary degrees with academic orientation (ISCED 5A)



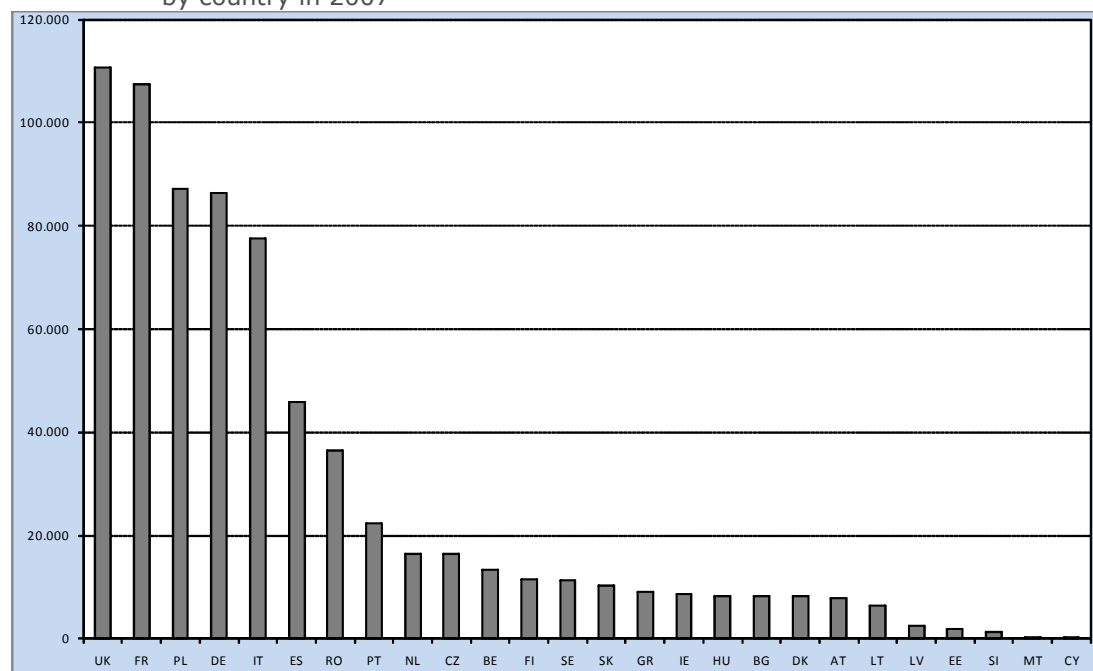
Source: Eurostat (Education Statistics).

Notes Figure 15:

- 1) For each country, we have aggregated the number of new higher education graduates for all main fields.
- 2) Luxembourg is not included in the figure, since there are missing values for each of the main fields for this country. See Sub-indicators 26-34 in Annex 4.

In science and engineering fields of education (including Science, mathematics and computing and Engineering, manufacturing and construction) the countries with most degrees awarded are the UK, and France with around 110 000 degrees each. They are followed by Poland, Germany and Italy with 78 000 to 87 000 degrees each. Spain is the sixth country with around 46 000 degrees awarded. These top-6 countries account for about 72% of the total number of degrees awarded in 2007 in the fields of science and engineering.

Figure 16: Number of science and engineering tertiary degrees (ISCED 5A) in the EU27 by country in 2007

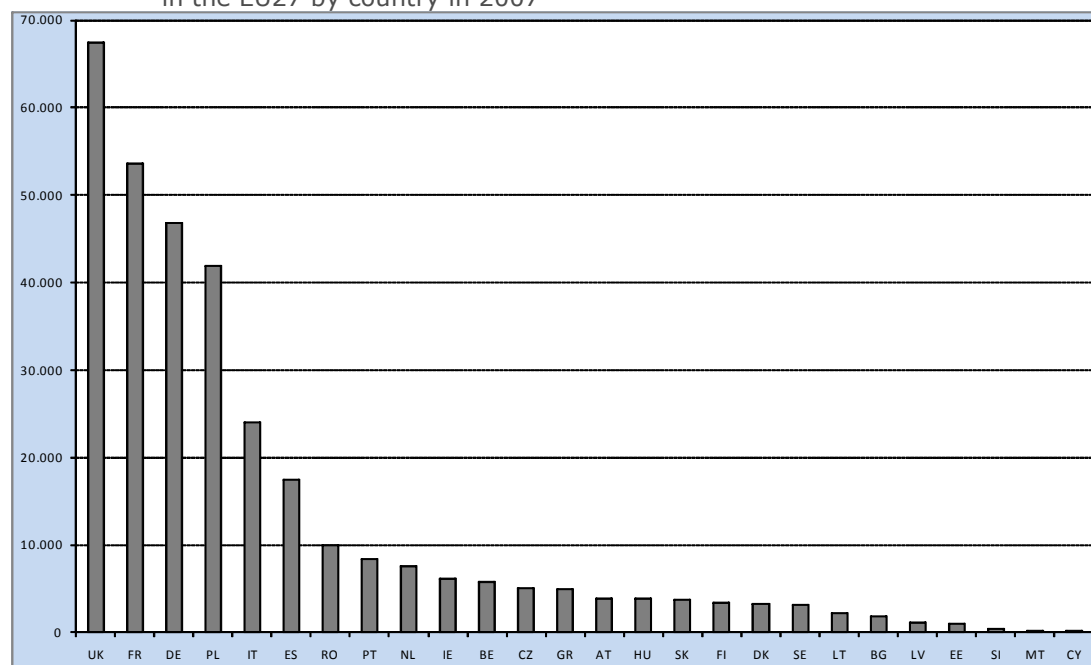


Source: Eurostat (Education Statistics).

Note Figure 16: Luxembourg is not included in the figure, since there are missing values for this country. See Sub-indicators 29 and 30 in Annex 4.

In Science, mathematics and computing, the countries with most degrees awarded are again UK and France with around 67 000 and 54 000 degrees respectively. The list is followed by Germany and Poland with 47 000 and 42 000 each, and Italy and Spain with 24 000 and 17 000 each. The top-6 countries account for around 77% of the total number of degrees awarded in 2007 in this field.

Figure 17: Number of science, mathematics and computing tertiary degrees (ISCED 5A) in the EU27 by country in 2007

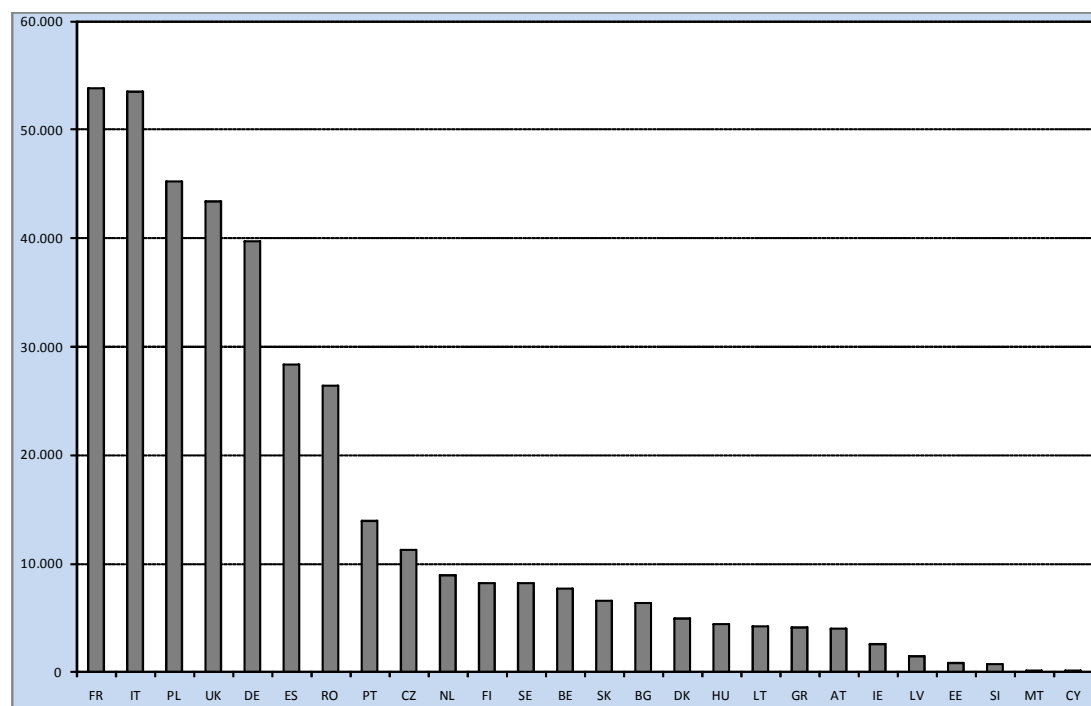


Source: Eurostat (Education Statistics).

Note Figure 17: Luxembourg is not included in the figure, since there are missing values for this country. See Sub-indicator 29 in Annex 4.

In Engineering, manufacturing and construction, again the same six countries populate the top of the list. France and Italy stand on the top with around 54 000 degrees each in tertiary education in 2007, followed by Poland and the UK with 45 000 and 43 000 degrees each. Germany and Spain have awarded 40 000 and 28 000 degrees respectively. These top-6 countries account for about 68% of the total number of degrees awarded in 2007 in this field.

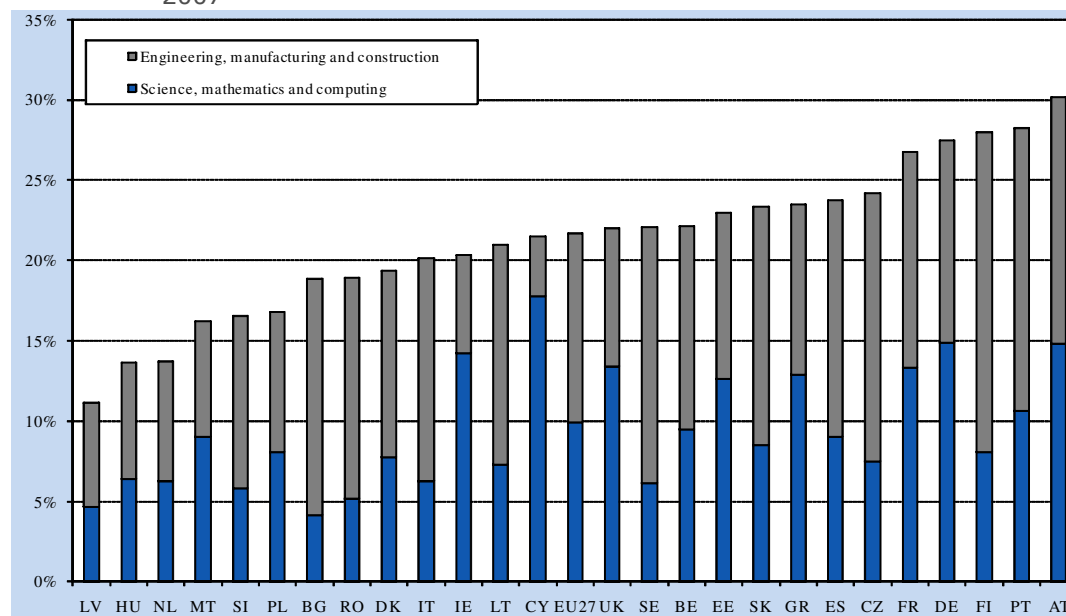
Figure 18: Number of engineering, manufacturing and construction tertiary (ISCED 5A) in the EU27 by country in 2007



Source: Eurostat (Education Statistics).

Note Figure 18: Luxembourg is not included in the figure, since there are missing values for this country. See Sub-indicator 30 in Annex 4.

Figure 19: Share of science and engineering tertiary degrees in the total number of tertiary degrees with academic orientation (ISCED 5A) in the EU27 by country in 2007

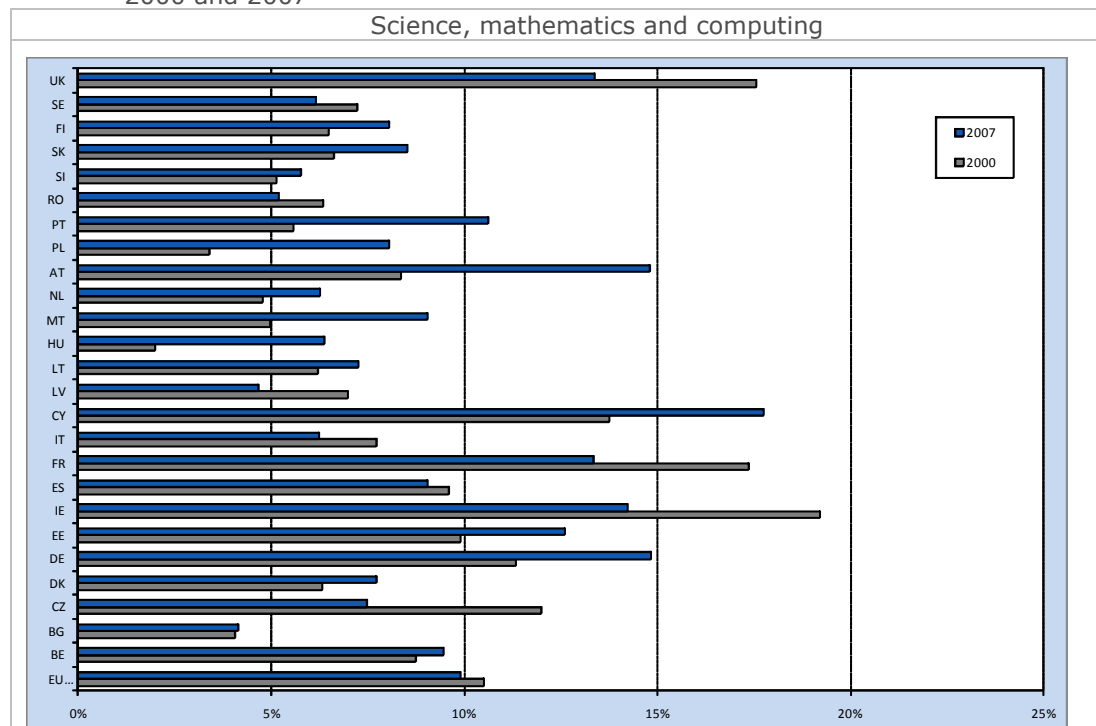


Source: Eurostat (Education Statistics).

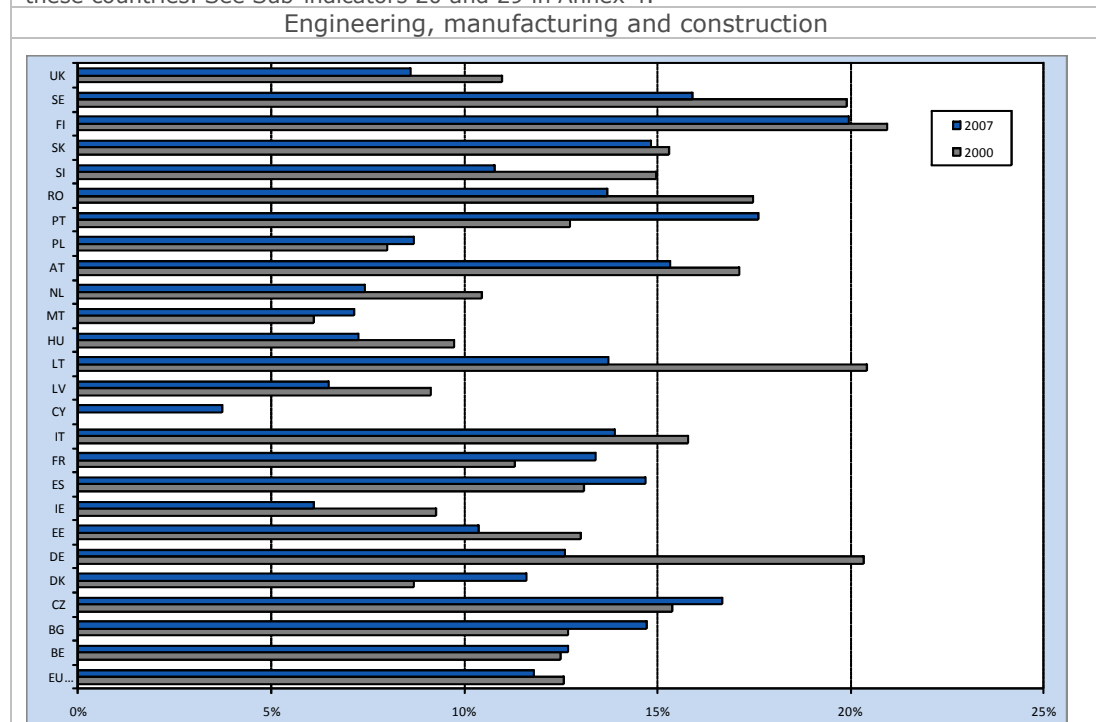
Note Figure 19: Luxembourg is not included in the figure, since there are missing values for this country. See Sub-indicators 29 and 30 in Annex 4.

Figure 20 and Figure 21 present the share of science and engineering degrees in the total number of tertiary degrees with academic orientation in EU27 countries.

Figure 20: Share of science and engineering tertiary degrees in the total number of tertiary degrees with academic orientation (ISCED 5A) in the EU27 by country in 2000 and 2007



Note: Greece and Luxembourg are not included in the figure, since there are missing values for these countries. See Sub-indicators 20 and 29 in Annex 4.



Note: Greece and Luxembourg are not included in the figure, since there are missing values for these countries. See Sub-indicators 21 and 30 in Annex 4.

Source: Eurostat (Education Statistics).

The highest shares of Science and engineering (S&E) degrees in the total number of tertiary degrees with academic orientation in 2007 are found in Austria, Portugal and Finland, with shares between 28% and 30% for each. The next highest, Germany and France each have a share of 27%. When distinguishing

between the two fields, the countries with highest shares of degrees in Science, mathematics and computing are Cyprus (18%), Germany (15%) and Austria (15%). In Engineering, manufacturing and construction the countries with the highest shares of tertiary degrees are Finland (20%) and Portugal (18%).

Tertiary degrees with academic orientation: the picture in the EU27

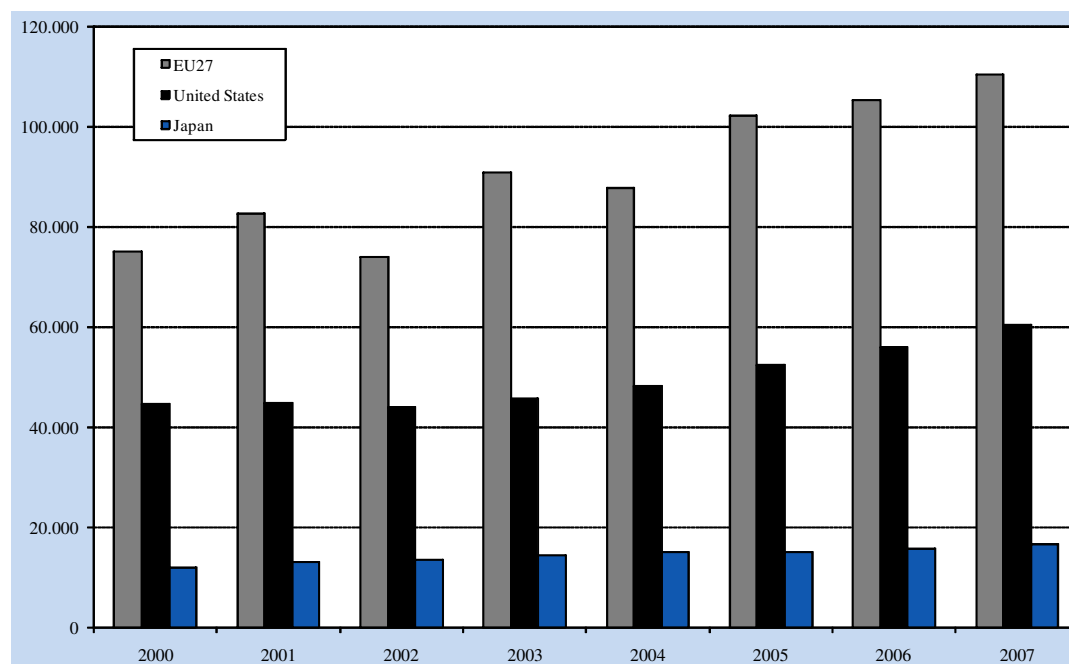
- The number of tertiary degrees with academic orientation in the EU27 has increased at an average annual rate of 6.0% per year over the period 2000-2007.
- There are increases in all fields of education; however the fields with the highest annual growth rate are Services (11.3%), Health and welfare (9.9%) and Social sciences, business and law (6.6%).
- Poland, UK, France and Italy have awarded the highest numbers of tertiary degrees with academic orientation, about 400 000 to 520 000 for each of the countries. Along with Germany and Spain, these 6 countries account for about 70% of the total number of tertiary degrees with academic orientation awarded in the EU27 in 2007.
- The highest shares of Science and engineering (S&E) degrees in the total number of tertiary degrees with academic orientation awarded in 2007 is found in Austria, Portugal and Finland, with shares between 28% and 30% for each.

2.1.3 Doctoral degrees

2.1.3.1 International comparison

Figure 21 and Figure 22 provide a comparison among the EU27, the US and Japan on the number of doctoral degrees awarded in 2000-2007, as well as on the share of science and engineering doctoral degrees awarded. In 2007 111 000 doctoral degrees were awarded in the EU27 compared with 61 000 in the US and 16 800 in Japan. The average annual growth rate in the period 2000-2007 in the EU27 was 5.7%. In the US the average annual growth rate was 4.4%, while in Japan it was 4.7%.

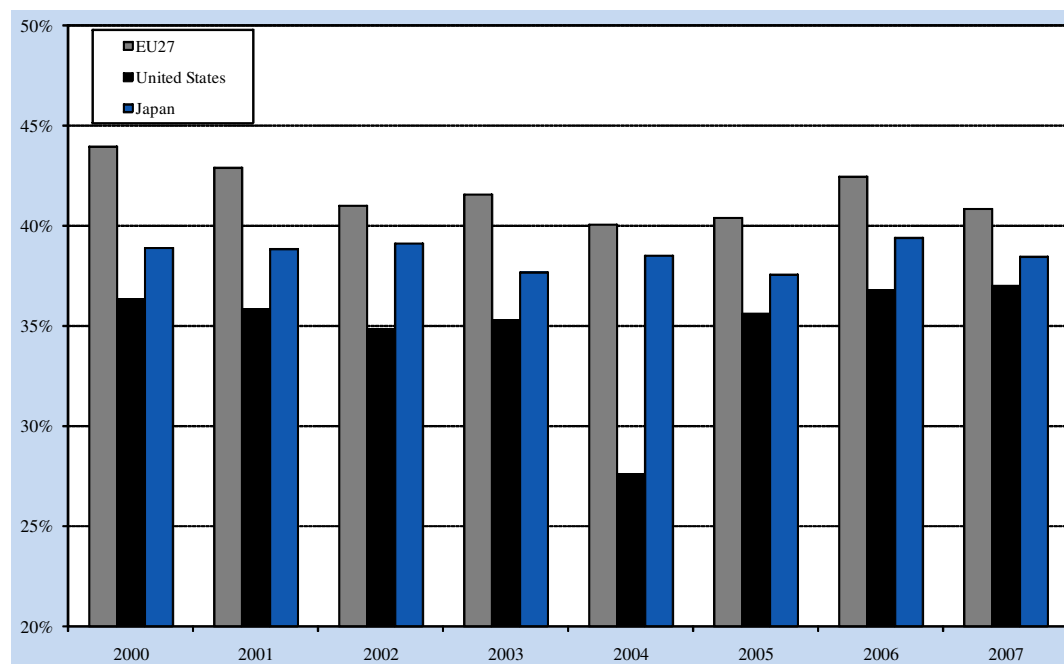
Figure 21: Number of doctoral degrees (ISCED 6) in the EU27, U.S. and Japan (2000-2007)



Source: Eurostat (Education Statistics).

The share of science and engineering doctoral degrees in the total number of doctoral degrees has not changed significantly in the EU27 or the US from 2000 to 2007: for the EU27 the respective shares were 44% in 2000 and 41% in 2007; for the US, 36% and 37% respectively and for Japan, 39% and 38% respectively.

Figure 22: The number of science and engineering doctoral degrees as a per cent of the total number of doctoral degrees (ISCED 6) in the EU27, U.S. and Japan (2000-2007)



Source: Eurostat (Education Statistics).

Figure 23 presents the share of doctoral degrees in Science and engineering in the EU27 and the US as a share of the total number of doctoral degrees.

The share of doctoral degrees in Science and engineering in the EU27 has remained around 42% of the total number of doctoral degrees awarded in 2000-2007, with the share of degrees in Science, mathematics and engineering being higher than that of Engineering, manufacturing and construction.

In the US, the share of doctoral degrees in Science and engineering is lower than the EU27 at around 35% of the total number of doctoral degrees in 2000-2007. The share of degrees in Science, mathematics and engineering is also higher here than that of Engineering, manufacturing and construction. In Japan, the share of doctoral degrees in Science and engineering is slightly lower than for the EU27 at around 39% of the total number of doctoral degrees awarded in 2000-2007. The share of degrees in Science, mathematics and engineering here is, however, considerably lower than that of Engineering, manufacturing and construction.

Figure 23: The number of science and engineering doctoral degrees in per cent of the total number of doctoral degrees (ISCED 6) in the EU27, the US and Japan (2000-2007)



Source: Eurostat (Education Statistics).

Doctoral degrees: international comparison

- In 2007 about 111 000 doctoral degrees were awarded in the EU27 compared with 61 000 in the US and 16 800 in Japan. The average annual growth rate for the EU27 in 2000-2007 was 5.7% (US: 4.4%; Japan: 4.7%).
- The number of doctoral degrees in Science and engineering in the EU27 increased with 37% while in US increased only with 6% during the period 2000-2007.
- The share of doctoral degrees in Science and engineering in the EU27 has remained around 42% of the total number of doctoral degrees awarded in 2000-2007; in the US, the share of doctoral degrees in Science and engineering is lower than the EU27 at around 35% of the total number of doctoral degrees in 2000-2007.
- The share of Science and engineering doctoral degrees in the total number of doctoral degrees awarded has not changed significantly in the EU27, US or Japan (in 2007: 41%, 37% and 38% respectively). In the EU27, the share of degrees in Science, mathematics and computing was higher than in Engineering, manufacturing and construction. This also applies in the US, but not in Japan.

2.1.3.2 The picture in the EU27

Between 2000 and 2007, the number of doctoral degrees in the EU27 has increased at an average annual rate of 5.7% per year. Increases occurred in all fields of education; however the fields with the highest annual growth rate were Services (15.9%) and Teacher training and education sciences (12.0%).

In Science, mathematics and computing, the annual growth rate (3.5%) was lower than the average for all fields (5.7%). In Engineering, manufacturing and construction, the growth rate of 6.7% was higher than the average growth rate.

The shares of degrees by disciplines in the total number of degrees awarded in 2000-2007 have not changed considerably. The share of degrees in Social sciences, business and law increased from 16% in 2000 to 18% in 2007. The shares for Teacher training and education science and Humanities and arts also increased from 2% to 4% and from 12% to 13% respectively, while for Health and welfare, the share decreased from 21% to 19%. In Science, mathematics and computing, the share decreased from 31% to 27%; in Engineering, manufacturing and construction, it increased from 13% to 14%.

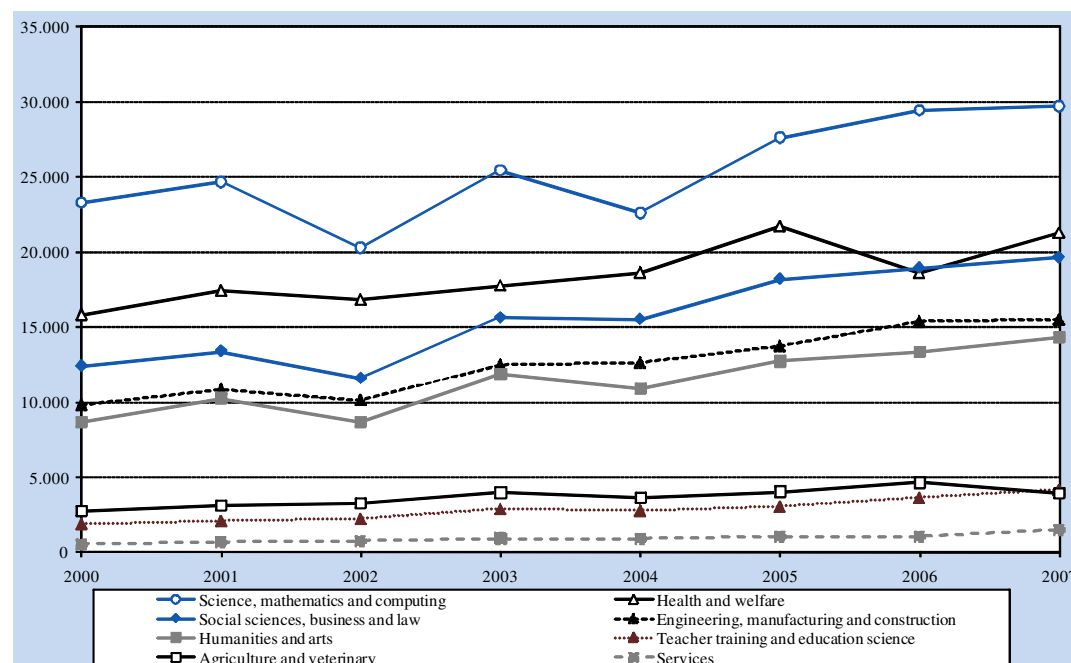
Table 11: Number of doctoral degrees (ISCED 6) in the EU27 by main fields (2000 and 2007)

Field of education	2000		2007		Change from 2000 to 2007	
	total	%	total	%	total	%
Teacher training and education science	1 881	2	4 170	4	2 289	122
Humanities and arts	8 698	12	14 307	13	5 609	64
Social sciences, business and law	12 379	16	19 615	18	7 236	58
Science, mathematics and computing	23 295	31	29 700	27	6 405	27
Engineering, manufacturing and construction	9 807	13	15 475	14	5 668	58
Agriculture and veterinary	2 750	4	3 952	4	1 202	44
Health and welfare	15 827	21	21 252	19	5 425	34
Services	525	1	1 477	1	952	181
Unknown or not specified	84	0	680	1	596	710
Total	75 246	100	110 628	100	35 382	47

Source: Eurostat (Education Statistics).

Figure 24 displays the information of Table 11 by main fields annually for the period 2000-2007. We provide this figure here in order to give a 'picture' of the evolution over time for this indicator.

Figure 24: Number of doctoral degrees (ISCED 6) in the EU27 by main fields (2000-2007)

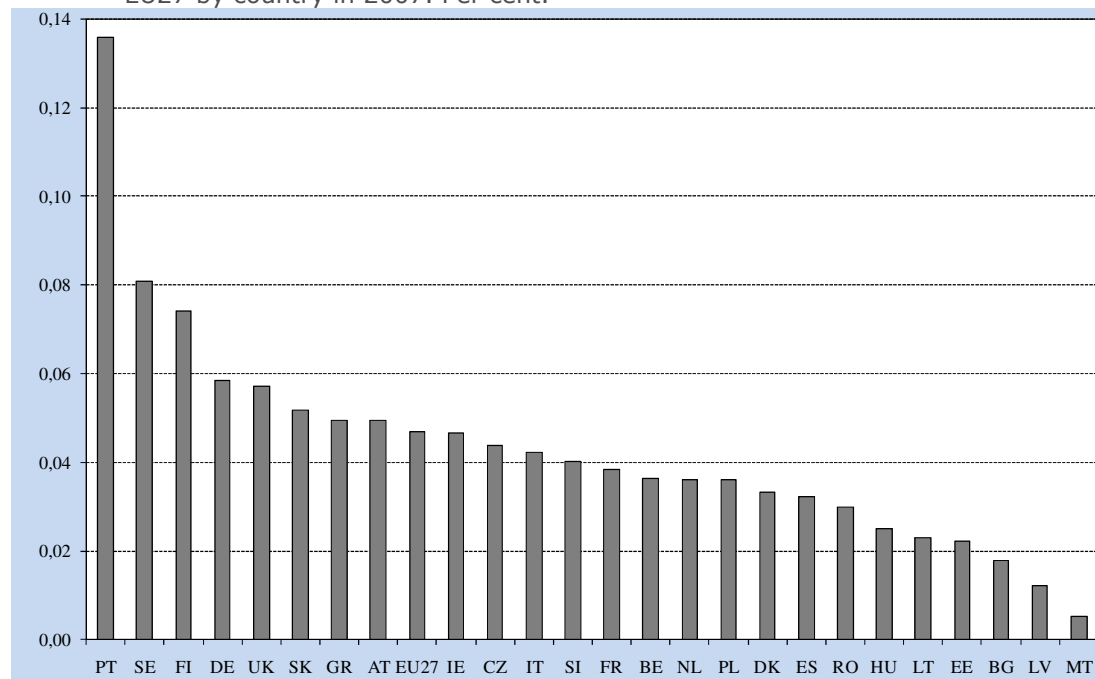


Source: Eurostat (Education Statistics).

Across the EU27, Germany, UK, France and Italy have awarded the highest numbers of doctoral degrees, about 24 000, 18 000, 11 000 and 10 000, respectively. Portugal and Spain follow with around 7 000-8 000 doctoral degrees each year. These 6 countries account for 70% of the total number of doctoral degrees awarded in the EU27 in 2007.

Figure 25 and Figure 26 show the total number of doctoral degrees awarded in 2007 in EU27 as shares of the active population by country (Figure 25) as well as the share of doctoral degrees in Science and engineering in total doctoral degrees awarded (Figure 26). Of course, number of doctoral degrees awarded is a measure of the annual production of PhD-holders (a flow measure) and compared with the number of active population (a stock measure) the shares of doctoral degrees awarded become very small. Nevertheless, Figure 25 shows that Portugal produces a surprisingly large number of doctoral degrees compared to its size of active population. Next to Portugal, we find the Nordic countries, Germany, UK, Slovakia, Greece and Austria.

Figure 25: Number of doctoral degrees (ISCED 6) as shares of the active population in the EU27 by country in 2007. Per cent.



Source: Eurostat (Education and LFS Statistics).

a) Doctoral degrees data from Eurostat Education statistics.

b) Active population data from Eurostat LFS statistics.

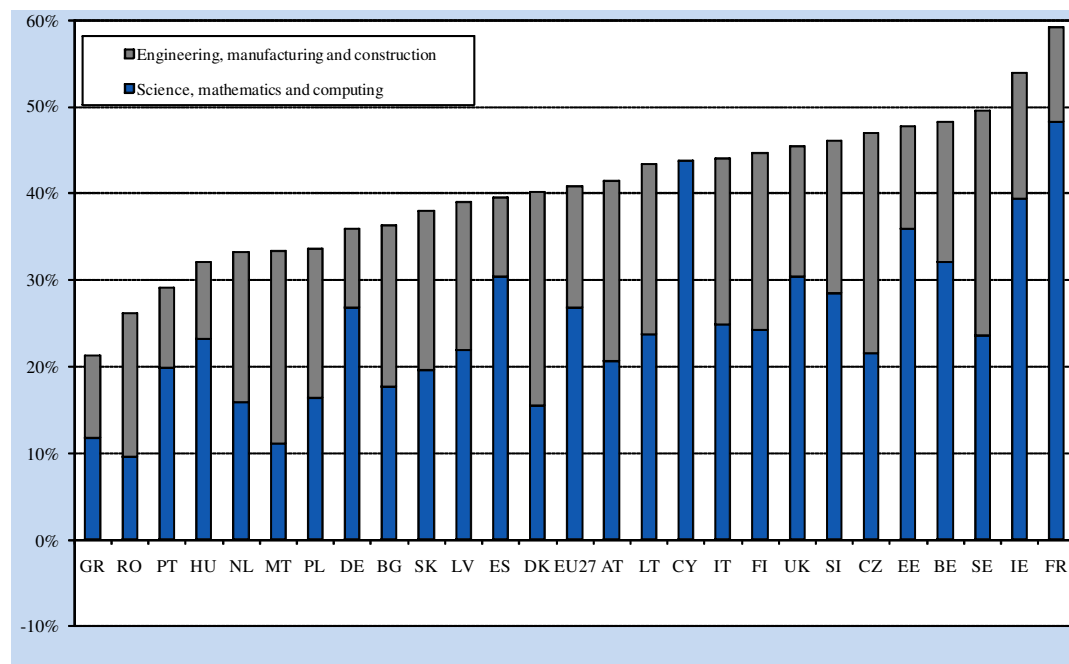
Notes Figure 25:

- 1) For each country, we have aggregated the number of doctoral graduates for all main fields.
- 2) Luxembourg is not included in the figure, since there are missing values for each of the main fields for doctoral graduates for this country. See Sub-indicators 35-43 in Annex 4.
- 3) For information about the active population in different EU27 countries, see Sub-indicator 13 in Annex 4.

The highest shares of Science and engineering (S&E) doctoral degrees as share of the total number of doctoral degrees awarded in 2007, is found in France, Ireland and Sweden with shares of 59%, 54% and 50%, respectively. Belgium and Estonia follow with 48% for each and the Czech Republic, Slovenia, the United Kingdom and Finland all have shares of approximately 45-47%.

