European Commission

MORE4 study

Support data collection and analysis concerning mobility patterns and career paths of researchers

Indicators report

PPMI, IDEA Consult and WIFO
December 2019

Research and Innovation

MORE4 study: Support data collection and analysis concerning mobility patterns and career paths of researchers

European Commission
Directorate-General for Research & Innovation
Directorate A — Directorate A — ERA & Innovation
Unit A.3 — R&I Actors and Research Careers
Email: RTD-ACTORS-AND-CAREERS@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

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Support data collection and analysis concerning mobility patterns and career paths of researchers

2nd Interim Report. Part 2: Indicators report

PPMI, IDEA Consult and WIFO

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Directorate-General for Research and Innovation
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1. Introduction

1.1. Purpose of the report

The "MORE4 study Support data collection and analysis concerning mobility patterns and career paths of researchers", under the framework contract "PO/2016-06/01 – Lot 1", foresees to **update, improve and further develop the set of indicators** of the MORE3 study. Alike its previous reiterations, this update in MORE4 is to meet the need for indicators over time to assess the impact on researchers of policy measures introduced during implementation of the European Partnerships for Researchers and to provide new indicators to meet emerging policy needs and priorities.

The MORE4 study involves carrying out two major surveys and developing indicators to help monitor progress towards an open labour market for researchers. More specifically, this study will:

- conduct a survey of researchers currently working in the EU (and EFTA) in higher education institutions (HEI) regarding their mobility patterns, career paths, employment and working conditions (Task 1);
- conduct a survey of researchers currently working outside Europe regarding their mobility patterns, career paths and working conditions (Task 2);
- update the set of internationally-comparable indicators on researchers (Task 3);
- draft a final report that provides a comparative, policy-relevant analysis of the mobility patterns, working conditions and career paths of researchers (Task 4).

This report presents the final results of Task 3, the revision, updating and development of a limited set of key indicators covering different aspects related to researchers in the EU: human resources, working conditions, career paths, mobility (international, intersectoral and interdisciplinary), attractiveness of the ERA and open access in research. These indicators provide recent trends and international comparison, in particular with respect to the EU average, of these aspects.

1.2. Guide to the reader

Section 2 of this report includes a **list of the key indicators** used in the study and covering different aspects related to researchers in the EU, together with the description of each indicator and its rationale, the source of data, period of time and countries covered, as well as the availability of gender data for the indicator.

Section 3 of the report includes a detailed **description of the methodology** used in the revision, updating and development of a limited set of key indicators, including the description of data collection and data imputation processes, as well as methodological changes made since the previous MORE reports.

Section 4 presents the **results for the key indicators** according to 8 main aspects related to researchers: human resources, working conditions, career paths, international mobility, intersectoral mobility, interdisciplinary mobility, attractiveness of the ERA and open access in research. Each sub-section corresponds to one of these aspects. At the beginning of each sub-section a summary of analysis results is provided.

Section 5 presents the overall **conclusions** for each of 8 main aspects related to researchers**.**

2. List of key indicators

2.1. Updated indicators

The report is based on the total of 36 key indicators, including 31 indicators that were used in previous MORE studies and have been updated in MORE4 and 5 new indicators that were only introduced since MORE4. The five new indicators were included to address monitoring needs of new policy developments, such as the concept of Open Science and other developments identified in the impact assessment of the forthcoming framework programme Horizon Europe. The tables below include detailed information on each indicator, including the concept and definition of indicator, it's rational for the present study, data source, period of time covered by indicator, gender and country coverage by each indicator.

Table 1: List of updated indicators

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
1-1	Human resources	Researchers (FTE) per thousand employees	The indicator presents the current stock of researchers. It provides a measure of the achievements of EU Member States' national R&D targets established in the EUROPE 2020 Strategy.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc)	2000-2017	Yes	EU28; EU candidate countries; Iceland; Norway; Switzerland; US; China; Japan; South Korea
1-2	Human resources	Number of young PhD graduates (ISCED 6/8) per thousand population aged 25- 29	The indicator provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad01 from 2013, educ_grad4 until 2012)	2000-2017	Yes	EU28; Iceland; Norway; Switzerland
1-3	Human resources	Number of PhD graduates (ISCED 6/8) per thousand population	The indicator provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad01 from 2013, educ_grad4 until 2012)	2000-2017	Yes	EU28; Iceland; Norway; Switzerland; US; Japan

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
1-4	Human resources	New women doctoral graduates (ISCED 6/8) per thousand population aged 25- 34	This indicator addresses the gender dimension and provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad06 from 2013, educ_grad4 until 2012)	2000-2017	Yes	EU28; Iceland; Norway; Switzerland
1-5	Human resources	Share of female researchers in the total number of researchers	This indicator addresses the gender dimension by providing a direct measure of the proportion of women in the population of researchers. This indicator is to be related to Indicators 3-1 and 3-4 which address the career development of female researchers.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc)	2000-2017	Yes	EU28; EU candidate countries
1-6	Human resources	Share of researchers in the private sector in the total number of researchers	Given the significant differences between working conditions, incentives, potential for mobility and private sector, the indicator provides insight into better understanding the observed values in the other indicators.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc)	2000-2017	Yes	EU28; EU candidate countries; Iceland; Norway; Switzerland; US; China; Japan; South Korea
1-7	Human resources	Satisfaction with recruitment process at home research institution (open, transparent, merit-based)	The indicator provides insights into the recruitment process of researchers according to priority criteria of the Commission (OTM).	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU and other selected non-EU countries

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
2-1	Working conditions	Share of researchers employed on fixed-terms contracts in their current academic position	The indicator measures the size of non–permanent employment compared with total employment.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU and other selected non-EU countries
2-2	Working conditions	Share of researchers with part-time employment in their current academic position	The indicator measures the size of part-time employment compared to full time researchers.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU and other selected non-EU countries
2-3	Working conditions	Glass Ceiling Index	This indicator helps to assess and understand the difficulties for women progressing in their research career.	SHE figures (WIS database)	2000-2017	Yes	EU28; Norway; Switzerland
2-4	Working conditions	Satisfaction with remuneration	The indicator provides an assessment of how each country stands in terms of remuneration according to researchers.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28; Iceland; Norway; Switzerland
2-6[1]	Working conditions	Transferability of pensions/social security	The indicator provides a measurement of the existence of a potential barrier to international mobility (i.e. the transferability of pensions and social security). However, it does not indicate the degree of importance of the barrier. This indicator is to be related to the Pan-	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	No	EU28 ; Iceland; Norway; Switzerland

[1] Previously 2-5.

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
			European pension fund.				
2-7[2]	Working conditions	Satisfaction in current academic position regarding pensions/social security	The indicator provides an insight into the current level of satisfaction related to pension for academic researchers.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
2-8[3]	Working conditions	Number of HRS4R acknowledged institutions per thousand researchers	These institutions have signed the Code of Conduct and provided the Commission with a gap analysis and a solid action plan on how to concretely implement the elements of the Code of Conduct. This indicates the strong commitment of the institutions of the countries.	EURAXESS	2005-2019	No	EU28; Iceland; Norway
3-1	Career paths	Share of researchers receiving transferable skills training during PhD	The indicator assesses the extent of the countries' move towards more transferable skills training at the PhD stage.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
3-2	Career paths	Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc.) are regarded as positive factors	The indicator assesses the importance of transferable skills in the shaping of career paths.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland

[2] Previously 2-6.

[3] Previously 2-7.

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
		for career progression					
3-3	Career paths	Degree of satisfaction with different aspects of the current academic position. Composite indicator with career related aspects	The indicator assesses the appreciation from the researcher's point of view of the different dimensions related to his/her career path.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
3-4	Career paths	Transparency and meritocracy in professional advancement in HEIs (composite indicator)	The indicator expresses the assessment by researchers of the level of transparency and meritocracy in the career progression in their institutions.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
3-5	Career paths	Proportion of women as Grade A academic staff	The indicator measures gender (in)equality and thereby helps to assess and understand the difficulties for women in entering in a research career. The gender dimension provides an indication of the progress made towards implementing measures of gender equal opportunities.	WIS database/ SHE figures	2000-2017	Yes	EU28; Iceland; Norway; Switzerland
3-6	Career paths	Proportion of women on boards	The indicator measures gender (in)equality and thereby helps to assess and understand the difficulties for women in entering and progressing in the research career. The gender dimension	WiS database/ SHE figures	2002-2017	Yes	EU28; Iceland; Norway; Switzerland; Israel

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
			provides an indication of the progress made towards implementing measures of gender equal opportunities.				
4-1	International mobility	Share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years.	The indicator measures medium- to long-term international mobility.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
4-2	International mobility	Share of researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last ten years	The indicator measures short-term international mobility.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
4-3	International mobility	Share of HEI researchers that consider virtual mobility as substitute for short or long-term mobility	The indicator gives information about the relevance of ICT in reducing physical mobility while maintaining international scientific collaboration.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
4-4	International mobility	Percentage of co-publications of the country with an author from another country	The indicator is a proxy for scientific output effects of researcher mobility.	SCOPUS	2000-218	No	EU28; Iceland; Norway; Switzerland; United States; China; Japan; South Korea
4-5	International mobility	R1-R2 PhD degree mobility	The indicator measures the proportion of mobile PhD candidates as a measurement of international mobility at early career stages.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
5-1	Intersectoral mobility	Share of researchers with experience in private sector	The indicator measures intersectoral (public-private sector) mobility.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
5-2	Intersectoral mobility	Share of female researchers with experience in private sector	This indicator on intersectoral (public-private sector) mobility addresses the gender issue.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
6-1	Interdisciplinary mobility	Interdisciplinary mobility as a positive factor for career progression	The indicator assesses whether interdisciplinarity is facilitating career progression.	MORE3/ MORE4 surveys	MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
7-1	Attractiveness of the ERA	Mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country	The indicator focuses on country of destination measuring mobility of researchers in the first stage of their career, with specific focus on mobility within Europe. It is also a measure of a country's "brain-gain" within EU.	Eurostat: educ_uoe_mobs02/educ_uoe_enrt01	2008-2017	No	EU28
7-2	Attractiveness of the ERA	Share of HEI researchers considering availability of research funding better in non-EU countries than in the EU	The indicator measures the attractiveness of countries in terms of research funding.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28
7-3	Attractiveness of the ERA	Share of HEI researchers considering social security and pension plan better in	The indicator measures the attractiveness of countries in terms of	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016),	Yes	EU28

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
		non-EU countries than in the EU	social security/pension plans.		MORE4 (2019)		

2.2. New indicators

Table 2: List of new indicators

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
2-5	Working conditions	Gender pay gap in the research sector	This indicator provides a measurement of the magnitude of the gender pay gap in the scientific research sector compared to that in the general economy.	Eurostat: Structure of Earnings Survey, as published in SHE figures	2007-2017	Yes	EU28; Norway, Switzerland
5-3	Intersectoral mobility	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in public or government sector	The indicator measures intersectoral (academia-public/government sector) mobility.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
5-4	Intersectoral mobility	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in the private not-for-profit sector	The indicator measures intersectoral (academia-private not-for-profit) mobility.	MORE2/ MORE3/ MORE4 surveys	MORE2 (2012), MORE3 (2016), MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland
8-1	Open access	Share of researchers who published in (or sent articles for	The indicator measures the extent to which researchers engage in open access publishing activities.	MORE4 survey	MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland

NO.	CONCEPT	INDICATOR	RATIONALE	DATA SOURCE	PERIOD	FEMALE	COUNTRY COVERAGE
		review to) open access journals					
8-2	Open access	Share of PhD students who received training in open science approaches	This indicator measures the extent to which young researchers in Europe are familiarised with open science approaches (publishing in open access journals, sharing research data, participating in citizen science events, etc.).	MORE4 survey	MORE4 (2019)	Yes	EU28 ; Iceland; Norway; Switzerland

3. Methodology

This section presents the methodology used for collecting data for each indicator by source. After the collection phase, an imputation procedure was implemented in order to fill in missing values in time series, which is presented in the subsequent chapter. Finally, we present the key methodological changes in MORE4 which were implemented in order to provide more insightful monitoring of the relative position of countries and of evolutions over time.

3.1. Data collection

Key indicators rely on primary data from the MORE surveys (19 key indicators) and secondary data collected from various sources of information (12 key indicators):

— Eurostat;
— SHE Figures report (from the Women in Science WiS database);
— EURAXESS;
— Scopus;
— World Bank.

This section explains how data was collected from these different sources.

3.1.1. Eurostat

Eurostat was used to produce the following key indicators:

Table 3: Indicators based on Eurostat

No	Indicator	Reference of Eurostat database
1-1	Researchers (FTE) per thousand employees	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employment and activity by sex and age (lfsi_emp_a)
1-2	Number of young PhD graduates (ISCED8) per thousand population aged 25-29	Eurostat, Graduates by education level, programme orientation, completion, sex and age (educ_uoe_grad01 from 2013, educ_grad until 2012)
1-3	Number of PhD graduates (ISCED8) per thousand population	Eurostat, Graduates by education level, programme orientation, completion, sex and age (educ_uoe_grad01 from 2013, educ_grad until 2012)
1-4	New women doctoral graduates (ISCED 8) per thousand population aged 25- 34	Eurostat, Graduates by education level, programme orientation, completion, sex and age (educ_uoe_grad01 from 2013, educ_grad until 2012)

No	Indicator	Reference of Eurostat database
1-5	Share of female researchers in the total number of researchers	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employment and activity by sex and age (lfsi_emp_a)
1-6	Share of researchers in the private sector in the total number of researchers	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employment and activity by sex and age (lfsi_emp_a)
7-1	Mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country	Eurostat: Mobile students from abroad enrolled by education level, sex and country of origin (educ_uoe_mobs02)/Students enrolled in tertiary education by education level, programme orientation, sex, type of institution and intensity of participation (educ_uoe_enrt01)

Indicators 1-1, 1-5 and 1-6 in Table 2 were collected using 'Total R&D personnel by sectors of performance, occupation and sex' (rd_p_persocc) database from Eurostat. Data was extracted for years 2000 to 2017 in full-time equivalent. For indicators 1-5 and 1-6, which are ratios, all data needed to calculate the share in the total number of researchers could be found in the rd_p_persocc database. On the other hand, to build the final indicator 1-1, the number of total researchers was divided by the total employment in thousands from the 'Employment and activity by sex and age' dataset (lfsi_emp_a) (see section 3.1.6 for information on the source of the employment data).

Indicators 1-2, 1-3 and 1-4 were collected using two different databases from Eurostat. Data on the number of PhD graduates from the year 2000 to 2012 was extracted from the 'Graduates in ISCED 5 and 6 by age and sex' (educ_grad4) database, while from 2013 onwards, the data was extracted from 'Graduates by education level, programme orientation, completion, sex and age' (educ_uoe_grad01) database. Again, the use of additional data to build the final indicators (total population aged 25-34; total population and population aged 25-34) is described in section 3.1.6*Additional indicators*.

Finally, indicator 7-1 was built as the share of foreign (intra-EU28) PhD students on the total number of PhD students of the country. Four Eurostat databases were used to build this indicator. From 2008 to 2012, dataset for 'Foreign students by level of education and country of origin' (educ_mofo_orig) was used to gather the number of foreign PhD students from the EU27 + Croatia and 'Students enrolled in tertiary education by education level, programme orientation, sex, type of institution and intensity of participation' (educ_uoe_enrt01) for the total number of PhD students in each EU28 country. From 2013 onwards, 'Mobile students from abroad enrolled by education level, sex and country of origin' (educ_uoe_mobs02) was used to collect the number of foreign PhD students from the EU28 and educ_uoe_enrt01 for the total number of PhD students in each EU28 country.

For all these indicators, missing values were imputed following the methodology explained in section 3.2.

3.1.2. SHE Figures

Data from the Women in Science (WIS) database, published in the SHE Figures reports, were used for the following indicators:

Table 4: Indicators based on SHE figures

No	Concept	Indicator
2-3	Working conditions	Glass Ceiling Index
2-5	Working conditions	Gender pay gap in the research sector
3-5	Career paths	Proportion of women as Grade A academic staff
3-6	Career paths	Proportion of women on boards

For indicator 2-3, SHE Figures reports 2006, 2009, 2012, 2015 and 2018 were used. These reports respectively present the Glass Ceiling Index for the years 2003, 2006, 2009, 2013 and 2016.

Regarding indicator 2-5, SHE Figures reports from 2015 and 2018 were used. These reports respectively present the gender pay gap in the research sector for the years 2010 and 2014. While the metric is published in the SHE Figures reports, it is based on the Structures of Earnings (SES) survey from Eurostat.

Also, for indicator 3-5, SHE Figures reports 2006, 2009, 2012, 2015 and 2018 were used. These reports respectively present the proportion of women as Grade A academic staff for the years 2004, 2007, 2010, 2013 and 2016.

Regarding indicator 3-6, SHE Figures reports 2009, 2012 and 2015 and 2018 were used. These reports respectively present the proportion of women on boards for years 2007, 2010, 2014 and 2017.

When exceptions to the reference year are mentioned in the reports for some countries, these have been taken into account in the data collection. Finally, values were imputed according to the methodology explained in section 3.2. This allowed us to create continuous time series for these indicators.

3.1.3. EURAXESS

The following indicator was built based on EURAXESS information.

Table 5: Indicators based on EURAXESS

No	Concept	Indicator
2-8	Working conditions	Number of HRS4R acknowledged institutions per million inhabitants

The European Commission presents all listed institutions that have been acknowledged with HRS4R1 on EURAXESS. A direct link to the website of each of the acknowledged institutions is provided, with information on the strategy and on specific measures taken by the organisation generally available.

In order to collect data, the project team browsed through all the available links in order to find out the exact year in which each organisation received the HRS4R acknowledgement from the European Commission.

When the main method was not successful, an estimate was made based on the year of publication of the "action plan on concrete measures for implementing the elements of the Code of Conduct for the Recruitment of Researchers". Generally, institutions receive the HRS4R acknowledgement from the European Commission soon after the publication of such action plan.

The key indicator based on this data is presented as the number of institutions located in a country with an HRS4R acknowledgement from the European Commission in a given year per thousand researchers.

3.1.4. Scopus

One indicator relies on Scopus abstract and citation database: percentage of co-publications of the country with an author from another country. The indicator calculates the percentage share from total publications of publications with at least one author from another country. The publications calculated for this indicator include articles, reviews, and conference proceedings (i.e., peer reviewed material).

It is important to note that the dataset on the percentage of co-publications of the country with an author from another country (2000-2018) used in MORE4 is different from the one used in MORE3 study, mainly in that MORE3 study included only articles and reviews, whereas MORE4 also covers conference proceedings among co-publications. As a consequence, the indicator values for co-publications in MORE4 dataset are slightly different from the ones included in MORE3 indicators' report.

No	Concept	Indicator
4-4	International mobility	Percentage of co-publications of the country with an author from another country

3.1.5. MORE surveys

23 key indicators rely on surveys conducted in the course of the MORE projects and are therefore unique to this project. Table 7 lists these 23 indicators.

Table 6: Indicators based on MORE surveys

No	Concept	Indicator
1-7	Human resources	Satisfaction with recruitment process at home research institution (open, transparent, merit-based)
2-1	Working conditions	Share of researchers employed on fixed-terms contracts in their current academic position
2-2	Working conditions	Share of researchers with part-time employment in their current academic position
2-4	Working conditions	Satisfaction with remuneration
2-6	Working conditions	Transferability of pensions/social security
2-7	Working conditions	Satisfaction in current academic position regarding the pension/social security

No	Concept	Indicator
3-1	Career paths	Share of researchers receiving transferable skills training during PhD
3-2	Career paths	Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc.) are regarded as positive factors for career progression
3-3	Career paths	Degree of satisfaction with different aspects of the current academic position. Composite indicator with career related aspects.
3-4	Career paths	Transparency and meritocracy in professional advancement in HEIs (composite indicator)
4-1	International mobility	Share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years
4-2	International mobility	Share of researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last ten years
4-3	International mobility	Share of HEI researchers that consider virtual mobility as substitute for short- or long-term mobility
4-5	International mobility	R1-R2 PhD degree mobility
5-1	Intersectoral mobility	Share of researchers with experience in private sector
5-2	Intersectoral mobility	Share of female researchers with experience in private sector
5-3	Intersectoral mobility	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in public or government sector
5-4	Intersectoral mobility	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in the private not-for-profit sector
6-1	Interdisciplinary mobility	Interdisciplinary mobility as a positive factor for career progression
7-2	Attractiveness of the ERA	Share of HEI researchers considering availability of research funding better in EU than in non-EU countries
7-3	Attractiveness of the ERA	Share of HEI researchers considering
8-1	Open access	Share of researchers who published in (or sent articles for review to) open access journals
8-2	Open access	Share of PhD students who received training in open science approaches

As in MORE3, the survey focused on researchers in HEIs currently working in the EU and, therefore, these indicators do not cover non-EU countries.

Also, as in MORE3 the indicators 7-2 and 7-3 on the attractiveness of ERA in terms of research funding and social security/pension plan differentiate researchers according to their nationality as follows: one sub-set of data refer to non-EU researchers currently working in the EU while another sub-set refer to EU researchers currently working in the EU but that have previously been mobile outside the EU.

Methodology for collecting and treating data survey indicators are detailed in Task 1 of this project (Part 1 of this Second Interim report).