When distinguishing between the two fields, the countries with the highest shares of degrees in Science, mathematics and computing are France (48%), Cyprus (44%) and Ireland (39%). In the field Engineering, manufacturing and construction the countries with highest shares in doctoral degrees are Sweden (26%), Czech Republic (25%) and Denmark (25%).

Figure 26: Number of doctoral degrees in science and engineering in per cent of the total number of doctoral degrees (ISCED 6) in the EU27, by country in 2007



Source: Eurostat (Education Statistics).

Note: For the total number of doctoral degrees for each country, we have aggregated the number of doctoral graduates for all main fields.

Doctoral degrees: international comparison

- In Science, mathematics and computing, the annual growth rate (3.5%) was lower than the average for all fields (5.7%) while Engineering, manufacturing and construction, the growth rate of 6.7% was higher.
- Across the EU27, Germany, UK, France and Italy have awarded the highest numbers of doctoral degrees, about 24 000, 18 000, 11 000 and 10 000, respectively. Portugal and Spain follow with around 7 000-8 000 doctoral degrees each. These 6 countries account for 70% of the total number of doctoral degrees awarded in the EU27 in 2007.
- The highest shares of Science and engineering (S&E) doctoral degrees as share of the total number of doctoral degrees awarded in 2007, is found in France, Ireland and Sweden with shares of 59%, 54% and 50%, respectively.

2.1.4 Tertiary degrees with academic orientation and doctoral degrees: Comparative evolution

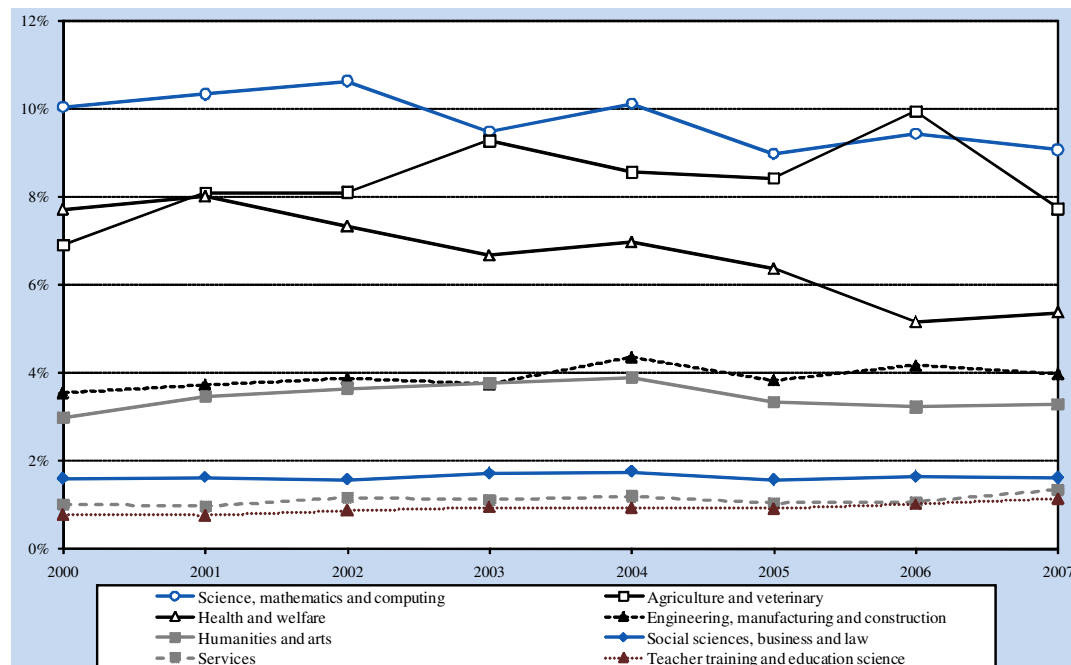
This section provides a comparison over time of tertiary degrees with academic orientation and doctoral degrees in EU27 over the period 2000-2007.

One could argue that in a national research system there must be an upper limit which if exceeded the further production of doctoral degrees awarded as a share of awarded tertiary degrees with academic orientation cannot anymore be considered as an optimal situation. There are many reasons for why this may be so. First, it can be an indication of low employability levels of people with academic degrees combined with a large number of people funding their PhD-studies with own means. Second, this may also be an indication of poor conditions and low opportunities for career advancement of academics in the working life, a problem which is only pushed ahead in time only to be faced again after the award of a PhD-degree. Third, it may be an indication of overproduction of PhD awards

given the resources and the capacity of higher education institutions in a country available and hence it may signify lower quality of national PhD-education schemes compared with other countries. Fourth, it may be associated with large numbers of drop-outs. The issue is that there is a very limited⁹ number of studies investigating systematically what levels of PhD-production may be considered as “healthy” in a country, given the overall capacity of and the teaching resources in the educational system, as well as, the needs of the national (and European) research and innovation system. This is typically a topic where education, research and innovation policies meet, the so-called Knowledge Triangle, and it requires broad systemic approaches of investigation and inquiry.

Be that as it may, the ratio of doctoral degrees to tertiary degrees with academic orientation has remained constant from 2000 to 2007 (3%) for all fields of education. Also in most of the fields individually, this ratio has remained stable; in the field of Health and welfare, however, the largest decrease is seen, from 8% in 2000 to 5% in 2007.

Figure 27: Ratio of doctoral degrees (ISCED 6) to tertiary degree with academic orientation (ISCED 5A) in the EU27, by main fields (2000-2007)

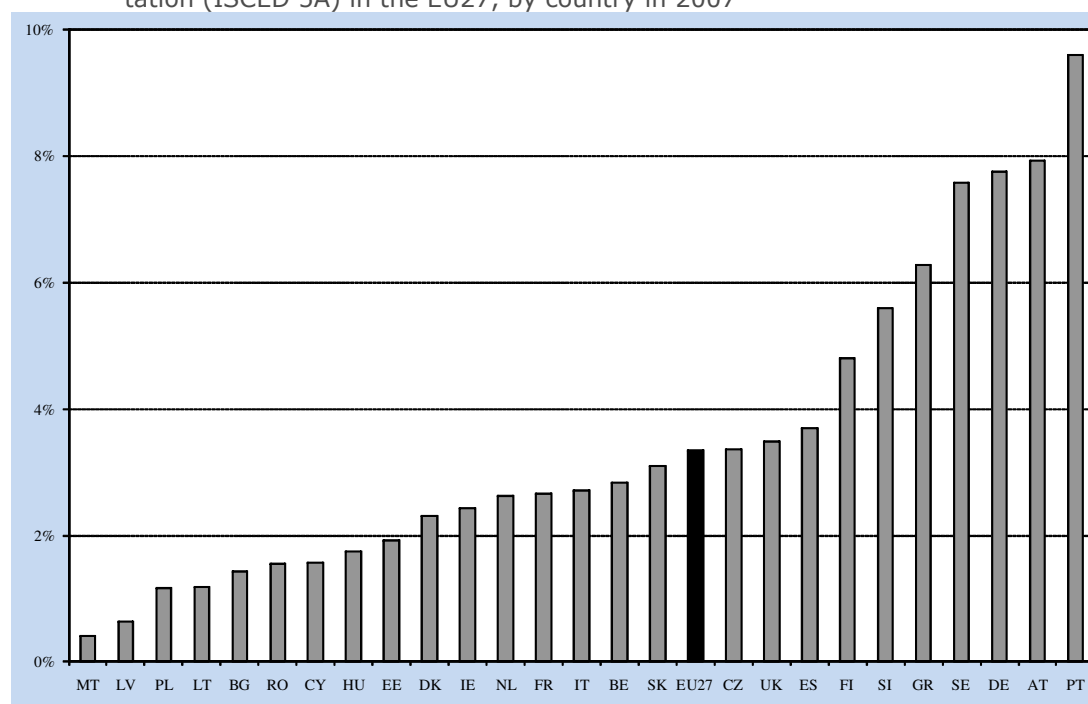


Source: Eurostat (Education Statistics).

The overall ratio of doctoral degrees over tertiary degrees with academic orientation in the EU27 was 3% in 2007. Among the EU27 countries, the highest ratio is seen in Portugal (10%) with Austria, Germany and Sweden (around 8% for each) following.

⁹ See for example. Næss T., T.B. Olsen, B. Sarpebakken and A. Kaloudis (2007): Recruitment of PhD candidates in Norway. Forecasts for the period 2010-2020 based on three scenarios of development.

Figure 28: Ratio of doctoral graduates (ISCED 6) to tertiary degree with academic orientation (ISCED 5A) in the EU27, by country in 2007



Source: Eurostat (Education Statistics).

Notes Figure 28:

- 1) For each country, we have aggregated the number of doctoral graduates and tertiary degrees with academic orientation for all main fields.
- 2) Luxembourg is not included in the figure, since there are missing values for each of the main fields for this country. See Sub-indicators 26-43 in Annex 4.

Tertiary degrees with academic orientation and doctoral degrees: a comparison

- The ratio of doctoral degrees to tertiary degrees with academic orientation has remained constant from 2000 to 2007 (3%) for all fields of education; in the field of Health and welfare, however, the largest decrease is seen, from 8% in 2000 to 5% in 2007.
- The overall ratio of doctoral degrees over tertiary degrees with academic orientation in the EU27 was 3% in 2007. Among the EU27 countries, the highest ratio is seen in Portugal (10%) with Austria, Germany and Sweden (around 8% for each) following.

2.2 Postdoctoral researchers in the EU

No current data are available on the number of postdoctoral researchers in the EU to update the IISER 2007 indicator. Both the academic researchers' survey (2009) and the research institutes' survey (2010) of the MORE project will provide data on the number of postdoctoral researchers among the respondents of the surveys.

3 INDICATOR 3: NUMBER OF RESEARCHERS RECRUITED UNDER A PERMANENT CONTRACT IN R&D

This chapter provides information currently available from the Rindicate (2008) project. In the final stage of this project (WP8) information will be provided, where available, from the different surveys within the MORE project.

For Indicator 3, we will use data from the Rindicate (2008) project: "Evidence on the main factors inhibiting mobility and career development of researchers". These data are the only data currently available for this indicator (see also IISER 2007). It should be mentioned that the data used here from the Rindicate survey are not comparable across time nor can they be proposed as a sustainable source of data, as the survey has only been carried out in 2007 (and the results published in 2008). It remains however the only currently available source of information related to indicator 3 of the IISER set of indicators.

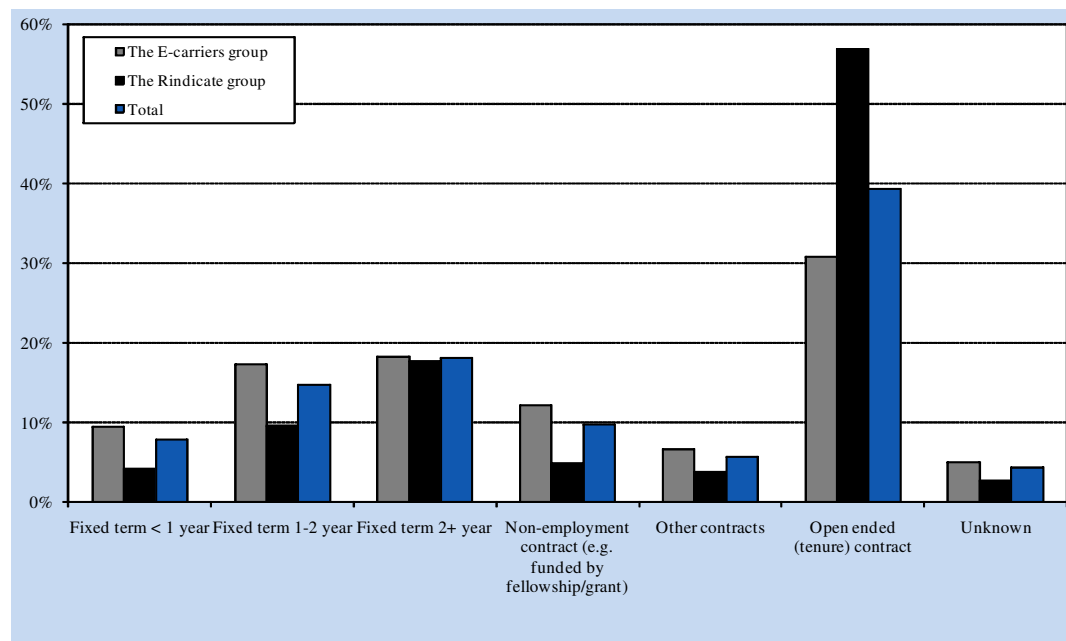
In the Rindicate project we use data from two surveys: the Rindicate group survey and the E-carriers group survey. The Rindicate group survey, the online survey in the Rindicate project (the Rindicate survey), was distributed to a population of researchers from eight countries (Hungary, France, Germany, The Netherlands, Norway, Poland, Spain and UK) via an invitation e-mail. The E-carriers group survey was mounted separately on the same server and linked to the European Researcher mobility portal. A link was also placed on the Marie Curie website and national ERACAREERS websites. Both surveys were run in parallel, but the response data from the two samples was held separately.

For the Rindicate survey, the final size of the sample which received the RINDICATE questionnaire via e-mail was just over 6 000. Initial e-mails were sent out in late December 2007 and early January 2008, followed up by two reminder e-mails at two-week intervals. The sample was not representative with respect to countries or other dimensions such as age of researchers, seniority etc. For the E-carriers group survey, it is not possible to determine the number of 'invites' (as there were none), and therefore a 'response rate' can not be calculated. The respondents are employed in academic and/or research institutes in a broad range of countries including the eight countries that were targeted in the e-mail survey, plus at least 20 other European countries and several non-European countries including Japan, Australia and the US.

In the next figures we use data from the E-carriers group of respondents and the Rindicate group of respondents from the Rindicate project. The gross sample of respondents consists of 2 513 persons in the E-carriers group and 1 164 persons in the Rindicate group. Therefore, the total gross sample consists of 3 677 individual responses. 242 persons in the E-carriers group and 70 persons in the Rindicate group have not answered the question about their mobility status, and therefore these persons are excluded from the further analysis. The total net sample, thus, consists of 3 365 respondents.

Figure 29 shows that most of the researchers from both groups have either a fixed term contract (41%) or an open ended (tenure) contract (39%). The share of researchers with a fixed term contract is much higher for the E-carriers group (45%) than for the Rindicate group (32%). On the other hand, the share of researchers with an open ended contract is much higher for the Rindicate group (57%) than for the E-carriers group (31%).

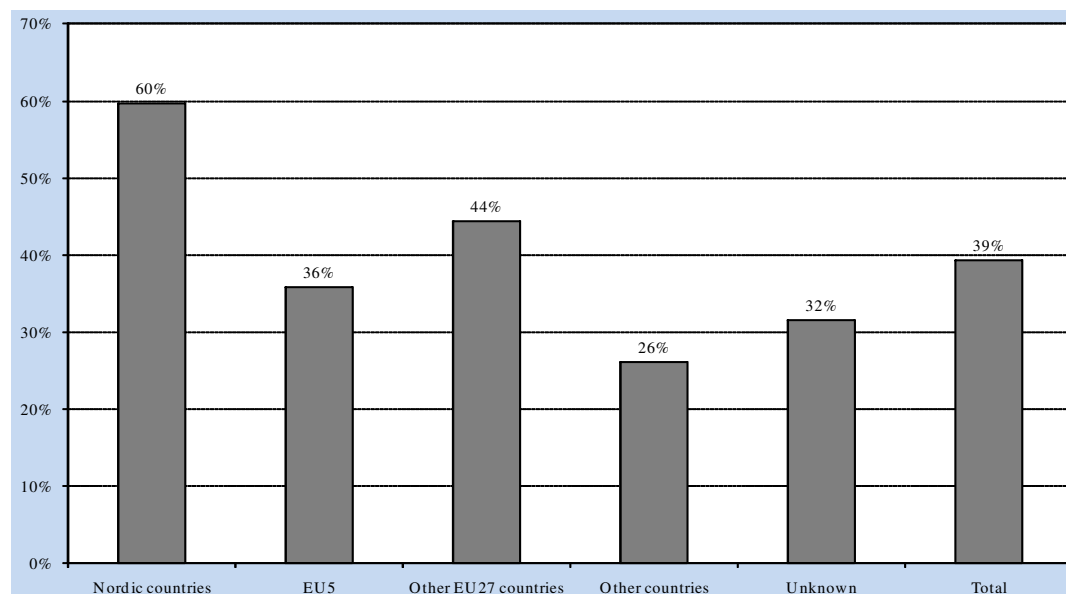
Figure 29: The researchers' current type of contract by group of respondents (N=3,365)



Source: Rindicate (2008).

Figure 30 shows that the share of researchers with an open-ended contract is much higher among Nordic researchers (60%) than among other EU27 researchers (Nordic EU countries excluded); EU5: 36%, and other EU27 countries 44%). Table 12 shows that the share of researchers with a fixed term contract is, however, much lower among Nordic researchers (26%) than among EU27 researchers (Nordic EU countries excluded; EU5: 44%, and other EU27 countries: 39%).

Figure 30: The share of researchers with an open ended (tenure) contract by group of country, both groups of respondents (N=3,365)



Source: Rindicate (2008).

Notes:

- 1) Country of nationality.
- 2) Nordic countries: Denmark, Finland, Iceland, Norway and Sweden.
- 3) EU5: France, Germany, Italy, Spain and UK.
- 4) Other EU27 countries: the EU27 countries not included in the Nordic and the EU5 groups.
- 5) Other countries: countries not included in the Nordic group, EU5 or other EU27 countries.

Table 12: The researchers' currently type of contract by group of country, both groups of respondents (N=3,365)

	Nordic countries	EU5	Other EU27 countries	Other countries	Unknown	Total
Fixed term < 1 year	6 %	10 %	7 %	8 %	8 %	8 %
Fixed term 1-2 year	8 %	17 %	14 %	20 %	1 %	15 %
Fixed term 2+ year	12 %	18 %	19 %	21 %	3 %	18 %
Non-employment contract	3 %	12 %	8 %	14 %	1 %	10 %
Open ended (tenure) contract	60 %	36 %	44 %	26 %	32 %	39 %
Other type of contracts	8 %	6 %	5 %	8 %	3 %	6 %
Unknown contracts	3 %	2 %	3 %	3 %	52 %	4 %
Total	100 %	100 %	100 %	100 %	100 %	100 %
Number of researchers	226	1 244	1 322	478	95	3 365

Source: Rindicate (2008).

Notes:

- 1) Country of nationality.
- 2) Nordic countries: Denmark, Finland, Iceland, Norway and Sweden.
- 3) EU5: France, Germany, Italy, Spain and UK.
- 4) Other EU27 countries: EU27 countries not included in the Nordic and the EU5 groups.
- 5) Other countries: countries not included in the Nordic group, EU5 or other EU27 countries.

Though the data provided in Figure 29 and Figure 30 and Table 12 are new and quite illuminating, note that they originate from a sample which does not necessarily reflect the accurate distribution of researchers with open-ended versus fixed-term contracts in Europe. Thus, these figures must be regarded as a first approximation of the respective distribution in the EU27.

4 INDICATOR 4: AVERAGE TIME FROM GRADUATION TO A FIRST REGULAR EMPLOYMENT CONTRACT IN R&D

No current data are available on the average time from graduation to a first regular employment contract in R&D.

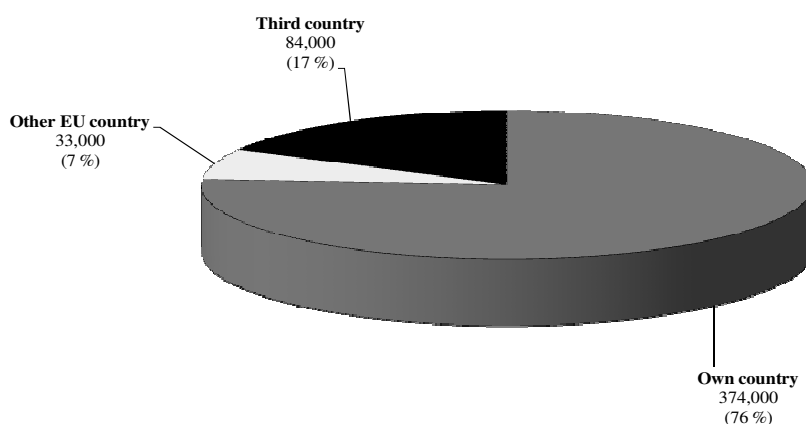
5 INDICATOR 5: CIRCULATION OF RESEARCHERS WITHIN EUROPE

5.1 General picture on doctoral candidates and post-doctoral researchers

This section provides data on the mobility of doctoral and post-doctoral researchers in the EU27. Mobility of doctoral and post-doctoral researchers is important in analysing the mobility of researchers not only because (post)doctoral researchers represent an important share of the overall number of researchers but also because mobility in the early stages of the careers of researchers is expected to explain the future mobility of established researchers.

There are about 526 000 doctoral candidates in the EU27 (excluding those enrolled in Germany and Luxembourg, where data are not available). The vast majority, about 76% (374 000) doctoral candidates hold citizenship of the country where they study/work; 17% (84 000) hold citizenship of a Third Country and 7% (33 000) hold citizenship of another EU Member State (data are not available for Germany, Greece, Ireland, Luxembourg and Netherlands, see the note in Figure 31).

Figure 31: Number and percentage of doctoral candidates (ISCED 6) in the EU27 according to their country of citizenship (2007)



Source: Eurostat (Education Statistics).

Note:

Data for doctoral candidates are not available for Germany and Luxembourg. Data for students who are non-citizens of reporting country and data for doctoral candidates by citizenship are not available for Germany, Ireland, Greece, Luxembourg and Netherlands. These five countries are therefore not included in the numbers and percents in the figure.

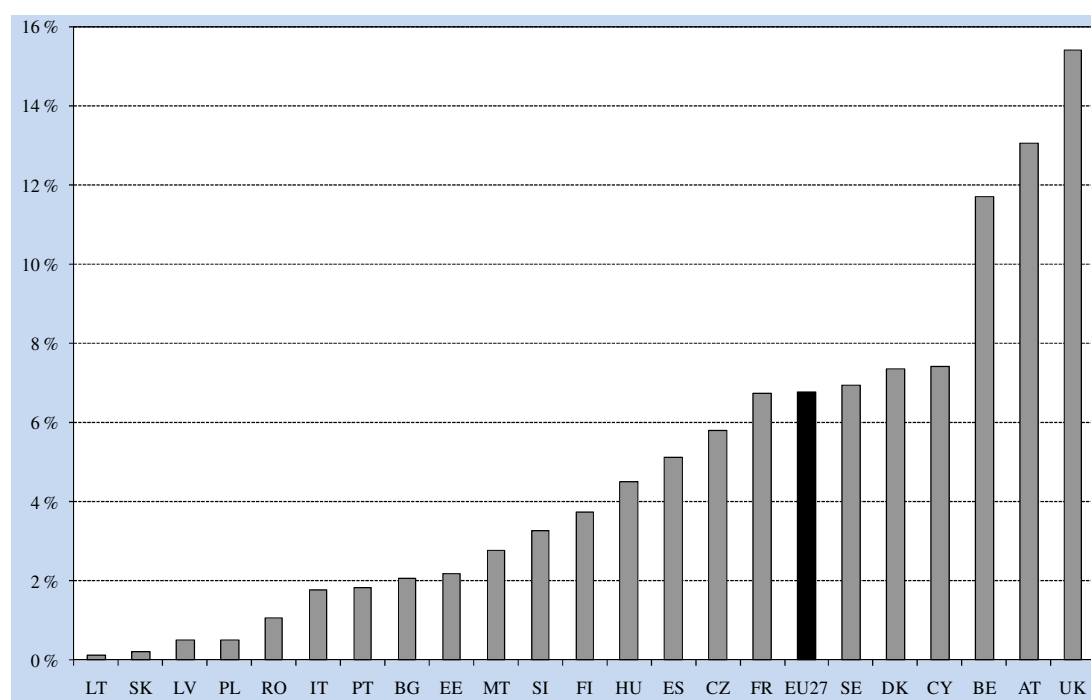
Doctoral candidates in the EU27 according to citizenship

- Four out of five doctoral candidates in the EU27 hold citizenship of the country where they study/work; 16% hold citizenship of a Third Country and 6% hold citizenship of another EU Member State.

5.2 Intra-EU inflows of doctoral researchers

Figure 32 shows the number of doctoral researchers in the EU Member States with citizenship from another Member State. Of the 22 countries reporting data, UK receives the larger number of doctoral candidates from other Member States as a share of the total number of doctoral students in the country: 15% of doctoral students in UK hold the citizenship of another Member State. Austria and Belgium follow with 13% and 12% respectively. The EU27 average equals 6%. The countries with the lowest inflows of doctoral candidates from other Member States are primarily the new Member States (Lithuania, Slovakia, Latvia, Poland, Romania, Bulgaria, Estonia and the South-European countries (Italy, Portugal).

Figure 32: Percentage of doctoral candidates (ISCED 6) with the citizenship of another EU27 member state in the reporting country in the EU27 (2007)



Source: Eurostat (Education Statistics).

Notes:

1) Germany, Greece, Ireland, Luxembourg and the Netherlands are not included in the figure, since for each of these countries we have no information about doctoral candidates with the citizenship of another EU27 member state.

2) There are also some missing values for other EU27 countries than the countries mentioned in Note 1) (i.e. Germany, Greece, Ireland, Luxembourg and the Netherlands). The number of doctoral candidates in each of the countries in the figure is the sum of non-missing values for doctoral candidates in the other EU27 member states.

3) See Table A.6.1 in Annex 6.

Intra-EU inflows of doctoral researchers

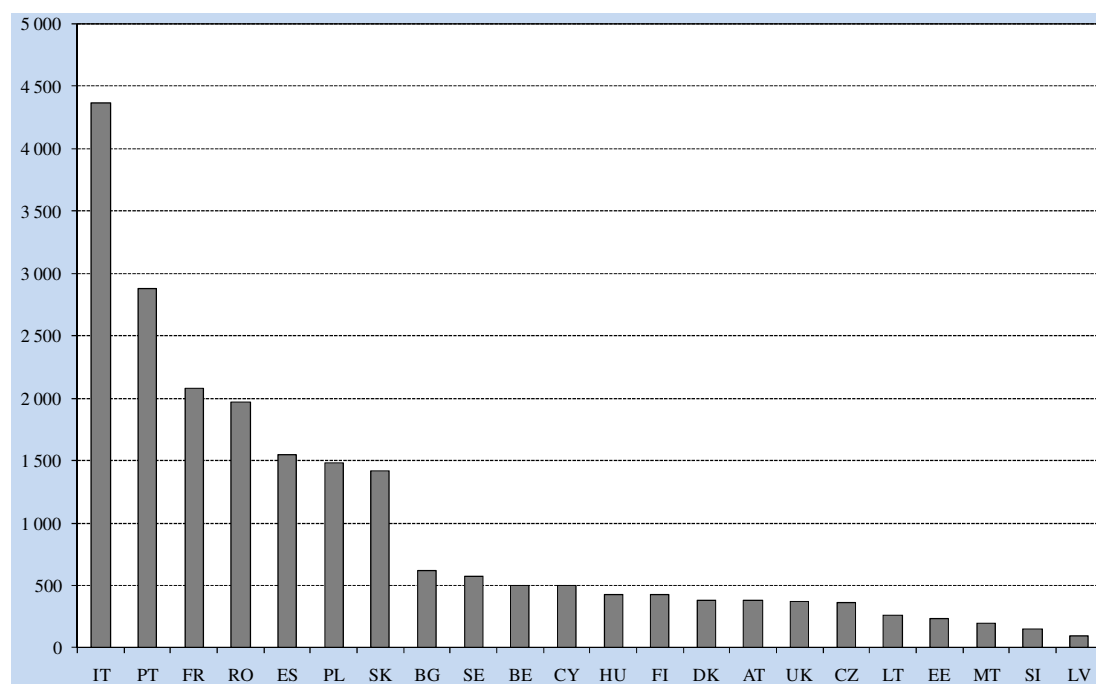
- 15% of doctoral students in UK hold the citizenship of another Member State.
- In Austria and Belgium the share of doctoral students from another Member State equals 13% and 12%, respectively. The EU27 average equals 6%.
- The countries with the lowest inflows of doctoral candidates from other Member States are primarily new Member States and South-European countries (Italy and Portugal).

5.3 Intra-EU outflows of doctoral researchers

Figure 33 and Figure 34 present the number and share of doctoral researchers of each of the EU27 nationalities working in all other Member States. This provides an indication of the intra-EU outflow of doctoral researchers per EU27 nationality.

Doctoral candidates from Germany, Italy and Greece top the list of nationalities that study in other Member States in absolute terms. Although we have seen from the previous figure that UK tops the list of countries (out of the 22 reporting countries) with doctoral candidates from another member state, Figure 33 shows a low number (in absolute terms) of doctoral candidates with UK citizenship studying/working in other member states of the EU27 (see also below in Figure 34).

Figure 33: Number of doctoral candidates (ISCED 6) of the reporting nationality in EU27 in all other member states in the EU27 (2007)



Source: Eurostat (Education Statistics).

Notes Figure 33:

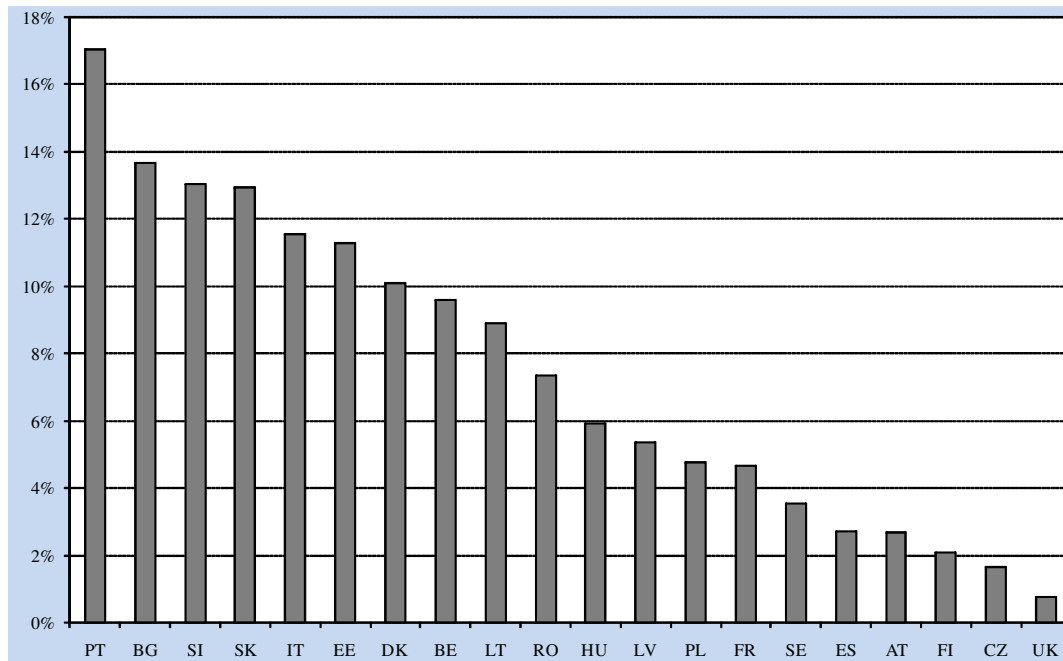
- 1) For a given nationality, the number of doctoral candidates abroad is calculated by summing up the numbers provided for this nationality by the receiving EU countries. For example, 4,361 doctoral candidates with Italian citizenship were in all the other member states in EU27 than Italy in 2007.
- 2) Germany, Greece, Ireland, Luxembourg and the Netherlands are not included in the figure, since for each of these countries we have no information about doctoral candidates with the citizenship of another EU27 member state.

Figure 34 provides a picture of the intra-EU outflows of doctoral researchers in relative terms, but for a different set of countries than in Figure 33. The figure shows the percentage of doctoral candidates of each EU nationality in another EU Member State to the total number of doctoral candidates in the country with the reporting country's nationality.

Portugal presents the highest share of doctoral students in another EU Member State as percentage of doctoral candidates with Portuguese citizenship studying/working in Portugal (17%). Bulgaria follows with 14% and Slovenia and Slovakia with 13% for each. As mentioned also above, although UK tops the list of countries with the highest share of doctoral candidates from another member state, Figure 33 shows that a relatively low share of doctoral candidates with UK citizenship study/work in other member states of the EU27. The differences between these two indicators may be explained by many factors, e.g. the quality of

the educational system in the UK or the perceptions of foreign students/researchers about the quality of this system. It may also point to the relatively lower language barriers for students/researchers coming into the UK and the relatively higher barriers of UK researchers to study in other EU countries. However, these are only indications; this report does not provide additional explanatory variables and therefore cannot conclude on causal relationships.

Figure 34: Share of doctoral candidates (ISCED 6) of the reporting nationality in EU27 in all the other member states in the EU27 (2007)



Source: Eurostat (Education Statistics).

Notes:

- 1) The figure measures the number of doctoral candidates (ISCED 6) of the reporting nationality in EU27 in all the other member states in EU27, in per cent of the total number of doctoral candidates of this nationality in their own country. This implies that each of the numbers in Figure 33 is divided by the total number of doctoral candidates of this nationality within the home country. For example, 150 doctoral candidates with Slovenian citizenship were in all the other member states in EU27 than Slovenia in 2007. In the same year, there were 1,151 doctoral candidates in Slovenia with Slovenian citizenship. The share in Figure 34 for Slovenia in 2007 was therefore 13%.
- 2) It is not possible to calculate this ratio for Germany and Luxembourg, which do not provide the total number of doctoral candidates. The ratio is not possible to calculate for Ireland, Greece and Netherlands either, since for these countries there are missing values for the number of students who are noncitizens of the reporting country.

Intra-EU outflows of doctoral researchers

- Around 6% of doctoral candidates in the EU27 are studying/working in an EU member state other than the country of his/her citizenship.
- 5 300 doctoral researchers with German nationality, 4 400 with Italian nationality and 4 000 with Greek nationality have been studying in 2007 in an EU Member State other than the country in which they hold citizenship (top-3 nationalities on the list) in 2007.
- Portugal has the highest share (17%) of doctoral students abroad as percentage of doctoral candidates with Portuguese citizenship in Portugal. Bulgaria, Slovenia and Slovakia also have relatively high shares (around 13%-14%) while Austria, Finland, Czech Republic and the UK have relatively low shares (below 3%).
- Although 15% of doctoral students in the UK hold the citizenship of another Member State (the highest share among all EU Member States), the data also show that UK citizens are least likely to study/work in other EU member states.

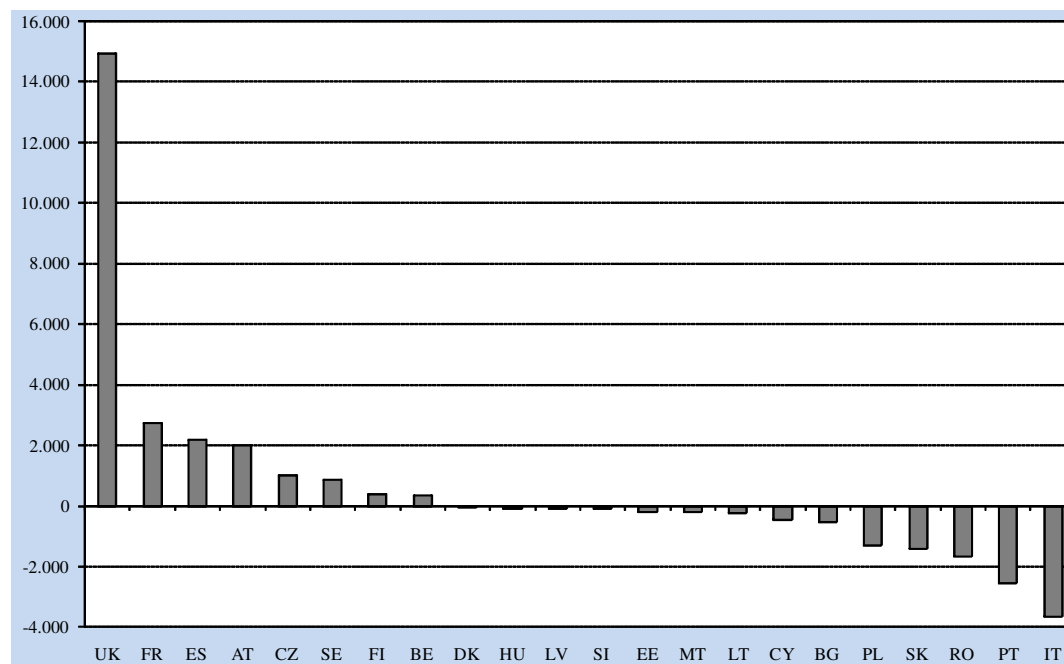
5.4 Intra-EU net gains and losses

Combining the information of the previous sections, we focus here on the net gains and losses of each EU Member State with respect to the mobility of doctoral researchers in the EU27. Intra-EU net gains have been calculated as the difference of the number of foreign doctoral candidates in EU27 from all the other Member States and the number of doctoral candidates of the reporting nationality in the EU27 in all the other Member States.

The most important net receiver in absolute terms is the United Kingdom with a net gain of almost 15 000 doctoral researchers of EU nationality. The other Members States with a net gain are France, Spain, Austria, Czech Republic, Sweden, Finland and Belgium.

Among the Member States with the largest net-losses in absolute terms in intra-EU exchanges of doctoral researchers are Italy (3 600), Portugal (2 500) and Romania (1 700).

Figure 35: Intra-EU “net gain” of doctoral researchers: differences between the number of doctoral candidates (ISCED 6) in the reporting country with citizenship from all other Member States in the EU27, and the number of doctoral candidates (ISCED 6) of the reporting nationality in all the other member states in the EU27 (2007)



Source: Eurostat (Education Statistics).

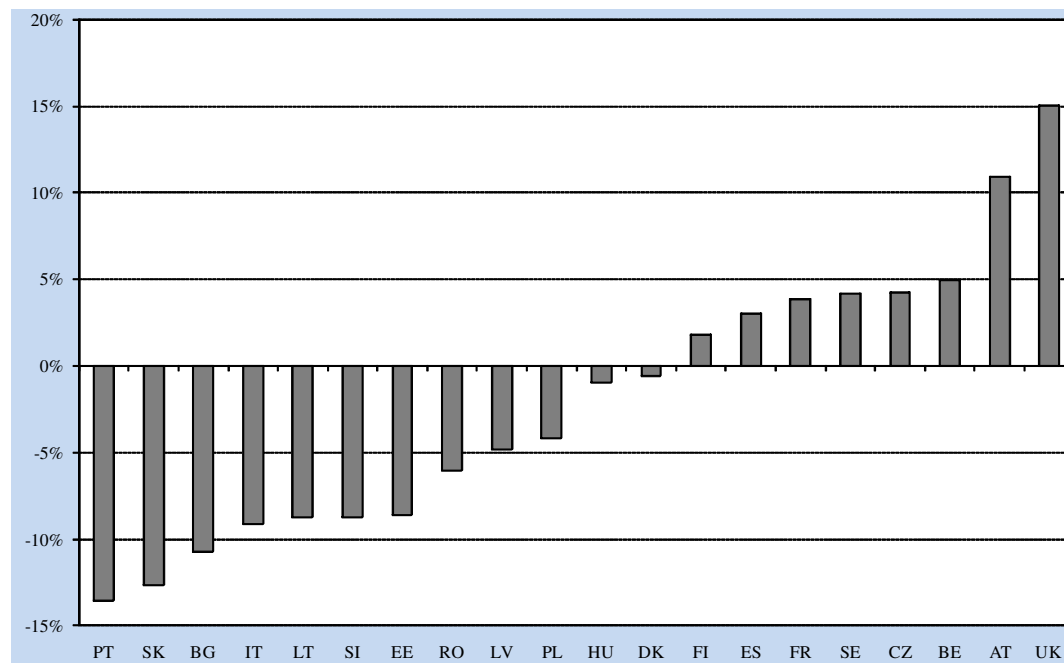
Notes:

1) For each country, Figure 35 shows the difference between the number of doctoral candidates with citizenships from all the other member states (there are missing values for these numbers for Germany, Greece, Ireland, Luxembourg and the Netherlands), and the number of doctoral candidates from Figure 33. For example, in United Kingdom there were 15 306 doctoral candidates in 2006 with citizenships from all the other member states in EU27, while there were only 369 persons in Figure 33. The difference for this country is therefore 14 937 persons.

2) Germany, Greece, Ireland, Luxembourg and the Netherlands are excluded from Figure 35 since there are missing values for these countries (see note 1).

Taking into account the relative sizes of the net gains and losses, Figure 36 shows the net gain of every Member State as a percentage of the total number of doctoral researchers in the reporting Member States. Again, the picture is similar to that shown in the previous figure: UK is the larger net receiver of doctoral researchers, while Portugal, Italy and many new Member States are net senders.

Figure 36: Intra-EU “net gain” of doctoral researchers (%): differences between the number of doctoral candidates (ISCED 6) in the reporting country with citizenships from all the other member states in the EU27, and the number of doctoral candidates (ISCED 6) of the reporting nationality in all the other member states in the EU27 (2007) (in per cent of the total number of doctoral candidates in the reporting country whatever their nationality)



Source: Eurostat (Education Statistics).

Notes:

- 1) In Figure 36 we divide each of the differences in Figure 35 with the total number of doctoral candidates in the reporting country.
- 2) Germany, Greece, Ireland, Luxembourg and the Netherlands are excluded from Figure 36, since there are missing values for these countries (see note 1 in Figure 35).
- 3) For Malta the per cent in the figure will be -265%, for Cyprus -134%, and for the EU27 as a whole -17%.

Intra-EU net gains and losses

- The most important net receiver of doctoral researchers in both absolute and relative terms is the United Kingdom with a net gain of almost 15 000 doctoral researchers of EU nationality.
- The other Members States with a net gain are France, Spain, Austria, Czech Republic, Sweden, Finland and Belgium.
- Among the Member States with the largest net-losses in absolute terms in intra-EU exchanges of doctoral researchers are Italy (3 600), Portugal (2 500) and Romania (1 700).

6 INDICATOR 6: NUMBER OF RESEARCHERS LEAVING EUROPE

As in the previous chapters of the current report, here we present the update of the current IISER report (as structured in the version of 2007). Additional data on this indicator will be provided in the Final Report of the MORE project, where available. More details about the additional indicators will be provided in the MORE-set of indicators in the MORE Final Report.

6.1 Definition of indicator 6 in the present report

The two data sources used for the calculation of indicator 6, are the NSF 2008 Survey of Earned Doctorates and Open Doors. In this paragraph, we describe the definitions used in each of these sources, in order to guarantee a correct interpretation of the results concerning indicator 6, as presented in the following sections.

6.1.1 Definitions in the NSF 2008 Survey of Earned Doctorates

In the NSF 2008 Survey of Earned Doctorates, individuals earning doctorates at U.S. colleges and universities are counted and described according to a list of characteristics. All individuals receiving research doctorates from accredited U.S. institutions are asked to complete the survey.

The following definition of research doctorate is applied:

"A doctoral degree that

(1) requires the completion of an original intellectual contribution in the form of a dissertation or an equivalent project of work (e.g., musical composition), and

(2) is not primarily intended as a degree for the practice of a profession."

Doctorate recipients of professional doctorate degrees such as M.D., D.D.S., J.D., D.Pharm., and Psy.D are thus not included in the survey. The most common research doctorate degree is the Ph.D. The 2008 SED covers the academic year, from July 1, 2007 to June 30, 2008.

6.1.2 Definitions in the Open Doors Data

With the support of the Department of State, the Institute of International Education conducts an annual census of international students in the United States and publishes the results as *Open Doors*.

Open Doors is an information resource on both the international students in the United States and the U.S. students who sojourn abroad as part of their academic experience. IIE conducts a separate survey of research universities to determine the number and characteristics of foreign scholars in the U.S. each year.

For the IISER indicator 6, it is the data on foreign scholars that is used to calculate sub-indicators. A foreign scholar is then defined as:

"Non-immigrant teachers and/or researchers who are not enrolled as students."

6.2 European doctoral graduates in the U.S.

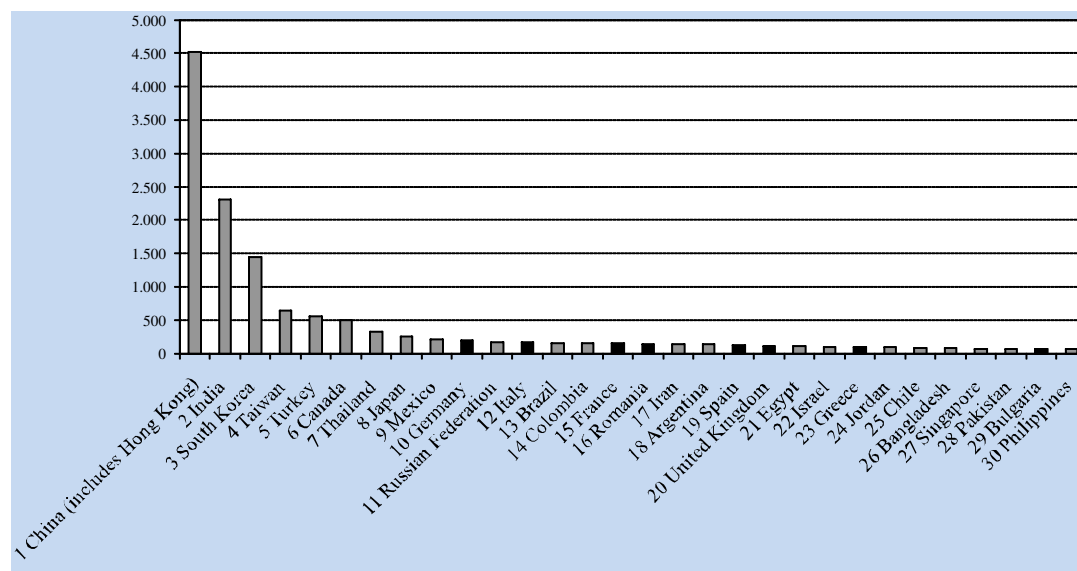
This section starts with an update of the indicators on the doctoral graduates of European origin in the US and continues in the next section with information on scholars of EU origin in the US.

6.2.1 Top countries of origin

In 2008, approximately 15 000 doctorates were awarded in the US to non-US citizens. Figure 37 presents the top-30 countries of origin of non-US citizens earning doctorates in the US. The country with the highest number of doctorates awarded in the US is China, accounting for 30% of all doctorates in the US awarded to non-US citizens. India and South Korea follow with 15% and 10% of the doctorates awarded, respectively.

Within the EU27, Germany (which ranks 10th) and Italy (which ranks 12th) are highest on the list with 1.3% and 1.1% of US doctoral degrees awarded, respectively. France, Romania, Spain, the UK, Greece and Bulgaria follow at the 15th, 16th, 19th, 20th, 23th and 29th rank respectively.

Figure 37: Top 30 countries of origin of non-U.S. citizens earning doctorates at U.S. colleges and universities (ranked by number of doctorate recipients), 2008



Source: NSF/NIH/USED/USDA/NEH/NASA, 2008 Survey of Earned Doctorates.

Table 13: Top 40 countries of origin of non-U.S. citizens earning doctorates at U.S. colleges and universities (ranked by number of doctorate recipients), 2008

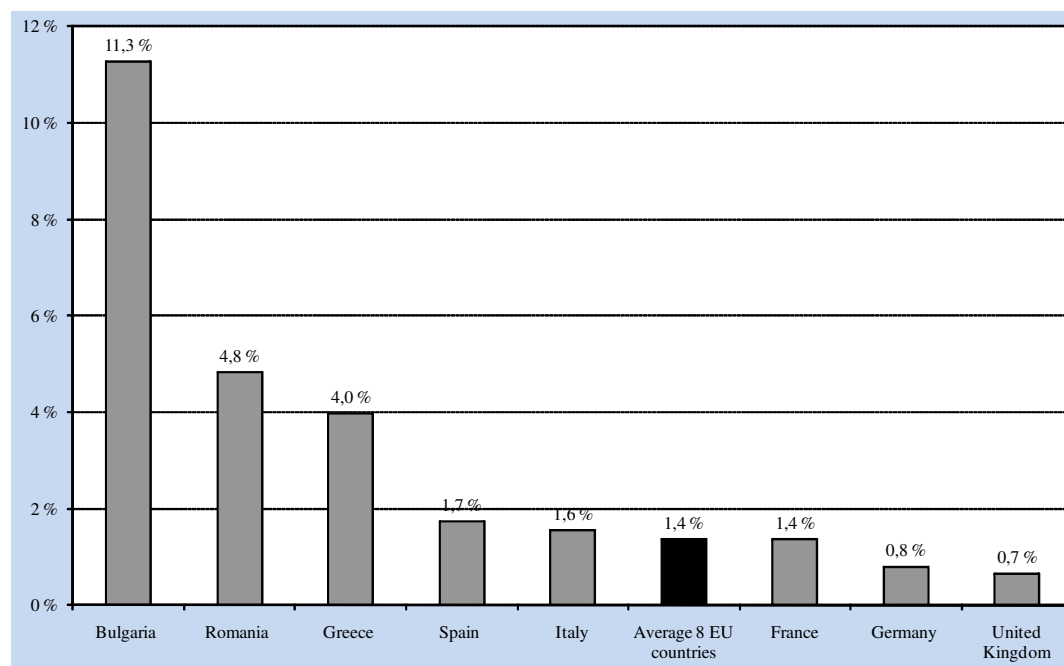
Country/economy	Number of doctorate recipients
1 China (includes Hong Kong)	4 526
2 India	2 316
3 South Korea	1 440
4 Taiwan	642
5 Turkey	558
6 Canada	497
7 Thailand	327
8 Japan	255
9 Mexico	207
10 Germany	194
11 Russian Federation	171
12 Italy	162
13 Brazil	157
14 Colombia	149
15 France	147
16 Romania	144
17 Iran	137
18 Argentina	134
19 Spain	124
20 United Kingdom	117
21 Egypt	104
22 Israel	103
23 Greece	97
24 Jordan	94
25 Chile	81
26 Bangladesh	76
27 Singapore	73
28 Pakistan	72
29 Bulgaria	70
30 Philippines	68
31 Indonesia	65
32 Saudi Arabia	61
32 Ukraine	61
34 Lebanon	60
35 Kenya	59
35 Nepal	59
37 Nigeria	58
39 Ghana	55
39 Venezuela	55
39 Vietnam	55
Top 40 countries/economies of origin	13 830
Total temporary visa holders (158 countries), excludes cases with unknown country/economy of origin	15 117

Source: NSF/NIH/USED/USDA/NEH/NASA, 2008 Survey of Earned Doctorates.

Figure 38 presents the ratio of non-US citizens earning doctorates in the US to the number of doctoral degrees earned at home for the eight EU countries on the top-30 list of Figure 37 (see also the top-40 list in Table 13).

The average for these 8 EU countries is 1.4%: on average 1.4 doctorate is awarded to citizens of these 8 countries from US institutions for every 100 doctorates awarded at home. Bulgaria appears to be an outlier with a ratio of 11.3%.

Figure 38: Ratio of citizens earning doctorates at U.S. universities and colleges over the number of doctoral degrees awarded at home, 2008



Source: NSF/NIH/USED/USDA/NEH/NASA, 2008 Survey of Earned Doctorates and Eurostat (Education Statistics).

Notes:

- 1) The figure only includes the eight EU countries on the top-40 list of Table...
- 2) Numbers of doctoral degrees awarded at home are for the year 2007, and are taken from Figure 25.

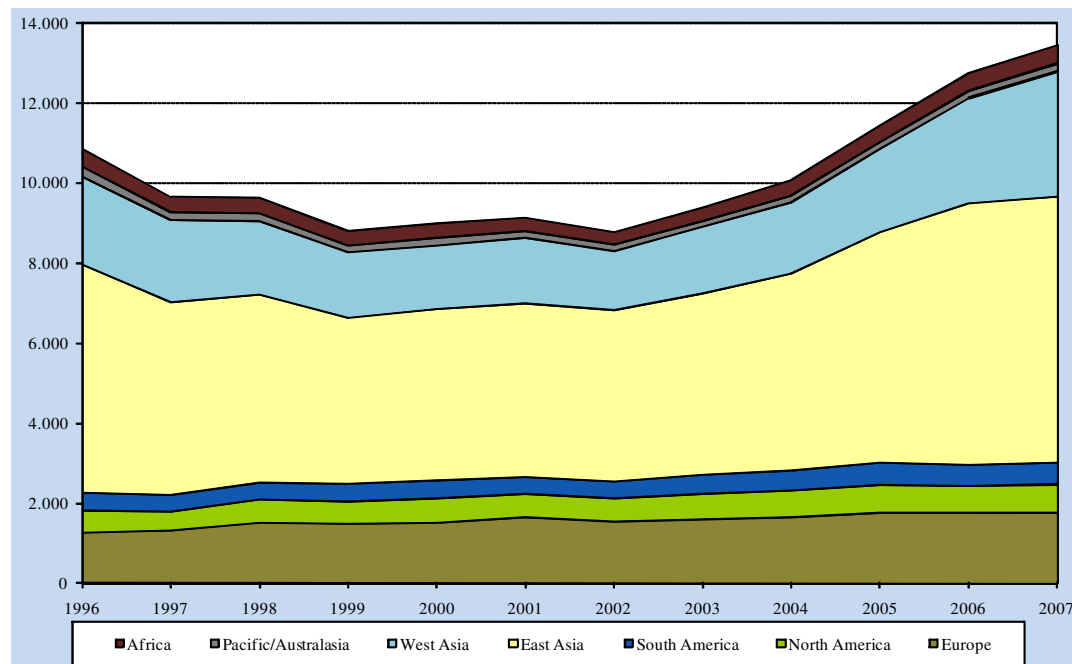
EU doctoral candidates in the US

- Approximately 15 000 doctorates were awarded in the US to non-US citizens in 2007: China accounts for 30% of these degrees; India and South Korea each earned around 15% and 10% of these degrees.
- Within the EU27, Germany, Italy, France, Romania, Spain, the UK, Greece and Bulgaria belong to the top-30 countries with doctorates awarded in the US. On average, 1.4 doctorates are awarded to citizens of these 8 countries from US institutions for every 100 doctorates awarded at home. Bulgaria appears to be an outlier with a ratio of 11.3% while the EU average is around 1.4%

6.2.2 Origin of doctoral graduates in the US

Figure 39 presents the number of non-US doctoral graduates by main region of origin in Science and engineering over time. The number of doctoral graduates in the US with European citizenship has increased from about 1 300 in 1996 to about 1 800 in 2007, an increase of approximately 38.5%. The number of doctorate recipients in the US from East Asia is the highest, and equals approximately 6 600 doctorates in 2007.

Figure 39: Non-U.S. citizens doctoral graduates in science and engineering, by main region of origin (1996–2007)

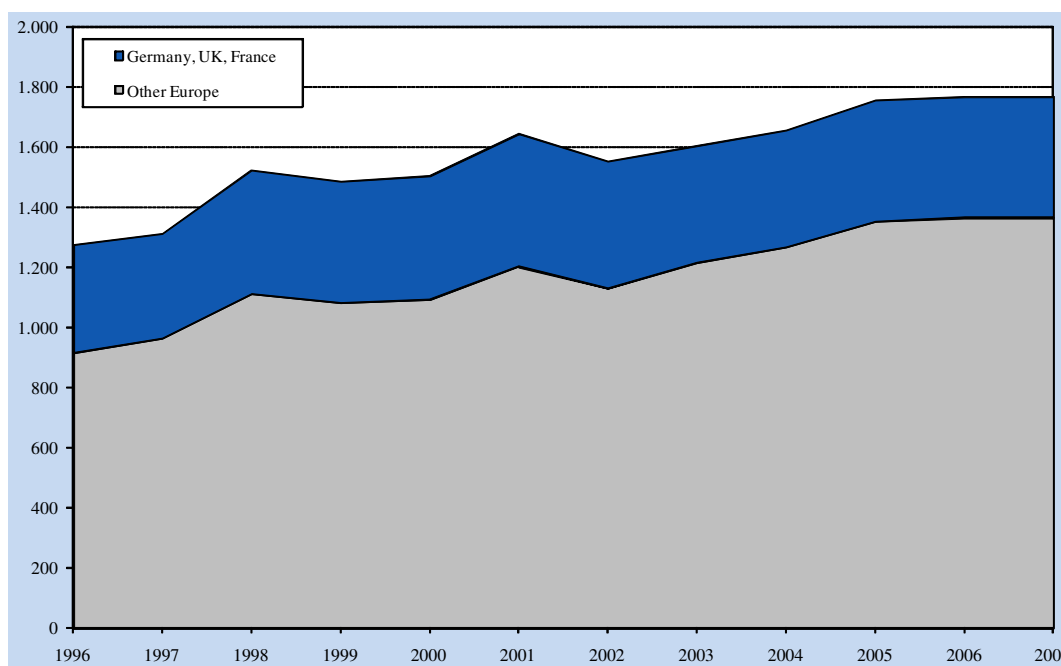


Source: www.census.gov/compendia/statab/2010/tables/10s0787.xls¹⁰

Figure 40 shows the number of doctoral graduates in Science and engineering in the US holding citizenship of European countries, separating Germany, UK and France from the rest of Europe, over time. The number of doctorate graduates in the US originating from Germany, UK and France represents 23% of all doctorate holders in the US from Europe. The number of doctorate recipients from Germany, UK and France has increased by 12% from 359 in 1996 to 403 in 2007. For the rest of Europe the number of doctorate recipients in the US has increased stronger from about 919 in 1996 to 1 368 in 2007 (by 49%).

¹⁰ The Statistical Abstract of the United States, published since 1878, is a summary of statistics on the social, political, and economic organization of the United States. Sources of data include the Census Bureau, Bureau of Labor Statistics, Bureau of Economic Analysis, and many other Federal agencies and private organizations.

Figure 40: Non-U.S. citizen doctoral graduates in science and engineering (1996–2007), European citizens



Source: www.census.gov/compendia/statab/2010/tables/10s0787.xls

Origin of doctoral graduates in science and engineering in the US

- The number of doctoral graduates in science and engineering in the US with European citizenship has increased from about 1 300 in 1996 to about 1 800 in 2007, an increase of approximately 38.6%. In United Kingdom (-5.1%) and Germany (-5.3%) the number of doctoral graduates in science and engineering has decreased.
- The number of doctorate graduates in science and engineering in the US originating from Germany, UK and France represents 23% of all doctorate holders in the US from Europe in 2007, while the corresponding share was 28% in 1996.

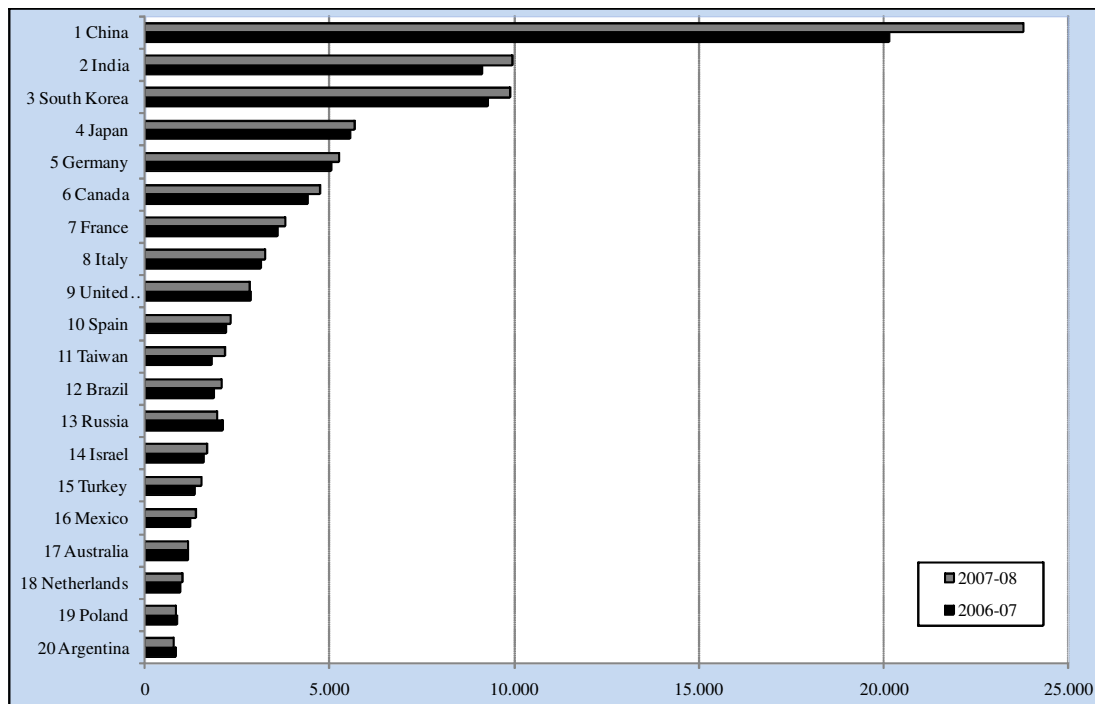
6.3 Scholars of EU origin in the U.S.

6.3.1 Top countries of origin

In 2007-2008, there were approximately 106 000 scholars of foreign origin in the US. Figure 41 presents the top-20 countries of these scholars without US citizenship in the US. As was the case of doctorate recipients, China, India and South Korea are the top-3 on this list. These three countries account for 41% of all foreign scholars in the US. China alone accounts for 22% of all foreign scholars in the US.

Within the EU27, Germany (ranks 5th) and France, Italy, UK and Spain rank 7th, 8th, 9th and 10th, respectively, with each having about 2-5% of the foreign scholars in the US. The Netherlands and Poland rank 18th and 19th with 1% and 0.8% of the foreign scholars in the US.

Figure 41: Top 20 countries of origin of foreign scholars in the U.S., 2006-07 and 2007-08, in percentage



Source: Open Doors data.

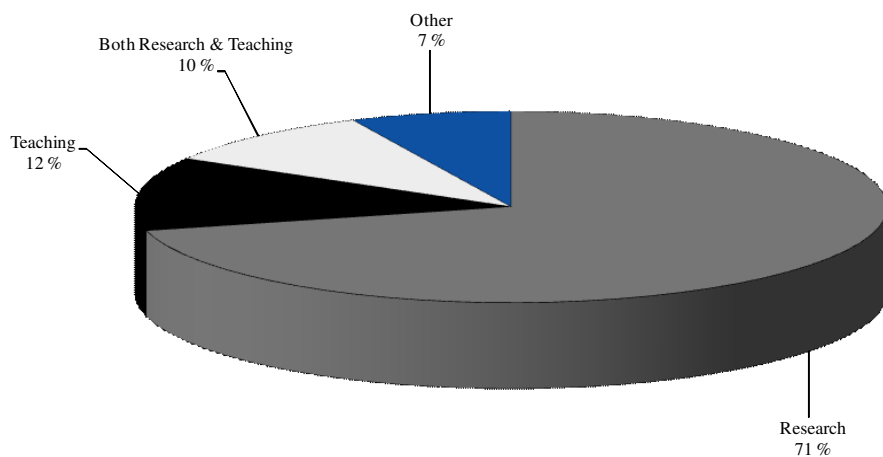
EU scholars in the US

- China, India and South Korea are the top-3 countries of origin of scholars in the US with no US citizenship, accounting for 41% of all foreign scholars in the US.
- China alone accounts for 22% of all the foreign scholars in the US.
- Within EU27, Germany, France, Italy, UK, Spain, Netherland and Poland are in the top-20 on the list of foreign scholars in the US.

6.3.2 Main fields and functions

In 2007-08, more than two out of three foreign scholars in the US report research as their main function; 12% report teaching and 10% both research and teaching. This is shown in Figure 42.

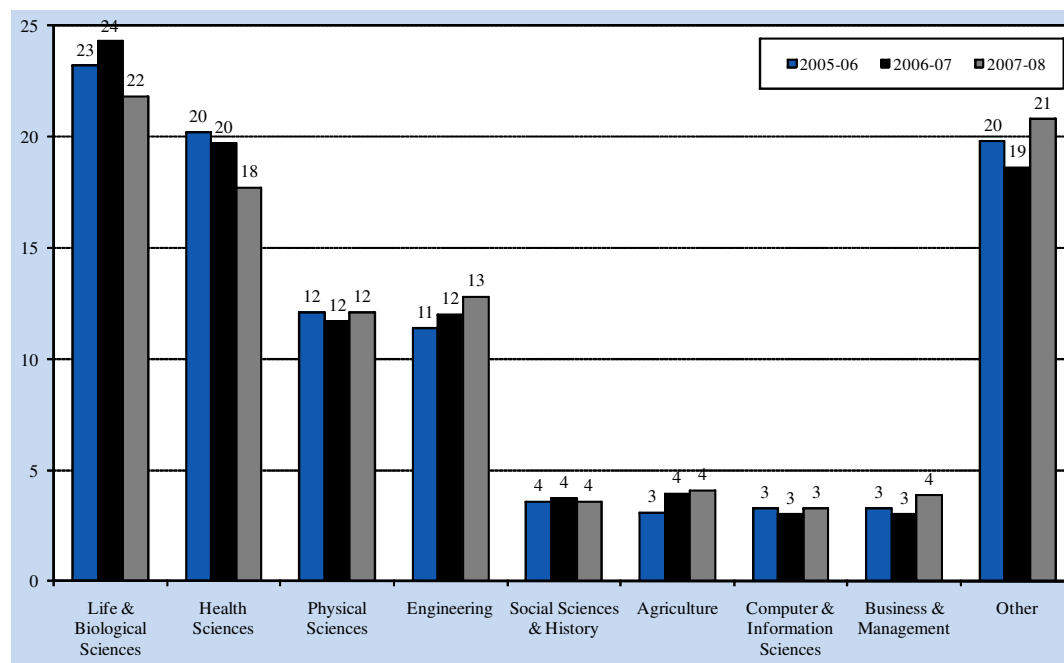
Figure 42: Primary function of foreign scholars in the U.S. (2007-08)



Source: Open Doors data.

Many of the foreign scholars in the US as shown in Figure 43, are active in the life and biological sciences (22% in 2007-08) and in the health sciences (18% in 2007-08). Another 12% are active in the physical sciences and 13% are active in engineering. Over the period 2005-2008, these percentages have not changed much.

Figure 43: Fields of specialization of foreign scholars in the U.S., 2005-06, 2006-07 and 2007-08, in percentage



Source: Open Doors data.

Main fields and function of foreign scholars in the US

- More than 70% of foreign scholars in the US report research as their main function; a further 12% report teaching and 10% both 'research and teaching'.
- Many of the foreign scholars in the US were active in the life and biological sciences and in the health sciences in 2007-08.

7 INDICATOR 7: NUMBER OF RESEARCHERS COMING INTO EUROPE

As in the previous chapters of the current report, here we present the update of the current IISER report (as structured in the version of 2007). Additional data on this indicator will be provided in the Final Report of the MORE project, where available. More details about the additional indicators will be provided in the MORE-set of indicators in the MORE Final Report.

For the update of indicator 7, we use data from Eurostat (R&D statistics). Note that there are missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands. This may have an impact on the data presented here for certain nationalities.

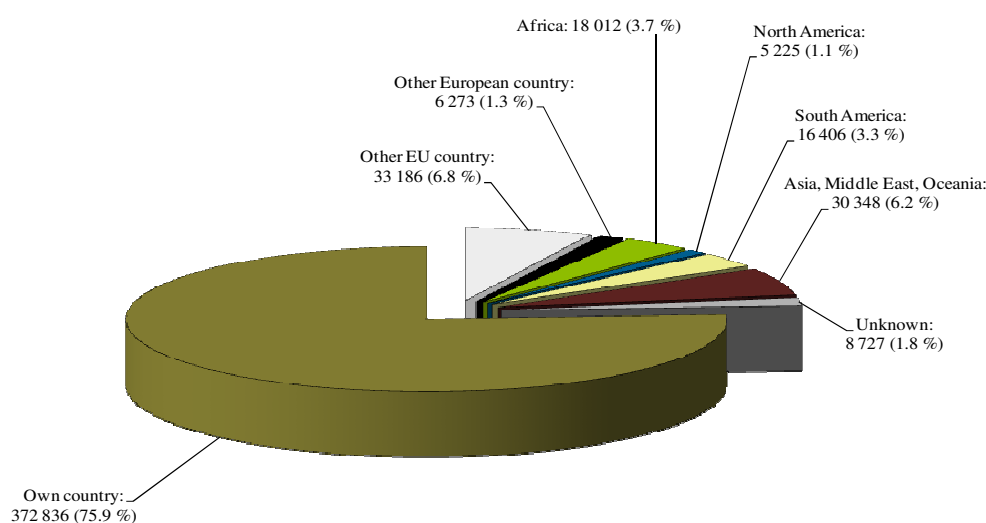
7.1 Origin of doctoral candidates in the EU27

Taking a different perspective, this section examines the number of researchers not holding EU citizenship who are studying/working in the EU. Information on both foreign doctoral candidates and foreign researchers coming into the EU are discussed in this and next section.

According to Figure 44 around four out of five (77.5%) doctoral candidates in the EU have been studying in their own country in 2007, 6.3% in a different EU country and 1.2% in another European (non-EU) country. This means that 15% of doctoral candidates in the EU are from outside Europe.

'Asia, Middle East and Oceania' are the largest senders of doctoral candidates to the EU with 5.8% of doctoral candidates in the EU27 coming from this broad geographical region; 3.4% and 3.1% of doctoral candidates come from Africa and South America respectively; only 1.0% of doctoral candidates in the EU hold citizenship from a North-American country.

Figure 44: Number and percentage of doctoral candidates (ISCED 6) in the EU27 according to their country of citizenship (2007)

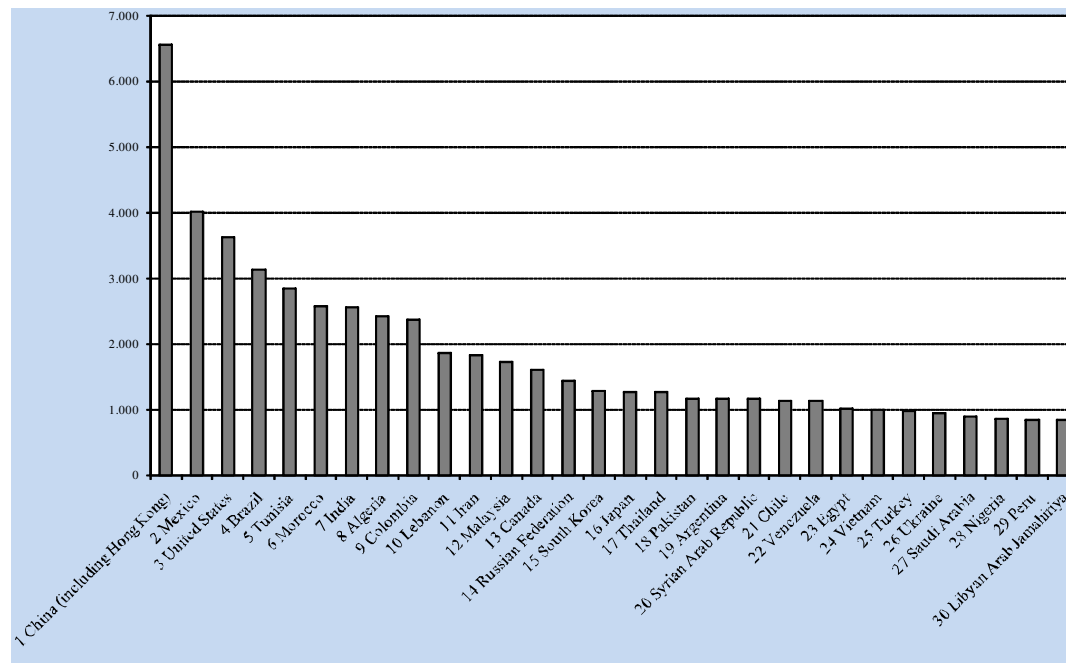


Source: Eurostat (Education Statistics).

Note: Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

As Figure 45 shows, among Third Countries, China was the most important sender of doctoral candidates to the EU with around 6 500 doctoral candidates in 2007. Mexico and the US followed with 4 000 and 3 600 doctoral candidates, respectively.

Figure 45: Top 30 countries of origin for foreign doctoral candidates (ISCED 6) from third countries in the EU27 (2007)



[Actual data in A.7.5 in the Annex]

Source: Eurostat (Education Statistics).

Note: Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

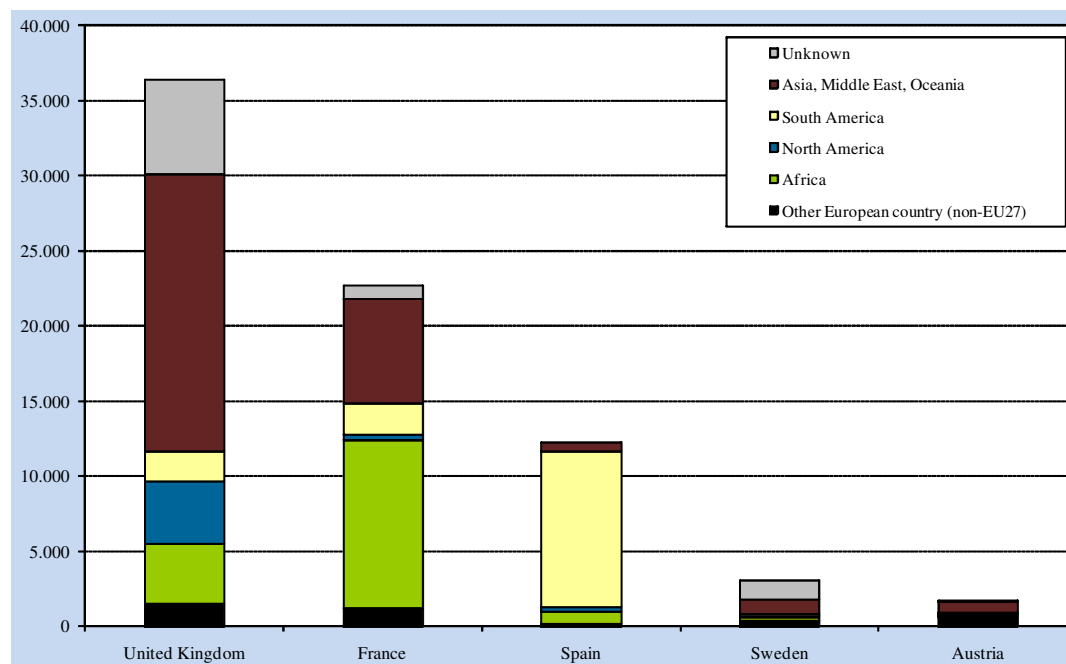
Origin of doctoral candidates in the EU

- Approximately four out of five doctoral candidates in the EU are studying in their own country, while 6.3% study in another EU country and 1.2% in another European (non-EU) country.
- 'Asia, Middle East and Oceania' are the largest "senders" of doctoral candidates to the EU with 5.8% of doctoral candidates in the EU27 coming from this broad geographical region.
- Among Third Countries, China was the most important sender of doctoral candidates to the EU with around 6 500 doctoral candidates in 2007. Mexico and the US followed.