It is also important to note that in comparison with other key indicators based on secondary sources, variations over time for MORE indicators between MORE3 (reference year 2016) and MORE4 (reference year 2019) can sometimes be larger. This can be due to sensitiveness of results to sampling differences per country and/or because questions in MORE surveys are more focused on perception of stakeholders of various concepts while indicators from secondary data are related to factual data like the number of researchers in a country.

3.1.6. Additional indicators

Additional indicators were collected in order to produce key indicators of Table 7, which consist in ratios with the denominator being population or employment in the country.

Table 7: Ratios indicators

No	Indicator
1-1	Researchers (FTE) per thousand employees
1-2	Number of young PhD graduates (ISCED8) per thousand population aged 25-29
1-3	Number of PhD graduates (ISCED8) per thousand population
1-4	New women doctoral graduates (ISCED 8) per thousand population aged 25- 34

Population and employment were collected by gender and for specific age categories when needed for the key indicators. These additional indicators are listed in Table 8.

Table 8: Additional indicators

Indicator	Source
Total population	Eurostat & World Bank
Total female population	Eurostat & World Bank
Total employment	Eurostat & World Bank
Total female employment	Eurostat & World Bank
Population aged 25 to 29	Eurostat & World Bank

Indicator	Source
Female population aged 25 to 29	Eurostat & World Bank
Population aged 25 to 34 (sum of 25-29 and 30-34)	Eurostat & World Bank
Female population aged 25 to 34 (sum of 25-29 and 30-34)	Eurostat & World Bank

Data for EU28, EFTA and EU candidate countries were collected from Eurostat, while data for the US, China, Japan and South Korea were collected from the World Bank database.

Table 9: Sources for additional indicators

Country or country group	Source
EU28, EU candidate and EFTA countries	Eurostat
United States, China, Japan, South Korea	World Bank

3.2. Data imputation

Consistent with MORE3, standard imputations methods are used as follows:

Linear interpolation methodology: when data for a single year or a time period no longer than 6 years is missing with adjacent years available, the following formula was used:

$$Imputation\ for\ year\ t\ = (t - ta)(tb - ta)Xa + (tb - t)(tb - ta)Xb$$

with Xa and Xb being data points for, respectively, previous year available (ta) and next year available (tb). This corresponds to a weighted average of adjacent available years with weights being the distance between the imputed year and available years. An example of this shown below:

$$Imputation\ for\ 2016\ = (2016 - 2015)(2017 - 2015)0.05 + (2017 - 2016)(2017 - 2015)0.13$$

Last observation carried forward: when data for years at the end of the period is missing, the data point from the last available year is used as imputed value, with a maximum of three years of difference between the imputed year and the last available year.

Next observation carried backward: when data for years at the beginning of the period is missing, the data point from the next available year is used as imputed value, with a maximum of three years of difference between the imputed year and the next available year.

Carry-backward and carry-forward imputations are used in order to get a better country coverage for a given year. The maximum length of three years for imputation reflects a compromise between ensuring better cross-sectional coverage and guaranteeing figures that still make sense for the imputed year. Trends should, however, be carefully assessed when comparing years for which these two types of imputations were used. For this

reason, in the scorecards presented in section 4, carried forward imputations are not included in the analysis of the last two available years.

Regarding indicators that consist in dividing an indicator by employment or population (e.g. researchers per thousand employees), the numerator is imputed based on the above methodology, not the ratio, as the denominator (employment, population) does not present missing values.

Table 10 presents the codes that are used to flag imputed value in the database and in Section 4.

Table 10: Flags used for imputation methods

Flag	Imputation method
ixy	Interpolation for the yth year in a series of missing value for x consecutive years. For example, i34 indicates that data for 4 consecutive years was initially missing, and that the flag correspond to the 3rd year of this period.
b	Next available data point was carried backward
f	Last available data point was carried forward

3.3. Methodological changes in MORE4

We have introduced several novelties into the overall MORE4 methodology, of which the purpose is to deepen the analysis and provide new insights on the existing and new indicators. These novelties include the introduction of the long-term trend, the progress against EU average index and the use of real versus arithmetic averages.

3.3.1. Long-term trend

As part of the broader methodological changes in MORE4, we have introduced the **long-term trend** measurement, which will be operationalised in the form of a graph inside the scorecard table.

Long-term trend measurement allows us to have a closer look to the overall trend of a country's performance, as the short-trend analysis might skew the picture of the progress (or lack thereof) made by the analysed EU member states. The reason behind this is that short-trend analysis is based on two data points only, while the long-term trend visualises all available data points.

Limitations of the proposed metric

The main limitation to this metric is the lack of long-term data for selected countries, especially those that are EU candidate countries. Additionally, long-term trends might not show a conclusive look to the overall picture, as long-term data tends to have missing values which have to be imputed. Finally, the long-term trend metric is not applicable to indicators which are based on the consecutive MORE surveys, since long time-series data is not available.

3.3.2. *Progress against EU average index*

Another measurement introduced as part of MORE4 is the progress against EU average index, shortened as **progress index**. This metric shows whether the country in question is drawing closer to or further from the EU average based on the latest data point used in the short-term trend analysis. The equation used to calculate this measurement is presented below:

$$Progress\ against\ EU\ average\ index = \frac{country\ value\ (latest\ year)}{EU\ average\ (latest\ year)} * 100\% - \frac{country\ value\ (earlier\ year)}{EU\ average\ (earlier\ year)} * 100\%$$

The introduction of this new metric is valuable for several reasons:

— It complements measurement of the progress made by individual countries against their recent historical performance, with measurement of their relative progress in comparison to a general trend. While scorecards used in MORE3 were indicative of how much progress individual countries made against their own result a few years ago (2010-2014 % change) and where they stand in comparison to the EU average, information on the extent to which each country improved/worsened its situation against the EU average was not measured.
— It adds an additional layer of analysis to the traffic light colour coding used for comparing each country against the EU average. For instance, this new index shows clearly how fast the countries coded in red (i.e. countries below the EU average) are catching up with their better performing counterparts.

Limitations of the proposed metric

For certain indicators, the progress index may show an unreasonably high or low value for the progress (or lack thereof) made, mainly due to the unusual fluctuations within the short-term data. This is especially true for smaller countries are which are prone to having large increases or decreases in the short-term trend, which in turn causes the progress index value to increase or decrease in a similar fashion. Therefore, it could sometimes be difficult to extrapolate insights from the progress index metric which show dramatic changes.

3.3.3. *Use of real average versus arithmetic average*

One other adjustment has been made in the MORE4 study. Whenever possible, the real EU average is calculated, meaning that EU-wide data will be either be extracted as a separate value from the datasets used or compiled by using all EU MS values to acquire it. This is done for several reasons:

— It gives a more accurate representation of the situation in the EU. It applies sample size to all EU countries, while arithmetic treats all countries' as equal to one another. This means that small countries no longer oversell the EU average etc. EU28 scorecards should be used based on the actual averages rather than arithmetic averages.
— Appropriately, we will use reference periods that contain real values, when available, in order to gauge the short-term trend and the progress index more accurately.

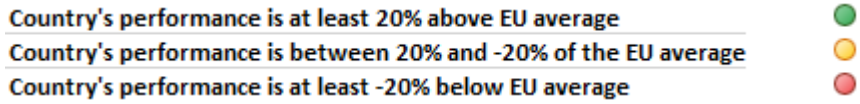
However, for the purpose of facilitating long-term trends, we will only use arithmetic averages, as actual averages are often not available for the whole reference period (2000 or oldest available data). Additionally, this metric targets the short-term trend presented within the indicator itself. Since the long-term trend graphic only visualises the data points and does not provide their actual values, this change would not be relevant for that purpose.

4. Indicators and scorecards

This section presents the key indicators in the following format:

— One scorecard reporting the indicator for the last year available and the indicator three to five years before the last year available. Changes between these two years are reported (**short-term trend**) together with an arrow indicating the direction of the change (up or down). Relative changes (percentage change) are reported except for indicators that consist in percentages. For these indicators, absolute changes in percentage points are reported.

— Coloured circles indicate the **comparison with EU average** as follows:



For four indicators, a higher value is associated with a lower performance: share of researchers employed on fixed-term contracts (2-1); share of part-time researchers (2-2); glass ceiling index (2-3) and importance of transferability of pensions/social security as barrier for post-PhD mobility. For these indicators, green, yellow and red circles indicate country's performance being, respectively, at least 20% below, between -20% and 20% and at least 20% above compared to EU average.

Additionally, the progress relative to EU average (operationalized as the 'progress index') is shown together with an arrow indicating the direction of the change (up or down), similarly to that of the aforementioned short-term trend.

Finally, the long-term trend visualizes all data points (since 2000 or oldest available) of the selected country. For indicators based on MORE3/MORE4 survey values, this does not apply. An example of this is shown below:

— One table reporting data since 2000 or oldest available year.

Regarding indicators based on the MORE surveys, only scorecards are presented because long time series are not available for these indicators.

Indicators for female researchers are reported separately when available.

4.1. Human resources

In the area of human resources, Europe has been experiencing positive developments both in the short term (2014-2017/2018) and from the longer-term perspective of the last decade.

The **number of researchers** (FTE) per thousand employees in EU28 has increased by 7% between 2014 and 2017 and has been increasing since 2000. Scandinavian countries (Denmark, Finland, Sweden) were the best overall

performers, whereas the score was the lowest in Romania, Cyprus and Malta. The number of researchers (FTE) per thousand employees was higher in EFTA countries compared to EU28 average. In 2017 the EU28 already had higher number of researchers per thousand employees than the US and significantly higher score compared to China. At the same time the indicator score for EU28 was lower than Japan's and South Korea's.

The **number of young PhD graduates** (ISCED8) per thousand population aged 25-29 in EU28 has increased by 6% between 2014 and 2017 and has been increasing continuously over the last decade. The highest numbers of young PhD graduates per thousand population were in the UK, France and Slovakia, whereas the lowest numbers were in Latvia, Croatia and Cyprus. The number of PhD graduates (all ages, ISCED 6/8) per thousand population has also continued to increase. The best performers were Spain, UK and Denmark, whereas the lowest performance was in Poland, Latvia and Romania. Both in terms of the number of young PhD graduates and PhD graduates of all ages, Norway and Iceland had lower performance whereas Switzerland had higher performance than EU28. Compared to EU28, the number of PhD graduates (ISCED 6/8) per thousand population was lower in the US and much lower in Japan.

The **number of new women doctoral graduates** (ISCED 6/8) per thousand population aged 25-34 in EU28 has been increasing since 2000. The strongest performers were Germany, Denmark and the UK, whereas the lowest numbers were in Latvia, Croatia and Poland. On the other hand, the share of female researchers in the total number of researchers in EU28 remained stable between 2013 and 2016, whereas in the longer-term perspective (2000-2017) this share decreased.

The **share of researchers in the private sector** in the total number of researchers has increased both in the short term (2014-2017) and in the long-term perspective (2000-2017). This share was highest in Sweden, Netherlands, Austria, Hungary and Slovenia and lowest in Latvia, Croatia and Romania. The share of researchers in the private sector in EU28 was slightly lower than in EFTA countries and significantly lower compared to the US, China, Japan and South Korea.

European researchers are generally **satisfied with the recruitment process** at their home research institution - the overall indicator score in the MORE4 survey was 84% - an increase of around 7 p.p. since the MORE3 survey (2016). There were no significant differences between countries in this respect.

4.1.1. Researchers (FTE) per thousand employees

No	Indicator	Rationale	Data sources
1-1	Researchers (FTE) per thousand employees	The indicator presents the current stock of researchers. It provides a measure of the achievements of EU Member States' national R&D targets established in the EUROPE 2020 Strategy.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employee statistics (lfsi_emp_a)

Key descriptive insights:

- In 2017 there were 8.91 researchers (FTE) per thousand employees in EU28 – **an increase of 7% since 2014.**
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has also increased:** the number of researchers per thousand employees increased from **5.08** in 2000 to **8.20** in 2017, while peaking in **2016** with **8.49**. Similarly, the number of female researchers per thousand employees increased from **3.38** in 2000 to **5.51** in 2017, while peaking in **2016** with **5.59**.
- In the period 2014-2017, the **largest increases** in the number of **researchers (FTE) per thousand employees** were registered in **Croatia** (3.97 to 4.97, +25%), **Bulgaria** (4.51 to 5.42, +20%) and **Belgium** (10.42 to 11.95, +15%). The

largest decreases were observed in **Latvia** (4.37 to 3.66, -16%), **Malta** (5.01 to 4.37, -13%) and **Luxembourg** (10.49 to 9.67, -8%).

- **The highest overall** number of researchers per thousand employees in 2017 are found in **Denmark** (16.23), **Finland** (15.09) and **Sweden** (14.86). **The lowest overall numbers** are found in **Romania** (2.21), **Cyprus** (2.54) and **Latvia** (3.66).
- **The highest overall** number of female researchers per thousand employees in 2017 are found in **Denmark** (12.35), **Greece** (8.01) and **Portugal** (7.96). **The lowest overall numbers** are found in **Cyprus** (1.85), **Romania** (2.27) and **Malta** (2.74).
- The number of researchers (FTE) per thousand employees was higher in EFTA countries compared to EU28 average. Between 2014 and 2017 **Norway's** and **Switzerland's** short-term performance has increased substantially.
- In 2017 the EU28 already had higher scores in the number of researchers per thousand employees than the US (8.35) and significantly higher score compared to China (2.2). At the same time the indicator score for EU28 was lower than Japan's (10.06) and South Korea's (13.67).

Table 11: Researchers (FTE) per thousand employees - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	10.16	11.03	↑ 9%		↑ 1%	
Belgium	10.42	11.95	↑ 15%		↑ 9%	
Bulgaria	4.51	5.42	↑ 20%		↑ 6%	
Croatia	3.97	4.97	↑ 25%		↑ 8%	
Cyprus	2.44	2.54	↑ 4%		↓ -1%	
Czechia	7.38	7.44	↑ 1%		↓ -5%	
Denmark	15.40	16.23	↑ 5%		↓ -3%	
Estonia	7.21	7.09	↓ -2%		↓ -7%	
Finland	16.04	15.09	↓ -6%		↓ -24%	
France	10.32	10.88	↑ 6%		↓ -2%	
Germany	9.08	9.95	↑ 10%		↑ 2%	
Greece	8.59	8.14	↓ -5%		↓ -12%	
Hungary	6.44	5.99	↓ -7%		↓ -10%	
Ireland	9.40	9.55	↑ 2%		↓ -6%	
Italy	5.50	6.01	↑ 9%		↑ 1%	
Latvia	4.37	3.66	↓ -16%		↓ -12%	
Lithuania	6.71	6.47	↓ -4%		↓ -8%	
Luxembourg	10.49	9.67	↓ -8%		↓ -18%	
Malta	5.01	4.37	↓ -13%		↓ -11%	
Netherlands	9.41	9.86	↑ 5%		↓ -3%	
Poland	5.04	5.54	↑ 10%		↑ 1%	
Portugal	9.05	9.46	↑ 5%		↓ -3%	
Romania	2.19	2.21	↑ 1%		↓ -2%	
Slovakia	6.28	5.72	↓ -9%		↓ -11%	
Slovenia	9.61	9.00	↓ -6%		↓ -15%	
Spain	7.10	6.96	↓ -2%		↓ -7%	
Sweden	14.50	14.86	↑ 3%		↓ -8%	
UK	9.26	9.50	↑ 3%		↓ -5%	
EU28	**8.30**	**8.91**	↑ **7%**			
Iceland	11.55	11.20	↓ -3%		↓ -13%	
Norway	11.53	13.33	↑ 16%		↑ 11%	
Switzerland	8.23	9.82	↑ 19%		↑ 11%	
United States	8.39	8.35	↓ 0%		↓ -7%	
China	1.93	2.20	↑ 14%		↑ 1%	
Japan	10.32	10.06	↓ -3%		↓ -11%	
South Korea	12.74	13.67	↑ 7%		↓ 0%	
Montenegro	1.98	2.00	↑ 1%		↓ -1%	
North Macedonia	2.54	2.07	↓ -18%		↓ -7%	
Serbia	5.33	5.50	↑ 3%		↓ -3%	
Turkey	3.55	4.08	↑ 15%		↑ 3%	

Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows

Table 12: Researchers (FTE) per thousand employees over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	6,61 b	6,59 b	6,63	6,74 i1	7,25	7,67	7,72	8,20	8,78	8,87	9,28	9,32	9,80	10,03	10,16	10,71	11,35	11,03
Belgium	7,46	8,03	7,61	7,88 i61	7,96 i62	8,07 i63	8,27 i64	8,29 i65	8,42 i66	8,71	9,17	9,55	10,18	10,34	10,42	11,82	12,22	11,95
Bulgaria	3,34	3,38	3,34	3,40	3,36	3,41	3,36	3,49	3,44	3,73	3,62	4,07	3,90	4,25	4,51	4,79	4,91	5,42
Croatia	b	b	5,82	3,95	4,69	3,79	3,79	3,62	3,88	4,06	4,31	4,32	4,38	4,37	3,97	4,08	4,88	4,97
Cyprus	1,06	1,11	1,42	1,55	1,78	2,02	2,15	2,17	2,17	2,35	2,37	2,37	2,34	2,47	2,44	2,45	2,74	2,54
Czechia	3,00	3,24	3,20	3,40	3,52	5,13	5,51	5,74	6,04	5,92	6,08	6,40	6,91	7,07	7,38	7,72	7,69	7,44
Denmark	7,22 b	7,26	9,46	9,34	9,67	10,41	10,45	10,94	12,72	13,51	14,11	14,82	15,29	15,38	15,40	15,99	16,62	16,23
Estonia	4,67	4,73	5,35	5,23	5,79	5,61	5,61	5,84	6,29	7,52	7,44	7,76	7,75	7,39	7,21	6,83	7,47	7,09
Finland		17,18 b	17,16 b	17,22 b	17,32	16,65	16,73	15,86	16,37	16,86	17,19	16,47	16,65	16,31	16,04	15,84	15,42	15,09
France	7,47	7,52	7,84	7,86	8,27	8,14	8,41	8,71	8,83	9,17	9,52	9,75	10,13	10,43	10,32	10,63	10,79 i1	10,88
Germany	7,17	7,31	7,41	7,57	7,72	7,59	7,64	7,78	7,98	8,39	8,78	8,90	9,20	9,17	9,08	9,90	10,22	9,95
Greece	3,59 b	3,48	3,58 i1	3,66	4,07 i1	4,49	4,48	4,69	4,85 i31	5,11 i32	5,52 i33	6,20	6,82	8,45	8,59	9,78	9,55	8,14
Hungary	3,81	3,82	3,89	3,89	3,85	4,09	4,49	4,49	4,85	5,40	5,77	6,18	6,28	6,49	6,44	6,06	6,50	5,99
Ireland	5,20	5,30	5,43	5,71	6,11	6,05	6,07	6,05	6,97	7,40	7,71	8,47	8,92	9,21	9,40	11,14	9,61	9,55
Italy	3,21	3,17	3,33	3,24	3,27	3,74	3,95	4,13	4,22	4,56	4,67	4,78	5,00	5,34	5,50	5,73	6,07	6,01
Latvia	4,15	3,84	3,73	3,44	3,58	3,48	3,97	4,09	4,33	4,13	4,70	4,70	4,58	4,18	4,37	4,16	4,04	3,66
Lithuania	5,63	6,01	4,53	4,58	5,23	5,40	5,68	5,95	6,04	6,58	7,02	6,85	6,45	6,77	6,71	6,28	6,67	6,47
Luxembourg	9,15	9,45 i21	9,86 i22	10,47	10,80	11,53	10,54	10,86	11,34	11,15	11,95	12,73	9,88	10,60	10,49	9,96	10,12	9,67
Malta	1,91 b	1,86 b	1,84	1,87	3,00	3,23	3,47	3,18	3,43	3,13	3,71	4,54	5,00	4,95	5,01	4,23	4,12	4,37
Netherlands	5,40	5,70	5,42	5,44	6,05	5,97	6,52	6,12	5,99	5,56	6,53	7,52	8,96	9,46	9,41	9,75	10,18	9,86
Poland	3,90	4,04	4,20	4,38	4,54	4,49	4,15	4,09	3,97	3,91	4,23	4,19	4,37	4,67	5,04	5,22	7,13	5,54
Portugal	3,56	3,71	3,92	4,24	4,35	4,47	5,19	5,92	8,44	8,58	9,07	9,89	9,99	9,09	9,05	8,97	9,95	9,46
Romania	2,10	2,04	2,26	2,39	2,42	2,65	2,15	2,13	2,18	2,19	2,38	1,98	2,19	2,27	2,19	2,12	2,09	2,21
Slovakia	4,79	4,54	4,36	4,46	5,01	4,95	5,13	5,26	5,19	5,64	6,58	6,65	6,59	6,35	6,28	5,99	6,09	5,72
Slovenia	4,97	5,05	5,16	4,30	4,36	5,68	6,25	6,53	7,21	7,80	8,18	9,59	9,80	9,80	9,61	8,76	9,85	9,00
Spain	5,00	5,02	5,00	5,34	5,64	5,75	5,85	6,00	6,45	7,06	7,25	7,13	7,25	7,25	7,10	6,91	7,14	6,96
Sweden	11,36 b	10,78	11,02 i1	11,26	11,50	12,87	12,81	10,29	11,18	10,77	11,20	10,83	10,93	14,10	14,50	14,32	14,90	14,86
UK	6,36	6,72	7,29 i31	7,83 i32	8,36 i33	8,83	8,94	8,83	8,74	9,04	9,07	8,85	8,94	9,26	9,26	9,48	9,41	9,50
Arithmetic EU28	**5,08**	**5,59**	**5,72**	**5,74**	**6,05**	**6,29**	**6,40**	**6,40**	**6,80**	**7,04**	**7,41**	**7,67**	**7,80**	**8,05**	**8,07**	**8,20**	**8,49**	**8,20**
Real EU28										**7,24**	**7,56**	**7,67**	**7,98**	**8,24**	**8,30**	**8,56**	**8,65**	**8,91**
Iceland	12,38 b	12,25	12,58 i1	12,68	13,52 i1	14,00	14,81	13,02	13,53	15,69	15,00 i1	14,18	13,08 i1	11,79	11,55 f	11,17	12,26	11,20
Norway	8,79 b	8,78	8,91 i1	9,24	9,25	9,45	9,78	10,22	10,41	10,78	10,88	11,07	11,11	11,24	11,53	12,04	12,54	13,33
Switzerland	6,91	6,76 i31	6,66 i32	6,63 i33	6,57	6,52 i31	6,39 i32	6,28 i33	6,11	6,72 i31	7,35 i32	7,86 i33	8,49	8,34 f	8,23 f	10,01	9,89 f	9,82 f
United States										7,97	7,65	7,99	7,91	8,14 f	8,39	8,52	8,43	8,35 f
China										1,48	1,55	1,68	1,79	1,89	1,93	2,05	2,14	2,20
Japan										9,80	9,84	9,94	9,85	10,01	10,32	9,98	9,96	10,06
South Korea										9,79	10,46	11,26	12,11	12,20	12,74	12,99	13,03	13,67
Montenegro										2,10 b	2,10 b	2,10	2,17 i1	2,02	1,98	2,41	2,05	2,00 f
North Macedonia										1,43	1,75	1,44	1,97	2,08	2,54	2,56	2,49	2,07
Serbia												4,80 b	4,83 b	5,05 b	5,33	5,93	5,82	5,50
Turkey										2,79	2,92	3,08	3,40	3,58	3,55	3,68	3,78	4,08