7.2 EU receiving countries

This section examines what we know about the mobility of non-EU doctoral candidates in EU Member States. Figure 46 shows that the EU countries which received the most foreign (non-EU) doctoral candidates are UK, France and Spain, all three receiving around 71 000 doctoral candidates from Third Countries (36 000, 23 000 and 12 000, respectively). Asia, Middle East and Oceania as a region was the most important sender of doctoral candidates to the UK: 51% of non-EU doctoral candidates in UK come from this region. The language element seems to be important here: in Spain 85% of doctoral candidates from Third Countries come from South America; in France almost one out of two doctoral candidates from Third Countries (49%) come from African countries.

Figure 46: Number of doctoral candidates (ISCED 6) non-EU citizens by receiving member state, according to citizenship (2007), 5 largest EU27 countries measured in candidates



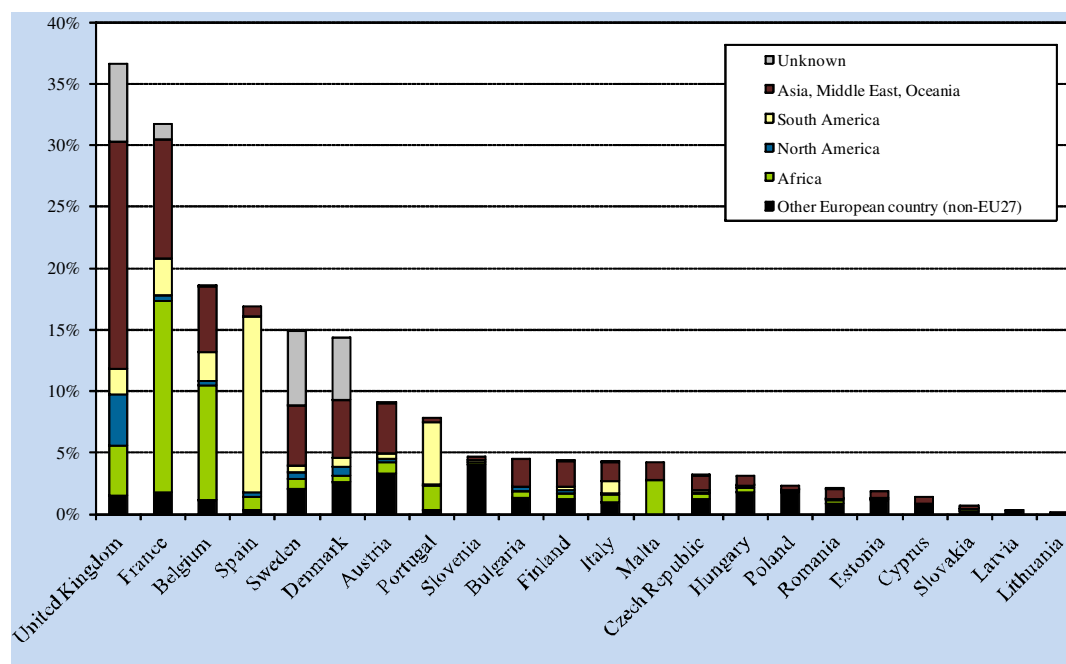
Source: Eurostat (Education Statistics).

Note: Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

Figure 47 presents data on mobility in relative terms: the number of doctoral candidates from Third Countries per EU Member State as a share of the total number of doctoral candidates in the reporting country. The top two receiving countries (UK and France) remain unchanged with around 37% and 32%, respectively, of doctoral candidates being nationals of non-EU countries. Belgium and Spain follow with around 19% and 17% and Sweden and Denmark with about 15% each.

In the UK about one out of five (19%) doctoral candidates in the country come from the region of Asia, Middle East, Oceania. In France, 16% of doctoral candidates come from Africa, in Belgium this is 9%. In Spain, 14% of the doctoral candidates are nationals of a South American country. One out of twenty doctoral candidates in Sweden and Denmark hold citizenship of a country in the region of Asia, Middle East, Oceania.

Figure 47: Number of doctoral candidates (ISCED 6) non-EU citizens, according to citizenship, as a percentage of the total number of doctoral candidates in the receiving Member States (2007)



Source: Eurostat (Education Statistics).

Note: Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

Non-EU doctoral candidates in the EU27

- UK, France and Spain, received the most foreign (non-EU) doctoral candidates (all three receiving about 71 000 doctoral candidates from Third Countries).
- Asia, Middle East and Oceania as a region is the most important sender of doctoral candidates to the UK (51% of non-EU doctoral candidates in UK).
- The language element seems to be important here: in Spain 85% of doctoral candidates from Third Countries come from South America; in France almost one out of two doctoral candidates from Third Countries (49%) come from African countries.

More data per country on the number of doctoral candidates by broad regions of origin as well as on the destination is presented in Annex 7 (Table A.7.1 and Table A.7.2).

7.3 Researchers by citizenship according to Eurostat data

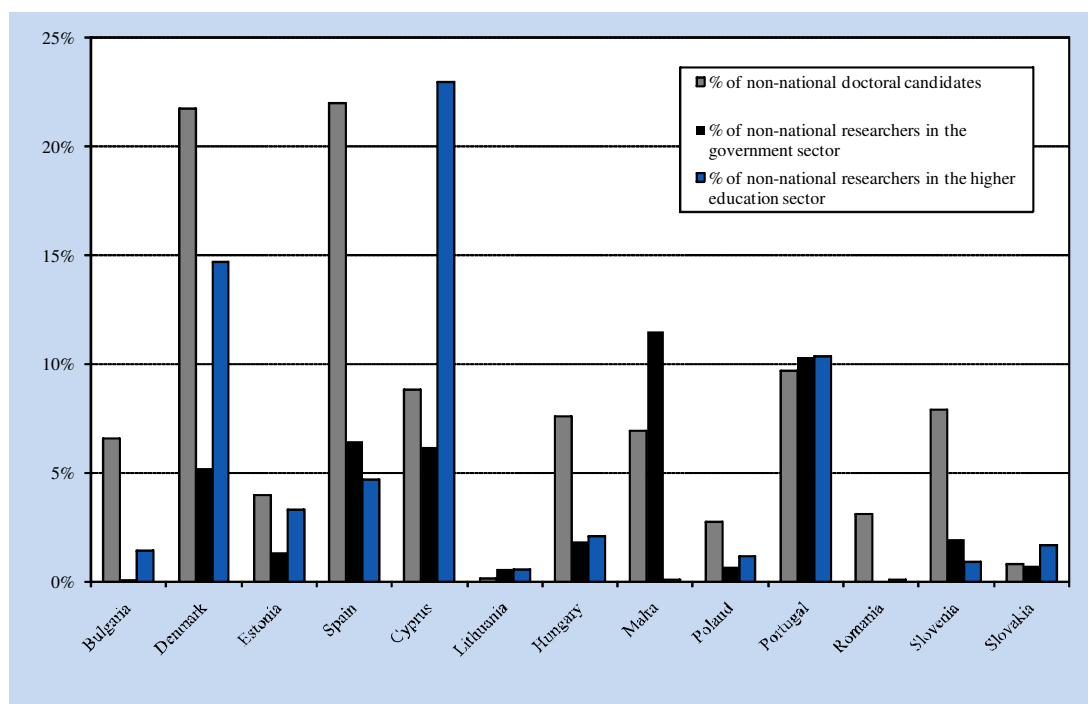
Table A.7.3 and Table A.7.4 in Annex 7 summarise the available data on the number of researchers in the government and the higher education sectors. There are 13-14 countries (13 countries in the higher education sector and 14 countries in the government sector) that provide some information on the nationality of their researchers in these sectors. Unfortunately, the existing information covers no more than 27-35% of the total number of researchers in these sectors (27% in the higher education sector and 35% in the government sector). Data on researchers by citizenship is provided in Annex 6.

In Figure 48, we compare the shares of non-national researchers in the government and higher education sector (in Table A.7.3 and Table A.7.4) with the share of non-national doctoral candidates. This comparison is useful as doctoral

candidates working in a country are the main 'pool' for the researchers in the country and in general can be thought as a sub-sample. Therefore, in general terms, we can expect that the total number of non-national doctoral candidates in a country is related to the total number of non-national researchers working in the higher-education sector. However, we do not have information on the extent to which this is the case as we need information on the share of non-national doctoral candidates who stay in the country after finishing their PhD. We also need to have an indication on the extent to which the set of doctoral candidates in a country (nationals or non-nationals) overlaps with the share of researchers working in the higher-education sector.

We see from the figure that for some countries, e.g., Bulgaria, Denmark, Estonia, Spain, Hungary, Poland, Romania and Slovenia, the share of non-national doctoral candidates is higher than the shares of non-national researchers in the two sectors. For Portugal, Lithuania and Slovakia there are small differences between these shares. Furthermore, we see that Cyprus has a much higher share of non-national researchers in the higher education sector (on a total of 871 researchers) than the share of non-national doctoral candidates (on a total of 351 researchers), and the share of non-national researchers in this sector is even higher than the corresponding share in the government sector (on a total of 225 researchers). However we have to be careful about the conclusions that are drawn as in some countries (e.g Denmark) the share of non-national researchers in higher-education and the share of non-national researchers in the government sector correspond to the share of non-national doctoral candidates but this is not the case for other countries (e.g. Spain).

Figure 48: Number of non-national researchers (HC) in the government sector and the higher education in the EU27 in 2007 (%), and the number of non-national doctoral candidates (ISCED 6) in the EU27 in 2007 (%)



Source: Eurostat (Education and R&D statistics).

Note Figure 48:

The figure shows the number of non-national researchers (%) in Table A.7.3 and Table A.7.4, and the number of non-national doctoral candidates (%) in Table A.7.1, but only for those countries in Table A.7.3 and Table A.7.4 that provide some information on the nationality of their researchers in both sectors. However, we have also excluded Luxembourg from the figure, since there are missing values for this country in Table A.7.1.

8 INDICATOR 8: CIRCULATION OF RESEARCHERS BETWEEN THE PUBLIC AND PRIVATE SECTOR

No current data are available on the circulation of researchers between the public and private sector.

In the final stage of this project (WP8) information will be provided, where available, from the different surveys within the MORE project. This will be included in the MORE-set of indicators which will be provided in the Final report of this project.

9 INDICATOR 9 AND 10: MOTIVATIONS FOR R&D CAREERS AND SATISFACTION OF RESEARCHERS WITH THEIR JOBS AND CAREERS

No current data are available on the motivations for R&D careers for researchers or for their job satisfaction.

In the final stage of this project (WP8) information will be provided, where available, from the different surveys within the MORE project. This will be included in the MORE-set of indicators which will be provided in the Final report of this project.

10 SHORTCOMINGS OF THE IISER INDICATORS

This chapter deals with the shortcoming of the existing IISER indicators. Some of these shortcomings have been addressed by the different surveys of the MORE project the results of which will be summarised in the Final report for the MORE project together with the list of the MORE-set of indicators.

10.1 Limitations of the ten main indicators

Difficulties have been encountered during the process of data collection for some of the ten IISER indicators. The first set of problems concern Indicator 2 “Number of researchers in the training phase and post-docs” which measures the number of higher education degrees and the number of doctoral degrees, data that are necessary to estimate the potential pool of human resources available in science and technology in Europe. Data on postdoctorates have been difficult to collect since information on postdoctorates in Europe is scarce and no comprehensive and comparable data at the EU level are available. Therefore, the number of post-doctoral researchers was estimated at the EU level by combining Eurostat aggregated data and data from the two pilot ad-hoc surveys commissioned by IPTS and carried out on a sample of 10 European countries, the NetReAct survey – for life sciences – and the Rescar survey – for engineering and social sciences in IISER 2007.¹¹ In the current update of IISER (current report) these data have not been revised. An update is expected to be provided in the academic survey of the MORE study.

It has not been possible to construct Indicator 3 “Number of researchers recruited under a permanent contract in R&D” and Indicator 4 “Average time from graduation to a first regular employment contract in R&D” on a strong methodological and empirical basis, as no comparable data are available. The initial idea was to model the annual number of new permanent positions at the doctoral level (by country, by main field), based primarily on the total number of permanent positions in universities and public labs at the doctoral level and the average number of years in activity (or the age distribution), and to “compare” it to the number of doctoral graduates annually awarded (by calculating for example the percentage of new doctoral graduates *potentially* employed in permanent positions in R&D). Many problems and difficulties were however identified, e.g., in the sample, small countries were over-represented compared to “big” countries, the classification of disciplines was not directly comparable between researchers and ISCED6 graduates, the calculations were based on strong assumptions (e.g., on the duration of doctoral studies, on the age distribution of researchers). The indicator 4 was then inferred from the calculations of indicator 3 (for example as the inverse of the percentage of new doctoral graduates potentially employed in permanent positions in R&D), with all its uncertainties. Therefore, after unsuccessfully trying to construct indicators 3 and 4, it was agreed (for IISER 2007) with DG Research to abandon these two indicators.

Indicators 5, 6 and 7 addressed the issues of geographical mobility, within, out and into Europe, while Indicator 8 addressed the issue of inter-sectoral mobility of researchers. They are essential to study brain circulation in the global knowledge economy. Indicator 5 “Circulation of researchers within Europe” addressed the issue of the international mobility of doctoral candidates and postdoctoral researchers in the EU. For the IISER 2007, the “geographical mobility” of doctoral

¹¹ See below for more details on these surveys.

candidates in the EU in all fields was first developed, based on Eurostat data. Calculations were done on 21 countries only as data on the remaining countries are not available. “Mobile”/“international” doctoral candidates were defined on the basis of their country of citizenship, which is not fully appropriate for measuring mobility. Estimations of the origin of doctoral candidates and postdoctorates in the EU in three fields – life sciences, social sciences and engineering – were then provided, based on the two pilot surveys. Indicator 6 “Number of researchers leaving Europe” presented results on the European doctoral graduates and scholars in the U.S., based on U.S. data, respectively the NSF/NIH/USED/NEH/USDA/NASA Survey of Earned Doctorates and the Institute of International Education Open Doors Surveys. Indicator 7 “Number of researchers coming into Europe” presented results on the origin of doctoral candidates in the EU, not covering the whole EU27. Therefore, the concept of researchers used to construct most of the geographical mobility indicators was limited to specific segments of researchers, doctoral candidates, postdoctorates and scholars. The MORE surveys intend to provide data on the mobility of established researchers in geographical terms and also between sectors (industry and academic sector).

Indicator 8 “Circulation of researchers between public and private sector” was impossible to construct as there is no systematic collection of information on the flows of researchers from public/academic sector to the private sector in Europe (and respectively from the private to the public/academic sector). Although there is data collected by some national statistical institutions (e.g. social security offices) of different countries, these data are not harmonised across the EU countries and access to them is not easy to get. The stocks of researchers in the different sectors are compiled in Eurostat data but flows cannot be derived as such from the stocks. The MORE surveys are addressing this issue by providing information on the movements of researchers between the academic and the industry sector.

No (comparable) data at the EU level exist to answer the qualitative issues addressed by indicators 9 and 10, motivations for R&D careers and satisfaction of researchers with their jobs and careers. Individual data have to be collected to be able to construct these qualitative indicators as the job holders or employers, themselves, have to answer to a questionnaire specifically designed for that purpose. The academic, the industry as well as the US mobility surveys in the MORE project will address this element by providing qualitative information on the motivations for researchers towards mobility and their job satisfaction.

10.2 Limitations of the NetReAct and Rescar surveys

For both the NetReAct and the Rescar surveys, the main unit of analysis was the university-based research team. Yet the distinction between university teams and teams of non-university research organisations and other tertiary education institutions is problematic in some countries, especially in France, where universities and large national public research organisations (e.g., CNRS, INSERM, INRA) are interlinked.

A number of limitations on the websites appeared, in particular in Southern and Central Eastern Europe. Contradictory or unclear information were found in some cases. Furthermore, other tertiary education institutions were generally not included, particularly teaching-oriented colleges in the UK, university colleges in Sweden, and the Fachhochschulen in Germany.

Moreover, the definition of a research team is a difficult issue. Various types of organisations structure exist in universities and public research institutions, e.g. departments, institutes, laboratories, units, centres and teams. Their meanings

vary from one organisation to another and from one country to another. Therefore, the definition of a "research collective" is problematic as it lies between the level of the individual researcher and the research institution. Laredo and Mustar (2000) noted that "Contrary to a firm and most analyses in industrial economics, there is no legal frame to identify actors. Ad hoc decisions are to be made about what are the relevant entities to analyze within larger institutions".¹²

In the NetReAct and Rescar projects, a research team was defined as "a group of people, scientists and non-scientists, which work in the same location for a longer time period to produce new scientific knowledge". The team members can be employed by different organisations but they work in one location. In some cases, especially in some countries, the application of this definition for the identification of teams was not obvious however, even if various ways have been used to identify them (International Handbook of Universities and internet searches). The selection of research teams, generally smaller than labs, is mainly due to the fact that information had to be collected on doctoral students and post-doctorates. Therefore the respondents had to have sufficient knowledge on these issues.

The definition of the social sciences may be loose, compared to natural sciences and engineering, and subject to various interpretations in different data sources. The identification of departments and teams is uncertain, and probably more difficult in the social sciences than in engineering.

The definition and identification of team leaders is also not obvious and a certain level of uncertainty is probably associated with the concept. Contact details were difficult to obtain in some cases as well. Furthermore, team leaders may not have good knowledge of their current and former doctoral students and postdoctorates. In addition, these surveys have asked the team leaders to fill in the questionnaires and not directly the researchers in their teams. Although this method might be more efficient, opinions among team leaders and team members may systematically vary.

In the two surveys, the definition of postdoctorate was not specified, and was left to the interpretation of the heads of each unit. And, as noted earlier, there is no agreement on the definition of postdoctorate, except that it is a 'temporary' research position, generally based in the academic sector.

¹² In this latter work, Laredo and Mustar choose to retain the smallest recognized budgetary unit in the French system, even if those were often split into research teams. A similar level of analysis – the lab – was chosen by other studies, e.g. Joly and Mangematin (1996), Laredo (2001). Laredo (2001), in a study on human genetics in six countries (Germany, UK, France, Spain, Italy and Sweden), showed that there were strong differences in lab sizes and composition between countries.

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ANNEX 2 METHODOLOGY OF INDICATOR 1 ON THE NUMBER AND FORECASTS OF RESEARCHERS

All figures and tables presented in this report are based on descriptive statistics, except for indicator 1. For indicator 1 we have estimated the number of researchers in both HC and FTE in EU Member States for which data were missing in the Eurostat database, including the U.S., Japan and China, by sector for the period 2000-2007 based on observed values. We have also estimated the number of researchers in FTE for other OECD countries. Then, we have used the estimates for the EU27 to predict the number of researchers (HC) in the EU27 for the period 2008-2011, for all sectors combined and each sector separately. In chapters 1 and 2 we describe how we have estimated the number of researchers in HC and FTE, respectively. In chapter 4 we describe the estimation methods of forecasting the number of researchers in the EU27.

Box 1: Note on the estimation methodology used by the MORE consortium

For the update of the IISER indicators presented in this report, the MORE consortium based all estimates on Eurostat's statistics on Head Counts (HC) and Full time equivalent (FTE). Our general estimation strategy was the following one.

1. We estimated missing countries' data on number of researchers in both FTE and HC figures *by R&D performing sector* and then we add all these up to all sectors EU27 HC and FTE.
2. We applied total EU27 HC and FTE numbers from Eurostat in three of four R&D performing sectors (Government, Business and private non-profit) for the years 2000 - 2007 as our basis for all subsequent country estimations within each one of these three R&D-performing sectors.
3. Furthermore, and for the Higher education sector only, we apply Eurostat's total EU27 figures for HC and FTE in 2005-2007. These are the years with most complete R&D statistics for most of the EU27 countries and **in particular for United Kingdom in the higher education sector**. Our estimations of EU27 HES country sums for the years 2000-2004 do not necessarily add up to Eurostat total HES figures for these years (e.g. 2000-2004) as we had to extrapolate backwards data point 2005 for UK and this extrapolation gave figures which when added up with figures from other EU27 countries resulted to significant deviations from Eurostat-figures for HES (again this is only for the years 2000-2004).
4. We add up 1-3 for calculating total sector EU27 HC and FTE estimates.

As a consequence of our estimation methodology, our total EU27 of HC and HES for the years 2000-2004 (and only for these years) estimates deviate from those of Eurostat. **However, in all Tables and Figures of this report we do use ONLY Eurostat figures for total sector HC and FTEs, and for EU27 HC and FTEs in the higher education sector also for the years 2000-2004.**

More specific comments on the estimation methodology regarding estimates within the R&D performing sectors:

FTE-estimates: For the business enterprise sector and the government sector, the total number of EU27 FTE researchers is estimated by the MORE consortium to be 3-4% (3% for 2002 and 4% for 2003-2004) higher for the period 2002-2004 than Eurostat's figures. For the higher education sector, the total number of EU27 FTE researchers is estimated by the MORE consortium to be higher for the period 2000-2004 compared to what we find on the Eurostat's figures, due to the estimates for United Kingdom for these years. For the private non-profit sector, the sum of the total number of EU27 FTE researchers is estimated by the MORE consortium to be 1% higher for 2003 than what we find on the Eurostat's figures.

HC-estimates: For HC researchers there are no differences in what the MORE consortium estimated as the total number of researchers for the business enterprise sector in EU27, the government sector in EU27 and the private non-profit sector in EU27, and Eurostat's corresponding figures. As mentioned earlier the total, in the higher education sector the number of HC researchers in EU27 is estimated by the MORE consortium to be significantly higher for the period 2000-2004 compared to Eurostat's figures, due to non-available data for United Kingdom in the period 2000-2004.

In Tables A.2.1-A.2.10 we report the total number of HC and FTE researchers to what we find on the Eurostat website for each of the four sectors of performance (business enterprise sector, government sector, higher education sector and private non-profit sector) and for all sectors.

A main problem for the MORE consortium in our attempt to estimate the numbers of researchers in EU27 countries in the different sectors of performance, has been the fact that there are missing values in the Eurostat database. In the Eurostat database the flag ':' is used for 'non available' data. Eurostat has informed us that in some cases these data are not actually missing; they are not separately available but are included in the total and/or in other sectors of performance.

1 THE NUMBER OF RESEARCHERS (HC)

Table A.2.1 to Table A.2.4 show the stocks of researchers (HC) in the EU27, U.S., Japan and China by R&D performing sector for the period 2000-2007. We have estimated non-available values based on observed values (see Box 1 above). HC estimates in **dark blue colour** for a country are based on observed FTE values for the same country. Estimates in **pink colour** for a country are trend extrapolations of the observed values for the same country.

For some countries we have estimated the number of researchers in a specific sector by taking the difference between the total (Eurostat) number of researchers in this sector in the EU27 and the sum of the total number of researchers in all the other countries in this sector. These estimates are in **light blue colour**.

Some estimates are in **orange colour**. In this case we have estimated the number of researchers in Sector X in Country Y by taking the difference between the number of researchers for all sectors of performance in Country Y and the sum of the number of researchers in all the other sectors (than Sector X) in Country Y.

The Eurostat database does not contain any information about the number of researchers (both HC and FTE researchers) for the higher education sector for United Kingdom for the period 2000-2004. For this country we have estimated the number of researchers for each year in the period 2000-2004 by using the number of researchers for France for the same year multiplied by the fraction of researchers for United Kingdom and France for 2005. These estimates are in **red colour**.

Table A.2.5 shows the number of researchers for all sectors, and for each country. This table is the sum of the numbers of researchers in Table A.2.1 to Table A.2.4.

Table A.2.1. Total researchers (HC). Sector of performance: Business enterprise sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	19 700	20 850	19 483	19 729	19 428	19 927	19 585	20 342
Bulgaria	1 225	1 128	1 075	1 385	1 445	1 251	1 500	1 591
Czech Republic	9 309	8 975	9 788	10 417	11 732	12 022	13 100	14 471
Denmark	12 042	12 281	20 794	18 520	21 657	24 264	24 366	24 319
Germany	169 810	175 040	171 738	178 964	181 545	186 732	191 419	196 660
Estonia	507	676	725	953	1 103	1 402	1 400	1 626
Ireland	6 542	6 937	6 581	6 611	7 120	7 696	7 969	8 242
Greece	3 803	4 375	4 473	4 385	5 371	6 357	5 687	6 417
Spain	23 218	21 093	30 403	34 105	40 008	43 627	51 273	56 505
France	86 216	94 374	101 690	107 401	114 930	112 266	128 374	132 307
Italy	29 706	29 360	32 047	30 500	31 676	31 485	35 350	38 725
Cyprus	237	259	291	256	257	317	345	344
Latvia	1 282	923	1 140	702	550	606	992	1 033
Lithuania	339	591	346	512	589	916	1 018	1 504
Luxembourg	1 412	1 478	1 543	1 609	1 561	1 807	1 556	1 640
Hungary	4 750	4 908	5 381	5 499	5 455	6 108	7 641	8 573
Malta	38	43	47	58	221	262	287	262
Netherlands	26 645	28 313	26 256	24 529	31 168	29 228	35 754	31 039
Austria	18 817	19 106	19 395	19 991	20 587	22 184	22 915	24 615
Poland	11 796	11 570	5 882	8 452	10 189	11 403	11 408	11 536
Portugal	3 977	4 625	5 364	6 102	6 144	6 186	10 322	14 457
Romania	13 274	11 656	11 010	10 086	9 264	10 644	8 036	7 971
Slovenia	1 585	1 725	1 858	1 669	1 913	2 203	2 660	2 901
Slovakia	2 912	2 715	2 557	2 255	2 181	2 414	2 482	2 144
Finland	21 106	25 976	28 153	27 135	27 182	26 122	26 666	26 608
Sweden	29 777	30 054	30 333	30 613	30 485	42 476	42 816	34 989
United Kingdom	87 515	93 036	97 693	101 413	96 327	95 661	95 789	93 446
EU27	587 539	612 065	636 047	653 851	680 088	705 566	750 710	764 267
United States	1 156 928	1 171 225	1 236 893	1 337 546	1 306 946	1 235 816	1 301 476	1 268 646
China (excluding Hong Kong)	393 134	429 207	509 597	560 201	622 536	784 038	890 607	1 083 942
Japan	451 960	461 962	460 053	497 620	490 551	519 360	527 100	535 121

Source: NIFU STEP based on Eurostat data (R&D statistics) for EU27, and on OECD – MSTI data for US, China and Japan.

Notes:

1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) See Sub-indicator 1 in Annex 4.

Table A.2.2. Total researchers (HC), sector of performance: Government sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	1 936	2 077	2 119	2 180	2 431	2 511	2 567	2 653
Bulgaria	6 763	6 387	6 326	6 377	6 474	6 472	6 493	6 440
Czech Republic	7 860	7 910	7 850	7 997	8 213	8 639	9 293	9 284
Denmark	6 118	6 117	3 118	3 269	3 353	3 104	3 282	1 969
Germany	42 741	43 785	44 345	43 935	47 326	44 898	47 783	49 509
Estonia	675	610	605	637	636	622	736	740
Ireland	737	505	587	666	588	457	545	538
Greece	2 807	2 868	2 948	3 027	2 850	2 916	3 173	3 092
Spain	17 071	18 687	18 137	21 467	24 245	28 212	27 957	30 264
France	27 569	23 012	25 973	26 376	26 645	27 671	27 441	28 709
Italy	18 512	16 226	16 086	17 389	17 817	18 818	23 171	24 150
Cyprus	177	201	219	217	212	222	234	225
Latvia	800	769	744	660	622	773	1 262	1 378
Lithuania	2 566	2 383	1 866	1 736	1 753	1 878	1 759	1 694
Luxembourg	264	307	331	365	394	431	482	543
Hungary	5 366	5 172	5 735	5 822	5 921	6 213	6 217	5 941
Malta	29	29	33	9	24	34	47	26
Netherlands	6 492	7 263	7 258	8 627	8 533	7 807	7 895	8 044
Austria	2 395	2 381	2 368	2 342	2 315	2 686	2 789	2 783
Poland	12 361	11 762	16 291	14 964	14 377	14 094	14 511	14 956
Portugal	5 290	5 211	5 119	5 027	5 315	5 602	5 105	4 607
Romania	5 390	5 764	6 082	6 270	6 586	7 267	5 864	6 100
Slovenia	1 919	1 845	1 939	1 221	1 313	1 846	1 973	2 194
Slovakia	2 855	2 761	2 722	2 844	2 706	2 845	2 939	3 299
Finland	5 221	5 117	5 397	5 347	5 326	5 622	5 703	5 714
Sweden	3 339	3 359	3 379	3 399	3 707	4 771	4 807	2 843
United Kingdom	14 845	9 893	9 848	10 016	10 004	10 188	9 736	9 488
EU27	202 098	192 402	197 424	202 185	209 686	216 599	223 764	227 183
United States	56 339	57 122	58 664	59 479	60 306	61 145	61 995	62 856
China (excluding Hong Kong)	229 226	221 187	232 034	239 328	239 814	243 654	259 314	283 836
Japan	33 302	35 992	36 052	36 268	36 725	36 675	36 268	35 618

Source: NIFU STEP based on Eurostat data (R&D statistics) for EU27, and on OECD – MSTI data for US, China and Japan.

Notes:

1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) See Sub-indicator 2 in Annex 4.

Table A.2.3. Total researchers (HC), sector of performance: Higher education sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	21 726	22 198	22 257	22 319	25 235	26 059	26 829	28 002
Bulgaria	2 488	2 837	3 016	3 024	3 379	3 894	3 909	4 917
Czech Republic	12 464	12 182	12 847	12 789	14 101	16 781	17 171	18 668
Denmark	10 251	11 095	13 683	13 991	14 221	15 682	16 070	16 328
Germany	171 280	173 514	182 015	174 231	171 832	174 623	184 372	191 611
Estonia	3 347	3 469	3 707	3 762	3 844	3 618	3 946	4 320
Ireland	6 592	7 285	8 344	8 600	8 933	9 500	10 078	10 600
Greece	20 899	18 998	19 753	20 507	22 246	23 984	25 576	26 151
Spain	93 919	99 059	101 019	102 572	105 393	108 823	113 075	118 769
France	93 191	95 326	99 354	102 110	103 780	107 356	108 763	108 322
Italy	51 953	54 856	57 533	56 480	57 401	70 187	72 404	74 759
Cyprus	326	365	446	555	703	807	830	871
Latvia	4 033	4 088	4 212	4 151	4 452	4 368	4 945	5 412
Lithuania	7 195	7 239	7 305	8 304	9 294	9 124	9 236	10 195
Luxembourg	36	49	49	49	187	205	259	287
Hungary	17 760	18 271	18 648	18 971	19 044	19 086	18 928	18 545
Malta	580	595	609	639	648	676	714	709
Netherlands	18 747	19 074	12 653	12 398	19 703	20 446	20 516	20 397
Austria	15 835	16 624	17 414	19 151	20 888	22 680	23 609	25 967
Poland	63 997	66 217	68 587	70 969	71 906	72 261	70 331	70 723
Portugal	16 697	17 276	18 591	19 906	20 645	21 384	24 044	26 703
Romania	4 515	6 177	7 544	9 526	11 218	11 492	16 082	16 510
Slovenia	2 954	2 999	3 056	2 501	2 571	3 564	3 609	3 623
Slovakia	9 980	10 447	10 101	11 002	12 414	12 249	13 379	13 918
Finland	14 510	15 428	16 346	17 263	18 181	18 495	20 367	20 570
Sweden	36 024	36 538	37 059	37 580	39 000	34 942	34 053	35 162
United Kingdom	221 397	226 469	236 038	242 586	246 553	255 049	265 635	271 360
EU27	797 441	880 432	925 238	951 234	999 223	1 067 335	1 108 730	1 143 399
United States	630 386	663 926	715 165	751 571	746 556	726 999	737 933	749 031
China (excluding Hong Kong)	294 095	329 015	366 212	380 672	421 771	431 888	464 352	485 823
Japan	259 759	280 710	281 304	284 330	291 147	295 476	301 193	302 492

Source: NIFU STEP based on Eurostat data (R&D statistics) for EU27, and on OECD – MSTI data for US, China and Japan.

Notes:

1) We apply Eurostat's total EU27 figures for the years 2005-2007. For the years 2000-2004 we had to extrapolate backwards datapoint 2005 for UK and this extrapolation gave figures which when added up with figures from other EU27 countries resulted to significant deviations from Eurostat-figures for HES as a whole in EU27 (only for the years 2000-2004). See Box 1.

2) See Sub-indicator 3 in Annex 4.

Table A.2.4. Total researchers (HC), sector of performance: Private non-profit sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	285	287	274	272	269	260	272	281
Bulgaria	51	94	28	90	79	303	131	142
Czech Republic	532	149	150	218	106	100	112	116
Denmark	222	298	288	266	302	410	377	376
Germany	:	:	:	:	:	:	:	:
Estonia	41	48	52	72	95	92	139	140
Ireland	:	:	:	:	:	:	:	:
Greece	:	99	:	139	:	139	:	:
Spain	1 661	1 568	539	422	325	361	719	652
France	4 389	4 461	4 799	4 299	4 178	4 306	4 366	4 204
Italy	:	:	3 216	3 085	3 701	5 044	6 238	6 069
Cyprus	52	55	58	61	54	78	88	92
Latvia	2	5	5	:	1	1	1	:
Lithuania	:	:	:	:	:	:	:	:
Luxembourg	:	:	:	:	:	:	:	:
Hungary	:	:	:	:	:	:	:	:
Malta	0	0	0	0	0	0	0	0
Netherlands	807	614	563	:	:	:	:	:
Austria	381	369	380	359	337	302	284	225
Poland	35	47	82	47	59	117	124	74
Portugal	3 798	4 034	4 427	4 820	4 709	4 597	5 137	5 676
Romania	:	:	:	86	185	205	140	159
Slovenia	104	171	174	37	45	31	28	24
Slovakia	:	:	5	7	53	18	16	14
Finland	481	527	446	364	530	534	537	528
Sweden	:	:	301	430	458	307	527	118
United Kingdom	3 492	3 819	3 372	3 332	3 666	3 910	4 101	4 100
EU27	16 333	16 645	19 159	18 406	19 152	21 115	23 337	22 990
United States	:	:	:	:	:	:	:	:
China (excluding Hong Kong)	:	:	:	:	:	:	:	:
Japan	19 902	14 035	13 815	12 327	12 051	10 390	10 129	10 155

Source: NIFU STEP based on Eurostat data (R&D statistics) for EU27, and on OECD – MSTI data for US, China and Japan.

Notes:

- 1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).
- 2) The flag ':' is used for 'non available' data in the Eurostat database (see Box 1 above).
- 3) See Sub-indicator 4 in Annex 4.

Table A.2.5. Total researchers (HC), all sectors of performance, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	43 646	45 412	44 133	44 500	47 363	48 757	49 253	51 278
Bulgaria	10 527	10 446	10 445	10 876	11 377	11 920	12 033	13 090
Czech Republic	30 165	29 216	30 635	31 421	34 152	37 542	39 676	42 539
Denmark	28 633	29 791	37 883	36 046	39 533	43 460	44 095	42 992
Germany	383 831	392 339	398 098	397 130	400 703	406 253	423 574	437 780
Estonia	4 570	4 803	5 089	5 424	5 678	5 734	6 221	6 826
Ireland	13 871	14 727	15 512	15 877	16 641	17 653	18 592	19 380
Greece	27 509	26 340	27 173	28 058	30 466	33 396	34 436	35 660
Spain	135 869	140 407	150 098	158 566	169 971	181 023	193 024	206 190
France	211 365	217 173	231 816	240 186	249 533	251 599	268 944	273 542
Italy	100 171	100 442	108 882	107 454	110 595	125 534	137 163	143 703
Cyprus	792	880	1 014	1 089	1 226	1 424	1 497	1 532
Latvia	6 117	5 785	6 101	5 513	5 625	5 748	7 200	7 823
Lithuania	10 100	10 213	9 517	10 552	11 636	11 918	12 013	13 393
Luxembourg	1 712	1 834	1 923	2 023	2 141	2 443	2 297	2 470
Hungary	27 876	28 351	29 764	30 292	30 420	31 407	32 786	33 059
Malta	647	666	689	706	893	972	1 048	997
Netherlands	52 691	55 264	46 730	45 554	59 404	57 481	64 165	59 480
Austria	37 427	38 481	39 557	41 842	44 127	47 852	49 597	53 590
Poland	88 189	89 596	90 842	94 432	96 531	97 875	96 374	97 289
Portugal	29 762	31 146	33 501	35 855	36 813	37 769	44 608	51 443
Romania	23 179	23 597	24 636	25 968	27 253	29 608	30 122	30 740
Slovenia	6 562	6 740	7 027	5 428	5 842	7 644	8 270	8 742
Slovakia	15 747	15 923	15 385	16 108	17 354	17 526	18 816	19 375
Finland	41 318	47 048	50 341	50 109	51 219	50 773	53 273	53 420
Sweden	69 140	69 950	71 072	72 022	73 651	82 496	82 203	73 112
United Kingdom	327 250	333 216	346 952	357 347	356 550	364 808	375 261	378 394
EU27	1 603 411	1 701 544	1 777 868	1 825 677	1 908 150	2 010 614	2 106 542	2 157 838
United States	1 843 652	1 892 274	2 010 721	2 148 597	2 113 808	2 023 959	2 101 403	2 080 533
China (excluding Hong Kong)	916 455	979 409	1 107 843	1 180 201	1 284 121	1 459 579	1 614 272	1 853 600
Japan	764 923	792 699	791 224	830 545	830 474	861 901	874 690	883 386

Source: NIFU STEP based on Eurostat data (R&D statistics) for EU27, and on OECD – MSTI data for US, China and Japan.

Notes:

1) Total EU27 numbers from Eurostat in three of the four R&D performing sectors (government, business and private non-profit) for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) For the higher education sector we apply Eurostat's total EU27 figures for the years 2005-2007. For the years 2000-2004 we had to extrapolate backwards datapoint 2005 for UK and this extrapolation gave figures which when added up with figures from other EU27 countries resulted to significant deviations from Eurostat-figures for HES as a whole in EU27 (only for the years 2000-2004). See Box 1.

2 THE NUMBER OF RESEARCHERS (FTE)

Table A.2.6 to Table A.2.9 show stocks of researchers (FTE) in the EU27, U.S., Japan, China and other OECD countries by R&D performing sector for the period 2000-2007. The colours of the estimates are the same as in chapter 1.

Table A.2.10 shows the number of researchers for all sectors, and for each country this table is the sum of the numbers of researchers in Table A.2.6 to Table A.2.9.

Table A.2.6. Total researchers (FTE). Sector of performance: Business enterprise sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	16 684	17 991	16 363	16 242	16 376	16 769	17 483	18 064
Bulgaria	1 139	1 082	957	1 225	1 239	1 157	1 304	1 318
Czech Republic	5 533	5 753	6 191	6 558	7 131	10 143	11 053	12 230
Denmark	9 366	9 651	15 747	14 734	15 877	17 624	17 718	19 145
Germany	153 120	157 836	155 440	161 980	162 239	166 874	171 063	174 307
Estonia	274	411	464	505	661	883	876	961
Ireland	5 631	5 971	5 992	6 012	6 300	6 768	7 015	7 262
Greece	3 234	3 797	4 017	4 295	5 164	6 033	5 397	6 090
Spain	20 869	18 959	24 632	27 581	32 054	35 034	39 936	42 101
France	81 012	88 479	95 294	100 646	108 752	106 837	113 521	118 568
Italy	26 099	26 550	28 019	26 866	27 594	27 939	30 006	32 871
Cyprus	77	83	117	103	108	130	161	182
Latvia	995	683	675	464	448	468	777	463
Lithuania	288	417	265	442	484	716	877	1 305
Luxembourg	1 399	1 464	1 529	1 594	1 546	1 696	1 460	1 522
Hungary	3 901	4 071	4 344	4 482	4 309	5 008	6 248	6 986
Malta	43	45	47	51	199	236	256	241
Netherlands	20 022	22 414	20 419	19 399	23 247	22 898	28 011	25 951
Austria	15 751	15 876	16 001	16 255	16 508	17 835	18 471	20 058
Poland	9 821	9 643	4 686	6 829	8 334	9 412	9 344	9 848
Portugal	2 358	2 722	3 258	3 794	3 904	4 014	6 245	8 477
Romania	12 690	11 292	10 673	9 920	9 092	10 319	7 708	7 754
Slovenia	1 380	1 510	1 620	1 516	1 657	1 936	2 262	2 571
Slovakia	2 420	2 256	2 169	1 914	1 815	1 947	1 901	1 599
Finland	19 647	22 422	22 747	23 072	23 397	21 967	22 721	22 005
Sweden	25 353	27 884	28 144	28 403	28 295	36 697	37 700	30 928
United Kingdom	85 737	91 145	95 708	99 352	94 369	93 717	93 844	91 548
EU27	524 844	550 407	551 389	563 990	577 173	625 055	653 358	664 353
Turkey	3 702	3 392	3 697	4 788	5 372	9 456	11 242	15 293
Iceland	740	853	845	836	924	1 012	1 144	1 069
Norway	10 517	11 296	11 388	11 480	11 063	10 692	11 654	12 417
Switzerland	16 275	15 366	14 458	13 549	12 640	12 216	11 792	11 806

	2000	2001	2002	2003	2004	2005	2006	2007
United States	1 041 300	1 060 200	1 075 300	1 156 000	1 111 300	1 097 700	1 135 500	1 116 600
China (excluding Hong Kong)	353 843	388 521	443 021	484 164	529 344	696 413	777 029	944 440
Japan	421 363	430 688	431 190	458 845	455 868	481 496	483 339	483 728
Australia	16 221	17 783	20 451	21 635	22 773	23 784	24 849	25 962
Canada	67 162	73 180	73 220	75 850	78 790	81 960	82 005	84 706
Korea	71 894	100 169	104 191	111 388	115 850	137 706	155 506	161 736
Mexico	4 821	6 102	7 382	8 663	20 958	24 367	25 648	26 929
New Zealand	2 315	2 490	3 256	4 022	3 856	3 690	3 773	3 732
OECD	2 164 267	2 256 403	2 296 076	2 437 063	2 426 605	2 493 292	2 585 589	2 593 537

Source: NIFU STEP based on Eurostat (R&D statistics) and OECD data.

Notes:

1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

3) See Sub-indicator 5 in Annex 4.

Table A.2.7. Total researchers (FTE). Sector of performance: Government sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	1 809	1 941	1 980	2 026	2 215	2 274	2 424	2 526
Bulgaria	6 417	6 082	6 067	6 113	6 168	6 076	6 148	6 178
Czech Republic	4 424	4 837	4 429	4 833	4 827	6 323	6 800	6 915
Denmark	3 622	3 511	2 268	2 337	2 287	2 105	2 173	1 203
Germany	37 667	38 587	39 080	38 719	42 212	39 911	41 486	43 561
Estonia	559	473	463	478	486	474	513	545
Ireland	737	505	587	553	559	419	497	497
Greece	1 991	1 980	2 058	2 136	2 106	2 076	2 259	2 201
Spain	12 708	13 345	12 625	15 489	17 151	20 446	20 063	21 412
France	26 132	22 945	24 140	24 541	24 779	25 889	25 641	26 494
Italy	14 315	13 006	13 565	13 976	14 237	14 454	16 590	17 291
Cyprus	81	95	104	109	104	107	111	105
Latvia	662	571	549	517	490	589	598	744
Lithuania	2 557	2 432	1 871	1 686	1 676	1 805	1 707	1 675
Luxembourg	225	278	285	325	342	374	435	503
Hungary	4 653	4 657	4 622	4 741	4 693	4 959	5 226	4 572
Malta	19	19	22	9	19	18	27	17
Netherlands	5 952	6 799	6 790	7 672	7 751	7 030	7 131	6 976
Austria	984	991	999	1 015	1 030	1 245	1 349	1 389
Poland	11 100	10 637	14 688	13 233	12 804	12 175	12 438	12 813
Portugal	3 546	3 646	3 543	3 440	3 389	3 338	3 248	3 159
Romania	5 244	5 599	5 934	6 043	6 326	7 082	5 585	5 818
Slovenia	1 495	1 452	1 493	1 044	1 124	1 591	1 804	1 998

	2000	2001	2002	2003	2004	2005	2006	2007
Slovakia	2 526	2 438	2 380	2 436	2 345	2 503	2 494	2 890
Finland	3 996	4 050	4 100	4 150	4 200	4 374	4 470	4 482
Sweden	2 342	2 260	2 274	2 287	2 345	3 018	3 041	1 941
United Kingdom	15 003	9 998	9 242	9 445	9 205	9 311	8 936	8 504
EU27	170 764	163 134	161 752	163 457	167 911	179 965	183 194	186 408
Turkey	2 479	2 512	2 754	3 646	3 762	4 249	4 709	4 832
Iceland	423	424	446	467	484	501	528	459
Norway	3 060	3 082	3 170	3 258	3 300	3 449	3 530	3 878
Switzerland	405	433	460	443	425	430	435	462
United States	47 522	48 187	47 822	47 868	47 913	47 959	48 005	48 050
China (excluding Hong Kong)	193 353	186 589	189 151	191 957	190 499	200 377	210 149	230 662
Japan	31 228	33 750	33 891	33 711	33 894	34 035	33 593	32 705
Australia	8 724	8 380	8 036	8 236	8 435	8 461	8 487	8 513
Canada	7 730	6 950	7 550	7 370	7 210	8 420	8 748	9 089
Korea	11 564	12 040	11 356	11 974	12 167	12 791	14 054	14 280
Mexico	7 254	6 969	6 683	6 397	6 754	6 589	6 672	6 630
New Zealand	1 810	1 988	1 917	1 845	1 829	1 812	1 804	1 796
OECD	275 929	271 126	273 738	278 567	284 650	290 920	297 265	300 024

Source: NIFU STEP based on Eurostat (R&D statistics) and OECD data.

Notes:

- 1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).
- 2) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.
- 3) See Sub-indicator 6 in Annex 4.

Table A.2.8. Total researchers (FTE). Sector of performance: Higher education sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	11 778	12 034	12 066	12 389	13 549	13 853	14 713	15 461
Bulgaria	1 886	1 987	2 181	2 193	2 362	2 607	2 756	3 605
Czech Republic	3 768	4 249	4 283	4 318	4 274	7 575	8 352	8 664
Denmark	5 813	6 105	7 379	7 669	7 846	8 242	8 763	9 642
Germany	67 087	67 962	71 292	68 243	65 764	65 363	67 273	72 985
Estonia	1 806	1 764	2 090	1 974	2 162	1 905	2 042	2 084
Ireland	2 148	2 473	2 797	3 474	4 151	4 400	4 672	4 910
Greece	9 508	8 544	8 808	9 072	10 214	11 356	12 110	12 382
Spain	42 064	46 964	45 727	49 196	51 616	54 028	55 443	58 813
France	61 583	62 427	63 555	64 403	65 498	66 290	67 935	67 397
Italy	25 696	27 146	28 301	27 774	28 226	37 073	37 636	38 860
Cyprus	128	138	194	256	349	414	435	465
Latvia	2 156	2 242	2 226	2 222	2 385	2 224	2 648	3 016

	2000	2001	2002	2003	2004	2005	2006	2007
Lithuania	4 932	5 226	4 190	4 478	5 196	5 116	5 452	5 509
Luxembourg	22	30	30	30	143	157	159	176
Hungary	5 852	5 938	5 999	5 957	5 902	5 911	6 073	5 833
Malta	201	202	203	216	218	225	238	236
Netherlands	15 480	15 750	10 448	10 211	16 227	16 839	16 897	16 799
Austria	6 428	6 702	6 977	7 629	8 281	8 944	9 261	10 112
Poland	34 246	35 827	37 275	38 455	39 716	40 449	37 653	38 562
Portugal	8 592	8 942	9 502	10 062	10 509	10 956	12 035	13 114
Romania	2 542	2 835	3 679	4 941	5 654	5 386	7 137	5 104
Slovenia	1 340	1 379	1 366	1 178	1 204	1 695	1 763	1 657
Slovakia	5 009	4 891	4 629	5 273	6 509	6 458	7 370	7 854
Finland	10 405	11 063	11 721	12 379	13 037	12 879	12 849	12 153
Sweden	15 237	15 851	16 499	17 146	17 794	15 125	14 740	14 840
United Kingdom	131 696	133 501	135 913	137 727	140 068	141 762	147 304	150 623
EU27	399 616	446 489	450 289	464 197	489 062	547 230	563 709	580 854
Turkey	16 902	16 798	17 544	24 226	24 742	25 434	26 713	29 543
Iceland	498	515	539	562	574	585	663	621
Norway	5 596	5 670	5 961	6 251	6 800	7 512	7 870	8 474
Switzerland	9 425	10 333	11 240	11 788	12 335	12 523	12 710	12 903
United States	200 958	211 323	219 328	226 682	234 307	242 221	242 046	246 392
China (excluding Hong Kong)	147 866	167 616	178 353	185 987	206 409	221 908	236 578	248 279
Japan	179 116	200 272	170 512	172 396	177 421	180 494	184 319	185 175
Australia	39 507	41 144	42 780	45 099	47 417	49 175	50 934	52 755
Canada	33 300	34 200	34 910	38 900	41 380	43 420	44 490	45 561
Korea	23 674	23 083	24 953	26 419	25 522	27 416	28 386	29 391
Mexico	12 270	13 892	15 513	17 135	16 043	16 691	17 365	18 067
New Zealand	6 826	8 655	9 305	9 955	10 843	11 731	12 211	12 692
OECD	990 481	1 042 283	1 035 785	1 070 819	1 106 708	1 144 862	1 168 945	1 200 752

Source: NIFU STEP based on Eurostat (R&D statistics) and OECD data.

Notes:

1) We apply Eurostat's total EU27 figures for the years 2005-2007. For the years 2000-2004 we had to extrapolate backwards datapoint 2005 for UK and this extrapolation gave figures which when added up with figures from other EU27 countries resulted to significant deviations from Eurostat-figures for HES as a whole in EU27 (only for the years 2000-2004). See Box 1.

2) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

3) See Sub-indicator 7 in Annex 4.

Table A.2.9. Total researchers (FTE). Sector of performance: Private non-profit sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	269	271	259	259	261	250	259	267
Bulgaria	37	66	18	58	58	213	128	102
Czech Republic	127	148	71	100	67	127	61	69
Denmark	184	186	152	142	157	208	193	184
Germany	:	:	:	:	:	:	:	:
Estonia	27	33	42	60	60	69	82	100
Ireland	:	:	:	:	:	:	:	:
Greece	:	50	:	129	:	128	141	145
Spain	1 029	812	335	258	173	213	357	299
France	3 343	3 521	3 431	3 200	3 349	3 491	3 494	3 296
Italy	:	:	1 357	1 716	1 955	3 023	4 198	3 978
Cyprus	16	16	19	22	22	32	41	47
Latvia	1	1	1	:	1	1	1	:
Lithuania	:	:	:	:	:	:	:	:
Luxembourg	:	:	:	:	:	:	:	:
Hungary	:	:	:	:	:	:	:	:
Malta	0	0	0	0	0	0	0	0
Netherlands	634	554	502	:	:	:	:	:
Austria	154	151	148	143	137	124	118	117
Poland	7	41	76	78	90	127	137	173
Portugal	2 243	2 415	2 681	2 946	2 882	2 819	3 122	3 426
Romania	:	:	:	61	185	171	76	132
Slovenia	121	157	163	37	45	31	28	24
Slovakia	:	:	3	4	49	14	12	12
Finland	346	423	405	354	370	362	371	360
Sweden	:	:	276	350	350	250	248	66
United Kingdom	3 403	3 721	3 286	3 247	3 572	3 810	3 925	3 924
EU27	11 941	12 566	12 772	12 701	13 358	15 463	16 992	16 721
Turkey	:	:	:	:	:	:	:	:
Iceland	59	68	60	52	55	57	64	60
Norway	:	:	:	:	:	:	:	:
Switzerland	:	:	:	:	:	:	:	:
United States	:	:	:	:	:	:	:	:
China (excluding Hong Kong)	:	:	:	:	:	:	:	:
Japan	15 865	11 188	10 954	10 378	10 023	8 924	8 440	8 366
Australia	1 549	1 728	1 906	2 236	2 567	2 783	3 000	3 233
Canada	300	310	280	430	460	500	535	581
Korea	1 238	1 045	1 417	1 473	2 681	1 899	2 044	2 125
Mexico	454	757	1 060	1 363	859	754	662	708
New Zealand

	2000	2001	2002	2003	2004	2005	2006	2007
OECD	31 204	27 389	28 659	28 858	30 056	29 863	31 380	31 389

Source: NIFU STEP based on Eurostat (R&D statistics) and OECD data.

Notes:

1) Total EU27 numbers from Eurostat for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

3) The flag ':' is used for 'non available' data in the Eurostat database (see Box 1 above), and the flag '.' is used for 'non available' data in the OECD database.

4) See Sub-indicator 8 in Annex 4.

Table A.2.10. Total researchers (FTE), all sectors of performance, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	30 540	32 237	30 668	30 916	32 401	33 146	34 879	36 318
Bulgaria	9 479	9 217	9 223	9 589	9 827	10 053	10 336	11 203
Czech Republic	13 852	14 987	14 974	15 809	16 299	24 168	26 266	27 878
Denmark	18 985	19 453	25 546	24 882	26 167	28 179	28 847	30 174
Germany	257 874	264 385	265 812	268 942	270 215	272 148	279 822	290 853
Estonia	2 666	2 681	3 059	3 017	3 369	3 331	3 513	3 690
Ireland	8 516	8 949	9 376	10 039	11 010	11 587	12 184	12 669
Greece	14 732	14 371	14 883	15 632	17 484	19 593	19 907	20 818
Spain	76 670	80 080	83 319	92 524	100 994	109 721	115 799	122 625
France	172 070	177 372	186 420	192 790	202 378	202 507	210 591	215 755
Italy	66 110	66 702	71 242	70 332	72 012	82 489	88 430	93 000
Cyprus	302	332	434	490	583	683	748	799
Latvia	3 814	3 497	3 451	3 203	3 324	3 282	4 024	4 223
Lithuania	7 777	8 075	6 326	6 606	7 356	7 637	8 036	8 489
Luxembourg	1 646	1 772	1 844	1 949	2 031	2 227	2 054	2 201
Hungary	14 406	14 666	14 965	15 180	14 904	15 878	17 547	17 391
Malta	263	266	272	276	436	479	521	494
Netherlands	42 088	45 517	38 159	37 282	47 225	46 767	52 039	49 726
Austria	23 317	23 721	24 125	25 041	25 956	28 148	29 199	31 676
Poland	55 174	56 148	56 725	58 595	60 944	62 163	59 572	61 396
Portugal	16 739	17 725	18 984	20 242	20 684	21 127	24 650	28 176
Romania	20 476	19 726	20 286	20 965	21 257	22 958	20 506	18 808
Slovenia	4 336	4 498	4 642	3 775	4 030	5 253	5 857	6 250
Slovakia	9 955	9 585	9 181	9 627	10 718	10 922	11 777	12 355
Finland	34 394	37 958	38 973	39 955	41 004	39 582	40 411	39 000
Sweden	42 932	45 995	47 191	48 186	48 784	55 090	55 729	47 775
United Kingdom	235 839	238 365	244 149	249 771	247 214	248 600	254 009	254 599
EU27	1 107 165	1 172 596	1 176 203	1 204 345	1 247 504	1 367 713	1 417 253	1 448 337
Turkey	23 083	22 702	23 995	32 660	33 876	39 139	42 664	49 668
Iceland	1 719	1 860	1 889	1 917	2 036	2 155	2 399	2 209
Norway	19 172	20 048	20 519	20 989	21 163	21 653	23 054	24 769
Switzerland	26 105	26 131	26 158	25 779	25 400	25 169	24 937	25 171

United States	1 289 780	1 319 710	1 342 450	1 430 550	1 393 520	1 387 880	1 425 550	1 411 042
China (excluding Hong Kong)	695 062	742 726	810 525	862 108	926 252	1 118 698	1 223 756	1 423 381
Japan	647 572	675 898	646 547	675 330	677 206	704 949	709 691	709 974
Australia	66 001	69 034	73 173	77 205	81 192	84 204	87 270	90 463
Canada	108 492	114 640	115 960	122 550	127 840	134 300	135 778	139 937
Korea	108 370	136 337	141 917	151 254	156 220	179 812	199 990	207 531
Mexico	24 799	27 719	30 638	33 558	44 614	48 401	50 346	52 333
New Zealand	10 950	13 133	14 478	15 822	16 528	17 233	17 788	18 219
OECD	3 461 881	3 597 199	3 634 258	3 815 307	3 848 018	3 958 937	4 083 179	4 125 702

Source: NIFU STEP based on Eurostat (R&D statistics) and OECD data.

Notes:

1) Total EU27 numbers from Eurostat in three of the four R&D performing sectors (government, business and private non-profit) for the years 2000 - 2007 are applied as our basis for all subsequent EU27 country estimations (see Box 1 above).

2) For the higher education sector we apply Eurostat's total EU27 figures for the years 2005-2007. For the years 2000-2004 we had to extrapolate backwards datapoint 2005 for UK and this extrapolation gave figures which when added up with figures from other EU27 countries resulted to significant deviations from Eurostat-figures for HES as a whole in EU27 (only for the years 2000-2004). See Box 1.

3) The following countries are included in OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

3 SUPPLEMENTED INFORMATION FROM THE EUROSTAT DATABASE OF THE DATA FOR HC AND FTE RESEARCHERS

In the Eurostat database some of the data for researchers are attended with standard flags (e.g. 'p'-provisional, 'e'-estimated, 'b'-break in series, etc.). In Tables A.2.11-A.2.20 we have added this information for the numbers of HC and FTE researchers in Tables A.2.1-A.2.10.

Table A.2.11. Total researchers (HC). Sector of performance: Business enterprise sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic								
Denmark			<u>b</u>					<u>b</u>
Germany								
Estonia								
Ireland								
Greece								
Spain			<u>b</u>					
France		<u>b</u>					<u>b</u>	<u>p</u>
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary								
Malta					<u>b</u>			
Netherlands								
Austria								
Poland								
Portugal	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						<u>b</u>		<u>b</u>
United Kingdom						<u>e</u>	<u>e</u>	<u>e</u>
EU27	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- p Provisional value
- e Estimated value

Table A.2.12. Total researchers (HC), sector of performance: Government sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic								
Denmark			b					b
Germany								
Estonia								
Ireland								p
Greece								
Spain								
France			b					
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary					b			
Malta								p
Netherlands				b				
Austria								
Poland								
Portugal	e		e		e		e	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						b		b
United Kingdom		b						
EU27	s	s	s	s	s	s	s	s
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.13. Total researchers (HC), sector of performance: Higher education sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic								
Denmark			<u>b</u>					<u>b</u>
Germany								
Estonia								
Ireland		<u>b</u>						<u>p</u>
Greece								
Spain								
France			<u>b</u>					
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg				<u>e</u>				<u>e</u>
Hungary								
Malta								
Netherlands								
Austria								
Poland								
Portugal	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						<u>b</u>		
United Kingdom								
EU27	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.14. Total researchers (HC), sector of performance: Private non-profit sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic								
Denmark								
Germany								
Estonia								
Ireland								
Greece								
Spain			b					
France								
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary								
Malta								
Netherlands								
Austria								
Poland								
Portugal	e		e		e		e	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden								b
United Kingdom						e	e	e
EU27	s	s	s	s	s	s	s	s
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value

Table A.2.15. Total researchers (HC), all sectors of performance, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic								
Denmark			<u>b</u>					
Germany								
Estonia								
Ireland								<u>p</u>
Greece								
Spain								
France			<u>b</u>					
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								<u>e</u>
Hungary					<u>b</u>			
Malta					<u>b</u>			
Netherlands								
Austria								
Poland								
Portugal	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						<u>b</u>		<u>b</u>
United Kingdom						<u>e</u>		<u>e</u>
EU27	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- p Provisional value
- e Estimated value

Table A.2.16. Total researchers (FTE). Sector of performance: Business enterprise sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic						<u>b</u>		
Denmark			<u>b</u>					<u>b</u>
Germany	<u>e</u>		<u>e</u>					
Estonia								
Ireland								
Greece							<u>e</u>	<u>e</u>
Spain			<u>b</u>					
France		<u>b</u>						
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary								
Malta				<u>p</u>	<u>b</u>			
Netherlands								
Austria						<u>e</u>		
Poland								
Portugal	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						<u>b</u>		<u>b</u>
United Kingdom		<u>b</u>						
EU27	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>
Turkey								
Iceland								
Norway								
Switzerland								
United States								
China (excluding Hong Kong)	<u>b</u>							
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.17. Total researchers (FTE). Sector of performance: Government sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic						b		
Denmark			b					b
Germany								
Estonia								
Ireland		b						p
Greece							e	e
Spain								
France	b							
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary					b			
Malta								p
Netherlands				b				
Austria						e		
Poland								
Portugal	e		e		e		e	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						b		b
United Kingdom		b						
EU27	s	s	s	s	s	s	s	s
Turkey								
Iceland								
Norway								b
Switzerland	b							
United States								
China (excluding Hong Kong)								
Japan								

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.18. Total researchers (FTE). Sector of performance: Higher education sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic						<u>b</u>		
Denmark			<u>b</u>					<u>b</u>
Germany							<u>b</u>	
Estonia								
Ireland		<u>b</u>						<u>p</u>
Greece							<u>e</u>	<u>e</u>
Spain								
France	<u>b</u>							
Italy						<u>b</u>		
Cyprus								
Latvia								
Lithuania								
Luxembourg				<u>e</u>				<u>e</u>
Hungary								
Malta								
Netherlands					<u>bp</u>	<u>p</u>	<u>p</u>	<u>p</u>
Austria						<u>e</u>		
Poland								
Portugal	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						<u>b</u>		
United Kingdom						<u>e</u>	<u>e</u>	<u>e</u>
EU27	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>	<u>s</u>
Turkey								
Iceland								
Norway								<u>b</u>
Switzerland	<u>e</u>		<u>e</u>		<u>e</u>		<u>e</u>	
United States								
China (excluding Hong Kong)								
Japan			<u>b</u>					

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.19. Total researchers (FTE). Sector of performance: Private non-profit sector, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic						b		
Denmark								b
Germany								
Estonia								
Ireland								
Greece							e	e
Spain			b					
France								
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								
Hungary								
Malta								
Netherlands								
Austria						e		
Poland								
Portugal	e		e		e		e	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden								b
United Kingdom			e	e	e	e	e	e
EU27	s	s	s	s	s	s	s	s
Turkey								
Iceland								
Norway								
Switzerland								
United States								
China (excluding Hong Kong)								
Japan		b						

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

Table A.2.20. Total researchers (FTE), all sectors of performance, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium								
Bulgaria								
Czech Republic						b		
Denmark			b					b
Germany			e					
Estonia								
Ireland								p
Greece							e	e
Spain								
France	b							
Italy								
Cyprus								
Latvia								
Lithuania								
Luxembourg								e
Hungary					b			
Malta					b			p
Netherlands					bp	p	p	p
Austria						e		
Poland								
Portugal	e		e		e		e	
Romania								
Slovenia								
Slovakia								
Finland								
Sweden						b		b
United Kingdom			e	e	e	e	e	e
EU27	s	s	s	s	s	s	s	s
Turkey								
Iceland								
Norway								
Switzerland								
United States	e	e	e	e	e	e	e	
China (excluding Hong Kong)	b							
Japan			b					

Source: Eurostat database (R&D statistics).

Note:

- b Break in series
- s Eurostat estimate
- e Estimated value
- p Provisional value

4 FORECASTS OF RESEARCHERS (HC)

Based on the total number of researchers in the EU27 in the period 2000-2007 in each sector (see Table A.2.1 to Table A.2.4), we have estimated the corresponding numbers for the period 2008-2011 for each sector using the following three models:

$$\text{Model 1: } RES_{ij} = \alpha + \beta \cdot GDP_t + \gamma \cdot GERD_{ij} + u_{ij}, \quad u_{ij} \sim N(0, \sigma^2),$$

$$\text{Model 2: } RES_{ij} = \alpha + \beta \cdot GDP_t + \gamma \cdot GERD_{ij} + \delta \cdot t + u_{ij}, \quad u_{ij} \sim N(0, \sigma^2),$$

$$\text{Model 3: } RES_{ij} = \alpha + \gamma \cdot GERD_{ij} + \delta \cdot t + u_{ij}, \quad u_{ij} \sim N(0, \sigma^2),$$

where RES is the number of researchers (Head Counts), GDP is the gross domestic product at market prices (price index 2000 = 100, based on euro), $GERD$ is the total intramural R&D expenditure, t is the year ($t=2000, \dots, 2007$), j is the sector (business enterprise, government, higher education, private non-profit), and u is an error term. α , β , γ and δ are the parameters to be estimated. These models have been applied to the number of researchers (HC) in each sector, and then we have aggregated the number of researchers for all four sectors. All models are estimated by using ordinary least squares (OLS).

ANNEX 3 SURVEYS ON RESEARCHERS AND DOCTORAL HOLDERS

This annex reviews a number of surveys on researchers and doctorate holders which have been conducted in Europe:

1. The EURODOC survey of characteristics of doctoral candidates in Europe;
2. The CDH survey of the careers and mobility of doctorate holders in a number of European countries;
3. The NetReAct and Rescar surveys of doctoral students and post-doctoral researchers in the life sciences (NetReAct) and the social sciences and engineering (Rescar).

For each survey we discuss its purpose, the methodology used and the data availability. In addition, we discuss the relation of each survey to the IISER indicators.

1 THE EURODOC SURVEY

1.1 Purpose

EURODOC stands for the European Council of doctoral candidates and young researchers and is the European-wide federation of national associations of Ph.D. candidates, and more generally of young researchers. EURODOC has recently conducted a European-wide survey of doctoral candidates in cooperation with the International Centre for Higher Education Research at the University of Kassel¹³.

The EURODOC survey was set up in order to provide a clear picture of the opinions and situation of the Ph.D. candidates in Europe. EURODOC found the current knowledge about the situation of doctoral candidates in Europe unsatisfactory as European-wide data sets on doctoral candidates were lacking. Most existing surveys were conducted nationwide and most European initiatives focussed on undergraduate students. EURODOC's first European survey on doctoral candidates aims at filling this gap by collecting and comparing data at the European level. The survey aims to be instrumental for policymaking at the level of the European Higher Education and Research Areas by:

- establishing a cross-section of the interviewed persons' characteristics
- providing internationally comparable data on doctoral candidates,
- supporting initiatives at the grass-root level, and
- clarifying the need for change of the Ph.D. phase.

The results of this survey will be used to help EURODOC in its efforts to improve the training and research conditions of doctoral researchers.

1.2 Methodology

A European-wide online survey has been set up by EURODOC. The questionnaire includes 9 sections and 74 questions and takes about 25-30 minutes to complete. It contains questions about doctoral candidates' background, career path, funding,

¹³ EURODOC's objectives are:

- To represent doctoral candidates and junior researchers at the European level in matters of education, research, and professional development of their careers.
- To advance the quality of doctoral programmes and the standards of research activity in Europe.
- To promote the circulation of information on issues regarding young researchers; organize events, take part in debates and assist in the elaboration of policies about Higher Education and Research in Europe.
- To establish and promote co-operation between national associations representing doctoral candidates and junior researchers within Europe.

EURODOC was founded in Girona (Spain) on the second of February 2002¹³ and consists of 28 member organisations¹³. All members aim to improve the conditions of young researchers in their country, both by getting involved in research and higher education policy, but also by promoting interdisciplinary communication and networking.

Each year in the spring, EURODOC organises an international conference for young researchers. The aim of this conference is to provide a forum for young European researchers to meet with European political and economical leaders and to engage in discussions on the construction of the European Research and Higher Education Areas. Given the participation of young researchers from all over Europe and from multiple disciplines, the EURODOC conference constitutes a unique occasion for interdisciplinary communication and networking.

training and supervision, working conditions, academic work, mobility, future prospects and socio-demographic indicators. An overview of the different sections of the questionnaire and some example questions are shown in Box 2. Throughout the questionnaire, the term “doctoral researcher” is used as a synonym for doctoral candidates, doctoral students, aspirants, PhD-students etc.

The EURODOC survey was launched on 9 December 2008 and stayed online until 31 of May 2009. Results are currently being analysed. Roughly 100 000 European doctoral researchers were asked to take part in this study.

Box 2: Overview of sections in the EURODOC questionnaire including example questions

- Section 1: Introduction and methodological remarks
- Section 2: Career path and career aspirations
- the minimal and the average entrance qualification in Europe
 - additional research activities of Ph.D. candidates
 - the sector where the Ph.D. candidate is employed or working
 - the definition of the Ph.D. phase as a job, a job and a study or more as a study
 - the kind of contract (fixed term, open contract, self employed or student with no fixed term contract and not self-employed)
 - the length of the hours per week fixed in the contract
 - the proposals for future career path and importance of the Ph.D. phase for the career
- Section 3: Model of financing during Ph.D. study
- Which is the way of financing Ph.D. candidates?
 - For which periods was the funding arranged at the start of the Ph.D. phase?
 - Does the level of personal income meet the living costs?
- Section 4: Training and supervision aspects
- Which kind of training is offered? Is it compulsory or voluntary?
 - Questions about the importance and the financing of training.
- Section 5: Work conditions regarding the length of contract or funding, publishing rights, project participation and social benefits
- Is there a legal limit for the duration to complete the doctorate?
 - Does your supervisor prevent you from using findings you have produced for your doctorate?
 - Are there clear agreements on using project findings of collaborative projects?
 - Questions about discrimination and family-work balance
- Section 6: Scientific activities
- This part includes questions about the extent to which doctoral candidates take part in publishing, project management, grant proposals, teaching activities and conference and administrative work.
- Section 7: Mobility
- the length of being abroad
 - funding mobility
 - the obstacles for mobility
 - the reason for being abroad
- Section 8: Basic socio-demographic information
- Section 9: Summary evaluation and prospects

Source: Max Reinhardt (2006), Concept and targets of the European-wide survey of Ph.D. candidates, Sofia conference “Researchers’ Mobility and Career” on 07.11.2006

1.3 Data availability

The EURODOC survey is conducted in Austria, Belgium, Belarus, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Latvia, Lithuania, FYR Macedonia, Moldova, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, Turkey

and Ukraine. This means 20 EU countries are covered by the survey ensuring a broad coverage of doctoral candidates.

1.4 Relation to IISER

The results of the EURODOC survey can complement the IISER indicators in several aspects:

- The EURODOC survey provides information about the origin and mobility of doctoral candidates in 20 EU countries. These data can be used to complement IISER indicator 5 (circulation of researchers within Europe) and IISER indicator 7 (number of researchers coming into Europe).
- Data is collected about the kind of contract doctoral researchers have
- Information about the sector in which the doctoral candidates are working
- Qualitative data about obstacles and motivations for mobility
- Qualitative information about career prospects and job satisfaction of doctoral candidates. (This is also related to IISER indicators 9 & 10: Motivations for R&D careers and satisfaction of researchers with their jobs and careers)

2 THE CDH SURVEY

2.1 Purpose and background

The project on careers of doctorate holders (CDH) was initiated in 2004 by the OECD in collaboration with Eurostat and the UNESCO Institute for Statistics (UIS). It aims at developing a regular and internationally comparable production system of indicators on the careers and mobility of doctorate holders. A first data collection was launched in September 2005 for seven countries. The data shed light on the main demographic, educational, labour market and mobility patterns of doctoral graduates. Below we elaborate on the background of the CDH project and the current status of this project.

In 2002 the OECD started exploring the potential of graduate and/or doctorate surveys. In 2003 an inventory of doctorate recipients' surveys in OECD countries was made up. This inventory¹⁴ showed that many surveys existed at the national level and that they provided valuable information about career patterns and mobility of doctorate holders. However, these surveys had been developed to serve national statistical needs and priorities and were not harmonised internationally. This limited the international comparison of the results and failed to capture some important aspects of doctorate holders (e.g. international experience or mobility).

To fill this gap, the OECD launched in 2004 a collaborative project to improve countries' capability to survey doctorate holders. The objective of the project was to develop an internationally comparable system of indicators on careers and mobility of doctorate holders building on surveys currently existing in some countries (in particular those of the United States and Canada) and on other data sources. An important focus of the project was to measure the mobility of doctorate holders both within a country and across borders. Interest in cross-border movements requires surveys to be internationally comparable, and for the OECD to partner with other relevant international organisations, i.e. UIS and Eurostat.

An expert group consisting of representatives of national statistical bodies with competence in the area was set up. The main task of this group was to develop the key elements and data collection methods for the CDH project. The group worked through a series of workshops in 2005-2006 and drew up a three-component package: methodological guidelines, a core model questionnaire and output indicator tables. A first data collection was launched in September 2005. The results received for seven countries (Argentina, Australia, Canada, Germany, Portugal, Switzerland and the United States) helped provide input to the three components described above. This data collection exercise has been repeated in 2007 where the following countries participated: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Spain, Sweden, Switzerland, United States.