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

Table 13: Female researchers (FTE) per thousand employees – Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	4.87	5.12	↑ 5%	●	↓ -1%	
Belgium	6.47	6.37	↓ -1%	●	↓ -6%	
Bulgaria	4.75	5.42	↑ 14%	●	↑ 4%	
Croatia	4.61	5.12	↑ 11%	●	↑ 2%	
Cyprus	1.93	1.85	↓ -4%	●	↓ -2%	
Czechia	3.96	3.90	↓ -2%	●	↓ -4%	
Denmark	10.48	12.35	↑ 18%	●	↑ 12%	
Estonia	6.43	5.94	↓ -8%	●	↓ -11%	
Finland						
France	5.51	5.56	↑ 1%	●	↓ -4%	
Germany	4.41	4.64	↑ 5%	●	↓ -1%	
Greece	7.77	8.01	↑ 3%	●	↓ -4%	
Hungary	3.61	3.47	↓ -4%	●	↓ -5%	
Ireland	5.74	7.72	↑ 34%	●	↑ 17%	
Italy	4.56	4.99	↑ 10%	●	↑ 1%	
Latvia	4.24	3.64	↓ -14%	●	↓ -10%	
Lithuania	6.31	5.95	↓ -6%	●	↓ -9%	
Luxembourg	6.28	5.76	↓ -8%	●	↓ -11%	
Malta	3.53	2.74	↓ -23%	●	↓ -12%	
Netherlands	5.26	5.55	↑ 6%	●	↓ -1%	
Poland	3.71	4.17	↑ 12%	●	↑ 2%	
Portugal	8.09	7.96	↓ -2%	●	↓ -8%	
Romania	2.35	2.27	↓ -3%	●	↓ -3%	
Slovakia	5.85	5.02	↓ -14%	●	↓ -14%	
Slovenia	7.42	6.16	↓ -17%	●	↓ -20%	
Spain	6.09	5.84	↓ -4%	●	↓ -8%	
Sweden	8.15	7.85	↓ -4%	●	↓ -10%	
UK						
EU28	**5.47**	**5.51**	**↑ 1%**			
Montenegro	2.07	2.42	↑ 17%	●	↑ 2%	
North Macedonia	3.09	3.33	↑ 8%	●	↑ 0%	
Serbia	6.01	6.15	↑ 2%	●	↓ -3%	
Turkey	3.89	4.30	↑ 10%	●	↑ 1%	

Note: EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 14: Female researchers (FTE) per thousand employees over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	2,37 b	2,35 b	2,32	2,56 i1	2,91	3,08 i1	3,29	3,70	3,95 i1	4,26	4,41 i1	4,54	4,71 i1	4,90	4,87 f	5,26	5,17 f	5,12 f
Belgium	4,50	4,87	4,85	4,96	5,18	5,32	5,69	5,79	5,94	6,08	6,42	6,65	6,62 f	6,56 f	6,47 f	6,44 f	6,43 f	6,37 f
Bulgaria	3,28	3,26	3,30	3,40	3,36	3,39	3,24	3,55	3,52	3,85	3,87	4,28	4,07	4,52	4,75	4,86	5,62	5,42 f
Croatia	b	b	5,59	4,28	4,84	4,01	3,90	3,89	4,30	4,39	4,65	4,72	4,81	4,72	4,61 f	4,39	5,22	5,12 f
Cyprus	0,76	0,80	1,00	1,09	1,36	1,61	1,64	1,64	1,67	1,88	1,84	1,84	1,82	1,96	1,93 f	1,91	1,93	1,85 f
Czechia	1,75	1,89	1,91	2,03	2,00	3,11	3,22	3,39	3,58	3,60	3,61	3,73	3,95	3,99	3,96 f	4,13	4,02	3,90
Denmark	4,42 b	4,47	5,35	5,60	5,94 i1	6,39	6,54 i1	6,81	7,48 i1	8,41	9,13	9,80	10,03	10,47	10,48 f	10,75	11,38 i1	12,35
Estonia	3,92	4,08	4,49	4,51	4,76	4,41	4,59	4,96	4,89	6,15	6,05	6,52	6,74	6,41	6,43 f	6,19	6,08	5,94 f
Finland																		
France								3,84 b	3,78 b	3,79 b	3,78	5,34	5,52	5,67	5,51 f	5,61 f	5,59 f	5,56 f
Germany	2,70 b	2,66	2,70 i1	2,74	2,90 i1	2,94	3,06 i1	3,19	3,46 i1	3,75	4,04 i1	4,22	4,36 i1	4,45	4,41 f	4,78	4,67 f	4,64 f
Greece	3,16 b	3,07	3,14 i1	3,19	3,42 i1	3,68	3,89 i51	4,16 i52	4,39 i53	4,68 i54	5,12 i55	5,85	6,94 i1	7,93	7,77 f	8,25	8,14 f	8,01 f
Hungary				3,09 b	3,12 b	3,10 b	3,09	3,13	3,27	3,57	3,73	3,99	3,84	3,80	3,61 f	3,56	3,49	3,47 f
Ireland	3,87 b	3,74 b	3,57	3,87	4,02	3,95	4,16	4,23	4,79	5,25	5,43	5,41	5,64 i1	5,80	5,74 f	8,26	7,95 f	7,72 f
Italy	2,64 b	2,54 b	2,48 b	2,42	2,40	3,07	3,26	3,49	3,47	3,84	3,95	4,04	4,27	4,58	4,56 f	4,91	5,06	4,99 f
Latvia	4,23	4,25	3,98	3,70	4,01	3,54	3,85	4,15	4,33	4,00	4,19	4,72	4,57	4,17	4,24 f	4,14	3,62	3,64 f
Lithuania	4,84	5,50	4,36	4,45	5,07	5,34	5,60	5,85	6,09	6,36	6,76	6,45	6,27	6,43	6,31 f	5,77	5,92	5,95 f
Luxembourg			5,21 b	5,19 b	5,08 b	4,85	5,08 i31	5,20 i32	5,76 i33	5,77	6,21 i1	6,70	6,44 i1	6,54	6,28 f	6,26	6,15 f	5,76 f
Malta		2,51 b	2,36 b	2,43 b	2,53	2,65	2,84	2,46	2,83	2,69	2,76	3,18	3,79	3,70	3,53 f	2,87	2,94	2,74 f
Netherlands									4,03 b	4,00 b	4,11 b	4,14	4,85	5,18	5,26 f	5,59	5,67	5,55 f
Poland	5,25	4,69 i21	4,19 i22	3,59	3,73	3,96	3,57	3,59	3,37	3,31	3,63	3,59	3,60	3,79	3,71 f	4,10	4,21	4,17 f
Portugal	3,50	3,67	3,88	4,16	4,25	4,33	4,95	5,58	7,86	8,05	8,31	9,01	9,10	8,29	8,09 f	7,88	8,21	7,96 f
Romania	1,93	1,90	2,24	2,35	2,35	2,73	2,15	2,07	2,23	2,21	2,43	2,06	2,24	2,36	2,35 f	2,24	2,35	2,27 f
Slovakia	4,04	3,91	3,88	4,00	4,58	4,58	4,92	4,96	5,00	5,41	6,20	6,36	6,23	5,98	5,85	5,65	5,14	5,02 f
Slovenia	3,78	3,82	3,90	3,01	3,03	4,20	4,54	4,87	5,25	5,73	6,17	7,36	7,25	7,47	7,42 f	6,55	6,43	6,16 f
Spain		4,77	4,70	5,08	5,33	5,39	5,37	5,49	5,81	6,20	6,29	6,12	6,13	6,15	6,09 f	5,94	5,99	5,84 f
Sweden			7,75 b	7,72 b	7,83 b	7,81	7,10 i1	6,35	6,45 i1	6,70	6,88 i1	6,87	7,57 i1	8,25	8,15 f	8,12	7,99 f	7,85 f
UK																		
EU28	**3,38 a**	**3,44 a**	**3,79 a**	**3,73 a**	**3,92 a**	**4,06 a**	**4,15 a**	**4,25 a**	**4,52 a**	**4,77 a**	**5,00 a**	**5,29 a**	**5,44 a**	**5,54 a**	**5,47 a**	**5,55 a**	**5,59 a**	**5,51 a**
Montenegro									2,33 b	2,33 b	2,33 b	2,33	2,17 i1	2,04	2,07	2,42	2,42 f	2,42 f
North Macedonia										2,02	2,55	2,09	2,69	2,82 i	3,09 i	3,24	3,42	3,33 f
Serbia												5,46 b	5,58 b	5,89 b	6,01	6,73	6,39	6,15
Turkey										3,38	3,36	3,45	3,79	3,94	3,89	4,01	4,00	4,30

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.2. Number of young PhD graduates (ISCED8) per thousand population aged 25-29

No	Indicator	Rationale	Data sources
1-2	Number of young PhD graduates (ISCED8) per thousand population aged 25-29	The indicator provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad01 from 2013, educ_grad4 until 2012); Population statistics (migr_pop1ctz)

Key descriptive insights:

- In 2017 EU28 countries had 1.35% young PhD graduates per thousand population aged 25-29 – **an increase of 6% since 2014**.
- In the period 2014-2017, the **largest increases** in the number of **young PhD graduates per thousand population aged 25-29** were registered in **Greece** (0.25 to 0.51, +105%), **Luxembourg** (0.46 to 0.95, +105%) and **Malta** (0.19 to 0.38, +95%). The **largest decreases** were observed in **Latvia** (0.26 to 0.07, -75%), **Portugal** (1.18 to 0.53, -55%) and **Croatia** (0.28 to 0.15, -47%).
- The **indicator score for female researchers was similar to the total figures for young PhD graduates**. Between 2014 and 2017 the female indicator score also slightly increased by 4%.
- **The highest overall** number of young PhD graduates per thousand population are found in **UK** (2.45), **France** (2.05) and **Slovakia** (2.04). The l**owest overall numbers** are found in **Latvia** (0.07), **Croatia** (0.15) and **Cyprus** (0.24).
- Similarly, **the highest overall** number of young female PhD graduates per thousand population are found in **UK** (2.25), **Slovakia** (2.08) and **Germany** (1.87). The l**owest overall numbers** are found in **Latvia** (0.07), **Cyprus** (0.11) and **Croatia** (0.31).
- In the **long-term perspective** (i.e. over the reference period 2000-2018), the **EU average has increased**: the number of young PhD graduates per thousand population increased from **0.44** in 2000 to **0.93** in 2018, while peaking in **2013** with **1.08**. Similarly, the number of young female PhD graduates per thousand population increased from **0.43** in 2000 to **0.91** in 2018, while peaking in **2013** with **1.05**.
- The indicator scores **were lower in Norway and Iceland but higher in Switzerland**. Between 2014 and 2017 Switzerland (+44%) had substantial increase in the indicator value**.**

Table 15: Young PhD graduates per thousand population aged 25-29 – Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU**	**Progress index**	**Long-term trend**
Austria	1.37	1.07	↓ -22%	🔴	↓ -28%	
Belgium	1.51	1.50	↓ -1%	🟡	↓ -7%	
Bulgaria	0.25	0.40	↑ 57%	🔴	↑ 10%	
Croatia	0.28	0.15	↓ -47%	🔴	↓ -11%	
Cyprus	0.36	0.24	↓ -34%	🔴	↓ -10%	
Czechia	0.68	0.56	↓ -19%	🔴	↓ -12%	
Denmark	1.68	1.70	↑ 1%	🟢	↓ -5%	
Estonia	0.56	0.54	↓ -5%	🔴	↓ -4%	
Finland	0.49	0.48	↓ -2%	🔴	↓ -3%	
France	1.57	2.05	↑ 31%	🟢	↑ 29%	
Germany	1.92	1.68	↓ -13%	🟢	↓ -26%	
Greece	0.25	0.51	↑ 105%	🔴	↑ 18%	
Hungary	0.57	0.53	↓ -5%	🔴	↓ -5%	
Ireland	2.07	1.53	↓ -26%	🟡	↓ -48%	
Italy	0.91	1.29	↑ 43%	🟡	↑ 25%	
Latvia	0.26	0.07	↓ -75%	🔴	↓ -15%	
Lithuania	0.76	0.67	↓ -12%	🔴	↓ -10%	
Luxembourg	0.46	0.95	↑ 105%	🔴	↑ 34%	
Malta	0.19	0.38	↑ 95%	🔴	↑ 13%	
Netherlands	1.60	1.55	↓ -3%	🟡	↓ -10%	
Poland	0.33	0.26	↓ -23%	🔴	↓ -7%	
Portugal	1.18	0.53	↓ -55%	🔴	↓ -53%	
Romania	0.60	0.32	↓ -46%	🔴	↓ -23%	
Slovakia	2.64	2.04	↓ -23%	🟢	↓ -55%	
Slovenia	1.72	1.01	↓ -41%	🔴	↓ -59%	
Spain	0.75	0.71	↓ -5%	🔴	↓ -6%	
Sweden	1.21	0.90	↓ -26%	🔴	↓ -28%	
UK	2.22	2.45	↑ 10%	🟢	↑ 8%	
EU28	**1.28**	**1.35**	↑ 6%			
Iceland	0.27	0.39	↑ 44%	🔴	↑ 8%	
Norway	0.70	0.66	↓ -7%	🔴	↓ -6%	
Switzerland	1.92	1.95	↑ 2%	🟢	↓ -5%	

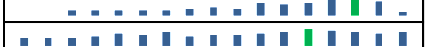
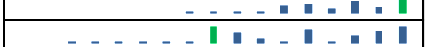
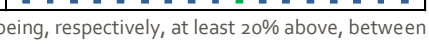
Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 16: Young PhD graduates per thousand population aged 25-29 over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria		1,72 b	1,78 b	1,83 b	1,85	1,94	1,62	1,56	1,64	1,69	1,76	1,68	1,52	1,31	1,37	1,27	1,17	1,07	1,06 f
Belgium		0,63 b	0,64 b	0,65 b	0,65	0,93	0,92	0,77	1,20	1,17	1,31	0,88	1,42	1,42	1,51	1,50	1,67	1,50	1,49 f
Bulgaria		0,09 b	0,10 b	0,09 b	0,10	0,16	0,17	0,18	0,19	0,18	0,13	0,12	0,15	0,18	0,25	0,31	0,36	0,40	0,41 f
Croatia							0,07 b	0,07 b	0,07 b	0,07	0,12 i1	0,17	0,22	0,29	0,28	0,29	0,24	0,15	0,15 f
Cyprus		0,12 b	0,12 b	0,12 b	0,12	0,02	0,25	0,15	0,23	0,14	0,09	0,18	0,21	0,16	0,36	0,25	0,44	0,24	0,23 f
Czechia		0,78 b	0,76 b	0,74 b	0,74	0,89	0,92	1,33	1,34	1,34	0,72	0,77	0,83	0,79	0,68	0,64	0,62	0,56	0,56 f
Denmark		0,61 b	0,63 b	0,65 b	0,66	0,51	0,59	0,57	0,73	0,80	1,09	1,18	0,89	1,66	1,68	1,71	1,85	1,70	1,64 f
Estonia				0,41 b	0,42 b	0,42 b	0,42	0,46	0,59	0,63	0,64	0,65	0,79	0,78	0,56	0,48	0,74	0,54	0,56 f
Finland	0,48	0,48 b	0,47 b	0,46		0,52	0,53	0,60	0,63	0,56	0,56	0,50	0,40	0,45	0,58	0,49	0,59	0,52	0,48	0,47 f
France												1,61 b	1,62 b	1,63 b	1,64	1,57	1,58	1,59	2,05	2,07 f
Germany		1,49 b	1,55 b	1,57 b	1,56	1,76	1,71	1,67	1,71	1,64	1,68	1,86	2,66	2,00	1,92	1,87	1,79	1,68	1,70 f
Greece					0,12	0,79	0,28	0,74	0,17	0,22 i1	0,28	0,27 i21	0,26 i22	0,25	0,25	0,27	0,31	0,51	0,51 f
Hungary		0,18 b	0,17 b	0,17 b	0,16	0,21	0,19	0,29	0,21	0,25	0,43	0,39	0,45	0,46	0,57	0,56	0,57	0,53	0,53 f
Ireland								1,25 b	1,22 b	1,23 b	1,27	1,42	1,52	1,84	2,07	2,13	1,63	1,53	1,55 f
Italy	0,39	0,39 b	0,40 b	0,42	0,51	0,64	0,74	0,80	0,84 i31	0,88 i32	0,92 i33	0,95	0,96	1,16	0,91	1,29	1,08	1,29	1,29 f
Latvia				0,08 b	0,08 b	0,08 b	0,08	0,11	0,12	0,24	0,12	0,22	0,26	0,29	0,26	0,35	0,25	0,07	0,07 f
Lithuania		0,45 b	0,47 b	0,48 b	0,49	0,62	0,61	0,66	0,57	0,50	0,54	0,66	0,75	0,82	0,76	0,70	0,63	0,67	0,69 f
Luxembourg									0,36 b	0,35 b	0,35 b	0,34	0,63	0,75	0,46	0,90	0,62	0,95	0,92 f
Malta				0,07 b	0,07 b	0,07 b	0,07	0,07	0,03	0,20	0,10	0,17	0,13	0,26	0,19	0,18	0,20	0,38	0,35 f
Netherlands									1,34 b	1,34 b	1,33 b	1,33	1,48	1,63	1,60	1,67	1,66	1,55	1,53 f
Poland										0,31 b	0,32 b	0,32 b	0,32	0,36	0,33	0,35	0,32	0,26	0,26 f
Portugal		0,08 b	0,08 b	0,08 b	0,08	0,15	0,16	0,16	0,20	0,20	0,25	0,32	0,37	1,31	1,18	0,41	0,50	0,53	0,53 f
Romania		0,27 b	0,29 b	0,29 b	0,29	0,85	0,38	0,28	0,33	0,70	0,79	0,93	0,92	0,90	0,60	0,68	0,38	0,32	0,35 f
Slovakia		0,66 b	0,63 b	0,62 b	0,61	0,70	0,90	1,20	2,00	1,75	2,26	1,93	2,85	2,71	2,64	2,34	2,26	2,04	2,08 f
Slovenia		0,56 b	0,55 b	0,55 b	0,54	0,41	0,38	0,57	0,49	1,04	0,99	1,13	1,20	2,69	1,72	1,95	1,35	1,01	1,06 f
Spain					0,45	0,38	0,43	0,49	0,51	0,59	0,76	0,54	0,60	0,64	0,75	0,79	0,78	0,71	0,71 f
Sweden		0,77 b	0,79 b	0,80 b	0,82	0,84	0,81	1,62	0,89	0,67	0,69	0,64	0,66	1,14	1,21	1,12	1,06	0,90	0,87 f
UK		1,71 b	1,77 b	1,82 b	1,84	1,80	1,87	1,98	1,80	1,84	1,92	1,98	1,94	2,13	2,22	2,34	2,39	2,45	2,44 f
Arithmetic EU28	**0,44**	**0,65**	**0,66**	**0,59**	**0,58**	**0,67**	**0,62**	**0,73**	**0,74**	**0,76**	**0,82**	**0,82**	**0,93**	**1,08**	**1,01**	**1,02**	**0,96**	**0,93**	**0,93**
Real EU28														**1,32**	**1,28**	**1,35**	**1,31**	**1,35**	**1,36**
Iceland		0,05 b	0,05 b	0,05 b	0,05	0,10	0,14	0,04	0,16	0,24	0,33	0,73	0,27	0,27 f	0,27 f	0,26	0,41	0,39 f	0,31 f
Norway		0,34 b	0,35 b	0,36 b	0,37	0,45	0,42	0,45	0,57	0,43	0,57	0,65	0,74	0,68	0,70	0,55	0,53	0,66	0,58 f
Switzerland		1,72 b	1,73 b	1,74 b	1,75	1,99	2,08	1,97	1,88	2,08	2,24	2,06	2,14	1,88	1,92	1,90	1,93	1,95	1,90 f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

Table 17: Young female PhD graduates per thousand population aged 25-29 – Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	1.30	1.08	↓ -17%	●	↓ -22%	
Belgium	1.46	1.39	↓ -5%	●	↓ -11%	
Bulgaria	0.28	0.46	↑ 67%	●	↑ 13%	
Croatia	0.28	0.31	↑ 9%	●	↑ 1%	
Cyprus	0.47	0.11	↓ -76%	●	↓ -28%	
Czechia	0.66	0.44	↓ -33%	●	↓ -19%	
Denmark	1.25	1.36	↑ 9%	●	↑ 3%	
Estonia	0.57	0.67	↑ 18%	●	↑ 5%	
Finland	0.37	0.43	↑ 14%	●	↑ 2%	
France	1.34	1.78	↑ 33%	●	↑ 27%	
Germany	2.15	1.87	↓ -13%	●	↓ -29%	
Greece	0.29	0.39	↑ 33%	●	↑ 6%	
Hungary	0.56	0.48	↓ -13%	●	↓ -8%	
Ireland	1.99	1.46	↓ -27%	●	↓ -47%	
Italy	0.95	1.38	↑ 45%	●	↑ 28%	
Latvia	0.31	0.07	↓ -76%	●	↓ -18%	
Lithuania	0.79	0.66	↓ -16%	●	↓ -13%	
Luxembourg	0.37	1.23	↑ 236%	●	↑ 62%	
Malta	0.07	0.39	↑ 478%	●	↑ 24%	
Netherlands	1.60	1.57	↓ -2%	●	↓ -9%	
Poland	0.36	0.29	↓ -20%	●	↓ -7%	
Portugal	1.19	0.59	↓ -50%	●	↓ -49%	
Romania	0.76	0.40	↓ -47%	●	↓ -30%	
Slovakia	2.86	2.08	↓ -27%	●	↓ -69%	
Slovenia	1.59	0.86	↓ -46%	●	↓ -60%	
Spain	0.84	0.74	↓ -11%	●	↓ -10%	
Sweden	0.94	0.68	↓ -28%	●	↓ -23%	
UK	2.02	2.25	↑ 11%	●	↑ 8%	
EU28	**1.28**	**1.33**	**↑ 4%**			
Norway	0.56	0.40	↓ -29%	●	↓ -14%	
Switzerland	1.85	1.88	↑ 2%	●	↓ -5%	

Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 18: Young female PhD graduates per thousand population aged 25-29 over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria		1,43 b	1,49 b	1,53 b	1,55	1,79	1,53	1,47	1,63	1,58	1,72	1,52	1,49	1,26	1,30	1,27	1,07	1,08	1,07 f
Belgium		0,48 b	0,49 b	0,50 b	0,50	0,71	0,74	0,66	1,13	1,10	1,28	0,86	1,36	1,41	1,46	1,34	1,73	1,39	1,38 f
Bulgaria		0,10 b	0,11 b	0,11 b	0,11	0,21	0,20	0,24	0,21	0,21	0,14	0,13	0,17	0,20	0,28	0,36	0,40	0,46	0,48 f
Croatia							0,08 b	0,08 b	0,08 b	0,08	0,14 i1	0,21	0,29	0,34	0,28	0,39	0,70	0,31	0,30 f
Cyprus		0,24 b	0,23 b	0,23 b	0,23	0,04	0,35	0,30	0,32	0,18	0,14	0,33	0,31	0,24	0,47	0,29	0,21	0,11	0,12 f
Czechia		0,58 b	0,56 b	0,54 b	0,54	0,62	0,68	1,00	1,07	1,13	0,64	0,77	0,74	0,75	0,66	0,59	0,63	0,44	0,45 f
Denmark		0,36 b	0,36 b	0,37 b	0,38	0,31	0,30	0,35	0,43	0,55	0,68	0,85	0,70	1,17	1,25	1,31	1,37	1,36	1,31 f
Estonia				0,44 b	0,45 b	0,45 b	0,45	0,33	0,50	0,56	0,58	0,56	0,90	0,90	0,57	0,31	0,78	0,67	0,70 f
Finland	0,46 b	0,46 b	0,45 b	0,44	0,44	0,47	0,38	0,57	0,56	0,51	0,51	0,38	0,37	0,45	0,37	0,53	0,41	0,43	0,42 f
France											1,36 b	1,37 b	1,38 b	1,39	1,34	1,31	1,32	1,78	1,80 f
Germany		1,49 b	1,54 b	1,56 b	1,55	1,78	1,75	1,77	1,81	1,86	1,88	2,11	2,80	2,21	2,15	2,07	2,04	1,87	1,89 f
Greece					0,10	0,63	0,15	0,29	0,13	0,16 i1	0,21	0,22 i21	0,23 i22	0,25	0,29	0,25	0,35	0,39	0,39 f
Hungary		0,15 b	0,14 b	0,14 b	0,13	0,17	0,20	0,24	0,18	0,25	0,41	0,40	0,45	0,43	0,56	0,50	0,53	0,48	0,48 f
Ireland								1,32 b	1,27 b	1,26 b	1,29	1,32	1,41	1,77	1,99	1,99	1,45	1,46	1,50 f
Italy	0,40	0,40 b	0,41 b	0,43	0,53	0,66	0,77	0,85	0,88 i31	0,93 i32	0,97 i33	1,00	1,06	0,99	0,95	1,41	0,97	1,38	1,39 f
Latvia				0,10 b	0,10 b	0,11 b	0,11	0,10	0,14	0,17	0,14	0,25	0,21	0,23	0,31	0,33	0,26	0,07	0,08 f
Lithuania		0,42 b	0,44 b	0,45 b	0,46	0,65	0,56	0,71	0,52	0,54	0,57	0,65	0,68	0,83	0,79	0,69	0,64	0,66	0,68 f
Luxembourg									0,24 b	0,24 b	0,23 b	0,23	0,60	0,70	0,37	0,91	0,49	1,23	1,19 f
Malta				0,07 b	0,07 b	0,07 b	0,07	0,07 i1	0,07	0,41	0,27 i1	0,14	0,07	0,34	0,07	0,19	0,30	0,39	0,36 f
Netherlands									1,18 b	1,18 b	1,17 b	1,17	1,40	1,51	1,60	1,72	1,70	1,57	1,55 f
Poland										0,34 b	0,35 b	0,35 b	0,35	0,44	0,36	0,39	0,34	0,29	0,29 f
Portugal		0,08 b	0,08 b	0,07 b	0,07	0,15	0,16	0,17	0,24	0,21	0,32	0,34	0,45	1,45	1,19	0,37	0,53	0,59	0,59 f
Romania		0,30 b	0,32 b	0,32 b	0,32	0,57	0,35	0,30	0,42	0,79	0,71	1,04	1,07	1,07	0,76	0,76	0,51	0,40	0,43 f
Slovakia		0,64 b	0,61 b	0,60 b	0,59	0,65	0,89	1,17	2,06	1,74	2,37	2,06	2,95	3,00	2,86	2,48	2,53	2,08	2,13 f
Slovenia		0,42 b	0,42 b	0,41 b	0,41	0,33	0,34	0,31	0,44	0,94	0,78	0,93	0,98	2,39	1,59	1,99	1,33	0,86	0,90 f
Spain					0,48	0,41	0,44	0,53	0,55	0,66	0,82	0,57	0,69	0,75	0,84	0,89	0,90	0,74	0,75 f
Sweden		0,66 b	0,67 b	0,69 b	0,70	0,68	0,73	1,37	0,73	0,66	0,69	0,58	0,57	0,88	0,94	0,87	0,76	0,68	0,66 f
UK		1,53 b	1,59 b	1,63 b	1,65	1,56	1,62	1,74	1,61	1,68	1,75	1,83	1,83	1,95	2,02	2,12	2,13	2,25	2,25 f
Arithmetic EU2	**0,43**	**0,57**	**0,58**	**0,53**	**0,52**	**0,59**	**0,56**	**0,66**	**0,71**	**0,74**	**0,79**	**0,79**	**0,91**	**1,05**	**0,99**	**0,99**	**0,94**	**0,91**	**0,91**
Real EU28														**1,29**	**1,28**	**1,33**	**1,28**	**1,33**	**1,34**
Norway		0,25 b	0,26 b	0,27 b	0,27	0,28	0,29	0,29	0,42	0,35	0,38	0,51	0,61	0,57	0,56	0,48	0,59	0,40	0,58 f
Switzerland		1,51 b	1,52 b	1,54 b	1,54	1,62	1,84	1,82	1,74	2,03	2,34	2,12	2,16	1,89	1,85	1,98	1,92	1,88	1,90 f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.3. Number of PhD graduates (ISCED 6/8) per thousand population

No	Indicator	Rationale	Data sources
1-3	Number of PhD graduates (ISCED 6/8) per thousand population	The indicator provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad01 from 2013, educ_grad4 until 2012); Population statistics (migr_pop1ctz)

Key descriptive insights:

- In 2017 EU28 had **0.27 PhD graduates (ISCED 6/8) per thousand population – an increase of 6% since 2014**.
- In the period 2014-2017, the **largest increases** in the number of **number of PhD graduates per thousand population** were registered in **Malta** (0.05 to 0.12, +127%), **Spain** (0.23 to 0.43, +84%) and **Luxembourg** (0.15 to 0.26, +73%). The **largest decreases** were observed in **Romania** (0.19 to 0.10, -49%), **Slovenia** (0.49 to 0.25, -49%) and **Portugal** (0.38 to 0.21, -46%).
- The indicator score for female PhD graduates was similar to the total PhD graduates per thousand population. The **EU-wide trend for women** over this reference period has shown a **small increase (0.24 to 0.25, +6%)**.
- **The highest overall** number of PhD graduates per thousand population are found in **UK** (0.43), **Spain** (0.43) and **Denmark** (0.39). The l**owest overall numbers** are found in **Poland** (0.08), **Latvia** (0.08) and **Romania** (0.10).
- **The highest overall** number of female PhD graduates per thousand population are found in **Spain** (0.43), **UK** (0.4) and **Denmark** (0.37). The l**owest overall numbers** are found in **Poland** (0.09), **Latvia** (0.09) and **Romania** (0.10).
- In the **long-term perspective** (i.e. over the reference period 2000-2018), the **EU average has increased**: the number of PhD graduates per thousand population increased from **0.12** in 2000 to **0.23** in 2018 while peaking in **2016** with **0.28**. Similarly, the number of female PhD graduates per thousand population increased from **0.11** in 2000 to **0.22** in 2018, while peaking in **2016** with **0.29**.
- Concerning EFTA countries, Norway and Iceland had similar performance to EU28, whereas **Switzerland's** score was higher the EU average.
- Compared to EU28, the number of PhD graduates (ISCED 6/8) per thousand population was lower in the US and much lower in Japan.

Table 19: Number of PhD graduates (ISCED8) per thousand population - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	0.26	0.30	↑ 15%		↑ 9%	
Belgium	0.23	0.26	↑ 12%		↑ 5%	
Bulgaria	0.19	0.20	↑ 7%		↑ 0%	
Croatia	0.20	0.17	↓ -14%		↓ -15%	
Cyprus	0.07	0.11	↑ 54%		↑ 12%	
Czechia	0.24	0.23	↓ -3%		↓ -8%	
Denmark	0.38	0.39	↑ 3%		↓ -5%	
Estonia	0.16	0.19	↑ 18%		↑ 7%	
Finland	0.37	0.34	↓ -9%		↓ -20%	
France	0.21	0.20	↓ -2%		↓ -7%	
Germany	0.35	0.34	↓ -1%		↓ -9%	
Greece	0.15	0.17	↑ 19%		↑ 7%	
Hungary	0.12	0.12	↑ 3%		↓ -1%	
Ireland	0.38	0.30	↓ -20%		↓ -37%	
Italy	0.18	0.16	↓ -12%		↓ -12%	
Latvia	0.13	0.08	↓ -41%		↓ -23%	
Lithuania	0.14	0.12	↓ -17%		↓ -12%	
Luxembourg	0.15	0.26	↑ 73%		↑ 37%	
Malta	0.05	0.12	↑ 127%		↑ 23%	
Netherlands	0.27	0.28	↑ 3%		↓ -3%	
Poland	0.09	0.08	↓ -5%		↓ -4%	
Portugal	0.38	0.21	↓ -46%		↓ -75%	
Romania	0.19	0.10	↓ -49%		↓ -39%	
Slovakia	0.40	0.31	↓ -24%		↓ -45%	
Slovenia	0.49	0.25	↓ -49%		↓ -100%	
Spain	0.23	0.43	↑ 84%		↑ 68%	
Sweden	0.37	0.36	↓ -3%		↓ -13%	
UK	0.39	0.43	↑ 10%		↑ 6%	
EU28	**0.25**	**0.27**	↑ 6%			
Iceland	0.12	0.21	↑ 73%		↑ 31%	
Norway	0.28	0.28	↑ 0%		↓ -6%	
Switzerland	0.47	0.49	↑ 4%		↓ -3%	
United States	0.21	0.21	↑ 1%		↓ -4%	
Japan	0.13	0.12	↓ -1%		↓ -3%	

Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 20: Number of PhD graduates (ISCED8) per thousand population

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria		0,30 b	0,30 b	0,30 b	0,30	0,27	0,26	0,25	0,27	0,27	0,30	0,28	0,29	0,26	0,26	0,25	0,26	0,30	0,30 f
Belgium		0,14 b	0,14 b	0,14 b	0,14	0,15	0,16	0,16	0,18	0,18	0,20	0,20	0,21	0,22	0,23	0,25	0,26	0,26	0,26 f
Bulgaria		0,05 b	0,05 b	0,05 b	0,05	0,07	0,08	0,08	0,08	0,09	0,08	0,09	0,13	0,17	0,19	0,20	0,20	0,20	0,20 f
Croatia		0,08 b	0,08 b	0,08 b	0,08	0,09	0,10	0,11	0,11	0,13	0,19	0,25	0,31	0,19	0,20	0,21	0,15	0,17	0,17 f
Cyprus		0,02 b	0,02 b	0,02 b	0,02	0,01	0,04	0,02	0,04	0,04	0,04	0,05	0,06	0,06	0,07	0,09	0,11	0,11	0,11 f
Czechia		0,17 b	0,17 b	0,17 b	0,17	0,19	0,20	0,22	0,23	0,23	0,21	0,23	0,26	0,23	0,24	0,23	0,23	0,23	0,23 f
Denmark		0,15 b	0,15 b	0,15 b	0,15	0,18	0,17	0,18	0,20	0,21	0,25	0,27	0,28	0,34	0,38	0,38	0,39	0,39	0,39 f
Estonia		0,15 b	0,15 b	0,15 b	0,15	0,10	0,11 i1	0,11	0,12	0,12	0,13	0,19	0,14	0,18	0,16	0,16	0,18	0,19	0,19 f
Finland	0,24	0,24 b	0,24 b	0,24	0,26	0,27	0,27	0,29	0,29	0,31	0,28	0,31	0,31	0,35	0,37	0,37	0,37	0,34	0,34 f
France				0,16 b	0,16 b	0,16 b	0,16	0,17	0,18	0,19	0,20	0,20 i1	0,20	0,21	0,21	0,21	0,21	0,20	0,20 f
Germany		0,28 b	0,28 b	0,28 b	0,28	0,31	0,29	0,29	0,31	0,31	0,31	0,34	0,33	0,34	0,35	0,36	0,36	0,34	0,34 f
Greece		0,12 b	0,12 b	0,12 b	0,12	0,11	0,14	0,22	0,13	0,15 i1	0,17	0,15	0,16	0,14	0,15	0,17	0,19	0,17	0,17 f
Hungary		0,09 b	0,09 b	0,09 b	0,09	0,11	0,10	0,11	0,11	0,14	0,13	0,12	0,13	0,11	0,12	0,12	0,13	0,12	0,12 f
Ireland		0,18 b	0,18 b	0,17 b	0,17	0,20	0,23	0,24	0,24	0,27	0,27	0,32	0,32	0,33	0,38	0,37	0,30	0,30	0,30 f
Italy	0,11	0,11 b	0,11 b	0,11	0,15	0,17	0,18	0,18	0,21	0,21 i21	0,20 i22	0,19	0,19	0,18	0,18	0,17	0,16	0,16	0,16 f
Latvia		0,04 b	0,04 b	0,04 b	0,04	0,05	0,05	0,07	0,06	0,08	0,06	0,14	0,13	0,16	0,13	0,13	0,10	0,08	0,08 f
Lithuania		0,09 b	0,09 b	0,09 b	0,09	0,10	0,10	0,11	0,11	0,12	0,13	0,12	0,13	0,15	0,14	0,14	0,11	0,12	0,12 f
Luxembourg									0,12 b	0,12 b	0,12 b	0,11	0,11	0,12	0,15	0,19	0,19	0,26	0,25 f
Malta	0,01	0,01 b	0,01 b	0,01	0,01 i1	0,01	0,01	0,02	0,03	0,05	0,03	0,05	0,03	0,06	0,05	0,07	0,08	0,12	0,11 f
Netherlands		0,17 b	0,17 b	0,17 b	0,16	0,18	0,18	0,19	0,20	0,20	0,23	0,22	0,24	0,26	0,27	0,28	0,29	0,28	0,28 f
Poland		0,14 b	0,14 b	0,14 b	0,14	0,15	0,16	0,16	0,15	0,13	0,09	0,08	0,09	0,10	0,09	0,10	0,10	0,08	0,08 f
Portugal		0,09 b	0,09 b	0,09 b	0,09	0,10	0,10	0,12	0,12	0,12	0,13	0,15	0,18	0,40	0,38	0,23	0,23	0,21	0,21 f
Romania		0,12 b	0,12 b	0,12 b	0,12	0,18	0,15	0,14	0,16	0,23	0,23	0,28	0,26	0,27	0,19	0,20	0,11	0,10	0,10 f
Slovakia		0,16 b	0,16 b	0,16 b	0,16	0,19	0,23	0,26	0,31	0,36	0,53	0,31	0,40	0,39	0,40	0,35	0,33	0,31	0,30 f
Slovenia		0,18 b	0,18 b	0,18 b	0,18	0,18	0,20	0,21	0,20	0,23	0,23	0,26	0,28	0,57	0,49	0,48	1,82	0,25	0,25 f
Spain		0,20 b	0,20 b	0,20 b	0,19	0,16	0,16	0,16	0,16	0,17	0,19	0,19	0,20	0,22	0,23	0,24	0,32	0,43	0,43 f
Sweden		0,31 b	0,31 b	0,31 b	0,31	0,31	0,29	0,43	0,31	0,31	0,29	0,27	0,27	0,35	0,37	0,37	0,36	0,36	0,35 f
UK		0,26 b	0,26 b	0,26 b	0,26	0,26	0,27	0,29	0,27	0,28	0,30	0,32	0,32	0,41	0,39	0,41	0,42	0,43	0,42 f
Arithmetic El	**0,12**	**0,15**	**0,15**	**0,15**	**0,15**	**0,16**	**0,16**	**0,18**	**0,17**	**0,19**	**0,20**	**0,20**	**0,21**	**0,24**	**0,24**	**0,24**	**0,28**	**0,23**	**0,23**
Real EU28														**0,26**	**0,25**	**0,26**	**0,27**	**0,27**	**0,27**
Iceland		0,04 b	0,03 b	0,03 b	0,03	0,05	0,05	0,03	0,07	0,10	0,11	0,16	0,13	0,12 f	0,12 f	0,20	0,22	0,21 f	0,21 f
Norway		0,17 b	0,17 b	0,17 b	0,17	0,18	0,19	0,21	0,26	0,23	0,25	0,26	0,28	0,31	0,28	0,27	0,26	0,28	0,28 f
Switzerland		0,38 b	0,38 b	0,38 b	0,38	0,42	0,43	0,43	0,42	0,44	0,46	0,44	0,46	0,45	0,47	0,47	0,47	0,49	0,49 f
United States		0,17 b	0,17 b	0,17 b	0,17	0,18	0,19	0,20	0,21	0,22	0,22	0,23	0,24	0,21	0,21	0,21	0,22	0,21 f	0,21 f
Japan		0,12 b	0,12 b	0,12 b	0,12	0,12	0,12	0,13	0,13	0,13	0,12	0,12	0,13	0,13	0,13	0,12	0,12	0,12 f	0,12 f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years