2.2 Methodology

The CDH project aims to determine the stock of persons having obtained a highly advanced degree across participating countries, as well as their demographic and educational characteristics, their labour market situation and their international

¹⁴ "Availability and Characteristics of Surveys on the Destination of Doctorate Recipients in OECD Countries", DSTI/DOC(2003)9.

mobility. In addition, the project aims to provide information on the career development and prospects of doctorate holders.

Several data sources at the national level could provide data in a harmonised and internationally comparable manner that could be used in the CDH project:

- Censuses and labour force surveys are widespread and reasonably harmonised data sources at the international level. They can provide the basic contextual data on doctorate holders.
- More complex indicators on career path or trajectories can be taken from cohort, longitudinal or retrospective surveys.

Five of the seven countries that reported data in the first exercise have extensively drawn from their census and/or labour force survey, while sometimes also using other data sources. The seven countries included in the first CDH data collection exercise used the following sources:

- Data for Germany and Switzerland originate from their labour force surveys
- Data for the United States come from dedicated surveys (the National Survey of College Graduates and the Survey of Earned Doctorates)
- Data for Australia and Canada are for the most part generated by the national censuses. In addition, Canada conducted a Survey of Earned Doctorates in 2003 and 2004 on the model of the one in the United States and used some of the results for data in the CDH exercise.
- Argentina and Portugal have conducted dedicated surveys using the core model questionnaire developed in the framework of the CDH project. In the case of Portugal, the survey was a pilot test. For this reason, the data for Portugal only cover recent doctorate holders¹⁵, while the whole population of doctorate holders is covered in the aforementioned countries. In the case of Argentina, only employed doctorate holders are covered. Doctorate holders who work exclusively for the business sector were also not covered but their number is estimated to be quite limited.

For more details on the data sources used for each of the seven countries included in the first CDH data collection, see Table A.3.1.

As a follow-up of the 2007 data collection exercise, in 2009 a follow-up data collection exercise was conducted. In total 16 countries submitted a new dataset. The results of the 2007 data-collection exercise have been presented at the CDH Expert Group in December 2008¹⁶. A number of quality and comparability limitations have been pointed out. In particular, divergences in coverage affecting the dataset of the 2007 exercise have made international comparisons difficult. In particular, the number of graduation years taken into account in the target population of doctorate holders has been identified as the main source of discrepancies. Country differences have also been observed in the coverage of doctorate holders having received their doctorate abroad or of those of foreign origin. In certain cases, those inactive and unemployed doctorate holders were also underrepresented.

In order to improve international comparability and achieve a better degree of harmonization, CDH participating countries agreed to submit a new dataset on a

¹⁵ Recent doctorate holders are defined as having received their doctoral degree between 2000 and 2004.

¹⁶ Eurostat (2009) "Task force on the Career Development of Doctorate Holders (CDH) – a contribution by the OECD Secretariat – First results of the 2009 CDH special data collection", Doc.Eurostat/F4/CDH/2009/07

restricted subset of the target population, i.e. those below 70 years old and having obtained their doctoral degree between 1990 and 2006.

In comparison to the 2007 data collection exercise, the 2009 exercise presents the following characteristics (for more details see Eurostat, 2009):

- The total number of doctorate holders is markedly reduced due to the fact that the 2007 data collection included doctorate holders having graduated before 1990. In Germany, Switzerland or the United States, half or more than half the doctoral population has been excluded as compared to the previous reporting. In Bulgaria, Lithuania or the Netherlands, the new population of doctorate holders accounts for about 55% of the previous one. In Estonia, the Slovak Republic and the Czech Republic, one third of the doctoral graduates reviewed in the previous exercise has been excluded.
- There were no or almost no changes in stocks in Austria or Spain and only a minor one in Finland, since these countries were already covering the target population in a reduced definition.
- The characteristics of the newly reviewed population have also changed. Previous analyses have shown that the female share of the doctoral population is higher for the younger age classes. The change of the population under review to more recent graduates and to individuals below 70 years old has contributed to increase the share of the younger than 45 years old and mechanically the female participation. The percentage of women among doctorate holders is higher by 9.0 percentage points in the Netherlands, 8.5 in the United States and 6.8 in Switzerland.
- Another effect of the coverage adjustment is an increased focus on the active population of doctorate holders. Most countries display a decrease in the share of inactive doctorate holders and changes are particularly noticeable in Germany (-22.5 percentage point) and the United States (-8.2 percentage point).

2.3 Data availability

In the 2009 special data collection exercise of the CDH 16 countries have submitted a new dataset. Among the participants of the previous data collection exercise (2007) the following countries have provided data according to the new instructions: Austria, Bulgaria, the Czech Republic, Estonia, Finland, Germany, Lithuania, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Spain, Switzerland and the United States.

Table A.3.1. Data sources first OECD/Eurostat/UIS data collection on careers of doctorate holders

		Argentina	Australia	Canada	Germany	Italy	Portugal	Switzerland	United States
Table P1.	Number of DH by sex and age class	Dedicated on-line survey	2001 Census of Population and Housing	1996 and 2001 censuses	Federal Statistical Office, Microcensus 2003, 2004	M/IUR	Dedicated on-line survey (Inquérito aos Doutorados 2004)	Swiss Labour Force Survey (SLFS) 2003, 2004	NSF/IBRS National Survey of College Graduates, 1993 and 2003
Table P2.	Number of DH by sex and country of citizenship	d.	id.	id.	id.	id.	d.	id.	id.
Table P3.	Number of DH by citizenship/residential status and age class	d.	id.	id.	id.	id.	d.	id.	id.
Table P4.	Number of DH by citizenship/residential status and field of doctorate degree	d.	id.	id.	id.	id.	d.	id.	id.
Table P5.	Number of DH by sex and country of birth	d.	id.	id.	id.	id.	d.	id.	id.
Table P6.	Number of DH by place of birth/residential status and age class	d.	id.	id.	id.	id.	d.	id.	id.
Table P7.	Number of DH by place of birth/residential status and field of doctorate degree	d.	id.	id.	id.	id.	d.	id.	id.
Table ED1.	Number of DH by citizenship/residential status and country of doctorate award	id.					id.		NSF/IBRS National Survey of College Graduates, 1993
Table ED2.	Number of DH by place of birth/residential status and country of doctorate award	id.					d.		id.
Table ED3.	Number of DH by country of doctorate award and of prior education	d.	Data not collected by any agency				d.		id.
Table ED4.	Recent doctorate recipients: age at graduation and time to completion by main field of doctorate degree	d.	Higher Education Student Collection, 2003-2004, DEBT	Survey of earned doctorates, 2003-2004	Federal Statistical Office, Microcensus 2004	M/IUR	id.	Schweizerisches Hochschulinformationssystem (SHIS)	NSF/IBRS Survey of Earned Doctorates
Table ED5.	Number of DH by source of funding during completion of doctorate	d.		id.			id.		NSF/IBRS Survey of Doctorate Recipients, 2003 and Doctorate Records File 2003
Table EMP1.	Number of DH by employment status and year of doctorate award	d.	2001 Census of Population and Housing	2001 census (+ 2000 Followup Survey to the 1997 National Graduates Survey: Class of 1995)	Federal Statistical Office, Microcensus 2004		id.	Swiss Labour Force Survey (SLFS) 2003, 2004	NSF/IBRS National Survey of College Graduates, 2003
Table EMP2.	Number of DH by employment status, field of doctorate degree and age	d.	id.	id.	d.		id.	From SLFS as of 2006	id.
Table EMP3.	Number of recent doctorate recipients by source of funding during completion of doctorate and employment status	d.	id.	id.	d.		id.	From SLFS as of 2006	NSF/IBRS Survey of Earned Doctorates
Table EMP4.	Occupations of employed doctorate holders by field of doctorate degree	d.	id.	1996 and 2001 censuses	d.		id.		NSF/IBRS National Survey of College Graduates, 2003
Table EMP5.	Number of DH employed as researchers by field of doctorate degree	d.	id.	id.	id.		d.		id.
Table EMP6.	Median annual basic salary of employed doctorate holders (national currency)	d.	id.	id.	id.		d.		id.
Table EMP7.	Average annual basic salary of employed recent doctorate recipients by source of funding during completion of doctorate (national currency)	d.	id.	id.	id.		id.		id.
Table EMP8.	Job-to-job mobility: length of stay with the same employer	d.	Data not collected by any agency		id.				id.
Table PERC1.	Perception of doctorate holders regarding their job qualification	id.	No data collection on this	2000 Followup Survey to the 1997 National Graduates Survey: Class of 1995			id.		NSF/IBRS National Survey of College Graduates, 2003
Table PERC2.	Satisfaction of doctorate holders with their employment situation	d.	id.	id.			d.		id.
Table IMOB1.	Number of DH by citizenship/residential status and length of stay in the country	id.		2001 census	Federal Statistical Office, Microcensus 2004		id.	Swiss Labour Force Survey (SLFS) 2003, 2004	NSF/IBRS National Survey of College Graduates, 2003
Table IMOB2.	Number of DH by citizenship/residential status and previous country of residence						id.		id.
Table IMOB3.	Reasons for moving into the country for doctorate holders having entered the country in the last five or ten years		Data not collected by any agency				d.		id.
Table OMOB1.	Intentions to move out of the country in the next year (optional)		Data not collected by any agency	Survey of earned doctorates, 2003-2004			id.		NSF/IBRS Survey of Earned Doctorates
Table OMOB2.	Reasons for intentions to move out of the country in the next year (optional)		id.	id.			id.		id.
Table OMOB3.	Number of DH having left the country in the last five or ten years by citizenship/residential status and country of destination (optional)		id.	id.			id.		id.
Table OMOB4.	Reasons for moving out of the country in the last five or ten years (optional)		id.	id.			id.		id.
Table OUTP1.	Average output of DH working as researchers in the last three years (by field of doctorate degree and by age)	id.	id.						NSF/IBRS National Survey of College Graduates, 2003
Table OUTP2.	Average output of DH working as researchers in the last three years (by sex and by citizenship/residential status)	id.	id.						id.

Source: First OECD/Eurostat/UIS data collection on careers of doctorate holders.

Table A.3.2. Data availability first OECD/Eurostat/UIS data collection on careers of doctorate holders

		Argentina	Australia ¹	Canada	Germany	Italy	Portugal ²	Switzerland	USA
Table P1.	Number of DH by sex and age class	2005	2001	1996, 2001	2003, 2004	(1987-2003)	2004	2003, 2004	1993, 2003
Table P2.	Number of DH by sex and country of citizenship	2005	2001	1996, 2001	2003, 2004	(2001-2003)	2004	2003, 2004	1993, 2003
Table P3.	Number of DH by citizenship/residential status and age class	2005	2001		2003, 2004		2004	2003, 2004	1993, 2003
Table P4.	Number of DH by citizenship/residential status and field of doctorate degree	2005	2001	(1996, 2001)	2003, 2004		2004	2003, 2004	1993, 2003
Table P5.	Number of DH by sex and country of birth	2005	2001	1996, 2001	2003, 2004		2004	2003, 2004	1993, 2003
Table P6.	Number of DH by place of birth/residential status and age class	2005	2001	1996, 2001	2003, 2004		2004	2003, 2004	1993, 2003
Table P7.	Number of DH by place of birth/residential status and field of doctorate degree	2005	2001	(1996, 2001)	2003, 2004		2004		1993, 2003
Table ED1.	Number of DH by citizenship/residential status and country of doctorate award	2005					2004		2003
Table ED2.	Number of DH by place of birth/residential status and country of doctorate award	2005					2004		2003
Table ED3.	Number of DH by country of doctorate award and of prior education	2005					2004		2003
Table ED4.	Recent doctorate recipients: age at graduation and time to completion by main field of doctorate degree	2005	2002-2003	2003-2004	Under calculation	2003	2004	2004	2003
Table ED5.	Number of DH by source of funding during completion of doctorate	2005		2003-2004			2004		2003
Table EMP1.	Number of DH by employment status and year of doctorate award	(2005)	2001	2001+	2004		2004	2003, 2004	2003
Table EMP2.	Number of DH by employment status, field of doctorate degree and age	(2005)	2001	2001+	2004		2004	from 2006	2003
Table EMP3.	Number of recent doctorate recipients by source of funding during completion of doctorate and employment status	(2005)					2004		2003
Table EMP4.	Occupations of employed doctorate holders by field of doctorate degree	2005	~ 2001	~ 1996, 2001	2004		2004	from 2006	2003
Table EMP5.	Number of DH employed as researchers by field of doctorate degree	2005	~ 2001	~ 1996, 2001			2004		2003
Table EMP6.	Median annual basic salary of employed doctorate holders (national currency)			1996, 2001			2004		2003
Table EMP7.	Average annual basic salary of employed recent doctorate recipients by source of funding during completion of doctorate (national currency)						2004		2003
Table EMP8.	Job-to-job mobility: length of stay with the same employer	2005			Under calculation				2003
Table PERC1.	Perception of doctorate holders regarding their job qualification	2005		2000			2004		2003
Table PERC2.	Satisfaction of doctorate holders with their employment situation	2005		2000			2004		2003
Table IMOB1.	Number of DH by citizenship/residential status and length of stay in the country	2005		1996, 2001	2004		2004	2003, 2004	2003
Table IMOB2.	Number of DH by citizenship/residential status and previous country of residence						2004		
Table IMOB3.	Reasons for moving into the country for doctorate holders having entered the country in the last five or ten years						(2004)		2003
Table OMOB1.	Intentions to move out of the country in the next year (optional)			2003-2004			2004		2003
Table OMOB2.	Reasons for intentions to move out of the country in the next year (optional)						(2004)		
Table OMOB3.	Number of DH having left the country in the last five or ten years by citizenship/residential status and country of destination (optional)						2004		
Table OMOB4.	Reasons for moving out of the country in the last five or ten years (optional)						2004		
Table OUTP1.	Average output of DH working as researchers in the last three years (by field of doctorate degree and by age)	2005							2003
Table OUTP2.	Average output of DH working as researchers in the last three years (by sex and by citizenship/residential status)	2005							2003

1. Data also available for "higher degree" 1991 and 1996 for tables P1, P2, P4, P5.

2. This pilot survey covers doctorate holders who received their degree between 2000 and 2004. The entire population of doctorate holders should be covered as from 2006.

Source: First OECD/Eurostat/UIS data collection on careers of doctorate holders.

2.4 Relation with IISER

The CDH survey has a number of interesting links with IISER:

- The CDH project aims at determining the stock of persons having obtained a doctoral degree across participating countries. This output indicator can be compared with IISER indicator 2 (number of researchers in the training phase and post-docs). The number of doctorate holders is also provided by field of doctorate degree in the CDH data set.
- CDH data measures international mobility of doctorate holders by cross-classifying place of birth and citizenship with residential status and other variables. Relevant output indicators are:
 - country of citizenship
 - country of birth
 - residential status
 - country of doctorate awarded
 - previous country of residence
 - intentions to move out of the country in the next year and reasons for this
 - number of doctorate holders having left the country in the last 5 or 10 years and the reasons for moving out
 - reasons for having moved into the country (for doctorate holders having entered the country in the last 5 or 10 years)

These data has a clear link to IISER indicator 5 (circulation of researchers within Europe), IISER indicator 6 (number of researchers leaving Europe) and IISER indicator 7 (Number of researchers coming into Europe). In addition, qualitative information about reasons for mobility and intentions to be mobile are included in the CDH.

- CDH also have an output indicator about job-to-job mobility. This indicator can possibly be used to provide information about the circulation of researchers between the public and the private sector (IISER indicator 8).

In the first data collection (which was a pilot exercise), only two EU countries (Germany and Portugal) were included. In the 2007 survey more countries have been included. However, the potential of the CDH project as a data source for IISER will be enhanced when more EU countries participate.

3 THE NETREACT AND RESCAR SURVEYS

3.1 Purpose

In Europe, information on post doctorates is scarce and no comprehensive and comparable data are available at the EU level. Therefore, two ad-hoc surveys on young researchers in the EU were commissioned by IPTS¹⁷:

- The NetReAct survey (2005) in the field of life sciences
- The Rescar survey (2007) in the fields of engineering and social sciences

These surveys collected information on doctoral candidates and post-doctorates in 10 European countries (Norway, Czech Republic, Germany, Spain, France, Hungary, Italy, Portugal, Sweden and UK), through questionnaires addressed to the heads of university-based research teams.

The NetReAct¹⁸ project ('The role of Networking in research activities') was designed to capture, describe and analyse the strategies, patterns, dynamics and impact of networking in research activities in the life sciences in 10 European countries. The objectives were to develop and apply methods to shed light on current research collaborative behaviour of European universities, in particular in regards to the mobility of ideas and of personnel (brains) and in doing so:

- to assess the dynamics of universities' networking activities with respect to other universities, public and private research bodies, and
- to measure the capacity of universities and their laboratories to attract doctoral students and post-doctoral staff from other geographical areas.

The objective of the Rescar¹⁹ project was to collect and analyse existing data on researcher careers and to implement new surveys and data collection activities in order to build trend indicators on researcher stocks and flows and researcher career development and motivations. In addition, the project was designed to contribute to evidence-based policy analysis on researchers in science and technology (S&T).

3.2 Methodology

The NetReAct study used a methodological approach which rested on three pillars:

- a questionnaire-based survey targeted principally at heads of research teams to collect data on the doctoral students and post-docs at these institutions, as well as further covariates which are supposed to influence research productivity,

¹⁷ The Institute for Prospective Technological Studies (IPTS) is one of the seven scientific institutes of the European Commission's Joint Research Centre (JRC).

¹⁸ The Role of Networking in Research Activities, Deliverable D3.2 "Post-docs in the life sciences", Epirica, Gesellschaft für Kommunikations- und Technologieforschung mbH, EU Contract No. 22540-2004-12 F1ED SEV DE, Issued by IPTS, see <http://www.netreact-eu.org/>

¹⁹ Cf. Draft Report Work Package 2 (WP2) for the Specific Contract "Collection and Analysis of existing data on researchers careers and Implementation of new data collection activities", Submitted to the IPTS by the ERAWATCH NETWORK ASBL, Prepared by: EMPIRICA, FHNW, University of Wolverhampton, August 2007. Framework Service Contract Nr -150176-2005-F1SC-BE.

- a bibliometric analysis (publication and citation statistics) using the Thomson-ISI database to assess the levels of collaboration and output produced by these institutions, and
- a webometric analysis (hyperlinks) using the internet to evaluate the position of these institutions in life sciences networks.

Below we focus on the first pillar of the NetReAct survey.

The NetReAct survey collected data on research teams²⁰ in the life sciences defined according to the ISCED 1997 category 42 which are affiliated to universities in 10 different European countries. Through internet research an overall population of 7,732 teams was identified from 359 universities. A stratified random sampling process was used to draw a sample of 1,773 teams. The stratification variable was the number of hyperlinks pointing to the team WWW homepage according to Google²¹. This indicator was chosen as a readily available proxy for the research performance of the team. For the sample teams the names and email addresses of the team leaders, the total scientific and non-scientific staff, the PhD students and the post-docs were identified through internet research.

The team leaders of the sample teams received an electronic questionnaire. This questionnaire contained questions on the team, its structure and team members and its collaboration activities. The questionnaire was accessed by 811 respondents leading to 468 usable questionnaires (26.4% of the sample teams).

Rescar replicated the NetReAct methodology in a survey of doctoral students and post-docs in the social sciences and engineering. The Rescar survey identified a universe of 5,500 university departments in the social sciences and engineering from 539 universities. A sample of 1,200 departments was drawn using stratified random sampling. In this sample, 4,700 teams were identified and approached. A questionnaire was implemented and sent to the heads of the units of these research teams. 595 valid questionnaires were completed, giving a lower than expected response rate of 13%.

The following aspects of the surveys should be taken into account when using the results:

- The response rate in the Rescar survey was lower than expected (13%).
- The definition of social sciences may be less clear compared to natural sciences and engineering, and thus subject to various interpretations in different data sources.
- The identification of departments and teams is uncertain, and probably more difficult in social sciences than in engineering.
- Team leaders may not have a perfect knowledge on the origin and destination of their doctoral graduates and postdoctorates.
- In the two surveys, the definition of postdoctorate was not specified. Generally there is no agreement on a definition of postdoctorate, except that it is a "temporary" research position, generally based in the academic sector. National and disciplinary traditions may vary considerably on that respect. While the term postdoctorate may be particularly obvious in some disciplines (e.g. life sciences) and in some countries (e.g. UK), this is not always the case in other countries and other disciplines. In the framework of the NetReAct and

²⁰ A research team or group is defined as a group of people, scientists and non-scientists, who work at the same location for a significant period of time to produce new scientific knowledge.

²¹ Teams without a homepage were included in the lowest stratum.

Rescar surveys, postdoctorates may have been assumed to be non tenured, non permanent academic appointments.

3.3 Data availability

The data collection and analyses of both the NetReAct and the Rescar survey were carried out for the following 10 European countries: France, Germany, the UK, Italy, Spain, Portugal, Sweden, Norway, Hungary, and Czech Republic. This means 9 EU countries are present in the data set.

3.4 Relation to IISER

Data from both the NetReAct and the Rescar survey were used to construct several indicators in IISER:

- In IISER, the number of post-doctoral researchers in life sciences, engineering and social sciences in the EU are estimated based on the results from the NetReAct and the Rescar survey (see IISER indicator 2: number of researchers in the training phase and post-docs).

Two methods have been used to estimate the number of postdoctorates. The first method uses only the NetReAct and Rescar surveys and is based on the identification of research teams and the average number of postdocs. The second method combines the NetReAct and Rescar survey and Eurostat data. It is based on the NetReAct and Rescar structure of research teams and the Eurostat number of doctoral candidates.

- The number of doctoral candidates and postdoctoral researchers by origin in three fields (life sciences, social sciences and engineering) in the EU for IISER was estimated using the results from the NetReAct and the Rescar survey (see IISER indicator 5: circulation of researchers within Europe). A distinction is made between the origin of doctoral candidates and that of postdoctoral researchers in the EU:
 - In Eurostat data the number of doctoral candidates by nationality is not disaggregated by fields. Therefore, indicators were constructed using the NetReAct and Rescar surveys. As for IISER indicator 2 (number of postdoctorates), the methodology consisted in combining Eurostat aggregated data and data from the surveys²².
 - Based on the estimated number of postdoctorates (see IISER indicator 2) and on the information provided in the NetReAct and Rescar surveys on the origin of postdoctorates, the origin of postdoctorates in life sciences, engineering and social sciences in the EU27 was estimated using a similar methodology as for the origin of doctoral candidates in the three fields²³.

²² In the NetReAct and Rescar surveys information on the origin of doctoral candidates is available. To have an EU picture of the origin of doctoral candidates in life sciences, social sciences and engineering, the following method was used. First, the distribution of doctoral candidates by country of origin was taken from the surveys. Second, these percentages were applied to the number of doctoral candidates from Eurostat data. Then the sum for the 9 EU countries was calculated and extrapolated to EU27 level. The same method was applied separately for each field.

²³ First, the distribution of postdoctorates by country of origin from the surveys were taken. Second, these percentages were applied to the number of postdoctorates previously calculated for IISER indicator 2. Finally the sum for the 9 EU countries was calculated and the results extrapolated at the EU27 level.

ANNEX 4 THE 28 SUB-INDICATORS

1.1 Number of researchers (HC) in the business enterprise sector in the EU27, 2000-2007								
Main-indicator		1						
Sub indicator		1						
Country	Abbreviation	Last available year	Years with missing values			Source		
EU27	EU27	2007				Eurostat		
Belgium	BE	2007				Eurostat		
Bulgaria	BG	2007				Eurostat		
Czech Republic	CZ	2007				Eurostat		
Denmark	DK	2007	2000			Eurostat		
Germany	DE	2007	2000	2002	2004	2006	Eurostat	
Estonia	EE	2007				Eurostat		
Ireland	IE	2007	2000			Eurostat		
Greece	GR	2005	2004			2006 2007	Eurostat	
Spain	ES	2007	2000			Eurostat		
France	FR	2007				Eurostat		
Italy	IT	2006				2007	Eurostat	
Cyprus	CY	2007				Eurostat		
Latvia	LV	2007				Eurostat		
Lithuania	LT	2007				Eurostat		
Luxembourg	LU	2007	2000	2001	2002	2004	2006	Eurostat
Hungary	HU	2007				Eurostat		
Malta	MT	2007	2000	2001			Eurostat	
Netherlands	NL	2007				2006	Eurostat	
Austria	AT	2007	2000	2001	2003	2005	Eurostat	
Poland	PL	2007				Eurostat		

1.1 Number of researchers (HC) in the business enterprise sector in the EU27, 2000-2007							
Portugal	PT	2007				Eurostat	
Romania	RO	2007				Eurostat	
Slovenia	SI	2007				Eurostat	
Slovakia	SK	2007				Eurostat	
Finland	FI	2007	2000	2001	2002	2003	Eurostat
Sweden	SE	2007	2000	2001	2002	2004 2006	Eurostat
United Kingdom	UK	2007	2000	2001	2002	2003 2004	Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.2 Number of researchers (HC) in the government sector in the EU27, 2000-2007				
Main-indicator	1			
Sub indicator	2			
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		Eurostat
Belgium	BE	2007	2000 2001	Eurostat
Bulgaria	BG	2007		Eurostat
Czech Republic	CZ	2007		Eurostat
Denmark	DK	2007		Eurostat
Germany	DE	2007	2000 2001 2002	Eurostat
Estonia	EE	2007		Eurostat
Ireland	IE	2007	2000 2001	Eurostat
Greece	GR	2005	2000 2002 2004 2006 2007	Eurostat
Spain	ES	2007		Eurostat
France	FR	2007		Eurostat
Italy	IT	2006		2007 Eurostat
Cyprus	CY	2007		Eurostat
Latvia	LV	2007		Eurostat

1.2 Number of researchers (HC) in the government sector in the EU27, 2000-2007					
Lithuania	LT	2007			Eurostat
Luxembourg	LU	2007		2004	Eurostat
Hungary	HU	2007			Eurostat
Malta	MT	2007	2000 2001		Eurostat
Netherlands	NL	2007		2006	Eurostat
Austria	AT	2007	2000 2001	2003 2005	Eurostat
Poland	PL	2007			Eurostat
Portugal	PT	2007			Eurostat
Romania	RO	2007			Eurostat
Slovenia	SI	2007			Eurostat
Slovakia	SK	2007			Eurostat
Finland	FI	2007	2000 2001 2002 2003		Eurostat
Sweden	SE	2007	2000 2001 2002	2004 2006	Eurostat
United Kingdom	UK	2007	2000		Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.3 Number of researchers (HC) in the higher education sector in the EU27, 2000-2007				
Main-indicator		1		
Sub indicator		3		
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		Eurostat
Belgium	BE	2007	2000 2001	Eurostat
Bulgaria	BG	2007		Eurostat
Czech Republic	CZ	2007		Eurostat
Denmark	DK	2007		Eurostat
Germany	DE	2007	2000 2001 2002	Eurostat
Estonia	EE	2007		Eurostat

1.3 Number of researchers (HC) in the higher education sector in the EU27, 2000-2007											
Ireland	IE	2007							Eurostat		
Greece	GR	2005		2000	2002	2004	2006	2007	Eurostat		
Spain	ES	2007							Eurostat		
France	FR	2007							Eurostat		
Italy	IT	2006						2007	Eurostat		
Cyprus	CY	2007							Eurostat		
Latvia	LV	2007							Eurostat		
Lithuania	LT	2007							Eurostat		
Luxembourg	LU	2007			2002	2004			Eurostat		
Hungary	HU	2007							Eurostat		
Malta	MT	2007		2000	2001				Eurostat		
Netherlands	NL	2003		2000	2001		2004	2005	2006	2007	Eurostat
Austria	AT	2007		2000	2001	2003	2005			Eurostat	
Poland	PL	2007								Eurostat	
Portugal	PT	2007								Eurostat	
Romania	RO	2007								Eurostat	
Slovenia	SI	2007								Eurostat	
Slovakia	SK	2007								Eurostat	
Finland	FI	2007		2000	2001	2002	2003			Eurostat	
Sweden	SE	2007		2000		2002		2004		2006	Eurostat
United Kingdom	UK	2007		2000	2001	2002	2003	2004		2006	Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.4 Number of researchers (HC) in the private non-profit sector in the EU27, 2000-2007				
Main-indicator	1			
Sub-indicator	4			
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		Eurostat
Belgium	BE	2007	2000 2001	Eurostat
Bulgaria	BG	2007		Eurostat
Czech Republic	CZ	2007		Eurostat
Denmark	DK	2007		Eurostat
Germany	DE		2000 2001 2002 2003 2004 2005 2006 2007	Eurostat
Estonia	EE	2007		Eurostat
Ireland	IE		2000 2001 2002 2003 2004 2005 2006 2007	Eurostat
Greece	GR	2005	2000 2002 2004 2006 2007	Eurostat
Spain	ES	2007		Eurostat
France	FR	2007		Eurostat
Italy	IT	2006	2000 2001 2007	Eurostat
Cyprus	CY	2007		Eurostat
Latvia	LV	2006	2003 2007	Eurostat
Lithuania	LT		2000 2001 2002 2003 2004 2005 2006 2007	Eurostat
Luxembourg	LU		2000 2001 2002 2003 2004 2005 2006 2007	Eurostat
Hungary	HU		2000 2001 2002 2003 2004 2005 2006 2007	Eurostat
Malta	MT	2007	2000 2001	Eurostat
Netherlands	NL	2002	2003 2004 2005 2006 2007	Eurostat
Austria	AT	2007	2000 2001 2003 2005	Eurostat
Poland	PL	2007		Eurostat
Portugal	PT	2007		Eurostat
Romania	RO	2007	2000 2001 2002	Eurostat

1.4 Number of researchers (HC) in the private non-profit sector in the EU27, 2000-2007						
Slovenia	SI	2007				Eurostat
Slovakia	SK	2007	2000	2001		Eurostat
Finland	FI	2007	2000	2001	2002	2003
Sweden	SE	2007	2000	2001	2002	2003
United Kingdom	UK	2007	2000	2001	2002	2003
			2004		2006	Eurostat
			2000	2001	2002	2003
			2004			Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010

1.5 Number of researchers (FTE) in the business enterprise sector in the EU27, 2000-2007				
Main-indicator	1			
Sub-indicator	5			
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		Eurostat
Belgium	BE	2007		Eurostat
Bulgaria	BG	2007		Eurostat
Czech Republic	CZ	2007		Eurostat
Denmark	DK	2007	2000	Eurostat
Germany	DE	2007		Eurostat
Estonia	EE	2007		Eurostat
Ireland	IE	2007		Eurostat
Greece	GR	2007	2004	Eurostat
Spain	ES	2007		Eurostat
France	FR	2007		Eurostat
Italy	IT	2007		Eurostat
Cyprus	CY	2007		Eurostat
Latvia	LV	2007		Eurostat
Lithuania	LT	2007		Eurostat
Luxembourg	LU	2007	2001	2002
				Eurostat

1.5 Number of researchers (FTE) in the business enterprise sector in the EU27, 2000-2007						
Hungary	HU	2007			Eurostat	
Malta	MT	2007	2000	2001	Eurostat	
Netherlands	NL	2007			Eurostat	
Austria	AT	2007	2000	2001	2003	
Poland	PL	2007			Eurostat	
Portugal	PT	2007			Eurostat	
Romania	RO	2007			Eurostat	
Slovenia	SI	2007			Eurostat	
Slovakia	SK	2007			Eurostat	
Finland	FI	2007	2000	2001	2002	2003
Sweden	SE	2007	2000	2002	Eurostat	
United Kingdom	UK	2007			Eurostat	

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.6 Number of researchers (FTE) in the government sector in the EU27, 2000-2007						
Main-indicator		1				
Sub-indicator		6				
Country	Abbreviation	Last available year	Years with missing values			Source
EU27	EU27	2007			Eurostat	
Belgium	BE	2007			Eurostat	
Bulgaria	BG	2007			Eurostat	
Czech Republic	CZ	2007			Eurostat	
Denmark	DK	2007			Eurostat	
Germany	DE	2007			Eurostat	
Estonia	EE	2007			Eurostat	
Ireland	IE	2007			Eurostat	
Greece	GR	2007	2000	2002	2004	

1.6 Number of researchers (FTE) in the government sector in the EU27, 2000-2007				
Spain	ES	2007		Eurostat
France	FR	2007		Eurostat
Italy	IT	2007		Eurostat
Cyprus	CY	2007		Eurostat
Latvia	LV	2007		Eurostat
Lithuania	LT	2007		Eurostat
Luxembourg	LU	2007		Eurostat
Hungary	HU	2007		Eurostat
Malta	MT	2007	2000 2001	Eurostat
Netherlands	NL	2007		Eurostat
Austria	AT	2007	2000 2001 2003	Eurostat
Poland	PL	2007		Eurostat
Portugal	PT	2007		Eurostat
Romania	RO	2007		Eurostat
Slovenia	SI	2007		Eurostat
Slovakia	SK	2007		Eurostat
Finland	FI	2007	2000 2001 2002 2003	Eurostat
Sweden	SE	2007	2000 2002	Eurostat
United Kingdom	UK	2007		Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.7 Number of researchers (FTE) in the higher education sector in the EU27, 2000-2007				
Main-indicator		1		
Sub-indicator		7		
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		Eurostat
Belgium	BE	2007		Eurostat

1.7 Number of researchers (FTE) in the higher education sector in the EU27, 2000-2007								
Bulgaria	BG	2007				Eurostat		
Czech Republic	CZ	2007				Eurostat		
Denmark	DK	2007				Eurostat		
Germany	DE	2007				Eurostat		
Estonia	EE	2007				Eurostat		
Ireland	IE	2007				Eurostat		
Greece	GR	2007	2000	2002	2004	Eurostat		
Spain	ES	2007				Eurostat		
France	FR	2007				Eurostat		
Italy	IT	2007				Eurostat		
Cyprus	CY	2007				Eurostat		
Latvia	LV	2007				Eurostat		
Lithuania	LT	2007				Eurostat		
Luxembourg	LU	2007		2002		Eurostat		
Hungary	HU	2007				Eurostat		
Malta	MT	2007	2000	2001		Eurostat		
Netherlands	NL	2007				Eurostat		
Austria	AT	2007	2000	2001	2003	Eurostat		
Poland	PL	2007				Eurostat		
Portugal	PT	2007				Eurostat		
Romania	RO	2007				Eurostat		
Slovenia	SI	2007				Eurostat		
Slovakia	SK	2007				Eurostat		
Finland	FI	2007		2001	2002	2003	Eurostat	
Sweden	SE	2007	2000	2002		Eurostat		
United Kingdom	UK	2007	2000	2001	2002	2003	2004	Eurostat

Source: Eurostat (R&D Statistics). Data downloaded on January 2010.

1.8 Number of researchers (FTE) in the private non-profit sector in the EU27, 2000-2007											
Main-indicator	1										
Sub-indicator	8										
Country	Abbreviation	Last available year	Years with missing values			Source					
EU27	EU27	2007				Eurostat					
Belgium	BE	2007				Eurostat					
Bulgaria	BG	2007				Eurostat					
Czech Republic	CZ	2007				Eurostat					
Denmark	DK	2007				Eurostat					
Germany	DE		2000	2001	2002	2003	2004	2005	2006	2007	Eurostat
Estonia	EE	2007				Eurostat					
Ireland	IE		2000	2001	2002	2003	2004	2005	2006	2007	Eurostat
Greece	GR	2007	2000		2002		2004				Eurostat
Spain	ES	2007				Eurostat					
France	FR	2007				Eurostat					
Italy	IT	2007	2000	2001							Eurostat
Cyprus	CY	2007				Eurostat					
Latvia	LV	2006				2003				2007	Eurostat
Lithuania	LT		2000	2001	2002	2003	2004	2005	2006	2007	Eurostat
Luxembourg	LU		2000	2001	2002	2003	2004	2005	2006	2007	Eurostat
Hungary	HU		2000	2001	2002	2003	2004	2005	2006	2007	Eurostat
Malta	MT	2007	2000	2001							Eurostat
Netherlands	NL	2002				2003	2004	2005	2006	2007	Eurostat
Austria	AT	2007	2000	2001		2003				Eurostat	
Poland	PL	2007				Eurostat					
Portugal	PT	2007				Eurostat					
Romania	RO	2007	2000	2001	2002				Eurostat		

1.8 Number of researchers (FTE) in the private non-profit sector in the EU27, 2000-2007				
Slovenia	SI	2007		Eurostat
Slovakia	SK	2007	2000 2001	Eurostat
Finland	FI	2007	2000 2001 2002 2003	Eurostat
Sweden	SE	2007	2000 2001 2002	Eurostat
United Kingdom	UK	2007		Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.9 Number of researchers (FTE) in the business enterprise sector in non-EU27 countries, 2000-2007				
Main-indicator	1			
Sub-indicator	9			
Country	Abbreviation	Last available year	Years with missing values	Source
Non-EU27 countries				
Croatia	HR	2007	2000 2001	Eurostat
Turkey	TR	2007		Eurostat
Iceland	IS	2007	2000 2002 2004	Eurostat
Norway	NO	2007	2000 2002	Eurostat
Switzerland	CH	2004	2001 2002 2003 2005 2006 2007	Eurostat
Russian Federation	RU	2007		Eurostat
United States	US	2006		2007 Eurostat
China (excluding Hong Kong)	CN	2007		Eurostat
Japan	JP	2007		Eurostat
Australia	AU	2006		2007 OECD
Canada	CA	2005		2006 2007 OECD
Korea	KR	2006		2007 OECD
Mexico	MX	2005	2000 2001 2002	2006 2007 OECD
New Zealand	NZ	2005	2000 2002 2004 2006 2007	OECD

Source: Eurostat (R&D Statistics) and OECD Statistics.
Data downloaded on January 2010.