Table 21: Number of female PhD graduates (ISCED8) per thousand population - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	0.21	0.27	↑ 26%		↑ 17%	
Belgium	0.31	0.22	↓ -27%		↓ -41%	
Bulgaria	0.13	0.21	↑ 65%		↑ 30%	
Croatia	0.20	0.18	↓ -10%		↓ -13%	
Cyprus	0.07	0.10	↑ 40%		↑ 10%	
Czechia	0.20	0.18	↓ -8%		↓ -11%	
Denmark	0.35	0.37	↑ 6%		↓ 0%	
Estonia	0.16	0.21	↑ 29%		↑ 15%	
Finland	0.38	0.35	↓ -8%		↓ -22%	
France	0.18	0.18	↓ -2%		↓ -6%	
Germany	0.31	0.30	↓ -2%		↓ -10%	
Greece	0.14	0.15	↑ 9%		↑ 2%	
Hungary	0.11	0.11	↑ 1%		↓ -2%	
Ireland	0.37	0.31	↓ -17%		↓ -34%	
Italy	0.18	0.16	↓ -13%		↓ -14%	
Latvia	0.15	0.09	↓ -40%		↓ -27%	
Lithuania	0.15	0.12	↓ -19%		↓ -15%	
Luxembourg	0.11	0.24	↑ 114%		↑ 49%	
Malta	0.03	0.12	↑ 335%		↑ 37%	
Netherlands	0.25	0.26	↑ 5%		↓ -1%	
Poland	0.09	0.09	↓ -2%		↓ -3%	
Portugal	0.39	0.22	↓ -44%		↓ -78%	
Romania	0.19	0.10	↓ -46%		↓ -39%	
Slovakia	0.39	0.29	↓ -24%		↓ -47%	
Slovenia	0.54	0.24	↓ -56%		↓ -135%	
Spain	0.23	0.43	↑ 88%		↑ 74%	
Sweden	0.34	0.33	↓ -6%		↓ -16%	
UK	0.36	0.40	↑ 10%		↑ 6%	
EU28	**0.24**	**0.25**	↑ 6%			
Iceland	0.13	0.28	↑ 115%		↑ 57%	
Norway	0.28	0.28	↑ 1%		↓ -6%	
Switzerland	0.40	0.44	↑ 8%		↑ 4%	
United States	0.21	0.21	↑ 1%		↓ -4%	
Japan	0.08	0.08	↓ -1%		↓ -2%	

Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 22: Number of female PhD graduates (ISCED8) per thousand population

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria		0,24 b	0,24 b	0,24 b	0,24	0,23	0,21	0,21	0,22	0,23	0,25	0,23	0,23	0,23	0,21	0,22	0,21	0,27	0,27 f
Belgium		0,12 b	0,12 b	0,13 b	0,13	0,15	0,17	0,17	0,20	0,21	0,24	0,25	0,28	0,28	0,31	0,21	0,24	0,22	0,22 f
Bulgaria		0,04 b	0,04 b	0,04 b	0,04	0,05	0,06	0,06	0,06	0,06	0,05	0,06	0,09	0,11	0,13	0,19	0,21	0,21	0,21 f
Croatia		0,07 b	0,07 b	0,07 b	0,07	0,08	0,10	0,11	0,11	0,12	0,19	0,27	0,33	0,21	0,20	0,23	0,16	0,18	0,19 f
Cyprus		0,02 b	0,02 b	0,02 b	0,02	0,00	0,05	0,03	0,03	0,03	0,03	0,06	0,05	0,06	0,07	0,10	0,12	0,10	0,10 f
Czechia		0,12 b	0,12 b	0,12 b	0,12	0,13	0,14	0,16	0,17	0,17	0,16	0,20	0,21	0,19	0,20	0,20	0,19	0,18	0,18 f
Denmark		0,10 b	0,10 b	0,10 b	0,10	0,14	0,14	0,14	0,17	0,18	0,22	0,24	0,25	0,30	0,35	0,37	0,37	0,37	0,37 f
Estonia		0,17 b	0,18 b	0,18 b	0,18	0,08		0,11	0,11	0,10	0,13	0,18	0,14	0,20	0,16	0,15	0,19	0,21	0,21 f
Finland	0,22	0,22 b	0,22 b	0,22	0,23	0,26	0,25	0,29	0,31	0,32	0,29	0,31	0,31	0,35	0,38	0,38	0,37	0,35	0,35 f
France				0,13 b	0,13 b	0,13 b	0,12	0,14	0,14	0,15	0,16		0,17	0,18	0,18	0,18	0,18	0,18	0,18 f
Germany		0,21 b	0,21 b	0,21 b	0,21	0,24	0,24	0,24	0,25	0,26	0,27	0,29	0,30	0,30	0,31	0,32	0,32	0,30	0,30 f
Greece		0,09 b	0,09 b	0,09 b	0,09	0,08	0,10	0,17	0,10		0,14	0,11	0,13	0,12	0,14	0,15	0,18	0,15	0,15 f
Hungary		0,07 b	0,07 b	0,07 b	0,07	0,09	0,08	0,08	0,09	0,13	0,11	0,11	0,11	0,10	0,11	0,11	0,11	0,11	0,11 f
Ireland		0,16 b	0,16 b	0,16 b	0,15	0,18	0,22	0,22	0,25	0,24	0,26	0,31	0,31	0,32	0,37	0,38	0,29	0,31	0,30 f
Italy	0,11	0,11 b	0,11 b	0,11	0,15	0,17	0,17	0,18	0,22			0,20	0,20	0,18	0,18	0,17	0,16	0,16	0,16 f
Latvia		0,04 b	0,04 b	0,04 b	0,04	0,06	0,04	0,07	0,07	0,09	0,07	0,17	0,14	0,16	0,15	0,13	0,11	0,09	0,09 f
Lithuania		0,09 b	0,09 b	0,09 b	0,10	0,10	0,11	0,13	0,12	0,14	0,14	0,12	0,14	0,16	0,15	0,16	0,12	0,12	0,13 f
Luxembourg									0,10 b	0,10 b	0,09 b	0,09	0,11	0,09	0,11	0,17	0,15	0,24	0,24 f
Malta	0,01	0,01 b	0,01 b	0,00	0,00 i21	0,00 i22	0,00	0,01	0,02	0,05	0,01	0,01	0,03	0,06	0,03	0,07	0,07	0,12	0,12 f
Netherlands		0,13 b	0,13 b	0,13 b	0,13	0,13	0,14	0,16	0,16	0,16	0,19	0,19	0,21	0,24	0,25	0,27	0,28	0,26	0,26 f
Poland		0,13 b	0,13 b	0,13 b	0,13	0,14	0,15	0,15	0,14	0,13	0,08	0,08	0,10	0,10	0,09	0,11	0,10	0,09	0,09 f
Portugal		0,08 b	0,08 b	0,08 b	0,08	0,09	0,11	0,11	0,12	0,12	0,14	0,16	0,19	0,41	0,39	0,23	0,24	0,22	0,22 f
Romania		0,12 b	0,12 b	0,12 b	0,12	0,17	0,14	0,14	0,15	0,21	0,22	0,27	0,28	0,27	0,19	0,20	0,12	0,10	0,10 f
Slovakia		0,14 b	0,14 b	0,14 b	0,14	0,17	0,21	0,23	0,29	0,34	0,51	0,31	0,38	0,39	0,39	0,34	0,33	0,29	0,29 f
Slovenia		0,14 b	0,14 b	0,14 b	0,14	0,17	0,19	0,19	0,19	0,20	0,21	0,23	0,28	0,60	0,54	0,55	2,22	0,24	0,24 f
Spain		0,19 b	0,19 b	0,18 b	0,18	0,15	0,15	0,15	0,15	0,17	0,17	0,18	0,19	0,22	0,23	0,24	0,32	0,43	0,42 f
Sweden		0,27 b	0,27 b	0,27 b	0,27	0,27	0,26	0,39	0,29	0,30	0,29	0,27	0,26	0,32	0,34	0,34	0,32	0,33	0,32 f
UK		0,22 b	0,22 b	0,22 b	0,21	0,22	0,23	0,25	0,24	0,25	0,27	0,28	0,29	0,37	0,36	0,38	0,38	0,40	0,39 f
Arithmetic El	**0,11**	**0,13**	**0,13**	**0,13**	**0,13**	**0,14**	**0,15**	**0,16**	**0,16**	**0,17**	**0,18**	**0,19**	**0,20**	**0,23**	**0,23**	**0,23**	**0,29**	**0,22**	**0,22**
Real EU28														**0,24**	**0,24**	**0,24**	**0,25**	**0,25**	**0,25**
Iceland		0,04 b	0,03 b	0,03 b	0,03	0,05	0,05	0,04	0,05	0,13	0,10	0,15	0,13	0,13 f	0,13 f	0,21	0,28	0,28 f	0,27 f
Norway		0,13 b	0,13 b	0,13 b	0,13	0,14	0,15	0,18	0,23	0,21	0,22	0,24	0,27	0,29	0,28	0,28	0,27	0,28	0,28 f
Switzerland		0,29 b	0,28 b	0,28 b	0,28	0,30	0,33	0,33	0,34	0,37	0,39	0,38	0,39	0,39	0,40	0,41	0,41	0,44	0,43 f
United States		0,16 b	0,16 b	0,16 b	0,16	0,17	0,18	0,20	0,21	0,23	0,24	0,25	0,26	0,20	0,21	0,21	0,21	0,21 f	0,21 f
Japan		0,06 b	0,06 b	0,06 b	0,06	0,06	0,07	0,07	0,07	0,07	0,07	0,07	0,07	0,08	0,08	0,07	0,08	0,08 f	0,08 f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.4. New women doctoral graduates (ISCED 6/8) per thousand population aged 25- 34

No	Indicator	Rationale	Data source
1-4	New women doctoral graduates (ISCED 6/8) per thousand population aged 25- 34	This indicator addresses the gender dimension and provides an indication of the efficacy of measures aimed to encourage the research career.	Eurostat, Graduates (educ_uoe_grad01 from 2013, educ_grad4 until 2012); Population statistics (migr_pop1ctz)

Key descriptive insights:

- In 2017 there were **0.67 new women doctoral graduates (ISCED 6/8) per thousand population aged 25- 34. This was a small increase of 4% since 2014**.
- Between 2014 and 2017, the **largest increases** in the number of **new women PhD graduates per thousand population aged 25-34** were registered in **Malta** (0.05 to 0.23, +382%), **Luxembourg** (0.31 to 0.65, +112%) and **Cyprus** (0.19 to 0.3, 52%). The **largest decreases** were observed in **Slovenia** (1.12 to 0.57, -49%), **Latvia** (0.27 to 0.15, -46%) and **Croatia** (0.42 to 0.23, -45%).
- **The highest overall** number of new women PhD graduates per thousand population aged 25-29 are found in **Germany** (0.98), **Denmark** (0.93) and **UK** (0.91). **The lowest overall numbers** are found in **Latvia** (0.15), **Croatia** (0.23) and **Poland** (0.25).
- In the **long-term perspective** (i.e. over the reference period 2000-2018), the **EU average has increased**: the number of young PhD graduates per thousand population increased from **0.3** in 2000 to **0.55** in 2017, while peaking in **2016** with **0.60**.
- Concerning EFTA countries, compared to EU28 the indicator score was lower in Norway and Iceland and significantly higher in Switzerland.

Table 23: New women doctoral graduates (ISCED 8) per thousand population aged 25 – 34 - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 % change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	0.61	0.64	↑ 6%		↑ 1%	
Belgium	0.62	0.70	↑ 12%		↑ 7%	
Bulgaria	0.24	0.34	↑ 41%		↑ 13%	
Croatia	0.42	0.23	↓ -45%		↓ -31%	
Cyprus	0.19	0.30	↑ 52%		↑ 14%	
Czechia	0.50	0.48	↓ -3%		↓ -6%	
Denmark	0.97	0.93	↓ -3%		↓ -11%	
Estonia	0.34	0.46	↑ 35%		↑ 16%	
Finland	0.57	0.52	↓ -8%		↓ -11%	
France	0.54	0.63	↑ 16%		↑ 9%	
Germany	1.06	0.98	↓ -8%		↓ -19%	
Greece	0.21	0.30	↑ 41%		↑ 12%	
Hungary	0.29	0.28	↓ -4%		↓ -4%	
Ireland	0.88	0.69	↓ -21%		↓ -33%	
Italy	0.59	0.60	↑ 1%		↓ -3%	
Latvia	0.27	0.15	↓ -46%		↓ -20%	
Lithuania	0.45	0.36	↓ -20%		↓ -16%	
Luxembourg	0.31	0.65	↑ 112%		↑ 49%	
Malta	0.05	0.23	↑ 382%		↑ 27%	
Netherlands	0.90	0.89	↓ -2%		↓ -8%	
Poland	0.24	0.25	↑ 2%		↓ -1%	
Portugal	0.77	0.44	↓ -43%		↓ -54%	
Romania	0.61	0.65	↑ 8%		↑ 3%	
Slovakia	0.95	0.74	↓ -23%		↓ -38%	
Slovenia	1.12	0.57	↓ -49%		↓ -88%	
Spain	0.52	0.69	↑ 33%		↑ 22%	
Sweden	0.71	0.61	↓ -13%		↓ -18%	
UK	0.84	0.91	↑ 9%		↑ 6%	
EU28	**0.65**	**0.67**	↑ 4%			
Iceland	0.50	0.43	↓ -14%		↓ -14%	
Norway	0.46	0.44	↓ -4%		↓ -6%	
Switzerland	1.18	1.24	↑ 5%		↑ 1%	

Note: EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows

Table 24: New women doctoral graduates (ISCED 8) per thousand population aged 25 – 34

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria		0,58 b	0,60 b	0,61 b	0,63	0,64	0,60	0,60	0,64	0,67	0,70	0,65	0,68	0,64	0,61	0,62	0,58	0,64
Belgium		0,18 b	0,19 b	0,19 b	0,19	0,23	0,26	0,27	0,48	0,46	0,53	0,36	0,58	0,58	0,62	0,61	0,77	0,70
Bulgaria		0,08 b	0,08 b	0,08 b	0,08	0,13	0,13	0,18	0,14	0,15	0,14	0,16	0,19	0,24	0,24	0,28	0,34	0,34
Croatia							0,20 b	0,20 b	0,20 b	0,20	0,27 i1	0,33	0,40	0,44	0,42	0,46	0,28	0,30
Cyprus				0,17 b	0,17 b	0,16 b	0,16	0,09	0,09 i1	0,09	0,05	0,13	0,14	0,15	0,19	0,19	0,30	0,23
Czechia		0,29 b	0,28 b	0,28 b	0,27	0,28	0,32	0,38	0,39	0,42	0,39	0,49	0,52	0,50	0,50	0,52	0,50	0,48
Denmark		0,24 b	0,24 b	0,25 b	0,25	0,32	0,33	0,31	0,38	0,45	0,55	0,61	0,59	0,83	0,97	0,98	0,94	0,93
Estonia				0,19 b	0,19 b	0,19 b	0,19	0,20	0,24	0,28	0,28	0,40	0,32	0,47	0,34	0,28	0,41	0,46
Finland	0,33	0,34 b	0,34 b	0,34	0,41	0,43	0,41	0,52	0,54	0,55	0,48	0,51	0,50	0,52	0,57	0,57	0,58	0,52
France											0,55 b	0,55 b	0,55 b	0,54	0,54	0,53	0,53	0,63
Germany		0,61 b	0,63 b	0,66 b	0,68	0,79	0,80	0,83	0,87	0,92	0,94	1,04	1,06	1,04	1,06	1,05	1,03	0,98
Greece		0,16 b	0,16 b	0,16 b	0,16	0,24	0,33	0,58	0,08	0,12 i1	0,16	0,17 i21	0,19 i22	0,21	0,21	0,23	0,34	0,30
Hungary		0,13 b	0,12 b	0,12 b	0,12	0,14	0,14	0,15	0,16	0,23	0,24	0,23	0,25	0,23	0,29	0,28	0,30	0,28
Ireland								0,58 b	0,57 b	0,57 b	0,57	0,65	0,67	0,74	0,88	0,87	0,66	0,69
Italy	0,29	0,29 b	0,30 b	0,30	0,40	0,47	0,50	0,54	0,55 i31	0,57 i32	0,59 i33	0,61	0,63	0,60	0,59	0,63	0,30	0,60
Latvia				0,09 b	0,09 b	0,09 b	0,09	0,14	0,13	0,13	0,10	0,26	0,24	0,24	0,27	0,25	0,18	0,15
Lithuania		0,23 b	0,24 b	0,24 b	0,25	0,31	0,32	0,35	0,32	0,37	0,36	0,35	0,40	0,47	0,45	0,42	0,33	0,36
Luxembourg									0,26 b	0,26 b	0,25 b	0,25	0,31	0,29	0,31	0,50	0,38	0,65
Malta							0,14 b	0,14 b	0,13 b	0,13	0,13 i31	0,12 i32	0,12 i33	0,11	0,05	0,11	0,13	0,23
Netherlands									0,67 b	0,68 b	0,68 b	0,68	0,76	0,84	0,90	0,93	0,96	0,89
Poland										0,22 b	0,22 b	0,22 b	0,22	0,28	0,24	0,28	0,27	0,25
Portugal		0,11 b	0,11 b	0,11 b	0,11	0,13	0,15	0,17	0,18	0,17	0,25	0,30	0,36	0,83	0,77	0,37	0,45	0,44
Romania		0,21 b	0,21 b	0,22 b	0,22	0,31	0,25	0,27	0,33	0,49	0,46	0,64	0,60	0,60	0,61	0,61 f	0,63 f	0,65 f
Slovakia		0,30 b	0,29 b	0,29 b	0,28	0,34	0,38	0,49	0,62	0,71	1,02	0,69	0,94	0,96	0,95	0,85	0,86	0,74
Slovenia		0,31 b	0,31 b	0,31 b	0,31	0,34	0,44	0,35	0,39	0,51	0,47	0,53	0,61	1,37	1,12	1,10	2,47	0,57
Spain		0,28 b	0,28 b	0,27 b	0,26	0,22	0,23	0,29	0,30	0,32	0,36	0,35	0,41	0,47	0,52	0,58	0,66	0,69
Sweden		0,48 b	0,49 b	0,50 b	0,51	0,50	0,54	0,84	0,59	0,59	0,58	0,53	0,52	0,67	0,71	0,64	0,64	0,61
UK		0,52 b	0,53 b	0,55 b	0,56	0,56	0,60	0,65	0,62	0,67	0,70	0,75	0,75	0,86	0,84	0,87	0,88	0,91
Arithmetic EU28	**0,31**	**0,30**	**0,30**	**0,28**	**0,29**	**0,32**	**0,33**	**0,38**	**0,38**	**0,40**	**0,43**	**0,45**	**0,48**	**0,56**	**0,56**	**0,56**	**0,60**	**0,54**
Real EU28														**0,64**	**0,65**	**0,66**	**0,65**	**0,67**
Iceland			0,05 b	0,05 b	0,05 b	0,05	0,14	0,15 i21	0,15 i22	0,17	0,15	0,26	0,20	0,30	0,50	0,20	0,40	0,40 f
Norway		0,20 b	0,21 b	0,21 b	0,22	0,26	0,25	0,30	0,37	0,34	0,35	0,40	0,49	0,51	0,46	0,40	0,40	0,40
Switzerland		0,79 b	0,80 b	0,81 b	0,82	0,88	0,95	1,01	1,04	1,13	1,21	1,13	1,13	1,13	1,18	1,20	1,20	1,20

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.5. Share of female researchers in the total number of researchers

No	Indicator	Rationale	Data source
1-5	Share of female researchers in the total number of researchers	This indicator addresses the gender dimension by providing a direct measure of the proportion of women in the population of researchers. This indicator is to be related to Indicators 3-1 and 3-4 which address the career development of female researchers.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employee statistics (lfsi_emp_a)

Key descriptive insights:

- In 2017 the share of **female researchers in the total number of researchers in EU28 was 33% - 2p.p. lower than in 201**4.
- In the period 2014-2017, the **largest increases** in the **share of female researchers in the total number of researchers** were registered in **Ireland** (+5 p.p.) and **Denmark** (+3 p.p.). The **largest decrease** was observed in **Poland** (-9 p.p.) and **Slovakia and Cyprus** (-6 p.p. each).
- **The highest overall share of female researchers in the total number of researchers** in 2017 is found in **Bulgaria** (52%), **Croatia** (48%) and **Romania** (47%). The **lowest overall** share in 2017 is found in **Austria** (21%) and **Germany** (21%).
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has decreased**: share of female researchers in the total number of researchers decreased from **36%** in 2000 to **33%** in 2017, while peaking in **2000-2001** with **36%**.

Table 25: Share (%) of female researchers in the total number of researchers - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	23%	21%	-1		0%	
Belgium	27%	24%	-2		-3%	
Bulgaria	50%	52%	2		14%	
Croatia	51%	48%	-3		0%	
Cyprus	39%	33%	-6		-11%	
Czechia	24%	23%	-1		1%	
Denmark	32%	35%	3		15%	
Estonia	43%	38%	-5		-7%	
Finland						
France	27%	25%	-2		-1%	
Germany	24%	21%	-3		-4%	
Greece	40%	35%	-5		-7%	
Hungary	26%	24%	-2		-2%	
Ireland	32%	37%	5		21%	
Italy	36%	35%	-1		3%	
Latvia	49%	45%	-3		-1%	
Lithuania	47%	46%	-1		6%	
Luxembourg	27%	26%	0		4%	
Malta	30%	27%	-3		-4%	
Netherlands	26%	26%	0		4%	
Poland	35%	26%	-9		-21%	
Portugal	44%	40%	-4		-5%	
Romania	45%	47%	2		14%	
Slovakia	41%	37%	-4		-5%	
Slovenia	35%	29%	-6		-11%	
Spain	39%	37%	-1		3%	
Sweden	28%	25%	-3		-3%	
UK						
EU28	**35%**	**33%**	-2			
Montenegro	47%	53%	6		27%	
North Macedonia	48%	63%	15		55%	
Serbia	49%	50%	1		11%	
Turkey	33%	33%	0		6%	

Note: p.p. change = change in percentage points. EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 26: Share (%) of female researchers in the total number of researchers

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	16% b	16% b	16%	17% i1	18%	18% i1	19%	21%	21% i1	22%	22% i1	23%	23% i1	23%	23% i1	23%	22% f	21% f
Belgium	25%	26%	27%	28%	29%	29%	30%	31%	32%	32%	32%	32%	30%	29%	27%	25% f	25% f	24% f
Bulgaria	46%	46%	47%	47%	47%	46%	45%	48%	48%	48%	50%	50%	50%	50%	50%	48%	49%	52% f
Croatia	43% b	43% b	43%	48%	46%	47%	46%	47%	49%	49%	49%	49%	50%	50%	51%	50%	48%	48% f
Cyprus	30%	32%	31%	32%	34%	35%	34%	34%	35%	38%	37%	37%	38%	38%	39%	38%	37%	33% f
Czechia	26%	26%	26%	26%	25%	26%	25%	25%	25%	26%	25%	25%	25%	25%	24%	23%	23%	23%
Denmark	29% b	29%	27%	28%	29% i1	29%	29% i1	29%	28% i1	30%	31%	32%	31%	33%	32% i1	32%	33% i1	35%
Estonia	42%	42%	41%	42%	41%	40%	40%	41%	38%	42%	41%	41%	43%	42%	43%	44%	41%	38% f
Finland																		
France								21% b	20% b	20% b	19%	26%	26%	26%	27%	26% f	25% f	25% f
Germany	17% b	16%	16% i1	16%	17% i1	18%	18% i1	19%	20% i1	21%	21% i1	22%	22% i1	23%	24% i	23%	22% f	21% f
Greece	33% b	33%	33% i1	33%	32% i1	32%	34% i51	35% i52	36% i53	37% i54	38% i55	39%	42% i1	39%	40% i	36%	42% f	35% f
Hungary				36% b	37% b	35% b	31%	32%	31%	30%	30%	30%	28%	27%	26%	27%	27%	24% f
Ireland	31% b	29% b	28%	29%	28%	28%	29%	30%	30%	33%	33%	30%	30% i1	29%	32% i	34%	39% f	37% f
Italy	30% b	30% b	28% b	29%	29%	32%	33%	34%	33%	34%	35%	35%	36%	36%	36%	36%	36%	35% f
Latvia	49%	55%	53%	53%	54%	50%	47%	50%	50%	50%	47%	52%	51%	50%	49% i	50%	50%	45% f
Lithuania	44%	47%	47%	48%	47%	49%	49%	49%	50%	50%	51%	49%	50%	48%	47%	47%	47%	46% f
Luxembourg			21% b	20% b	19% b	18%	21% i31	21% i32	22% i33	22%	23% i1	23%	29% i1	27%	27% i	28%	29% f	26% f
Malta		40% b	40% b	39% b	25%	25%	25%	25%	28%	29%	26%	25%	28%	28%	30%	27%	27%	27% f
Netherlands									31% b	33% b	29% b	25%	25%	26%	26%	27%	27%	26% f
Poland	61%	53% i21	46% i22	37%	37%	39%	38%	39%	38%	38%	38%	38%	37%	36%	35%	35%	34%	26% f
Portugal	44%	45%	45%	45%	45%	45%	44%	44%	44%	45%	44%	44%	44%	45%	44%	43%	43%	40% f
Romania	43%	43%	45%	45%	45%	46%	45%	44%	46%	45%	44%	46%	45%	45%	45%	45%	45%	47% f
Slovakia	39%	40%	41%	41%	41%	41%	42%	41%	42%	42%	42%	42%	42%	42%	41%	42%	40%	37% f
Slovenia	35%	34%	35%	32%	32%	34%	33%	34%	33%	34%	35%	35%	34%	35%	35%	34%	33%	29% f
Spain	37% b	35%	36%	37%	37%	38%	38%	38%	38%	39%	38%	39%	38%	39%	39%	39%	39%	37% f
Sweden			34% b	33% b	33% b	29%	26% i1	29%	27% i1	30%	29% i1	30%	33% i1	28%	28% i1	27%	26% f	25% f
UK																		
EU28	**36%**	**36%**	**36%**	**36%**	**35%**	**36%**	**36%**	**36%**	**36%**	**37%**	**37%**	**37%**	**37%**	**37%**	**36%**	**35%**	**35%**	**33%**
Montenegro									49% b	49% b	49% b	49%	47% i	46%	47%	46%	53% f	53% f
North Macedonia									55%	54%	56%	58%	54%	54% i21	48% i22	51%	54%	63% f
Serbia									47%	48%	49%	49%	50%	50%	49%	49%	48%	50%
Turkey									34%	33%	33%	32%	33%	33%	33%	33%	32%	33%

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.6. Share of researchers in the private sector in the total number of researchers

No	Indicator	Rationale	Data source
1-6	Share of researchers in the private sector in the total number of researchers	Given the significant differences between working conditions, incentives, potential for mobility and private sector, the indicator provides insight into better understanding the observed values in the other indicators.	Eurostat, Total R&D personnel by sectors of performance, occupation and sex (rd_p_persocc); Employee statistics (lfsi_emp_a)

Key descriptive insights:

- In **2017 the share of researchers in the private sector in the total number of researchers was 51% -** a **small increase of 3 p.p. since 2014**.
- In period 2014-2017, the **largest increases** in the share of researchers in the private sector in the total number of researchers were registered in **Bulgaria** (+16 p.p.), **Poland** (+15 p.p.) and **Greece** (+14 p.p.). The **largest decreases** were observed in **Ireland** (-11 p.p.), **Malta/Romania** (-3 p.p. in both countries).
- The **EU-wide trend for female researcher in the private sector** over this reference period has also shown a **small increase (28% to 30%, +2 p.p.)**.
- **The highest overall** share of researchers in the private sector in the total number of researchers is found in **Sweden** (72%), **Netherlands** (63%) and **Austria, Hungary and Slovenia** (62% each). The **lowest overall numbers** are found in **Latvia** (19%), **Croatia** (21%) and **Romania** (25%).
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has increased**: the share of researchers in the private sector in the total number of researchers increased from **37%** in 2000 to **45%** in 2017, while peaking in 2017. Similarly, the share of female researchers in the private sector in the total number of researchers increased from **25%** in 2000 to **30%** in 2017, while peaking in **2016-2017.**
- The indicator **score was slightly lower in EFTA countries**.
- **Compared to EU28, the share of researchers in the private sector was significantly higher in the US (71%), China (61%), Japan (74%) and South Korea (81%).**

Table 27: Share of researchers in the private sector in the total number of researchers – Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	64%	62%	-2		-11%	
Belgium	51%	54%	3		0%	
Bulgaria	27%	43%	16		29%	
Croatia	15%	21%	6		10%	
Cyprus	21%	26%	5		7%	
Czechia	51%	52%	1		-5%	
Denmark	60%	61%	1		-5%	
Estonia	29%	34%	5		5%	
Finland	56%	55%	0		-8%	
France	60%	60%	0		-8%	
Germany	56%	60%	4		0%	
Greece	17%	30%	14		25%	
Hungary	59%	62%	2		-3%	
Ireland	64%	53%	-11		-30%	
Italy	38%	43%	4		4%	
Latvia	21%	19%	-2		-7%	
Lithuania	23%	29%	6		9%	
Luxembourg	40%	42%	2		-2%	
Malta	60%	57%	-3		-13%	
Netherlands	61%	63%	2		-4%	
Poland	32%	47%	15		26%	
Portugal	27%	34%	7		10%	
Romania	29%	25%	-3		-10%	
Slovakia	18%	22%	4		6%	
Slovenia	54%	62%	8		8%	
Spain	37%	37%	1		-3%	
Sweden	67%	72%	5		2%	
UK	38%	38%	0		-5%	
EU28	**48%**	**51%**	3			
Iceland	38%	43%	5		**5%**	
Norway	49%	48%	-1		-8%	
Switzerland	47%	50%	3		1%	
United States	69%	71%	2		-4%	
China	62%	61%	-2		-11%	
Japan	73%	74%	0		-9%	
South Korea	79%	81%	3		-5%	
Montenegro	19%	12%	-7		-16%	
North Macedonia	12%	21%	10		18%	
Serbia	11%	11%	0		-2%	
Turkey	47%	56%	9		12%	
Russia	47%	47%	0		-5%	

Note: p.p. change = change in percentage points. EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows

Table 28: Share of researchers in the private sector in the total number of researchers over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	66% b	66% b	66%	65% i1	64%	64%	63%	63%	63%	62%	62%	62%	63%	64%	64%	64%	62%	62%
Belgium	55%	56%	53%	53%	51%	51%	50%	50%	47%	47%	49%	50%	51%	51%	51%	54%	54%	54%
Bulgaria	12%	12%	10%	13%	13%	12%	13%	12%	13%	14%	14%	13%	19%	22%	27%	39%	38%	43%
Croatia	15% b	15% b	15%	16%	14%	12%	13%	14%	16%	19%	18%	18%	17%	16%	15%	17%	23%	21%
Cyprus	25%	25%	27%	21%	19%	19%	22%	23%	26%	24%	22%	20%	19%	20%	21%	21%	25%	26%
Czechia	40%	38%	41%	41%	44%	42%	42%	44%	44%	44%	43%	45%	46%	49%	51%	50%	51%	52%
Denmark	50% b	50%	62%	59%	61%	63%	61%	63%	66%	64%	61%	61%	61%	59%	60%	58%	60%	61%
Estonia	10%	15%	15%	17%	20%	27%	25%	26%	31%	30%	31%	33%	31%	31%	29%	28%	30%	34%
Finland		57% b	57% b	57% b	57%	55%	56%	56%	59%	58%	55%	57%	57%	57%	56%	57%	56%	55%
France	47%	50%	51%	52%	54%	53%	54%	56%	56%	57%	59%	60%	60%	61%	60%	60%	60% i1	60%
Germany	59%	60%	58%	60%	60%	61%	61%	60%	60%	58%	57%	56%	57%	56%	56%	59%	59%	60%
Greece	23%	26%	27%	27%	29% i1	31%	27%	30%	26% i31	23% i32	19% i33	16%	18%	14%	17%	15%	19%	30%
Hungary	27%	28%	29%	30%	29%	32%	36%	40%	43%	45%	48%	51%	56%	57%	59%	59%	59%	62%
Ireland	66%	67%	64%	60%	57%	58%	58%	57%	54%	54%	56%	59%	61%	64%	64%	51%	57%	53%
Italy	39%	40%	39%	38%	38%	34%	34%	35%	38%	37%	37%	38%	37%	37%	38%	40%	42%	43%
Latvia	26%	20%	20%	14%	13%	14%	17%	10%	11%	9%	16%	14%	15%	16%	21%	17%	18%	19%
Lithuania	4%	5%	4%	7%	7%	9%	11%	15%	14%	13%	14%	16%	16%	21%	23%	23%	23%	29%
Luxembourg	85%	84% i21	83% i22	82%	76%	76%	71%	69%	64%	57%	56%	54%	40%	40%	40%	38%	45%	42%
Malta	17% b	17% b	17%	18%	46%	49%	49%	49%	47%	52%	57%	67%	67%	64%	60%	58%	61%	57%
Netherlands	47%	49%	47%	44%	48%	48%	53%	51%	49%	44%	50%	55%	60%	61%	61%	60%	62%	63%
Poland	18%	17%	8%	12%	14%	15%	16%	16%	14%	16%	18%	16%	23%	29%	32%	35%	46%	47%
Portugal	14%	15%	17%	19%	19%	19%	25%	30%	26%	26%	25%	28%	28%	27%	27%	30%	32%	34%
Romania	62%	57%	53%	47%	43%	45%	41%	41%	33%	32%	30%	22%	28%	29%	29%	24%	27%	25%
Slovakia	24%	24%	24%	20%	17%	18%	16%	13%	13%	12%	13%	13%	16%	17%	18%	19%	20%	22%
Slovenia	32%	34%	35%	40%	41%	37%	39%	41%	43%	44%	44%	51%	52%	54%	54%	53%	55%	62%
Spain	27%	24%	30%	30%	32%	32%	34%	34%	35%	34%	34%	34%	35%	36%	37%	37%	37%	37%
Sweden	61% b	61%	60% i1	59%	58%	67%	68%	63%	66%	62%	62%	60%	62%	67%	67%	68%	67%	72%
UK	50%	50%	48%	46%	41%	38%	37%	35%	34%	33%	33%	35%	35%	37%	38%	37%	38%	38%
Arithmetic EU28	**37%**	**38%**	**38%**	**37%**	**38%**	**39%**	**39%**	**39%**	**39%**	**38%**	**39%**	**40%**	**40%**	**41%**	**42%**	**42%**	**44%**	**45%**
Real EU28									**46%**	**45%**	**45%**	**46%**	**47%**	**48%**	**48%**	**49%**	**50%**	**51%**
Iceland	46% b	46%	45% i1	44%	45% i1	47%	48%	48%	48%	36%	41% i1	47%	43% i1	38%	38% f	42%	37%	43%
Norway	56% b	56%	55% i1	54%	51%	48%	50%	49%	50%	48%	47%	47%	48%	48%	49%	49%	48%	48%
Switzerland	62%	59% i31	56% i32	53% i33	50%	48% i31	45% i32	43% i33	41%	43% i31	44% i32	46% i33	47%	47% f	47% f	50%	50% f	50% f
United States	108% b	105%	98% i61	88% i62	87% i63	84% i64	79% i65	76% i66	70%	70%	67%	68%	69%	69% f	69% f	72%	71%	71% f
China	51%	52%	55%	56%	57%	62%	63%	66%	69%	61%	61%	62%	62%	62%	62% f	63%	62%	61%
Japan	65%	66%	69%	70%	70%	71%	71%	71%	75%	75%	75%	75%	74%	73%	73% f	73%	73%	74%
South Korea	66%	73%	73%	74%	74%	77%	78%	75%	77%	76%	77%	77%	78%	79%	79% f	80%	80%	81%
Montenegro									21% b	21% b	21% b	21%	21% i1	21%	19%	13%	12%	12% f
North Macedonia			9% b	9% b	9% b	9%	5%	6%	7%	9%	8%	15%	9%	9%	12%	17%	18%	21%
Serbia						3% b	3% b	3% b	3%	6%	2%	1%	2%	3%	11%	10%	13%	11%
Turkey	16%	15%	15%	15%	16%	24%	26%	31%	34%	36%	39%	42%	43%	45%	47%	48%	52%	56%
Russia	57%	56%	56%	55%	54%	51%	51%	51%	50%	49%	48%	48%	46%	47%	47%	46%	47% i1	47%

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

Table 29: Share of female researchers in the private sector in the total number of female researchers – Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	43%	43%	↓ 0	●	↓ -11%	
Belgium						
Bulgaria	22%	31%	↑ 9	●	↑ 26%	
Croatia	20%	22%	↑ 2	●	↑ 3%	
Cyprus	13%	18%	↑ 5	●	↑ 12%	
Czechia	28%	27%	↓ -1	●	↓ -11%	
Denmark	47%	51%	↑ 4	●	↑ 1%	
Estonia	20%	20%	↑ 0	●	↓ -4%	
Finland						
France	47%	47%	↑ 0	●	↓ -10%	
Germany	36%	38%	↑ 2	●	↓ -2%	
Greece	11%	11%	↑ 1	●	↓ 0%	
Hungary	40%	40%	↓ 0	●	↓ -10%	
Ireland	33%	36%	↑ 3	●	↑ 3%	
Italy	23%	26%	↑ 3	●	↑ 5%	
Latvia	15%	15%	↑ 1	●	↓ 0%	
Lithuania	18%	17%	↓ 0	●	↓ -5%	
Luxembourg	16%	17%	↑ 0	●	↓ -3%	
Malta	43%	52%	↑ 9	●	↑ 20%	
Netherlands	40%	44%	↑ 4	●	↑ 3%	
Poland	17%	31%	↑ 13	●	↑ 40%	
Portugal	19%	20%	↑ 1	●	↑ 0%	
Romania	25%	21%	↓ -5	●	↓ -21%	
Slovakia	8%	8%	↓ 0	●	↓ -3%	
Slovenia	40%	39%	↓ -1	●	↓ -12%	
Spain	29%	29%	↓ 0	●	↓ -7%	
Sweden	53%	51%	↓ -1	●	↓ -16%	
UK						
EU28	**28%**	**30%**	↑ **2**	●	↑ **0%**	
Montenegro	13%	8%	↓ -5	●	↓ -18%	
North Macedonia	19%	22%	↑ 3	●	↑ 6%	
Serbia	8%	7%	↓ -1	●	↓ -4%	
Turkey	34%	44%	↑ 10	●	↑ 26%	

Note: p.p. change = change in percentage points. EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows

Table 30: Share of female researchers in the private sector in the total of number of female researchers over 2000-2017

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	##	2016	2017
Austria	41% b	41% b	41%	40% i1	40%	40% i1	40%	41%	41% i1	42%	42% i1	42%	43% i1	44%	43% i1	43%	43% f	43% f
Belgium	36%	37%	36%	36%	34%	35%	35%	34%	32%	31%	34%	34%						
Bulgaria	13%	13%	12%	13%	13%	12%	11%	10%	12%	13%	13%	12%	16%	19%	22%	31%	31%	31% f
Croatia	12% b	12% b	12%	13%	13%	11%	10%	12%	16%	16%	16%	15%	16%	13%	20%	14%	18%	18% f
Cyprus	23%	24%	24%	17%	15%	15%	16%	17%	22%	20%	18%	16%	18%	18%	13%	19%	22%	22% f
Czechia	26%	24%	26%	26%	26%	25%	23%	24%	25%	25%	25%	27%	28%	29%	28%	26%	27%	27%
Denmark	42% b	42%	51%	50%	52% i1	54%	53% i1	52%	52% i1	52%	50%	48%	48%	46%	47% i1	46%	49% i1	51%
Estonia	8%	10%	9%	9%	11%	17%	16%	19%	18%	20%	21%	23%	21%	22%	20%	19%	20%	20% f
Finland																		
France				b	b	b		57%	57%	59%	62%	46%	47%	48%	47%	47% f	47% f	47% f
Germany	44% b	44%	42% i1	41%	40% i1	40%	38% i1	36%	36% i1	35%	35% i1	35%	35% i1	34%	36% i1	38%	38% f	38% f
Greece	17% b	17%	19% i1	20%	19% i1	19%	19% i1	20%	18% i31	16% i32	15% i33	14%	12% i1	10%	11% i1	11%	11% f	11% f
Hungary				26% b	26% b	26% b	26%	30%	32%	32%	35%	37%	38%	39%	40%	41%	40%	40% f
Ireland	47% b	47%	46%	42%	42%	43%	44%	44%	42%	45%	45%	45%	47% i1	30%	33% i1	36%	36% f	36% f
Italy	26% b	26% b	26% b	26%	26%	21%	20%	22%	24%	23%	22%	22%	22%	22%	23%	25%	26%	26% f
Latvia	21%	21%	19%	14%	14%	14%	14%	9%	12%	10%	13%	15%	14%	14%	15% i1	15%	15%	15% f
Lithuania	4%	5%	3%	5%	5%	6%	8%	9%	10%	9%	10%	11%	12%	14%	18%	15%	17%	17% f
Luxembourg			62% b	62% b	62% b	62%	49% i1	38%	33% i1	29%	27% i1	26%	25% f	16%	16% i1	17%	17% f	17% f
Malta		36% b	36% b	36% b	36%	44%	42%	46%	42%	48%	47%	59%	63%	57%	43%	46%	52%	52% f
Netherlands									34% b	34% b	34% b	34%	38%	42%	40%	42%	44%	44% f
Poland	10%	9% i21	8% i22	7%	8%	11%	11%	12%	11%	10%	10%	9%	13%	17%	17%	20%	31%	31% f
Portugal	8%	9%	11%	12%	12%	11%	16%	20%	17%	16%	16%	18%	19%	17%	19%	20%	20%	20% f
Romania	61%	55%	51%	45%	40%	41%	37%	36%	28%	27%	25%	18%	23%	25%	25%	19%	21%	21% f
Slovakia	17%	17%	18%	15%	14%	14%	13%	8%	7%	6%	6%	7%	8%	8%	8%	8%	8%	8% f
Slovenia	26%	27%	28%	31%	32%	27%	28%	30%	30%	29%	30%	38%	37%	40%	40%	39%	39%	39% f
Spain	13% b	13%	22%	22%	23%	23%	26%	26%	27%	27%	26%	27%	28%	29%	29%	29%	29%	29% f
Sweden	b	b	44% b	44%	50% i1	57%	55% i1	53%	53% i1	53%	51% i1	50%	52% i1	54%	53% i1	51%	51% f	51% f
UK																		
EU28	**25% a**	**25% a**	**28% a**	**27% a**	**27% a**	**28% a**	**27% a**	**28% a**	**28% a**	**28% a**	**28% a**	**28% a**	**29% a**	**29% a**	**29% a**	**## a**	**30% a**	**30% a**
Montenegro									17% b	17% b	17% b	17%	16% i1	15%	13%	8%	8% f	8% f
North Macedonia									10%	13%	11%	18%	14%	16% i21	19% i22	21%	22%	22% f
Serbia									3%	6%	2%	1%	2%	3%	8%	7%	8%	7%
Turkey									24%	26%	28%	30%	31%	33%	34%	35%	40%	44%

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.1.7. Satisfaction with recruitment process at home research institution (open, transparent, merit-based)

No	Indicator	Rationale	Data source
1-7	Satisfaction with recruitment process at home research institution (open, transparent, merit-based)	The indicator provides insights into the recruitment process of researchers according to priority criteria of the Commission (OTM).	MORE2/MORE3/ MORE4 surveys

This indicator is calculated as the average between the following three indicators:

- Share of researchers who agree that research job vacancies are sufficiently externally and publicly advertised by their home institution;
- Share of researchers who agree that the recruitment process is sufficiently transparent in their home institution;
- And share of researchers who agree that recruitment is sufficiently merit-based in their home institution.