1.10 Number of researchers (FTE) in the government sector in non-EU27 countries, 2000-2007											
Main-indicator	1										
Sub-indicator	10										
Country	Abbreviation	Last available year	Years with missing values							Source	
Non-EU27 countries											
Croatia	HR	2007	2000	2001							Eurostat
Turkey	TR	2007									Eurostat
Iceland	IS	2007	2000		2002		2004				Eurostat
Norway	NO	2007	2000		2002						Eurostat
Switzerland	CH	2006		2001		2003		2005		2007	Eurostat
Russian Federation	RU	2007									Eurostat
United States	US	2002				2003	2004	2005	2006	2007	Eurostat
China (excluding Hong Kong)	CN	2007									Eurostat
Japan	JP	2007									Eurostat
Australia	AU	2006		2001		2003		2005		2007	OECD
Canada	CA	2005							2006	2007	OECD
Korea	KR	2006								2007	OECD
Mexico	MX	2005	2000	2001	2002				2006	2007	OECD
New Zealand	NZ	2005	2000		2002		2004		2006	2007	OECD

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.11 Number of researchers (FTE) in the higher education sector in non-EU27 countries, 2000-2007											
Main-indicator	1										
Sub-indicator	11										
Country	Abbreviation	Last available year	Years with missing values							Source	
Non-EU27 countries											
Croatia	HR	2007	2000	2001							Eurostat

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Turkey	TR	2007										Eurostat
Iceland	IS	2007	2000		2002		2004					Eurostat
Norway	NO	2007	2000		2002							Eurostat
Switzerland	CH	2006		2001		2003		2005		2007		Eurostat
Russian Federation	RU	2007										Eurostat
United States	US		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat
China (excluding Hong Kong)	CN	2007										Eurostat
Japan	JP	2007										Eurostat
Australia	AU	2006		2001		2003		2005		2007		OECD
Canada	CA	2005							2006	2007		OECD
Korea	KR	2006								2007		OECD
Mexico	MX	2005	2000	2001	2002				2006	2007		OECD
New Zealand	NZ	2005	2000		2002		2004		2006	2007		OECD

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.12 Number of researchers (FTE) in the private non-profit sector in non-EU27 countries, 2000-2007												
Main-indicator	1											
Sub-indicator	12											
Country	Abbreviation	Last available year	Years with missing values									Source
Non-EU27 countries												
Croatia	HR	2007	2000	2001	2003	2004						Eurostat
Turkey	TR		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat
Iceland	IS	2007	2000		2002		2004					Eurostat
Norway	NO		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat
Switzerland	CH		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat
Russian Federation	RU	2007										Eurostat
United States	US		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat
China (excluding	CN		2000	2001	2002	2003	2004	2005	2006	2007		Eurostat

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Hong Kong)													
Japan	JP		2007							Eurostat			
Australia	AU		2006		2001	2003	2005	2007		OECD			
Canada	CA		2005					2006	2007	OECD			
Korea	KR		2006						2007	OECD			
Mexico	MX		2005		2000	2001	2002		2006	2007	OECD		
New Zealand	NZ				2000	2001	2002	2003	2004	2005	2006	2007	OECD

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.13 Number of persons in the active population in the EU27, 2000-2007				
Main-indicator		1		
Sub-indicator		13		
Country	Abbreviation	Last available year	Years with missing values	Source
EU27	EU27	2007		
Belgium	BE	2007		Eurostat
Bulgaria	BG	2007		Eurostat
Czech Republic	CZ	2007		Eurostat
Denmark	DK	2007		Eurostat
Germany	DE	2007		Eurostat
Estonia	EE	2007		Eurostat
Ireland	IE	2007		Eurostat
Greece	GR	2007		Eurostat
Spain	ES	2007		Eurostat
France	FR	2007		Eurostat
Italy	IT	2007		Eurostat
Cyprus	CY	2007		Eurostat
Latvia	LV	2007		Eurostat
Lithuania	LT	2007		Eurostat

1.13 Number of persons in the active population in the EU27, 2000-2007				
Luxembourg	LU		2007	Eurostat
Hungary	HU		2007	Eurostat
Malta	MT		2007	Eurostat
Netherlands	NL		2007	Eurostat
Austria	AT		2007	Eurostat
Poland	PL		2007	Eurostat
Portugal	PT		2007	Eurostat
Romania	RO		2007	Eurostat
Slovenia	SI		2007	Eurostat
Slovakia	SK		2007	Eurostat
Finland	FI		2007	Eurostat
Sweden	SE		2007	Eurostat
United Kingdom	UK		2007	Eurostat

Source: Eurostat LFS Statistics.
Data downloaded on January 2010.

1.14 Number of persons in the active population in non-EU27 countries, 2000-2007				
Main-indicator		1		
Sub-indicator		14		
Country	Abbreviation	Last available year	Years with missing values	Source
Non-EU27 countries				
United States	US	2004	2005 2006 2007	OECD
Japan	JP	2007		National Bureau of Statistics of China
China (economically active population)	CN	2007		OECD
OECD	OECD	2007		OECD

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Source: OECD Statistics (Labour Force Data) for the US, Japan and the OECD, and National Bureau of Statistics of China for China. Data downloaded on January 2010.

1.15 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2000										
Main-indicator	1									
Sub-indicator	15 Missing values									
Country	Abbreviation	All NACE branches - Total	Manufacture of food products and beverages (da15)	Manufacture of chemicals and chemical products except medicinal chemicals and botanical products (dg24_not_dg244)	Manufacture of pharmaceuticals, medicinal chemicals and botanical products (dg244)	Manufacture of fabricated metal products, except machinery and equipment (dj28)	Manufacture of machinery and equipment n.e.c. (dk29)	Manufacture of office machinery and computers (dl30)	Manufacture of electrical machinery and apparatus n.e.c. (dl31)	Source
EU27	EU27									
Belgium	BE									Eurostat
Bulgaria	BG			X	X	X				Eurostat
Czech Republic	CZ									Eurostat
Denmark	DK	X	X	X	X	X	X	X	X	Eurostat
Germany	DE		X	X	X	X	X	X	X	Eurostat
Estonia	EE					X				Eurostat
Ireland	IE		X	X	X	X	X	X	X	Eurostat
Greece	GR		X	X	X	X	X	X	X	Eurostat
Spain	ES									Eurostat
France	FR		X	X	X	X	X	X	X	Eurostat
Italy	IT		X	X	X	X	X	X	X	Eurostat
Cyprus	CY					X		X		Eurostat

1.15 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2000										
Main-indicator	1									
Sub-indicator	15									
Country	Abbreviation	All NACE branches - Total	Manufacture of food products and beverages (da15)	Manufacture of chemicals and chemical products except medicinal chemicals and botanical products (dg24_not_dg244)	Manufacture of pharmaceuticals, medicinal chemicals and botanical products (dg244)	Manufacture of fabricated metal products, except machinery and equipment (dj28)	Manufacture of machinery and equipment n.e.c. (dk29)	Manufacture of office machinery and computers (dl30)	Manufacture of electrical machinery and apparatus n.e.c. (dl31)	Source
Latvia	LV			X	X	X		X		Eurostat
Lithuania	LT			X	X	X		X	X	Eurostat
Luxembourg	LU		X	X	X	X	X	X	X	Eurostat
Hungary	HU									Eurostat
Malta	MT	X	X	X	X	X	X	X	X	Eurostat
Netherlands	NL									Eurostat
Austria	AT	X	X	X	X	X	X	X	X	Eurostat
Poland	PL									Eurostat
Portugal	PT		X	X	X					Eurostat
Romania	RO		X	X	X	X	X	X	X	Eurostat
Slovenia	SI					X		X		Eurostat
Slovakia	SK		X							Eurostat
Finland	FI	X	X	X	X	X	X	X	X	Eurostat
Sweden	SE	X	X	X	X	X	X	X	X	Eurostat
United Kingdom	UK		X	X	X	X	X	X	X	Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.15 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2000										
Main-indicator	1									
Sub indicator	15 Missing values									
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60_to_i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
EU27	EU27									
Belgium	BE									Eurostat
Bulgaria	BG					X				Eurostat
Czech Republic	CZ									Eurostat
Denmark	DK	X	X	X	X	X	X	X	X	Eurostat
Germany	DE	X	X	X	X	X	X	X	X	Eurostat
Estonia	EE	X			X	X				Eurostat
Ireland	IE	X	X	X	X	X	X	X	X	Eurostat
Greece	GR	X	X	X	X	X	X	X	X	Eurostat
Spain	ES									Eurostat

1.15 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2000										
Main-indicator	1									
Sub indicator	15	Missing values								
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60 to i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
France	FR	X	X	X	X	X	X	X	X	Eurostat
Italy	IT	X	X	X	X	X	X	X	X	Eurostat
Cyprus	CY	X	X	X	X	X		X		Eurostat
Latvia	LV			X	X	X				Eurostat
Lithuania	LT	X		X		X	X		X	Eurostat
Luxembourg	LU	X	X	X	X	X	X	X	X	Eurostat
Hungary	HU				X					Eurostat
Malta	MT	X	X	X	X	X	X	X	X	Eurostat
Netherlands	NL	X								Eurostat
Austria	AT	X	X	X	X	X	X	X	X	Eurostat
Poland	PL								X	Eurostat
Portugal	PT									Eurostat
Romania	RO	X	X	X	X	X				Eurostat

1.15 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2000										
Main-indicator	1									
Sub indicator	15 Missing values									
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60 to i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
Slovenia	SI					X				Eurostat
Slovakia	SK			X	X	X	X		X	Eurostat
Finland	FI	X	X	X	X	X	X	X	X	Eurostat
Sweden	SE	X	X	X	X	X	X	X	X	Eurostat
United Kingdom	UK	X	X	X	X	X	X	X	X	Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.16 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2007										
Main-indicator	1									
Sub-indicator	16 Missing values									
Country	Abbreviation	All NACE branches - Total	Manufacture of food products and beverages (da15)	Manufacture of chemicals and chemical products except medicinal chemicals and botanical products (dg24_not_dg244)	Manufacture of pharmaceuticals, medicinal chemicals and botanical products (dg244)	Manufacture of fabricated metal products, except machinery and equipment (dj28)	Manufacture of machinery and equipment n.e.c. (dk29)	Manufacture of office machinery and computers (dl30)	Manufacture of electrical machinery and apparatus n.e.c. (dl31)	Source
EU27	EU27									
Belgium	BE		X	X	X	X	X	X	X	Eurostat
Bulgaria	BG		X					X		Eurostat
Czech Republic	CZ									Eurostat
Denmark	DK			X	X					Eurostat
Germany	DE									Eurostat
Estonia	EE									Eurostat
Ireland	IE		X			X				Eurostat
Greece	GR		X	X	X	X	X	X	X	Eurostat
Spain	ES									Eurostat
France	FR		X							Eurostat
Italy	IT		X	X	X	X	X	X	X	Eurostat
Cyprus	CY									Eurostat
Latvia	LV		X	X	X	X	X	X		Eurostat
Lithuania	LT		X	X	X					Eurostat

1.16 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2007										
Main-indicator	1									
Sub-indicator	16 Missing values									
Country	Abbreviation	All NACE branches - Total	Manufacture of food products and beverages (da15)	Manufacture of chemicals and chemical products except medicinal chemicals and botanical products (dg24_not_dg244)	Manufacture of pharmaceuticals, medicinal chemicals and botanical products (dg244)	Manufacture of fabricated metal products, except machinery and equipment (dj28)	Manufacture of machinery and equipment n.e.c. (dk29)	Manufacture of office machinery and computers (dl30)	Manufacture of electrical machinery and apparatus n.e.c. (dl31)	Source
Luxembourg	LU		X	X	X	X	X	X	X	Eurostat
Hungary	HU									Eurostat
Malta	MT			X		X	X			Eurostat
Netherlands	NL							X		Eurostat
Austria	AT									Eurostat
Poland	PL									Eurostat
Portugal	PT									Eurostat
Romania	RO									Eurostat
Slovenia	SI									Eurostat
Slovakia	SK							X		Eurostat
Finland	FI		X	X	X			X		Eurostat
Sweden	SE		X	X		X	X	X	X	Eurostat
United Kingdom	UK		X							Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

1.16 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2007										
Main-indicator	1									
Sub-indicator	16 Missing values									
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60 to i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
EU27	EU27									
Belgium	BE	X	X	X	X	X	X	X	X	Eurostat
Bulgaria	BG				X	X				Eurostat
Czech Republic	CZ									Eurostat
Denmark	DK									Eurostat
Germany	DE									Eurostat
Estonia	EE									Eurostat
Ireland	IE			X	X	X				Eurostat
Greece	GR	X	X	X	X	X	X	X	X	Eurostat
Spain	ES									Eurostat
France	FR									Eurostat
Italy	IT	X	X	X	X	X	X	X	X	Eurostat
Cyprus	CY									Eurostat

1.16 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2007										
Main-indicator	1									
Sub-indicator	16 Missing values									
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60 to i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
Latvia	LV			X	X	X				Eurostat
Lithuania	LT									Eurostat
Luxembourg	LU	X	X	X	X		X	X	X	Eurostat
Hungary	HU									Eurostat
Malta	MT	X	X							Eurostat
Netherlands	NL				X					Eurostat
Austria	AT									Eurostat
Poland	PL									Eurostat
Portugal	PT									Eurostat
Romania	RO	X				X				Eurostat
Slovenia	SI									Eurostat
Slovakia	SK				X	X				Eurostat
Finland	FI			X						Eurostat

1.16 Number of researchers (FTE) in the business enterprise sector in the EU27 by selected NACE sectors, 2007										
Main-indicator	1									
Sub-indicator	16 Missing values									
Country	Abbreviation	Manufacture of radio, television and communication equipment and apparatus (dl32)	Manufacture of medical, precision and optical instruments, watches and clocks (dl33)	Manufacture of motor vehicles, trailers and semi-trailers (dm34)	Manufacture of other transport equipment (dm35)	Land transport; transport via pipelines; water transport; air transport; supporting and auxiliary transport activities; activities of travel agencies; post and telecommunications (i60 to i64)	Computer and related activities (k72)	Research and development (k73)	Other business activities (k74)	Source
Sweden	SE	X	X	X	X					Eurostat
United Kingdom	UK					X			X	Eurostat

Source: Eurostat (R&D Statistics).
Data downloaded on January 2010.

2.17 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Teacher training and education science				
Main-indicator	2			
Sub-indicator	17 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat

2.17 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Teacher training and education science				
Main-indicator	2			
Sub-indicator	17	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat

2.17 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Teacher training and education science				
Main-indicator	2			
Sub-indicator	17	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Slovakia	SK		X	Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.18 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Humanities and arts				
Main-indicator	2			
Sub-indicator	18	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat

2.18 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Humanities and arts				
Main-indicator	2			
Sub-indicator	18	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Cyprus	CY			Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU		X	Eurostat
Hungary	HU		X	Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat
Finland	FI		X	Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.19 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Social sciences, business and law				
Main-indicator	2			
Sub-indicator	19	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			

2.19 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Social sciences, business and law				
Main-indicator	2			
Sub-indicator	19	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU		X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL		X	Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat

2.19 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Social sciences, business and law				
Main-indicator	2			
Sub-indicator	19	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Slovakia	SK		X	Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.20 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Science, mathematics and computing				
Main-indicator	2			
Sub-indicator	20	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV		X	Eurostat

2.20 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Science, mathematics and computing				
Main-indicator	2			
Sub-indicator	20	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Lithuania	LT			Eurostat
Luxembourg	LU		X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL		X	Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.21 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Engineering, manufacturing and construction				
Main-indicator	2			
Sub-indicator	21	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat

2.21 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Engineering, manufacturing and construction				
Main-indicator	2			
Sub-indicator	21	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat

2.21 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Engineering, manufacturing and construction				
Main-indicator	2			
Sub-indicator	21 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Finland	FI		X	Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.22 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Agriculture and veterinary				
Main-indicator	2			
Sub-indicator	22 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ		X	Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat

2.22 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Agriculture and veterinary				
Main-indicator	2			
Sub-indicator	22	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT	X		Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat
Finland	FI			Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.23 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Health and welfare				
Main-indicator	2			
Sub-indicator	23	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat

2.23 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Health and welfare				
Main-indicator	2			
Sub-indicator	23	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat
Finland	FI			Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.24 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Services				
Main-indicator	2			
Sub-indicator	24	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE		X	Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV		X	Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT	X		Eurostat
Netherlands	NL		X	Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT		X	Eurostat

2.24 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Services				
Main-indicator	2			
Sub-indicator	24	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK		X	Eurostat
Finland	FI		X	Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK	X	X	Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.25 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Unknown or not specified				
Main-indicator	2			
Sub-indicator	25	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27			
Belgium	BE	X		Eurostat
Bulgaria	BG		X	Eurostat
Czech Republic	CZ	X	X	Eurostat
Denmark	DK	X	X	Eurostat
Germany	DE	X	X	Eurostat
Estonia	EE	X	X	Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES	X	X	Eurostat
France	FR		X	Eurostat
Italy	IT	X		Eurostat

2.25 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2000: Unknown or not specified				
Main-indicator	2			
Sub-indicator	25	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Cyprus	CY	X	X	Eurostat
Latvia	LV	X	X	Eurostat
Lithuania	LT	X	X	Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU	X	X	Eurostat
Malta	MT	X	X	Eurostat
Netherlands	NL	X	X	Eurostat
Austria	AT		X	Eurostat
Poland	PL	X		Eurostat
Portugal	PT	X	X	Eurostat
Romania	RO		X	Eurostat
Slovenia	SI	X	X	Eurostat
Slovakia	SK	X	X	Eurostat
Finland	FI	X	X	Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK	X	X	Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.26 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Teacher training and education science				
Main-indicator	2			
Sub-indicator	26	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat

2.26 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Teacher training and education science				
Main-indicator	2			
Sub-indicator	26 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO		X	Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat

2.26 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Teacher training and education science				
Main-indicator	2			
Sub-indicator	26 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.27 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Humanities and arts				
Main-indicator	2			
Sub-indicator	27 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat

2.27 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Humanities and arts				
Main-indicator	2			
Sub-indicator	27	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.28 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Social sciences, business and law				
Main-indicator	2			
Sub-indicator	28	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat

2.28 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Social sciences, business and law				
Main-indicator	2			
Sub-indicator	28 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.29 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Science, mathematics and computing				
Main-indicator	2			
Sub-indicator	29	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY			Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat

2.29 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Science, mathematics and computing				
Main-indicator	2			
Sub-indicator	29 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.30 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Engineering, manufacturing and construction				
Main-indicator	2			
Sub-indicator	30 Missing values			
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat

2.30 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Engineering, manufacturing and construction				
Main-indicator	2			
Sub-indicator	30	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Cyprus	CY			Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.31 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Agriculture and veterinary				
Main-indicator	2			
Sub-indicator	31	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat

2.31 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Agriculture and veterinary				
Main-indicator	2			
Sub-indicator	31	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT	X	X	Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat

2.31 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Agriculture and veterinary				
Main-indicator	2			
Sub-indicator	31	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Finland	FI			Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.32 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Health and welfare				
Main-indicator	2			
Sub-indicator	32	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES			Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat

2.32 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Health and welfare				
Main-indicator	2			
Sub-indicator	32	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT			Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI			Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.33 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Services				
Main-indicator	2			
Sub-indicator	33	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK			Eurostat

2.33 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Services				
Main-indicator	2			
Sub-indicator	33	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES		X	Eurostat
France	FR			Eurostat
Italy	IT			Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV			Eurostat
Lithuania	LT			Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU			Eurostat
Malta	MT		X	Eurostat
Netherlands	NL			Eurostat
Austria	AT			Eurostat
Poland	PL			Eurostat
Portugal	PT			Eurostat
Romania	RO			Eurostat
Slovenia	SI			Eurostat
Slovakia	SK			Eurostat
Finland	FI		X	Eurostat
Sweden	SE			Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.34 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Unknown or not specified				
Main-indicator	2			
Sub-indicator	34	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
EU27	EU27	X	X	
Belgium	BE			Eurostat
Bulgaria	BG	X	X	Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK	X	X	Eurostat
Germany	DE			Eurostat
Estonia	EE	X	X	Eurostat
Ireland	IE			Eurostat
Greece	GR	X	X	Eurostat
Spain	ES			Eurostat
France	FR	X	X	Eurostat
Italy	IT	X		Eurostat
Cyprus	CY	X	X	Eurostat
Latvia	LV	X		Eurostat
Lithuania	LT	X	X	Eurostat
Luxembourg	LU	X	X	Eurostat
Hungary	HU	X	X	Eurostat
Malta	MT	X	X	Eurostat
Netherlands	NL			Eurostat
Austria	AT		X	Eurostat
Poland	PL	X	X	Eurostat
Portugal	PT	X	X	Eurostat

2.34 Number of tertiary degrees with academic orientation (ISCED 5A) in the EU27, 2007: Unknown or not specified				
Main-indicator	2			
Sub-indicator	34	Missing values		
Country	Abbreviation	Tertiary programmes with academic orientation - all first degrees (ISCED 1997: isced5a_d1)	Tertiary programmes with academic orientation - second degree (ISCED 1997: isced5a_d2)	Source
Romania	RO		X	Eurostat
Slovenia	SI	X	X	Eurostat
Slovakia	SK	X	X	Eurostat
Finland	FI	X	X	Eurostat
Sweden	SE		X	Eurostat
United Kingdom	UK			Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.35 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Teacher training and education science				
Main-indicator	2			
Sub-indicator	35	Missing values		
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)		Source
EU27	EU27	X		
Belgium	BE			Eurostat
Bulgaria	BG			Eurostat
Czech Republic	CZ			Eurostat
Denmark	DK	X		Eurostat
Germany	DE			Eurostat
Estonia	EE			Eurostat
Ireland	IE			Eurostat
Greece	GR			Eurostat
Spain	ES			Eurostat
France	FR			Eurostat
Italy	IT			Eurostat

2.35 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Teacher training and education science			
Main-indicator	2		
Sub-indicator	35	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Cyprus	CY		Eurostat
Latvia	LV		Eurostat
Lithuania	LT	X	Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT	X	Eurostat
Netherlands	NL	X	Eurostat
Austria	AT		Eurostat
Poland	PL	X	Eurostat
Portugal	PT		Eurostat
Romania	RO	X	Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.36 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Humanities and arts			
Main-indicator	2		
Sub-indicator	36	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat

2.36 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Humanities and arts			
Main-indicator	2		
Sub-indicator	36	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY		Eurostat
Latvia	LV		Eurostat
Lithuania	LT		Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT		Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat

2.36 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Humanities and arts			
Main-indicator	2		
Sub-indicator	36	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.37 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Social sciences, business and law			
Main-indicator	2		
Sub-indicator	37	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY		Eurostat
Latvia	LV		Eurostat
Lithuania	LT		Eurostat

2.37 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Social sciences, business and law			
Main-indicator	2		
Sub-indicator	37	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT		Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.38 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Science, mathematics and computing			
Main-indicator	2		
Sub-indicator	38	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat

2.38 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Science, mathematics and computing			
Main-indicator	2		
Sub-indicator	38	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY		Eurostat
Latvia	LV		Eurostat
Lithuania	LT		Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT		Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.39 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Engineering, manufacturing and construction			
Main-indicator	2		
Sub-indicator	39	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY	X	Eurostat
Latvia	LV		Eurostat
Lithuania	LT		Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT		Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat

2.39 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Engineering, manufacturing and construction			
Main-indicator	2		
Sub-indicator	39	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.40 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Agriculture and veterinary			
Main-indicator	2		
Sub-indicator	40	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY	X	Eurostat

2.40 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Agriculture and veterinary			
Main-indicator	2		
Sub-indicator	40	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Latvia	LV		Eurostat
Lithuania	LT		Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT	X	Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.41 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Health and welfare			
Main-indicator	2		
Sub-indicator	41	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat

2.41 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Health and welfare			
Main-indicator	2		
Sub-indicator	41	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Czech Republic	CZ		Eurostat
Denmark	DK		Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR		Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT		Eurostat
Cyprus	CY	X	Eurostat
Latvia	LV		Eurostat
Lithuania	LT		Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU		Eurostat
Malta	MT		Eurostat
Netherlands	NL		Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat

2.41 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Health and welfare			
Main-indicator	2		
Sub-indicator	41	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

2.42 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Services			
Main-indicator	2		
Sub-indicator	42	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE		Eurostat
Bulgaria	BG		Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK	X	Eurostat
Germany	DE		Eurostat
Estonia	EE		Eurostat
Ireland	IE		Eurostat
Greece	GR	X	Eurostat
Spain	ES		Eurostat
France	FR		Eurostat
Italy	IT	X	Eurostat
Cyprus	CY	X	Eurostat
Latvia	LV		Eurostat
Lithuania	LT	X	Eurostat
Luxembourg	LU	X	Eurostat

2.42 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Services			
Main-indicator	2		
Sub-indicator	42	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Hungary	HU		Eurostat
Malta	MT	X	Eurostat
Netherlands	NL	X	Eurostat
Austria	AT		Eurostat
Poland	PL		Eurostat
Portugal	PT		Eurostat
Romania	RO		Eurostat
Slovenia	SI		Eurostat
Slovakia	SK		Eurostat
Finland	FI		Eurostat
Sweden	SE		Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).

Data downloaded on January 2010.

2.43 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Unknown or not specified			
Main-indicator	2		
Sub-indicator	43	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
EU27	EU27	X	
Belgium	BE	X	Eurostat
Bulgaria	BG	X	Eurostat
Czech Republic	CZ		Eurostat
Denmark	DK	X	Eurostat
Germany	DE		Eurostat

2.43 Number of doctoral degrees (ISCED 6) in the EU27, 2007: Unknown or not specified			
Main-indicator	2		
Sub-indicator	43	Missing values	
Country	Abbreviation	Second stage of tertiary education leading to an advanced research qualification - level 6 (ISCED 1997: isced6)	Source
Estonia	EE	X	Eurostat
Ireland	IE		Eurostat
Greece	GR	X	Eurostat
Spain	ES		Eurostat
France	FR	X	Eurostat
Italy	IT	X	Eurostat
Cyprus	CY	X	Eurostat
Latvia	LV	X	Eurostat
Lithuania	LT	X	Eurostat
Luxembourg	LU	X	Eurostat
Hungary	HU	X	Eurostat
Malta	MT	X	Eurostat
Netherlands	NL	X	Eurostat
Austria	AT		Eurostat
Poland	PL	X	Eurostat
Portugal	PT	X	Eurostat
Romania	RO	X	Eurostat
Slovenia	SI	X	Eurostat
Slovakia	SK	X	Eurostat
Finland	FI	X	Eurostat
Sweden	SE	X	Eurostat
United Kingdom	UK		Eurostat

Source: Eurostat (Education Statistics).
Data downloaded on January 2010.

ANNEX 5 ADDITIONAL DATA ON INDICATOR 1

Table A.5.1. HRST, sub-groups of HRST, scientists and engineers, R&D personnel and researchers in the EU27 by member states in 2007: numbers in thousands

	HRST Human Resources in Science and Technology	HRSTE Human Resources in Science and Technology - Education	HRSTO Human Resources in Science and Technology - Occupation	HRSTC Human Resources in Science and Technology - Core	SE Scientists and Engineers	Total R&D personnel (HC)	Researchers (HC)	Researchers (FTE)
Belgium	2 516	2 106	1 442	1 032	366	84	51	36
Bulgaria	1 260	1 080	710	531	112	20	13	11
Czech Republic	1 997	923	1 638	564	181	73	43	28
Denmark	1 411	1 016	1 010	615	161	68	43	30
Germany	19 882	12 870	13 835	6 824	2 267	722	438	291
Estonia	344	283	179	118	31	9	7	4
Ireland	963	847	487	370	157	31	19	13
Greece	1 701	1 466	1 039	804	208		36	21
Spain	9 715	8 583	4 933	3 801	1 002	331	206	123
France	13 139	10 018	8 126	5 006	1 482	452	274	216
Italy	9 492	4 978	7 404	2 889	773		144	93
Cyprus	182	160	102	80	19	2	2	1
Latvia	486	329	332	175	43	11	8	4
Lithuania	724	602	412	291	74	18	13	8
Luxembourg	103	76	80	53	11	6	2	2
Hungary	1 585	1 149	1 041	605	166	49	33	17
Malta	57	35	43	21	6	2	1	0
Netherlands	4 442	3 157	3 104	1 819	528		59	50
Austria	1 631	901	1 193	463	136	89	54	32
Poland	5 972	4 412	3 988	2 429	830	122	97	61

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	HRST Human Resources in Science and Technology	HRSTE Human Resources in Science and Technology - Education	HRSTO Human Resources in Science and Technology - Occupation	HRSTC Human Resources in Science and Technology - Core	SE Scientists and Engineers	Total R&D personnel (HC)	Researchers (HC)	Researchers (FTE)
Portugal	1 239	901	894	556	166	63	51	28
Romania	2 308	1 579	1 739	1 010	393	42	31	19
Slovenia	412	284	300	172	48	14	9	6
Slovakia	894	489	690	285	70	23	19	12
Finland	1 410	1 126	859	576	181	80	53	39
Sweden	2 413	1 715	1 780	1 083	316	117	73	48
United Kingdom	13 295	10 742	7 759	5 206	1 546	504	378	255
EU27	99 570	71 828	65 120	37 378	11 272	3 438	2 158	1 448

Source: NIFU STEP based on Eurostat data (R&D statistics).

All variables in the table are downloaded from Eurostat on January 2010.

Notes Table A.5.1:

- 1) The total numbers of researchers (HC and FTE) in the table are from Table A.2.5 and Table A.2.10, and are therefore estimated values.
- 2) The remaining variables in the table are observed values.

Table A.5.2. HRST, sub-groups of HRST, scientists and engineers, R&D personnel and researchers in the EU27 by member states in 2007: % of active population

	HRST Human Resources in Science and Technology	HRSTE Human Resources in Science and Technology - Education	HRSTO Human Resources in Science and Technology - Occupation	HRSTC Human Resources in Science and Technology - Core	SE Scientists and Engineers	Total R&D personnel (HC)	Researchers (HC)	Researchers (FTE)
Belgium	53.2	44.5	30.5	21.8	7.7	1.76	1.08	0.77
Bulgaria	36.1	30.9	20.3	15.2	3.2	0.57	0.37	0.32
Czech Republic	38.4	17.8	31.5	10.8	3.5	1.41	0.82	0.54
Denmark	48.4	34.9	34.7	21.1	5.5	2.35	1.48	1.04
Germany	47.6	30.8	33.1	16.3	5.4	1.73	1.05	0.70
Estonia	50.0	41.2	26.0	17.2	4.5	1.35	0.99	0.54
Ireland	43.5	38.3	22.0	16.7	7.1	1.40	0.88	0.57
Greece	34.6	29.8	21.1	16.4	4.2		0.73	0.42

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Spain	43.8	38.7	22.2	17.1	4.5	1.49	0.93	0.55
France	47.3	36.1	29.2	18.0	5.3	1.63	0.98	0.78
Italy	38.4	20.1	29.9	11.7	3.1		0.58	0.38
Cyprus	46.3	40.7	25.9	20.3	4.8	0.63	0.39	0.20
Latvia	40.9	27.7	27.9	14.7	3.6	0.93	0.66	0.36
Lithuania	45.2	37.5	25.7	18.2	4.6	1.15	0.84	0.53
Luxembourg	48.7	35.9	37.8	25.1	5.2	2.62	1.17	1.04
Hungary	37.4	27.1	24.6	14.3	3.9	1.17	0.78	0.41
Malta	34.1	20.9	25.7	12.6	3.6	0.93	0.60	0.30
Netherlands	50.8	36.1	35.5	20.8	6.0		0.68	0.57
Austria	38.7	21.4	28.3	11.0	3.2	2.12	1.27	0.75
Poland	35.4	26.2	23.7	14.4	4.9	0.72	0.58	0.36
Portugal	22.1	16.0	15.9	9.9	3.0	1.12	0.92	0.50
Romania	23.1	15.8	17.4	10.1	3.9	0.43	0.31	0.19
Slovenia	39.8	27.4	29.0	16.6	4.6	1.38	0.84	0.60
Slovakia	33.7	18.4	26.0	10.7	2.6	0.88	0.73	0.47
Finland	52.7	42.1	32.1	21.5	6.8	2.97	2.00	1.46
Sweden	49.9	35.4	36.8	22.4	6.5	2.42	1.51	0.99
United Kingdom	43.2	34.9	25.2	16.9	5.0	1.64	1.23	0.83
EU27	42.2	30.5	27.6	15.8	4.8	1.46	0.91	0.61

Source: NIFU STEP based on Eurostat data (R&D statistics).

All variables in the table are downloaded from Eurostat on January 2010.

Notes Table A.5.2:

- 1) The total numbers of researchers (HC and FTE) in the table are from Table A.2.5 and Table A.2.10, and are therefore estimated values.
- 2) The remaining variables in the table are observed values.

Table A.5.3. HRST, sub-groups of HRST, scientists and engineers, R&D personnel and researchers in the EU27 by member states in 2007: % of total employment

	HRST Human Resources in Science and Technology	HRSTE Human Resources in Science and Technology - Education	HRSTO Human Resources in Science and Technology - Occupation	HRSTC Human Resources in Science and Technology - Core	SE Scientists and Engineers	Total R&D personnel (HC)	Researchers (HC)	Researchers (FTE)
Belgium	57.4	48.1	32.9	23.6	8.4	1.91	1.17	0.83
Bulgaria	38.7	33.2	21.8	16.3	3.4	0.61	0.40	0.34
Czech Republic	40.6	18.8	33.3	11.5	3.7	1.48	0.86	0.57
Denmark	50.3	36.2	36.0	21.9	5.7	2.44	1.53	1.08
Germany	52.0	33.7	36.2	17.9	5.9	1.89	1.15	0.76
Estonia	52.5	43.2	27.3	18.0	4.7	1.42	1.04	0.56
Ireland	45.6	40.1	23.1	17.5	7.4	1.46	0.92	0.60
Greece	37.7	32.5	23.0	17.8	4.6		0.79	0.46
Spain	47.7	42.2	24.2	18.7	4.9	1.63	1.01	0.60
France	51.4	39.2	31.8	19.6	5.8	1.77	1.07	0.84
Italy	40.9	21.4	31.9	12.4	3.3		0.62	0.40
Cyprus	48.2	42.3	27.0	21.2	5.0	0.66	0.41	0.21
Latvia	43.5	29.4	29.7	15.7	3.8	0.99	0.70	0.38
Lithuania	47.2	39.2	26.9	19.0	4.8	1.20	0.87	0.55
Luxembourg	50.8	37.5	39.4	26.1	5.4	2.74	1.22	1.08
Hungary	40.4	29.3	26.5	15.4	4.2	1.26	0.84	0.44
Malta	36.5	22.4	27.5	13.4	3.8	0.99	0.64	0.32
Netherlands	52.5	37.3	36.7	21.5	6.2		0.70	0.59
Austria	40.5	22.4	29.6	11.5	3.4	2.22	1.33	0.79
Poland	39.2	28.9	26.2	15.9	5.4	0.80	0.64	0.40
Portugal	24.0	17.4	17.3	10.8	3.2	1.21	1.00	0.55
Romania	24.7	16.9	18.6	10.8	4.2	0.45	0.33	0.20
Slovenia	41.8	28.8	30.5	17.5	4.9	1.45	0.89	0.63

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Slovakia	37.9	20.7	29.3	12.1	3.0	0.99	0.82	0.52
Finland	56.6	45.2	34.5	23.1	7.3	3.19	2.14	1.57
Sweden	53.1	37.8	39.2	23.9	7.0	2.58	1.61	1.05
United Kingdom	45.7	36.9	26.6	17.9	5.3	1.73	1.30	0.87
EU27	45.5	32.8	29.7	17.1	5.1	1.57	0.99	0.66

Source: NIFU STEP based on Eurostat data (R&D statistics).

All the variables in the table are downloaded from Eurostat on January 2010.

Notes Table A.5.3:

- 1) The total numbers of researchers (HC and FTE) in the table are from Table A.2.5 and Table A.2.10, and are therefore estimated values.
- 2) The remaining variables in the table are observed values.