Key descriptive insights:

- European researchers are generally satisfied with the recruitment process at their home research institution - the overall indicator score in the MORE4 survey was 84% - an increase of around 7 p.p. since 2016. There were no significant differences between countries.
- In terms of the longer-term trend, **between MORE2 and MORE4 this increase in satisfaction with the recruitment process at the home research institution is even more significant** and constitutes around 21pp.
- Among EU28 countries, the **highest indicator values were in the UK (90%), the Netherlands (89%), Denmark/Czechia/Romania/Malta (88% in each country).**
- **The lowest indicator values were in Spain/Croatia (75% in both countries), Hungary (73%) and Portugal (71%).**
- The largest increase between 2016 and 2016 was observed in **Slovakia (an increase of 21 p.p.), Spain (+16 p.p.), Slovenia and Hungary (an increase of 15 p.p. in both countries)**.
- As in the previous survey, **the indicator value is slightly lower for female researchers** compared to the general population of researchers (81% compared to 84%). The indicator value for women increased almost for all countries between the MORE3 and MORE4 surveys, with the exceptions of Cyprus (-7 p.p.), Poland (-2 p.p.) and Luxembourg (-1 p.p.).
- The indicator score was **higher in EFTA countries compared to the EU28 average**.

Table 31: Satisfaction with recruitment process at home research institution (open, transparent, merit-based)

	2012	2016	2019	2016- 2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	56%	80%	82%	2	↑	●
Belgium	64%	80%	85%	5	↑	●
Bulgaria	47%	68%	79%	10	↑	●
Croatia	47%	66%	75%	9	↑	●
Cyprus	59%	74%	76%	2	↑	●
Czechia	59%	84%	88%	4	↑	●
Denmark	65%	81%	88%	7	↑	●
Estonia	70%	78%	84%	6	↑	●
Finland	61%	78%	82%	4	↑	●
France	56%	74%	78%	4	↑	●
Germany	63%	80%	87%	7	↑	●
Greece	57%	74%	81%	8	↑	●
Hungary	50%	58%	73%	15	↑	●
Ireland	70%	79%	83%	4	↑	●
Italy	41%	66%	76%	9	↑	●
Latvia	61%	81%	85%	5	↑	●
Lithuania	49%	68%	76%	8	↑	●
Luxembourg	72%	81%	79%	-2	↓	●
Malta	64%	86%	88%	3	↑	●
Netherlands	67%	77%	89%	12	↑	●
Poland	63%	82%	83%	1	↑	●
Portugal	53%	62%	71%	9	↑	●
Romania	52%	82%	88%	6	↑	●
Slovakia	55%	64%	84%	21	↑	●
Slovenia	49%	67%	82%	15	↑	●
Spain	60%	59%	75%	16	↑	●
Sweden	66%	81%	84%	3	↑	●
UK	80%	86%	90%	4	↑	●
EU27-EU28	63%	77%	84%	7	↑	●
Iceland	58%	83%	92%	9	↑	●
Norway	66%	79%	86%	7	↑	●
Switzerland	67%	80%	87%	7	↑	●

Note: p.p. change = change in percentage points. EU27-28= average of 27 EU MS in MORE2 and 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 32: Satisfaction of female researchers with recruitment process at home research institution (open, transparent, merit-based)

	2016	2019	2016- 2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	72%	80%	9	↑	●
Belgium	79%	81%	2	↑	●
Bulgaria	66%	75%	9	↑	●
Croatia	64%	75%	11	↑	●
Cyprus	75%	68%	-7	↓	●
Czechia	80%	84%	4	↑	●
Denmark	72%	87%	15	↑	●
Estonia	72%	79%	7	↑	●
Finland	70%	80%	10	↑	●
France	73%	76%	2	↑	●
Germany	81%	86%	5	↑	●
Greece	68%	75%	7	↑	●
Hungary	62%	68%	6	↑	●
Ireland	79%	82%	4	↑	●
Italy	67%	73%	6	↑	●
Latvia	77%	84%	7	↑	●
Lithuania	65%	74%	9	↑	●
Luxembourg	79%	78%	-1	↓	●
Malta	82%	87%	5	↑	●
Netherlands	78%	81%	2	↑	●
Poland	82%	80%	-2	↓	●
Portugal	60%	66%	6	↑	●
Romania	82%	86%	4	↑	●
Slovakia	62%	84%	22	↑	●
Slovenia	73%	85%	12	↑	●
Spain	60%	76%	16	↑	●
Sweden	77%	82%	5	↑	●
UK	82%	89%	8	↑	●
EU28	75%	81%	7	↑	●
Iceland	84%	96%	12	↑	●
Norway	75%	81%	6	↑	●
Switzerland	81%	85%	4	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2. Working conditions

In 2019 around 20% of researchers in Europe were employed on **fixed-terms contracts** in their current academic position – a decrease of 6 p.p. since 2016 and a decrease of 14 p.p. since 2012. Most of the countries saw a decrease in the indicator score between the MORE3 and MORE4 surveys, except for Bulgaria, Cyprus, France, Latvia, Malta, Romania, Slovenia and Spain.

According to the MORE4 data, around 9% of researchers in EU28 countries were in **part-time employment** in their current academic position employment - a very slight decrease (-1 p.p.) compared to 2016 and 2012.

In terms of the **Glass Ceiling Index** for EU female researchers, data confirms the existence of the discrepancy between male and female researcher's career progression. However, this gap has been decreasing both from the short term (2013-2016) and long-term perspective. Similarly, analysis confirmed that in 2014 the overall gender pay gap in EU28 was 17% - a small decrease of 1 p.p. since 2010.

The majority (70%) of researchers in EU28 countries **consider themselves well paid or paid a reasonable salary –** a slight increase of around 3 p.p. since 2016. There was a great heterogeneity between countries with respect to researchers' satisfaction with remuneration. The indicator scores were the highest in Luxembourg, Germany, the Netherlands, Belgium and Austria/Ireland. The indicator scores were the lowest in Greece, Slovakia, Lithuania, Estonia and Poland.

Around 37% of researchers in EU28 acknowledged **the importance of transferring pensions/social security as barrier for post-PhD mobility**. This constituted an increase of 18% (in the case of transferability of pensions) and an increase of 14 p.p. (in the case of transferability of social security) since 2016 when MORE3 study was conducted.

Around 78% of researchers in EU28 were **satisfied with their pension plan in their current academic position** – a 5 p.p. increase since 2016. There are significant differences in this indicator score between different European countries. The highest indicator scores were in the Netherlands, Denmark and Luxembourg, whereas the lowest in Greece, Lithuania, Croatia, Estonia and Portugal. Similarly, around 87% of researchers in EU28 were **satisfied with their social security rights and benefits in the current academic position** – a 4 p.p. increase since 2016. The highest rates were registered in Luxembourg, the Netherlands and Austria/Sweden while the lowest in Greece, Hungary and Lithuania/Cyprus.

In 2019 there are 445 **HRS4R acknowledged institutions** in EU MS - an increase of 0.09 institutions per thousand researchers since 2015.

4.2.1. Share of researchers employed on fixed-terms contracts in their current academic position

No	Indicator	Rationale	Data source
2-1	Share of researchers employed on fixed-terms contracts in their current academic position	The indicator measures the size of non–permanent employment compared with total employment.	MORE2/MORE3/ MORE4 surveys

Key descriptive insights:
- Overall, in **2019 around 20% of researchers in Europe were employed on fixed-terms contracts** in their current academic position – **a decrease of 6 p.p. since 2016 and a decrease of 14 p.p. since 2012**.

- **Most of the countries saw a decrease in the indicator score** between the MORE3 and MORE4 surveys, except for Bulgaria, Cyprus, France, Latvia, Malta, Romania, Slovenia and Spain.
- The indicator scores were **the highest in Slovakia (54%), Lithuania (50%), Belgium (42%), Latvia and Luxembourg (36%).** The indicator values were the **lowest in Romania (3%), the UK and Malta (8% in both countries), Poland (9%) and Greece (10%).**
- Between MORE3 and MORE4 **the most significant decrease in the indicator score were in Luxembourg (-27 p.p.), Poland (-26 p.p.) and Estonia (-21 p.p.), whereas the highest increases were in France (11 p.p.), Spain (6 p.p.) and Latvia (3 p.p.).**
- Compared to the general population of researchers, the **share of female researchers employed on fixed-terms contracts in their current academic position was higher by 5 p.p.** (20% and 25% respectively). Among EU28 countries the indicator score for females also decreased by around 6 p.p. since 2016, and by 14 p.p. since 2012 (from 39% to 24%).
- Concerning EFTA countries, the indicator **score was lower in Iceland but higher in Norway and Switzerland** in comparison to EU28.

Table 33: Share of researchers employed on fixed-terms contracts in their current academic position

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	45%	33%	29%	-3	↓	🔴
Belgium	63%	44%	42%	-2	↓	🔴
Bulgaria	11%	13%	13%	0	↑	🟢
Croatia	46%	28%	16%	-11	↓	🟡
Cyprus	34%	23%	25%	2	↑	🔴
Czechia	46%	39%	20%	-19	↓	🟡
Denmark	56%	36%	33%	-3	↓	🔴
Estonia	73%	45%	24%	-21	↓	🟡
Finland	63%	41%	27%	-14	↓	🔴
France	20%	8%	20%	11	↑	🟡
Germany	54%	53%	35%	-18	↓	🔴
Greece	23%	12%	10%	-1	↓	🟢
Hungary	23%	19%	12%	-7	↓	🟢
Ireland	26%	20%	15%	-5	↓	🟢
Italy	7%	17%	16%	-1	↓	🟢
Latvia	38%	33%	36%	3	↑	🔴
Lithuania	74%	70%	50%	-20	↓	🔴
Luxembourg	65%	63%	36%	-27	↓	🔴
Malta	5%	7%	8%	0	↑	🟢
Netherlands	52%	35%	20%	-15	↓	🟡
Poland	32%	34%	9%	-26	↓	🟢
Portugal	37%	23%	16%	-7	↓	🟢
Romania	7%	2%	3%	1	↑	🟢
Slovakia	52%	61%	54%	-7	↓	🔴
Slovenia	20%	17%	17%	0	↓	🟡
Spain	21%	16%	22%	6	↑	🟡
Sweden	51%	28%	24%	-4	↓	🟡
UK	28%	9%	8%	-1	↓	🟢
EU27-EU28	34%	26%	20%	-6	↓	🟡
Iceland	21%	22%	16%	-6	↓	🟡
Norway	31%	33%	27%	-6	↓	🔴
Switzerland	61%	59%	35%	-24	↓	🔴

Note: p.p. change = change in percentage points. EU27-28= average of 27 EU MS in MORE2 and 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 34: Share of female researchers employed on fixed-terms contracts in their current academic position

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	56%	42%	46%	4	↑	🔴
Belgium	75%	55%	53%	-2	↓	🔴
Bulgaria	12%	10%	14%	4	↑	🟢
Croatia	52%	30%	18%	-11	↓	🟢
Cyprus	33%	25%	31%	6	↑	🔴
Czechia	41%	38%	21%	-17	↓	🟡
Denmark	61%	40%	48%	9	↑	🔴
Estonia	77%	49%	30%	-19	↓	🟡
Finland	59%	48%	30%	-18	↓	🔴
France	27%	9%	24%	15	↑	🟡
Germany	61%	62%	45%	-17	↓	🔴
Greece	24%	13%	11%	-2	↓	🟢
Hungary	30%	13%	16%	3	↑	🟢
Ireland	25%	20%	20%	0	↓	🟡
Italy	8%	18%	17%	-1	↓	🟢
Latvia	43%	33%	37%	3	↑	🔴
Lithuania	73%	75%	55%	-21	↓	🔴
Luxembourg	77%	75%	44%	-31	↓	🔴
Malta	4%	14%	10%	-4	↓	🟢
Netherlands	63%	44%	32%	-13	↓	🔴
Poland	34%	40%	10%	-31	↓	🟢
Portugal	34%	28%	20%	-8	↓	🟡
Romania	8%	2%	3%	1	↑	🟢
Slovakia	53%	60%	46%	-14	↓	🔴
Slovenia	23%	18%	19%	1	↑	🟢
Spain	24%	17%	26%	9	↑	🟡
Sweden	52%	35%	23%	-11	↓	🟡
UK	34%	13%	10%	-3	↓	🟢
EU27-EU28	39%	31%	25%	-6	↓	🟡
Iceland	32%	26%	18%	-8	↓	🟢
Norway	41%	37%	32%	-5	↓	🔴
Switzerland	77%	62%	40%	-22	↓	🔴

Note: p.p. change = change in percentage points.EU27-28= average of 27 EU MS in MORE2 and 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2.2. *Share of researchers with part-time employment in their current academic position employment compared to full time researchers*

No	Indicator	Rationale	Data source
2-2	Share of researchers with part-time employment in their current academic position employment compared to full time researchers.	The indicator measures the size of part- time employment compared to full-time researchers	MORE2/MORE3/ MORE4 surveys

Key descriptive insights:

- Overall, **around 9% of researchers in EU28 countries were in part-time employment** in their current academic position employment. This was a **very slight decrease (-1 p.p.)** compared to 2016 and 2012 (10% in both years).
- Most of the **countries did not experience significant changes in the indicator score between MORE3 and MORE4**: some countries experience slight increase, whereas other slightly decreased their share of researchers with part-time employment in their current academic position employment compared to full time researchers.
- The **indicator scores were the highest in Latvia (26%), Lithuania (25%), Estonia (21%), and Czechia/Iceland (19% in both countries).**
- The **indicator scores were the lowest in Italy/France (2% in both countries), Greece/Poland/Croatia (3%), Ireland/Portugal (4%).**
- The indicator scores **mostly increased in Czechia and Latvia (6 p.p. increase in both countries), Romania (5 p.p.) and Cyprus (4 p.p.), whereas the most significant decreases were in the Netherlands (-12 p.p.) and Germany (-8 p.p.)**.
- There was **a slightly higher share of female researchers with part-time employment** in their current academic position (12%) compared to the general population of researchers (9%).
- In comparison to EU28 average, the **indicator score was much higher in Switzerland (24%) and Iceland (19%) but lower in Norway (6%)**.

Table 35: Share of researchers with part-time employment in their current academic position

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	21%	15%	12%	-3	↓	🔴
Belgium	9%	7%	8%	1	↑	🟡
Bulgaria	4%	5%	6%	1	↑	🟢
Croatia	2%	6%	3%	-3	↓	🟢
Cyprus	1%	5%	9%	4	↑	🟡
Czechia	20%	13%	19%	6	↑	🔴
Denmark	5%	7%	7%	0	↓	🟢
Estonia	21%	21%	21%	1	↑	🔴
Finland	7%	4%	8%	3	↑	🟡
France	5%	5%	2%	-2	↓	🟢
Germany	23%	24%	16%	-8	↓	🔴
Greece	4%	1%	3%	2	↑	🟢
Hungary	10%	14%	12%	-2	↓	🔴
Ireland	2%	4%	4%	0	↓	🟢
Italy	3%	1%	2%	1	↑	🟢
Latvia	29%	20%	26%	6	↑	🔴
Lithuania	31%	26%	25%	-1	↓	🔴
Luxembourg	3%	6%	8%	2	↑	🟡
Malta	7%	8%	9%	1	↑	🟡
Poland	3%	3%	3%	0	↓	🟢
Portugal	7%	7%	4%	-2	↓	🟢
Romania	4%	2%	7%	5	↑	🟢
Slovakia	9%	3%	5%	3	↑	🟢
Slovenia	6%	9%	9%	0	↑	🟡
Spain	7%	5%	7%	2	↑	🟢
Sweden	10%	9%	10%	1	↑	🟡
The Netherlands	17%	23%	10%	-12	↓	🟡
UK	8%	7%	9%	2	↑	🟡
EU27-EU28	10%	10%	9%	-1	↓	🟡
Iceland	20%	17%	19%	2	↑	🔴
Norway	8%	9%	6%	-3	↓	🟢
Switzerland	38%	33%	24%	-9	↓	🔴

Note: p.p. change = change in percentage points. EU27-28= average of 27 EU MS in MORE2 and 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 36: Share of female researchers with part-time employment in their current academic position

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	31%	21%	23%	2	↑	🔴
Belgium	9%	10%	12%	2	↑	🟡
Bulgaria	5%	4%	6%	3	↑	🟢
Croatia	2%	7%	3%	-4	↓	🟢
Cyprus	2%	7%	11%	3	↑	🟡
Czechia	20%	12%	19%	7	↑	🔴
Denmark	5%	5%	10%	5	↑	🟡
Estonia	21%	25%	21%	-3	↓	🔴
Finland	11%	7%	10%	3	↑	🟡
France	11%	7%	3%	-4	↓	🟢
Germany	32%	31%	23%	-9	↓	🔴
Greece	3%	2%	4%	2	↑	🟢
Hungary	13%	15%	20%	5	↑	🔴
Ireland	3%	7%	6%	0	↓	🟢
Italy	3%	1%	2%	1	↑	🟢
Latvia	25%	19%	25%	6	↑	🔴
Lithuania	31%	28%	24%	-4	↓	🔴
Luxembourg	6%	9%	12%	4	↑	🟡
Malta	6%	1%	11%	10	↑	🟡
Poland	3%	1%	4%	2	↑	🟢
Portugal	4%	5%	6%	1	↑	🟢
Romania	3%	3%	6%	3	↑	🟢
Slovakia	10%	2%	4%	2	↑	🟢
Slovenia	4%	10%	10%	0	↑	🟡
Spain	8%	3%	8%	5	↑	🟢
Sweden	14%	10%	11%	1	↑	🟡
The Netherlands	28%	35%	16%	-20	↓	🔴
UK	13%	14%	16%	2	↑	🔴
EU27-EU28	14%	13%	12%	-1	↓	🟡
Iceland	16%	17%	25%	8	↑	🔴
Norway	5%	7%	6%	-1	↓	🟢
Switzerland	51%	44%	31%	-13	↓	🔴

Note: p.p. change = change in percentage points. EU27-28= average of 27 EU MS in MORE2 and 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2.3. Glass Ceiling Index

No	Indicator	Rationale	Data source
2-3	Glass Ceiling Index	This indicator helps to assess and understand the difficulties for women progressing in their research career.	SHE figures (WIS database)

"The Glass Ceiling Index (GCI) is a relative index comparing the proportion of women in academia (grades A, B, and C) with the proportion of women in top academic positions (grade A positions; equivalent to full professors in most countries) in a given year. The GCI can range from 0 to infinity. A GCI of 1 indicates that there is no difference between women and men in terms of their chances of being promoted. A score of less than 1 means that women are more represented at the grade A level than in academia generally (grades A, B, and C) and a GCI score of more than 1 indicates the presence of a glass ceiling effect, meaning that women are less represented in grade A positions than in academia generally (grades A, B, and C). In other words, the interpretation of the GCI is that the higher the value, the stronger the glass ceiling effect and the more difficult it is for women to move into a higher position" (SHE Figures Report 2018).

Key descriptive insights:

- In period 2013-2016, the **largest increases** in the **Glass Ceiling Index** were registered in **Malta** (0.72 to 1.08, +50%), **Germany** (1.34 to 1.77, +32%) and **Hungary** (1.57 to 1.94, +23%). The **largest decreases** were observed in **Romania** (1.38 to 1.04, -25%), **Latvia** (1.63 to 1.35, -17%) and **Slovenia** (1.63 to 1.39, -14%). The **EU-wide trend** over this reference period has shown a **small decrease (1.68 to 1.64, -2%)**.
- The highest **GCI** in 2016 is found in **Cyprus** (2.60), **Ireland** (2.16) and **Hungary** (1.94). The lowest GCI in 2016 is found in **Romania** (1.04), **Malta** (1.08) and **Bulgaria** (1.18).
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has decreased**: share of female researchers in the total number of researchers decreased from **1.90** in 2000 to **1.64** in 2017, while peaking in **2002-2006** with **1.90**.
- Glass Ceiling Index score in EFTA countries (Switzerland and Norway) was somewhat lower than the EU28 average.