Table A.5.4. The number of researchers (FTE) in per cent of active population in 2007 and growth (%) of this share from 2005 to 2007

	Researchers (FTE) as % of the active population in 2007	Growth rate of the share of researchers (FTE) as % of active population from 2005 to 2007
Belgium	0.77 %	7.08 %
Bulgaria	0.32 %	5.81 %
Czech Republic	0.54 %	14.81 %
Denmark	1.04 %	6.26 %
Germany	0.70 %	5.38 %
Estonia	0.54 %	6.30 %
Ireland	0.57 %	0.82 %
Greece	0.42 %	4.73 %
Spain	0.55 %	5.19 %
France	0.78 %	5.08 %
Italy	0.38 %	11.48 %
Cyprus	0.20 %	9.28 %
Latvia	0.36 %	22.75 %
Lithuania	0.53 %	11.41 %
Luxembourg	1.04 %	-5.28 %
Hungary	0.41 %	8.64 %
Malta	0.30 %	-1.19 %
Netherlands	0.57 %	3.55 %
Austria	0.75 %	7.69 %
Poland	0.36 %	0.53 %
Portugal	0.50 %	31.62 %
Romania	0.19 %	-19.51 %
Slovenia	0.60 %	16.71 %
Slovakia	0.47 %	12.77 %
Finland	1.46 %	-3.48 %
Sweden	0.99 %	-15.50 %
United Kingdom	0.83 %	0.28 %
EU27	0.61 %	3.88 %

Note: The data in this table are also presented in Figure 1.

Table A.5.5. Number of researchers (FTE), in the EU27, U.S., Japan and China, 2000-2007 (in thousands)

	2000	2001	2002	2003	2004	2005	2006	2007
EU27	1 107	1 173	1 176	1 204	1 248	1 368	1 417	1 448
United States	1 290	1 320	1 342	1 431	1 394	1 388	1 426	1 411
Japan	648	676	647	675	677	705	710	710
China	695	743	811	862	926	1 119	1 224	1 423
OECD	3 462	3 597	3 634	3 815	3 848	3 959	4 083	4 126

Note: The data in this table are also presented in Figure 2.

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Table A.5.5.a. Number of researchers (FTE) in the EU27 by Member State, 2000-2007 (in thousands)	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	31	32	31	31	32	33	35	36
Bulgaria	9	9	9	10	10	10	10	11
Czech Republic	14	15	15	16	16	24	26	28
Denmark	19	19	26	25	26	28	29	30
Germany	258	264	266	269	270	272	280	291
Estonia	3	3	3	3	3	3	4	4
Ireland	9	9	9	10	11	12	12	13
Greece	15	14	15	16	17	20	20	21
Spain	77	80	83	93	101	110	116	123
France	172	177	186	193	202	203	211	216
Italy	66	67	71	70	72	82	88	93
Cyprus	0	0	0	0	1	1	1	1
Latvia	4	3	3	3	3	3	4	4
Lithuania	8	8	6	7	7	8	8	8
Luxembourg	2	2	2	2	2	2	2	2
Hungary	14	15	15	15	15	16	18	17
Malta	0	0	0	0	0	0	1	0
Netherlands	42	46	38	37	47	47	52	50
Austria	23	24	24	25	26	28	29	32
Poland	55	56	57	59	61	62	60	61
Portugal	17	18	19	20	21	21	25	28
Romania	20	20	20	21	21	23	21	19
Slovenia	4	4	5	4	4	5	6	6
Slovakia	10	10	9	10	11	11	12	12
Finland	34	38	39	40	41	40	40	39
Sweden	43	46	47	48	49	55	56	48
United Kingdom	236	238	244	250	247	249	254	255
EU27	1 107	1 173	1 176	1 204	1 248	1 368	1 417	1 448

Note: The data in this table are also presented in Table A.2.10.

Table A.5.5.b. Number of researchers (FTE) in the EU27 by Member State, 2000-2007	2000	2001	2002	2003	2004	2005	2006	2007
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Mobility Patterns and Career Paths of EU Researchers

Belgium	30 540	32 237	30 668	30 916	32 401	33 146	34 879	36 318
Bulgaria	9 479	9 217	9 223	9 589	9 827	10 053	10 336	11 203
Czech Republic	13 852	14 987	14 974	15 809	16 299	24 168	26 266	27 878
Denmark	18 985	19 453	25 546	24 882	26 167	28 179	28 847	30 174
Germany	257 874	264 385	265 812	268 942	270 215	272 148	279 822	290 853
Estonia	2 666	2 681	3 059	3 017	3 369	3 331	3 513	3 690
Ireland	8 516	8 949	9 376	10 039	11 010	11 587	12 184	12 669
Greece	14 732	14 371	14 883	15 632	17 484	19 593	19 907	20 818
Spain	76 670	80 080	83 319	92 524	100 994	109 721	115 799	122 625
France	172 070	177 372	186 420	192 790	202 378	202 507	210 591	215 755
Italy	66 110	66 702	71 242	70 332	72 012	82 489	88 430	93 000
Cyprus	302	332	434	490	583	683	748	799
Latvia	3 814	3 497	3 451	3 203	3 324	3 282	4 024	4 223
Lithuania	7 777	8 075	6 326	6 606	7 356	7 637	8 036	8 489
Luxembourg	1 646	1 772	1 844	1 949	2 031	2 227	2 054	2 201
Hungary	14 406	14 666	14 965	15 180	14 904	15 878	17 547	17 391
Malta	263	266	272	276	436	479	521	494
Netherlands	42 088	45 517	38 159	37 282	47 225	46 767	52 039	49 726
Austria	23 317	23 721	24 125	25 041	25 956	28 148	29 199	31 676
Poland	55 174	56 148	56 725	58 595	60 944	62 163	59 572	61 396
Portugal	16 739	17 725	18 984	20 242	20 684	21 127	24 650	28 176
Romania	20 476	19 726	20 286	20 965	21 257	22 958	20 506	18 808
Slovenia	4 336	4 498	4 642	3 775	4 030	5 253	5 857	6 250
Slovakia	9 955	9 585	9 181	9 627	10 718	10 922	11 777	12 355
Finland	34 394	37 958	38 973	39 955	41 004	39 582	40 411	39 000
Sweden	42 932	45 995	47 191	48 186	48 784	55 090	55 729	47 775
United Kingdom	235 839	238 365	244 149	249 771	247 214	248 600	254 009	254 599
EU27	1 107 165	1 172 596	1 176 203	1 204 345	1 247 504	1 367 713	1 417 253	1 448 337

Note: The data in this table are also presented in Table A.2.10.

Please add separate data for all 27 Member States to this table A5.5 and also for A5.6, A5.7 and A5.8 (and for the other sectors too)

Table A.5.6. Number of business researchers (FTE), in the EU27, U.S., Japan and China, 2000-2007 (in thousands)

	2000	2001	2002	2003	2004	2005	2006	2007
EU27	525	550	551	564	577	625	653	664
United States	1 041	1 060	1 075	1 156	1 111	1 098	1 136	1 117
Japan	421	431	431	459	456	481	483	484
China	354	389	443	484	529	696	777	944
OECD	2 164	2 256	2 296	2 437	2 427	2 493	2 586	2 594

Note: The data in this table are also presented in Figure 3.

Table A.5.6.a. Number of business researchers	2000	2001	2002	2003	2004	2005	2006	2007

(FTE) in the EU27 by Member State, 2000-2007 (in thousands)								
Belgium	17	18	16	16	16	17	17	18
Bulgaria	1	1	1	1	1	1	1	1
Czech Republic	6	6	6	7	7	10	11	12
Denmark	9	10	16	15	16	18	18	19
Germany	153	158	155	162	162	167	171	174
Estonia	0	0	0	1	1	1	1	1
Ireland	6	6	6	6	6	7	7	7
Greece	3	4	4	4	5	6	5	6
Spain	21	19	25	28	32	35	40	42
France	81	88	95	101	109	107	114	119
Italy	26	27	28	27	28	28	30	33
Cyprus	0	0	0	0	0	0	0	0
Latvia	1	1	1	0	0	0	1	0
Lithuania	0	0	0	0	0	1	1	1
Luxembourg	1	1	2	2	2	2	1	2
Hungary	4	4	4	4	4	5	6	7
Malta	0	0	0	0	0	0	0	0
Netherlands	20	22	20	19	23	23	28	26
Austria	16	16	16	16	17	18	18	20
Poland	10	10	5	7	8	9	9	10
Portugal	2	3	3	4	4	4	6	8
Romania	13	11	11	10	9	10	8	8
Slovenia	1	2	2	2	2	2	2	3
Slovakia	2	2	2	2	2	2	2	2
Finland	20	22	23	23	23	22	23	22
Sweden	25	28	28	28	28	37	38	31
United Kingdom	86	91	96	99	94	94	94	92
EU27	525	550	551	564	577	625	653	664

Note: The data in this table are also presented in Table A.2.6.

Table A.5.6.b. Number of business researchers (FTE) in the EU27 by Member State, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Belgium	16 684	17 991	16 363	16 242	16 376	16 769	17 483	18 064
Bulgaria	1 139	1 082	957	1 225	1 239	1 157	1 304	1 318
Czech Republic	5 533	5 753	6 191	6 558	7 131	10 143	11 053	12 230
Denmark	9 366	9 651	15 747	14 734	15 877	17 624	17 718	19 145
Germany	153 120	157 836	155 440	161 980	162 239	166 874	171 063	174 307
Estonia	274	411	464	505	661	883	876	961

Ireland	5 631	5 971	5 992	6 012	6 300	6 768	7 015	7 262
Greece	3 234	3 797	4 017	4 295	5 164	6 033	5 397	6 090
Spain	20 869	18 959	24 632	27 581	32 054	35 034	39 936	42 101
France	81 012	88 479	95 294	100 646	108 752	106 837	113 521	118 568
Italy	26 099	26 550	28 019	26 866	27 594	27 939	30 006	32 871
Cyprus	77	83	117	103	108	130	161	182
Latvia	995	683	675	464	448	468	777	463
Lithuania	288	417	265	442	484	716	877	1 305
Luxembourg	1 399	1 464	1 529	1 594	1 546	1 696	1 460	1 522
Hungary	3 901	4 071	4 344	4 482	4 309	5 008	6 248	6 986
Malta	43	45	47	51	199	236	256	241
Netherlands	20 022	22 414	20 419	19 399	23 247	22 898	28 011	25 951
Austria	15 751	15 876	16 001	16 255	16 508	17 835	18 471	20 058
Poland	9 821	9 643	4 686	6 829	8 334	9 412	9 344	9 848
Portugal	2 358	2 722	3 258	3 794	3 904	4 014	6 245	8 477
Romania	12 690	11 292	10 673	9 920	9 092	10 319	7 708	7 754
Slovenia	1 380	1 510	1 620	1 516	1 657	1 936	2 262	2 571
Slovakia	2 420	2 256	2 169	1 914	1 815	1 947	1 901	1 599
Finland	19 647	22 422	22 747	23 072	23 397	21 967	22 721	22 005
Sweden	25 353	27 884	28 144	28 403	28 295	36 697	37 700	30 928
United Kingdom	85 737	91 145	95 708	99 352	94 369	93 717	93 844	91 548
EU27	524 844	550 407	551 389	563 990	577 173	625 055	653 358	664 353

Note: The data in this table are also presented in Table A.2.6.

Table A.5.7. Number of researchers (FTE) as % of the active population in the EU27, U.S., Japan, China and OECD (2000-2007)

	2000	2001	2002	2003	2004	2005	2006	2007
EU27	0.50	0.52	0.52	0.53	0.55	0.59	0.61	0.61
United States	0.90	0.91	0.92	0.97	0.94	0.93	0.95	0.93
Japan	0.96	1.00	0.97	1.01	1.02	1.06	1.07	1.06
China	0.09	0.10	0.11	0.11	0.12	0.14	0.16	0.18
OECD	0.65	0.67	0.67	0.70	0.70	0.71	0.72	0.73

Note: The data in this table are also presented in

Figure 4.

Table A.5.7.a. Number of researchers (FTE) as % of the active population in the EU27 by Member State (2000-	2000	2001	2002	2003	2004	2005	2006	2007

2007)									
Belgium	0.69	0.75	0.70	0.70	0.72	0.72	0.75	0.77	
Bulgaria	0.28	0.27	0.27	0.29	0.29	0.30	0.30	0.32	
Czech Republic	0.27	0.29	0.29	0.31	0.32	0.47	0.51	0.54	
Denmark	0.67	0.69	0.89	0.87	0.90	0.97	0.99	1.04	
Germany	0.65	0.67	0.67	0.68	0.68	0.66	0.67	0.70	
Estonia	0.41	0.41	0.48	0.46	0.51	0.51	0.51	0.54	
Ireland	0.49	0.50	0.51	0.53	0.57	0.57	0.57	0.57	
Greece	0.32	0.31	0.32	0.33	0.36	0.40	0.41	0.42	
Spain	0.43	0.45	0.45	0.48	0.50	0.53	0.54	0.55	
France	0.67	0.68	0.71	0.72	0.75	0.74	0.76	0.78	
Italy	0.28	0.28	0.30	0.29	0.30	0.34	0.36	0.38	
Cyprus	0.10	0.10	0.13	0.14	0.17	0.19	0.20	0.20	
Latvia	0.35	0.32	0.30	0.29	0.29	0.29	0.34	0.36	
Lithuania	0.46	0.49	0.39	0.39	0.45	0.48	0.51	0.53	
Luxembourg	0.89	0.94	0.95	1.00	1.02	1.10	1.00	1.04	
Hungary	0.35	0.36	0.37	0.36	0.36	0.38	0.41	0.41	
Malta	0.17	0.17	0.17	0.17	0.28	0.30	0.32	0.30	
Netherlands	0.52	0.55	0.45	0.44	0.56	0.55	0.61	0.57	
Austria	0.60	0.62	0.63	0.64	0.67	0.70	0.71	0.75	
Poland	0.32	0.32	0.33	0.35	0.36	0.36	0.35	0.36	
Portugal	0.32	0.33	0.35	0.37	0.38	0.38	0.44	0.50	
Romania	0.17	0.17	0.19	0.21	0.21	0.23	0.20	0.19	
Slovenia	0.45	0.46	0.47	0.39	0.40	0.52	0.57	0.60	
Slovakia	0.39	0.37	0.35	0.37	0.41	0.41	0.44	0.47	
Finland	1.29	1.42	1.45	1.49	1.54	1.51	1.53	1.46	
Sweden	0.98	1.01	1.03	1.05	1.06	1.17	1.17	0.99	
United Kingdom	0.82	0.82	0.84	0.85	0.83	0.83	0.83	0.83	
EU27	0.50	0.52	0.52	0.53	0.55	0.59	0.61	0.61	

Source: NIFU STEP based on Eurostat data (R&D Statistics data and LFS).

Notes:

- 1) The numbers of researchers in the EU27 by country are based on Table A.2.10.
- 2) For information about the active population in different countries in EU27, see Sub-indicator 13 in Annex 4.

Table A.5.8. Number of business researchers (FTE) as % of the active population in the EU27, U.S., Japan, China and OECD (2000-2007)

Per cent	2000	2001	2002	2003	2004	2005	2006	2007
EU27	0.24	0.25	0.25	0.25	0.25	0.27	0.28	0.28
United States	0.72	0.73	0.74	0.78	0.75	0.73	0.75	0.74
Japan	0.62	0.64	0.64	0.69	0.69	0.72	0.73	0.73
China	0.05	0.05	0.06	0.06	0.07	0.09	0.10	0.12
OECD	0.40	0.42	0.42	0.45	0.44	0.45	0.46	0.46

Note: The data in this table are also presented in Figure 5.

Table A.5.8.a. Number of	2000	2001	2002	2003	2004	2005	2006	2007

business researchers (FTE) as % of the active population in the EU27 by Member State (2000-2007)									
Belgium	0.38	0.42	0.38	0.37	0.37	0.36	0.38	0.38	
Bulgaria	0.03	0.03	0.03	0.04	0.04	0.03	0.04	0.04	
Czech Republic	0.11	0.11	0.12	0.13	0.14	0.20	0.21	0.24	
Denmark	0.33	0.34	0.55	0.52	0.55	0.61	0.61	0.66	
Germany	0.39	0.40	0.39	0.41	0.41	0.40	0.41	0.42	
Estonia	0.04	0.06	0.07	0.08	0.10	0.13	0.13	0.14	
Ireland	0.32	0.33	0.33	0.32	0.33	0.33	0.33	0.33	
Greece	0.07	0.08	0.09	0.09	0.11	0.12	0.11	0.12	
Spain	0.12	0.11	0.13	0.14	0.16	0.17	0.19	0.19	
France	0.31	0.34	0.36	0.37	0.40	0.39	0.41	0.43	
Italy	0.11	0.11	0.12	0.11	0.11	0.11	0.12	0.13	
Cyprus	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.05	
Latvia	0.09	0.06	0.06	0.04	0.04	0.04	0.07	0.04	
Lithuania	0.02	0.03	0.02	0.03	0.03	0.04	0.06	0.08	
Luxembourg	0.76	0.78	0.79	0.82	0.78	0.84	0.71	0.72	
Hungary	0.10	0.10	0.11	0.11	0.10	0.12	0.15	0.16	
Malta	0.03	0.03	0.03	0.03	0.13	0.15	0.16	0.14	
Netherlands	0.25	0.27	0.24	0.23	0.27	0.27	0.33	0.30	
Austria	0.41	0.41	0.41	0.41	0.43	0.44	0.45	0.48	
Poland	0.06	0.06	0.03	0.04	0.05	0.05	0.06	0.06	
Portugal	0.05	0.05	0.06	0.07	0.07	0.07	0.11	0.15	
Romania	0.11	0.10	0.10	0.10	0.09	0.11	0.08	0.08	
Slovenia	0.14	0.16	0.17	0.16	0.16	0.19	0.22	0.25	
Slovakia	0.09	0.09	0.08	0.07	0.07	0.07	0.07	0.06	
Finland	0.74	0.84	0.85	0.86	0.88	0.84	0.86	0.82	
Sweden	0.58	0.61	0.62	0.62	0.61	0.78	0.79	0.64	
United Kingdom	0.30	0.32	0.33	0.34	0.32	0.31	0.31	0.30	
EU27	0.24	0.25	0.25	0.25	0.25	0.27	0.28	0.28	

Source: NIFU STEP based on Eurostat data (R&D Statistics data and LFS).

Notes:

- 1) The numbers of researchers in the EU27 by country are based on Table A.2.6.
- 2) For information about the active population in different countries in EU27, see Sub-indicator 13 in Annex 4.

Table A.5.9. Number of researchers (HC, FTE) in the EU27 (2000-2007), in thousands

	2000	2001	2002	2003	2004	2005	2006	2007
Head Count	1 603	1 702	1 778	1 826	1 908	2 011	2 107	2 158
Full time equivalent	1 107	1 173	1 176	1 204	1 248	1 368	1 417	1 448

Note: The data in this table are also presented in Figure 6.

Table A.5.10. Number of researchers (FTE) as % of the active population in the EU27 in 2007 by country

Country	Number of researchers as % of active population
Belgium	0.77
Bulgaria	0.32
Czech Republic	0.54
Denmark	1.04
Germany	0.70
Estonia	0.54
Ireland	0.57
Greece	0.42
Spain	0.55
France	0.78
Italy	0.38
Cyprus	0.20
Latvia	0.36
Lithuania	0.53
Luxembourg	1.04
Hungary	0.41
Malta	0.30
Netherlands	0.57
Austria	0.75
Poland	0.36
Portugal	0.50
Romania	0.19
Slovenia	0.60
Slovakia	0.47
Finland	1.46
Sweden	0.99
United Kingdom	0.83
EU27	0.61

Note: The data in this table are also presented in Figure 7.

Table A.5.11. Researchers (FTE) in the public sector (higher education sector and government sector) in the EU27 (2000-2007), in thousands

	2000	2001	2002	2003	2004	2005	2006	2007
Total (public sector)	570	610	612	628	657	727	747	767
Higher education sector	400	446	450	464	489	547	564	581
Government sector	171	163	162	163	168	180	183	186

Note: The data in this table are also presented in Figure 8.

Table A.5.12. Researchers (FTE) in the public sector (higher education sector and government sector) in the EU27 by country (2000 and 2007), in thousands

	2000	2007
--	------	------

Belgium	14	18
Bulgaria	8	10
Czech Republic	8	16
Denmark	9	11
Germany	105	117
Estonia	2	3
Ireland	3	5
Greece	11	15
Spain	55	80
France	88	94
Italy	40	56
Cyprus	0	1
Latvia	3	4
Lithuania	7	7
Luxembourg	0	1
Hungary	11	10
Malta	0	0
Netherlands	21	24
Austria	7	12
Poland	45	51
Portugal	12	16
Romania	8	11
Slovenia	3	4
Slovakia	8	11
Finland	14	17
Sweden	18	17
United Kingdom	147	159

Note: The data in this table are also presented in Figure 9.

Table A.5.13. Researchers (HC, FTE) in the business enterprise sector in the EU27 (2000-2007) (in thousands)

	2000	2001	2002	2003	2004	2005	2006	2007
Head Count	588	612	636	654	680	706	751	764
Full time equivalent	525	550	551	564	577	625	653	664

Note: The data in this table are also presented in Figure 10.

Table A.5.14. Researchers (FTE) in the business enterprise sector by selected NACE sectors in the EU27 (2000 and 2007) (in thousands)

	2000	2007
Food products	6	8
Chemicals	25	27
Pharmaceuticals	40	48
Fabricated metal products	7	8
Machinery and equipment	47	55
Office machinery and computers	19	9

Electrical machinery	20	27
Radio, tv and communication equipment	70	63
Medical, precision and optical instruments	36	45
Motor vehicles	62	84
Other transport equipment	31	41
Transport, post and telecommunications	18	18
Computer and related activities	38	70
Research and development	25	43
Other business activities	17	27

Note: The data in this table are also presented in Figure 11.

ANNEX 6 ADDITIONAL DATA ON INDICATOR 5

Table A.6.1. Number of doctoral candidates (ISCED 6) with the citizenship of another EU27 member state in the reporting country in the EU27 (2007)

Country	Belgium	Bulgaria	Czech Republic	Denmark	Germany	Estonia	Ireland	Greece	Spain
Belgium	:	16	2	2	43	0	7	59	62
Bulgaria	0	:	1	0	4	0	0	68	0
Czech Republic	0	30	:	1	83	4	1	14	5
Denmark	2	7	6	:	80	0	5	11	18
Germany	:	:	:	:	:	:	:	:	:
Estonia	2	2	0	4	7	:	0	1	2
Ireland	:	:	:	:	:	:	:	:	:
Greece	:	:	:	:	:	:	:	:	:
Spain	49	74	12	15	227	5	15	129	:
France	185	195	115	19	515	20	35	560	312
Italy	11	17	10	6	82	2	4	73	67
Cyprus	0	1	0	0	23	0	0	0	1
Latvia	0	0	0	0	3	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0
Luxembourg	:	:	:	:	:	:	:	:	:
Hungary	0	0	1	0	14	1	0	1	1
Malta	0	0	0	0	1	0	0	0	0
Netherlands	:	:	:	:	:	:	:	:	:
Austria	8	76	56	8	1 134	3	6	49	49

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Poland	2	7	14	0	10	3	0	1	2
Portugal	10	20	6	1	39	0	2	2	44
Romania	2	8	0	3	45	0	0	185	0
Slovenia	2	0	0	0	2	0	0	0	1
Slovakia	0	1	11	0	0	0	0	0	1
Finland	9	10	18	7	122	121	7	25	47
Sweden	13	15	19	83	310	39	23	46	67
United Kingdom	203	139	91	234	2 553	34	1 624	2 814	864

Table A.6.1 continued

Country	France	Italy	Cyprus	Latvia	Lithuania	Luxembourg	Hungary	Malta	Netherlands
Belgium	286	129	1	1	1	48	9	1	33
Bulgaria	1	0	19	0	1	0	1	0	0
Czech Republic	9	14	6	4	2	0	7	0	4
Denmark	20	34	0	2	27	1	5	0	13
Germany	:	:	:	:	:	:	:	:	:
Estonia	2	3	0	11	5	0	0	0	0
Ireland	:	:	:	:	:	:	:	:	:
Greece	:	:	:	:	:	:	:	:	:
Spain	219	769	9	0	8	3	8	2	30
France	:	945	24	12	30	76	85	2	61
Italy	102	:	3	1	11	3	14	4	16

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Cyprus	0	0	:	0	0	0	0	0	0
Latvia	0	0	0	:	6	0	0	0	0
Lithuania	2	1	0	0	:	0	0	0	0
Luxembourg	:	:	:	:	:	:	:	:	:
Hungary	2	6	4	0	2	0	:	0	1
Malta	0	0	1	0	0	0	0	:	0
Netherlands	:	:	:	:	:	:	:	:	:
Austria	35	387	3	1	10	17	84	0	20
Poland	3	8	0	6	39	0	8	0	1
Portugal	46	59	0	0	2	1	6	1	6
Romania	4	10	4	0	0	1	17	0	3
Slovenia	3	18	0	0	1	0	3	0	2
Slovakia	0	2	0	0	0	0	2	0	0
Finland	43	66	1	10	32	0	30	1	17
Sweden	89	121	2	20	40	1	19	0	51
United Kingdom	1 211	1 789	421	28	41	61	128	182	453

Table A.6.1 continued

Country	Austria	Poland	Portugal	Romania	Slovenia	Slovak Republic	Finland	Sweden	United Kingdom
Belgium	5	31	30	65	1	11	1	6	15
Bulgaria	0	1	0	1	0	0	0	3	0
Czech Republic	7	68	6	8	2	1 085	0	2	9

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Denmark	3	28	13	18	0	1	6	35	21
Germany	:	:	:	:	:	:	:	:	:
Estonia	1	0	0	1	0	0	4	1	1
Ireland	:	:	:	:	:	:	:	:	:
Greece	:	:	:	:	:	:	:	:	:
Spain	23	137	1 678	190	5	13	11	21	72
France	36	298	248	858	12	34	18	28	96
Italy	15	58	33	126	15	3	5	8	24
Cyprus	0	0	0	1	0	0	0	0	0
Latvia	0	0	0	0	0	0	0	0	0
Lithuania	0	1	0	0	0	0	0	0	0
Luxembourg	:	:	:	:	:	:	:	:	:
Hungary	1	0	0	243	3	69	0	0	3
Malta	0	0	0	0	0	0	0	0	0
Netherlands	:	:	:	:	:	:	:	:	:
Austria	:	143	21	86	54	77	9	14	18
Poland	1	:	1	15	1	35	1	3	1
Portugal	5	22	:	31	3	9	5	13	10
Romania	6	1	0	:	0	0	0	5	0
Slovenia	0	3	0	5	:	1	0	0	0
Slovakia	0	5	0	1	0	:	0	0	0
Finland	11	42	13	57	1	11	:	87	29

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Sweden	37	97	39	59	1	15	168	:	70
United Kingdom	232	546	795	208	52	56	197	350	:

Source: Eurostat (Education Statistics).

Notes Table A.7.1:

- 1) The flag ':' is used for 'non available' data in the Eurostat database.
- 2) How to read: There are 80 doctoral candidates (ISCED 6) with German citizenship in Denmark.

ANNEX 7 ADDITIONAL DATA ON INDICATOR 7

Table A.7.1. Number of doctoral candidates (ISCED 6) in each of the EU27 countries, by broad regions of origin (%), 2007

Country	Nationals	Other EU27 country	Other European country (non-EU27)	Africa	North America	South America	Asia, Middle East, Oceania	Unknown	Total
Belgium	69.7	11.7	1.2	9.3	0.4	2.4	5.3	0.1	100.0
Bulgaria	93.4	2.1	1.3	0.5	0.4	0.1	2.3	0.0	100.0
Czech Republic	91.0	5.8	1.2	0.5	0.1	0.2	1.2	0.0	100.0
Denmark	78.3	7.4	2.6	0.5	0.7	0.7	4.7	5.1	100.0
Germany									
Estonia	96.0	2.2	1.1	0.0	0.1	0.1	0.5	0.0	100.0
Ireland									
Greece									
Spain	78.0	5.1	0.3	1.1	0.4	14.3	0.8	0.0	100.0
France	61.6	6.7	1.7	15.6	0.5	2.9	9.7	1.2	100.0
Italy	93.9	1.8	1.0	0.6	0.1	1.0	1.6	0.0	100.0
Cyprus	91.2	7.4	0.9	0.0	0.0	0.0	0.6	0.0	100.0
Latvia	99.2	0.5	0.3	0.0	0.0	0.0	0.0	0.0	100.0
Lithuania	99.8	0.1	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Luxembourg									
Hungary	92.4	4.5	1.7	0.4	0.2	0.0	0.8	0.0	100.0
Malta	93.1	2.8	0.0	2.8	0.0	0.0	1.4	0.0	100.0
Netherlands									

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Austria	77.9	13.0	3.3	0.9	0.3	0.4	4.1	0.0	100.0
Poland	97.2	0.5	1.8	0.1	0.0	0.0	0.4	0.0	100.0
Portugal	90.3	1.8	0.3	2.1	0.1	5.0	0.4	0.0	100.0
Romania	96.9	1.1	0.9	0.2	0.1	0.0	0.8	0.0	100.0
Slovenia	92.1	3.3	4.0	0.2	0.0	0.2	0.2	0.0	100.0
Slovakia	99.1	0.2	0.2	0.1	0.0	0.0	0.3	0.0	100.0
Finland	91.9	3.7	1.2	0.5	0.2	0.3	2.1	0.1	100.0
Sweden	78.2	6.9	2.0	0.8	0.5	0.6	4.9	6.0	100.0
United Kingdom	48.0	15.4	1.5	4.0	4.2	2.0	18.5	6.3	100.0
Total	75.9	6.8	1.3	3.7	1.1	3.3	6.2	1.8	100.0

Source: Eurostat (Education Statistics).

Notes Table A.7.1:

- 1) How to read: 6.9% of doctoral candidates in Sweden are from another EU27 country.
- 2) Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

Table A.7.2. Destination of doctoral candidates (ISCED 6) in the EU27 from each broad region of origin, according to receiving country (%), 2007

Country	Nationals	Other EU27 country	Other European country (non-EU27)	Africa	North America	South America	Asia, Middle East, Oceania	Unknown	Total
Belgium	1.4	2.6	1.4	3.8	0.5	1.1	1.3	0.1	1.5
Bulgaria	1.2	0.3	1.0	0.1	0.3	0.0	0.4	0.0	1.0
Czech Republic	5.8	4.1	4.4	0.6	0.5	0.3	0.9	0.1	4.8
Denmark	1.0	1.1	2.0	0.1	0.7	0.2	0.7	2.8	1.0
Germany									
Estonia	0.6	0.1	0.4	0.0	0.1	0.0	0.0	0.0	0.4

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Ireland									
Greece									
Spain	15.2	11.2	3.4	4.5	5.1	63.4	1.9	0.0	14.8
France	11.8	14.5	19.7	62.0	6.9	12.9	22.9	9.9	14.6
Italy	10.1	2.1	6.2	1.3	0.7	2.4	2.1	0.2	8.2
Cyprus	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Latvia	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.4
Lithuania	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6
Luxembourg									
Hungary	1.9	1.1	2.2	0.2	0.3	0.0	0.2	0.0	1.6
Malta	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Netherlands									
Austria	3.8	7.1	9.5	0.9	0.9	0.5	2.4	0.1	3.7
Poland	8.3	0.5	9.0	0.2	0.2	0.0	0.4	0.0	6.5
Portugal	4.5	1.0	0.8	2.1	0.2	5.7	0.3	0.0	3.8
Romania	7.2	0.9	3.9	0.3	0.5	0.0	0.8	0.1	5.6
Slovenia	0.3	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.3
Slovakia	2.9	0.1	0.4	0.1	0.0	0.0	0.1	0.0	2.3
Finland	5.4	2.5	4.3	0.6	1.0	0.4	1.5	0.2	4.5
Sweden	4.4	4.4	6.8	0.9	2.0	0.8	3.3	14.4	4.2
United Kingdom	12.8	46.1	23.8	22.2	80.3	12.3	60.7	72.1	20.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Eurostat (Education Statistics).

Notes Table A.7.2:

- 1) How to read: 62.0% of doctoral candidates in EU27 reporting data from Africa are located in France.
- 2) Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.

Table A.7.3. Number of researchers (HC) in the government sector in the EU27 in 2007, by citizenship (%)

Country	Total in the government sector	Nationals	Other EU Member States	Citizens of European countries not in EU	Africa	North America	Central and South America	Asia	Other
Belgium	2 653								
Bulgaria	6 440	99.8 %		0.1 %	0.0 %	0.0 %	0.0 %		0.0 %
Czech Republic	9 284								
Denmark	1 969	94.8 %							5.2 %
Germany	49 509								
Estonia	740	98.6 %	0.4 %	0.5 %	0.0 %	0.1 %	0.1 %	0.1 %	0.0 %
Ireland	538								
Greece	3 092								
Spain	30 264	93.5 %	3.7 %	0.4 %	0.1 %	0.2 %	1.8 %	0.3 %	0.0 %
France	28 709								
Italy	24 150								
Cyprus	225	93.8 %	5.8 %	0.0 %	0.0 %	0.4 %	0.0 %	0.0 %	0.0 %
Latvia	1 378								
Lithuania	1 694	99.4 %	0.3 %	0.1 %					0.2 %
Luxembourg	543	19.7 %	79.0 %	0.7 %					4.2 %
Hungary	5 941	98.1 %	1.2 %	0.4 %					0.3 %
Malta	26	88.5 %	7.7 %	3.8 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Netherlands	8 044								

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Austria	2 783								
Poland	14 956	99.3 %							0.7 %
Portugal	4 607	89.6 %	1.6 %	0.1 %	0.7 %	0.0 %	0.2 %	0.1 %	0.0 %
Romania	6 100	99.9 %	0.0 %	0.0 %					
Slovenia	2 194	98.0 %	1.2 %	0.7 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Slovakia	3 299	99.2 %							
Finland	5 714								
Sweden	2 843								
United Kingdom	9 488								

Source: Eurostat (R&D statistics).

Notes Table A.7.3:

- 1) Data for the total numbers of researchers in the government sector for Greece and Italy from Table A.2.2.
- 2) How to read: 88.5% of the number of researchers (HC) in the government sector in Malta are nationals.

Table A.7.4. Number of researchers (HC) in the higher education sector in the EU27 in 2007, by citizenship (%)

Country	Total in the higher education sector	Nationals	Other EU Member States	Citizens of European countries not in EU	Africa	North America	Central and South America	Asia	Other
Belgium	28 002								
Bulgaria	4 917	98.5 %	0.7 %	0.1 %			0.0 %		
Czech Republic	18 668								
Denmark	16 328	85.3 %							14.7 %
Germany	191 611								
Estonia	4 320	96.7 %	2.2 %	0.6 %	0.0 %	0.3 %	0.0 %	0.1 %	0.0 %
Ireland	10 600								
Greece	26 151								
Spain	118 769	95.3 %	1.9 %	0.3 %	0.2 %	0.3 %	1.7 %	0.2 %	0.0 %
France	108 322								
Italy	74 759								
Cyprus	871	77.0 %	21.0 %	0.3 %	0.0 %	1.1 %	0.1 %	0.2 %	0.1 %
Latvia	5 412								

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Country	Total in the higher education sector	Nationals	Other EU Member States	Citizens of European countries not in EU	Africa	North America	Central and South America	Asia	Other
Lithuania	10 195	99.4 %	0.3 %	0.1 %					0.1 %
Luxembourg	287								
Hungary	18 545	97.9 %	1.4 %	0.3 %					0.3 %
Malta	709	99.9 %	0.1 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Netherlands	20 397								
Austria	25 967								
Poland	70 723	98.8 %							1.2 %
Portugal	26 703	89.6 %	3.7 %	0.6 %	0.5 %	0.3 %	1.5 %	0.6 %	0.0 %
Romania	16 510	99.9 %	0.1 %	0.1 %					
Slovenia	3 623	99.1 %	0.6 %	0.1 %	0.0 %	0.0 %	0.0 %	0.1 %	0.1 %
Slovakia	13 918	98.3 %			0.0 %	0.0 %	0.0 %	0.1 %	0.0 %
Finland	20 570								
Sweden	35 162								
United Kingdom	271 360								

Source: Eurostat (R&D statistics).

Notes Table A.7.4:

- 1) Data for the total numbers of researchers in the higher education sector for Greece, Italy and the Netherlands from Table A.2.3.
- 2) How to read: 89.6% of the number of researchers (HC) in the higher education sector in Portugal are nationals.

Table A.7.5. Top 30 countries of origin for foreign doctoral candidates (ISCED 6) from third countries in the EU27 (2007)

Country	Doctoral candidates
1 China (including Hong Kong)	6 545
2 Mexico	4 008
3 United States	3 613
4 Brazil	3 134
5 Tunisia	2 833
6 Morocco	2 561
7 India	2 550
8 Algeria	2 410
9 Colombia	2 366
10 Lebanon	1 862
11 Iran	1 815
12 Malaysia	1 717
13 Canada	1 605
14 Russian Federation	1 438
15 South Korea	1 275
16 Japan	1 268
17 Thailand	1 264
18 Pakistan	1 170
19 Argentina	1 169
20 Syrian Arab Republic	1 157
21 Chile	1 133
22 Venezuela	1 130
23 Egypt	1 006
24 Vietnam	996
25 Turkey	981
26 Ukraine	947
27 Saudi Arabia	895
28 Nigeria	857
29 Peru	847
30 Libyan Arab Jamahiriya	836
31 Senegal	753
32 Jordan (Hashemite Kingdom of)	646
33 Cameroon	644
34 Australia	615
35 Gabon	523
36 Israel	517
37 Serbia and Montenegro	452

Source: Eurostat (Education Statistics).

Note: Missing values for Germany, Greece, Ireland, Luxembourg and the Netherlands.