Table 37: Glass Ceiling Index - Scorecard

Scorecard						
Country	**2013**	**2016**	**2013-2016 % change**	**Comparison with EU**	**Progress index**	**Long-term trend**
Austria	1.60	1.55	-3%		-1%	
Belgium	1.95	1.74	-11%		-10%	
Bulgaria	1.25	1.18	-5%		-2%	
Croatia	1.31	1.24	-5%		-3%	
Cyprus	2.84	2.60	-8%		-11%	
Czechia						
Denmark	1.71	1.65	-4%		-2%	
Estonia						
Finland	1.58	1.53	-3%		-1%	
France	1.64	1.63	-1%		1%	
Germany	1.34	1.77	32%		28%	
Greece	1.48	1.42	-4%		-2%	
Hungary	1.57	1.94	23%		24%	
Ireland	2.34	2.16	-8%		-8%	
Italy	1.73	1.68	-3%		-1%	
Latvia	1.63	1.35	-17%		-15%	
Lithuania						
Luxembourg	2.01	1.62	-19%		-21%	
Malta	0.72	1.08	50%		23%	
Netherlands	1.78	1.70	-5%		-3%	
Poland	1.82	1.78	-2%		0%	
Portugal	1.74	1.69	-3%		-1%	
Romania	1.38	1.04	-25%		-19%	
Slovakia	1.82	1.74	-5%		-3%	
Slovenia	1.63	1.39	-14%		-12%	
Spain	1.76	1.85	5%		8%	
Sweden	1.64	1.59	-3%		-1%	
UK*	1.68	1.63	-3%		-1%	
EU28	**1.68**	**1.64**	**-2%**			
Norway	1.51	1.49	-1%		1%	
Switzerland	1.56	1.52	-2%		0%	

*UK data from 2014

Note: p.p. change = change in percentage points. EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2016 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows

Table 38. Glass Ceiling Index

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	2,39 b	2,39 b	2,39 b	2,39	2,22 i1	2,04	1,99 i21	1,95 i22	1,90	1,83 i1	1,76	1,71 i21	1,65 i22	1,60	1,58 i1	1,55	1,55 f	1,55 f
Belgium	2,32 b	2,32 b	2,32 b	2,32	2,31 i21	2,31 i22	2,30	2,28 i21	2,27 i22	2,25	2,21	2,12 i21	2,04 i22	1,95	1,88 i21	1,81 i22	1,74	1,74 f
Bulgaria	1,73 b	1,73 b	1,73 b	1,73	1,65 i21	1,58 i22	1,50	1,47 i21	1,43 i22	1,40	1,36 i31	1,33 i32	1,29 i33	1,25	1,23 i31	1,21 i32	1,18 i33	1,16
Croatia					1,51 b	1,51 b	1,51 b	1,51	1,51 i1	1,51	1,46 i41	1,41 i42	1,36 i43	1,31 i44	1,26	1,25 i21	1,24 i22	1,23
Cyprus	3,75 b	3,75 b	3,75 b	3,75	3,73 i1	3,70	3,65 i21	3,61 i22	3,56	3,39	3,28 i1	3,16	3,00 i1	2,84	2,72 i1	2,60	2,60 f	2,60 f
Czechia	3,12 b	3,12 b	3,12 b	3,12	2,81 i21	2,51 i22	2,20	2,12	2,12 f	2,12 f	2,12 f							
Denmark	2,29 b	2,29 b	2,29 b	2,29	2,25 i1	2,20	2,11 i21	2,03 i22	1,94	1,89	1,85 i31	1,80 i32	1,76 i33	1,71	1,69 i21	1,67 i22	1,65	1,65 f
Estonia	2,56 b	2,56 b	2,56 b	2,56	2,56 f	2,56 f	2,56 f											
Finland	1,84 b	1,84 b	1,84 b	1,84	1,83 i21	1,81 i22	1,80	1,77 i21	1,74 i22	1,71	1,63	1,61 i21	1,60 i22	1,58	1,56 i21	1,55 i22	1,53	1,53 f
France	1,81 b	1,81 b	1,81 b	1,81	1,81 i1	1,80	1,79 i21	1,79 i22	1,78	1,76 i21	1,74 i22	1,72	1,65	1,64 i21	1,64 i22	1,63	1,63 f	1,63 f
Germany	1,89 b	1,89 b	1,89 b	1,89	1,76 i21	1,63 i22	1,50	1,48 i21	1,47 i22	1,45	1,44 i31	1,42 i32	1,41 i33	1,34	1,48 i21	1,63 i22	1,77	1,77 f
Greece	2,00								1,49 b	1,49 b	1,49 b	1,49	1,49 i1	1,48	1,46 i21	1,44 i22	1,42	1,42 f
Hungary	2,34 b	2,34 b	2,34 b	2,34	2,23 i21	2,11 i22	2,00	1,92 i21	1,84 i22	1,76	1,71 i31	1,67 i32	1,62 i33	1,57	1,76 i1	1,94	1,94 f	1,94 f
Ireland			3,80 b	3,80 b	3,80 b	3,80	3,22 i31	2,63 i32	2,05 i33	1,46	1,68 i31	1,90 i32	2,12 i33	2,34	2,25 i1	2,16	2,16 f	2,16 f
Italy	1,91 b	1,91 b	1,91 b	1,91	1,87 i21	1,84 i22	1,80	1,79 i21	1,77 i22	1,76	1,75 i31	1,75 i32	1,74 i33	1,73	1,71 i21	1,70 i22	1,68	1,68 f
Latvia	2,18 b	2,18 b	2,18 b	2,18	2,09 i21	1,99 i22	1,90	1,86 i21	1,82 i22	1,78	1,74 i31	1,71 i32	1,67 i33	1,63	1,54 i21	1,44 i22	1,35	1,35 f
Lithuania	3,19 b	3,19 b	3,19 b	3,19	3,11 i21	3,04 i22	2,96	2,96 f	2,96 f	2,96 f							1,42	1,42 f
Luxembourg		2,55 b	2,55 b	2,55 b	2,55	2,80	2,81 i21	2,81 i22	2,82	2,66 i61	2,49 i62	2,33 i63	2,17 i64	2,01 i65	1,84 i66	1,68	1,62	1,62 f
Malta	11,70 b	11,70 b	11,70 b	11,70								0,72 b	0,72 b	0,72 b	0,72	0,90 i1	1,08	1,08
Netherlands	2,26 b	2,26 b	2,26 b	2,26	2,21 i21	2,15 i22	2,10	2,04 i21	1,98 i22	1,92	1,84	1,82 i21	1,80 i22	1,78	1,75 i21	1,73 i22	1,70	1,70 f
Poland	1,80 b	1,80 b	1,80 b	1,80	1,80 i21	1,80 i22	1,80	1,81 i41	1,82 i42	1,83 i43	1,84 i44	1,85	1,83 i1	1,82	1,81 i21	1,79 i22	1,78	1,78 f
Portugal	1,74 b	1,74 b	1,74	1,76 i51	1,77 i52	1,79 i53	1,80 i54	1,82 i55	1,83	1,85	1,80 i1	1,75	1,74 i1	1,74	1,72 i21	1,71 i22	1,69	1,69 f
Romania	1,42 b	1,42 b	1,42 b	1,42	1,38 i21	1,34 i22	1,30	1,28 i1	1,26	1,35 i31	1,45 i32	1,54 i33	1,63	1,38 i1	1,12	1,08 i1	1,04	1,04 f
Slovakia	2,90 b	2,90 b	2,90 b	2,90	2,63 i21	2,37 i22	2,10	2,05 i31	2,00 i32	1,95 i33	1,90	1,91	1,86 i1	1,82	1,77 i21	1,77 i22	1,74	1,74 f
Slovenia	2,20 b	2,20 b	2,20 b	2,20	2,13 i21	2,07 i22	2,00	1,93 i21	1,86 i22	1,79	1,75 i31	1,71 i32	1,67 i33	1,63	1,51 i1	1,39	1,39 f	1,39 f
Spain	2,35 b	2,35 b	2,35 b	2,35	2,20 i21	2,05 i22	1,90	1,92 i21	1,94 i22	1,96	1,91 i21	1,85 i22	1,80	1,76	1,79 i21	1,82 i22	1,85	1,85 f
Sweden	2,05 b	2,05 b	2,05 b	2,05	2,13 i21	2,22 i22	2,30	2,22 i1	2,14	1,93 i1	1,71	1,69 i21	1,66 i22	1,64	1,61 i1	1,59	1,59 f	1,59 f
UK	2,35 b	2,35 b	2,35 b	2,35	2,29 i1	2,23									1,68	1,65 i1	1,63	1,63 f
EU	**1,90 b**	**1,90 b**	**1,90 b**	**1,90**	**1,88 i51**	**1,87 i52**	**1,85 i53**	**1,83 i54**	**1,82 i55**	**1,80**	**1,78 i21**	**1,77 i22**	**1,75**	**1,68**	**1,67 i21**	**1,65 i22**	**1,64**	**1,64 f**
Norway	1,70 b	1,70 b	1,70	1,72 i1	1,74	1,77 i1	1,80	1,75 i21	1,71 i22	1,66	1,56	1,54 i21	1,53 i22	1,51	1,50 i21	1,50 i22	1,49	1,49 f
Switzerland	1,81 b	1,81 b	1,81 b	1,81	1,71 i21	1,60 i22	1,50	1,63 i21	1,76 i22	1,89	1,84 i21	1,78 i22	1,73	1,56	1,55 i21	1,53 i22	1,52	1,52 f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.2.4. Satisfaction with remuneration

No	Indicator	Rationale	Data source
2-4	Satisfaction with remuneration	The indicator provides an assessment of how each country stands in terms of remuneration according to researchers	MORE3/MORE4 surveys

The key indicator 2-4 consists of two sub-indicators:

- Satisfaction in current academic position with remuneration, measured as the share of researchers that consider themselves well paid or paid a reasonable salary.
- Share of researchers that consider the remuneration package in their current academic position better than that of people with comparable skills and experience outside academia.

Key descriptive insights:

- Overall, **around 70% of researchers in EU28 countries consider themselves well paid or paid a reasonable salary**. This constitutes a **slight increase of around 3 p.p. since 2016** when MORE3 survey was conducted. There are very significant differences between the indicator scores in different European countries.
- The indicator scores were **the highest in Luxembourg/Germany (92% in both countries), the Netherlands (90%), Belgium (89%) and Austria/Ireland** (83% in both countries).
- The indicator scores were the **lowest in Greece (23%), Slovakia (39%), Lithuania (40%), Estonia (44%) and Poland** (45%).
- Between MORE3 and MORE4 **the most significant increases in the indicator score are found in Romania (+40 p.p.), Germany (+14 p.p.) and Hungary (+13 p.p.)**.
- The most significant indicator score **decreases since MORE3 survey were in Malta (-9 p.p.), Poland (-7 p.p.), Cyprus (-6 p.p.) and Portugal (-5 p.p.**).
- The **share of female researchers considering themselves well paid or paid a reasonable salary was slightly smaller** (67%) compared to the general population of researchers in EU28 (70%).
- Concerning EFTA countries, the indicator score was higher in Switzerland (90%) and Norway (79%) but lower in Iceland (62%) compared to the EU28 average.
- The **share of researchers that consider the remuneration package in their current academic position better than that of people with comparable skills and experience outside academia was 10% in EU28** – the same share as in the MORE3 survey. There were **no differences between male and female researchers** for this indicator.
- The indicator scores were the **highest in Latvia (25%), the Netherlands (23%), Cyprus (22%) and Denmark/Lithuania (20% in both countries**).
- The indicator **scores were the lowest in France (3%), Italy (6%), Finland/UK (7% in both countries)**.
- The average share of share of researchers that consider the remuneration package in their current academic position better than that of people with comparable skills and experience outside academia was smaller in EFTA countries compared to EU28.

Table 39: Sub-indicator 1: share of researchers that consider themselves well paid or paid a reasonable salary

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	83%	83%	0	↑	🟡
Belgium	89%	89%	0	↓	🟢
Bulgaria	50%	48%	-2	↓	🔴
Croatia	55%	61%	5	↑	🟡
Cyprus	67%	61%	-6	↓	🟡
Czechia	51%	57%	6	↑	🟡
Denmark	82%	85%	3	↑	🟢
Estonia	44%	44%	0	↓	🔴
Finland	80%	78%	-1	↓	🟡
France	59%	63%	4	↑	🟡
Germany	77%	92%	14	↑	🟢
Greece	26%	23%	-3	↓	🔴
Hungary	34%	47%	13	↑	🔴
Ireland	73%	83%	9	↑	🟡
Italy	53%	57%	4	↑	🟡
Latvia	45%	53%	8	↑	🔴
Lithuania	33%	40%	7	↑	🔴
Luxembourg	89%	92%	3	↑	🟢
Malta	71%	62%	-9	↓	🟡
Netherlands	88%	90%	2	↑	🟢
Poland	52%	45%	-7	↓	🔴
Portugal	52%	48%	-5	↓	🔴
Romania	41%	81%	40	↑	🟡
Slovakia	32%	39%	7	↑	🔴
Slovenia	61%	68%	7	↑	🟡
Spain	58%	56%	-2	↓	🔴
Sweden	83%	80%	-3	↓	🟡
UK	78%	76%	-1	↓	🟡
EU28	67%	70%	3	↑	🟡
Iceland	49%	62%	13	↑	🟡
Norway	81%	79%	-1	↓	🟡
Switzerland	86%	90%	4	↑	🟢

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 40: Sub-indicator 1: share of female researchers that consider themselves well paid or paid a reasonable salary

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**total**		**female**
Austria	83%	80%	-3	↓	🟡
Belgium	89%	87%	-2	↓	🟢
Bulgaria	50%	43%	-7	↓	🔴
Croatia	55%	60%	4	↑	🟡
Cyprus	67%	55%	-13	↓	🟡
Czechia	51%	45%	-6	↓	🔴
Denmark	82%	78%	-3	↓	🟡
Estonia	44%	41%	-3	↓	🔴
Finland	80%	76%	-4	↓	🟡
France	59%	65%	6	↑	🟡
Germany	77%	90%	13	↑	🟢
Greece	26%	22%	-5	↓	🔴
Hungary	34%	35%	1	↑	🔴
Ireland	73%	83%	10	↑	🟢
Italy	53%	52%	0	↓	🔴
Latvia	45%	44%	-1	↓	🔴
Lithuania	33%	35%	2	↑	🔴
Luxembourg	89%	80%	-10	↓	🟡
Malta	71%	57%	-14	↓	🟡
Netherlands	88%	85%	-3	↓	🟢
Poland	52%	47%	-5	↓	🔴
Portugal	52%	46%	-6	↓	🔴
Romania	41%	75%	34	↑	🟡
Slovakia	32%	42%	11	↑	🔴
Slovenia	61%	65%	4	↑	🟡
Spain	58%	55%	-3	↓	🟡
Sweden	83%	84%	1	↑	🟢
UK	78%	75%	-3	↓	🟡
EU28	67%	67%	0	↑	🟡
Iceland	49%	56%	7	↑	🟡
Norway	81%	80%	-1	↓	🟡
Switzerland	86%	89%	3	↑	🟢

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%), and downwards (below -20%) arrows.

Table 41: Sub-indicator 2: share of researchers that consider the remuneration package in their current academic position better than that of people with comparable skills and experience outside academia

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	10%	9%	-1	↓	
Belgium	9%	11%	2	↑	
Bulgaria	18%	16%	-2	↓	
Croatia	12%	13%	0	↑	
Cyprus	20%	22%	2	↑	
Czechia	5%	16%	11	↑	
Denmark	10%	20%	10	↑	
Estonia	17%	11%	-6	↓	
Finland	16%	7%	-9	↓	
France	4%	3%	-1	↓	
Germany	14%	12%	-1	↓	
Greece	11%	11%	0	↑	
Hungary	12%	12%	0	↓	
Ireland	9%	11%	3	↑	
Italy	7%	6%	-1	↓	
Latvia	15%	25%	10	↑	
Lithuania	13%	20%	7	↑	
Luxembourg	15%	18%	3	↑	
Malta	18%	16%	-2	↓	
The Netherlands	12%	23%	10	↑	
Poland	8%	9%	1	↑	
Portugal	14%	9%	-5	↓	
Romania	42%	13%	-30	↓	
Slovakia	14%	15%	0	↑	
Slovenia	13%	12%	-1	↓	
Spain	10%	12%	2	↑	
Sweden	11%	14%	4	↑	
UK	6%	7%	2	↑	
EU28	10%	10%	0	↑	
Iceland	7%	5%	-1	↓	
Norway	7%	8%	1	↑	
Switzerland	14%	7%	-7	↓	

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 42: Sub-indicator 2: share of female researchers that consider the remuneration package in their current academic position better than that of people with comparable skills and experience outside academia

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**total**		**female**
Austria	15%	11%	-5	↓	🟡
Belgium	8%	11%	3	↑	🟡
Bulgaria	16%	15%	-1	↓	🟢
Croatia	11%	11%	0	↑	🟡
Cyprus	15%	25%	11	↑	🟢
Czechia	8%	21%	13	↑	🟢
Denmark	10%	15%	5	↑	🟢
Estonia	17%	13%	-4	↓	🟢
Finland	13%	8%	-5	↓	🟡
France	4%	2%	-2	↓	🔴
Germany	15%	9%	-6	↓	🟡
Greece	9%	18%	10	↑	🟢
Hungary	14%	13%	-1	↓	🟢
Ireland	7%	10%	4	↑	🟡
Italy	5%	8%	3	↑	🟡
Latvia	11%	19%	8	↑	🟢
Lithuania	12%	21%	9	↑	🟢
Luxembourg	17%	23%	5	↑	🟢
Malta	18%	16%	-2	↓	🟢
The Netherlands	16%	19%	3	↑	🟢
Poland	6%	7%	1	↑	🔴
Portugal	11%	7%	-4	↓	🔴
Romania	30%	12%	-18	↓	🟢
Slovakia	9%	18%	9	↑	🟢
Slovenia	10%	10%	0	↓	🟡
Spain	11%	16%	5	↑	🟢
Sweden	8%	16%	8	↑	🟢
UK	7%	7%	0	↓	🔴
EU28	10%	10%	0	↓	🟡
Iceland	7%	2%	-4	↓	🔴
Norway	5%	4%	-1	↓	🔴
Switzerland	13%	5%	-8	↓	🔴

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2.5. Gender pay gap in the research sector

No	Indicator	Rationale	Data source
2-5	Gender pay gap in the research sector	This indicator provides a measurement of the magnitude of the gender pay gap in the scientific research sector compared to that in the general economy.	Eurostat: Structure of Earnings Survey 2010 and 2014, as published in SHE Figures report.

Key descriptive insights:

- In 2014 the overall gender pay gap in EU28 was 17% - a small decrease of 1 p.p. since 2010.
- In the period 2010-2014, the **largest increases** in the gender pay gap in the research sector were registered in **Croatia** (12% to 18%, +6 p.p.), **Poland** (11% to 17%, +6 p.p.). The **largest decreases** were observed in **Romania** (13% to -7%, -19 p.p.), **Slovakia** (19% to 3%, -16 p.p.).
- **The largest overall** gender pay gap in the research sector is found in **Ireland** (30%), **Czechia** (25%) and **the Netherlands (**25%**). Negative** gender pay gap values can be seen in **Romania** (-7%), **Luxembourg** (-4%) and **Bulgaria** (-1%).
- Concerning EFTA countries, **gender pay gap was higher in Switzerland (21%) but slightly lower in Norway (16%) compared to the EU28 average.**

Table 43: Gender pay gap in the research sector - Scorecard

Scorecard					
Country	**2010**	**2014**	**2010-2014 p.p. change**	**Comparison with EU average**	**Progress index**
Austria	20%	16%	↓ -3	🟡	↓ -12%
Belgium	16%	16%	↑ 0	🔴	↑ 7%
Bulgaria	4%	-1%	↓ -6	🔴	↓ -32%
Croatia	12%	18%	↑ 6	🔴	↑ 41%
Cyprus	27%	19%	↓ -8	🟢	↓ -38%
Czechia	24%	25%	↑ 1	🟡	↑ 16%
Denmark	20%	18%	↓ -1	🟡	↓ -2%
Estonia	26%	22%	↓ -3	🟢	↓ -12%
Finland	1%	0%	↓ 0	🔴	↑ 0%
France	16%	17%	↑ 2	🔴	↑ 14%
Germany	2%	2%	↑ 0	🔴	↑ 1%
Greece	18%	23%	↑ 5	🟡	↑ 36%
Hungary	1%	1%	↓ 0	🔴	↑ 0%
Ireland	25%	30%	↑ 5	🟢	↑ 39%
Italy	7%	6%	↓ -1	🔴	↓ -3%
Latvia	15%	17%	↑ 1	🔴	↑ 12%
Lithuania	16%	6%	↓ -10	🔴	↓ -56%
Luxembourg	7%	-4%	↓ -10	🔴	↓ -60%
Malta	0%	0%	↑ 0	🔴	↑ 0%
Netherlands	25%	25%	↓ 0	🟢	↑ 7%
Poland	11%	17%	↑ 6	🔴	↑ 38%
Portugal	12%	15%	↑ 3	🔴	↑ 20%
Romania	13%	-7%	↓ -19	🔴	↓ -110%
Slovakia	16%	3%	↓ -13	🔴	↓ -70%
Slovenia	20%	21%	↑ 0	🟡	↑ 8%
Spain	18%	17%	↓ -1	🟡	↓ -1%
Sweden	20%	17%	↓ -3	🟡	↓ -12%
UK	25%	18%	↓ -7	🟢	↓ -31%
EU28	**18%**	**17%**	**↓ -1**		
Norway	18%	16%	↓ -2	🟡	↓ -5%
Switzerland	19%	21%	↑ 1	🟡	↑ 15%

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2.6. *Transferability of pensions/social security*

No	Indicator	Rationale	Data source
2-6	Transferability of pensions/social security	The indicator provides a measurement of the existence of a potential barrier to international mobility (i.e. the transferability of pensions and social security). However, it does not indicate the degree of importance of the barrier. This indicator is to be related to the Pan-European pension fund.	MORE3/MORE4 surveys

This indicator consists of two sub-indicators:

- One regarding transferability of pensions - Share of researchers acknowledging the importance of transferring pensions as barrier for post-PhD mobility; and another regarding transferability of social security
- Share of researchers acknowledging the importance of transferring social security as barrier for post-PhD mobility.

The indicators measure the share of researchers acknowledging importance of transferring pensions/social security as barrier for post-PhD mobility for mobile R2-3-4 researchers.

Key descriptive insights:

- Around **37% of researchers in EU28 acknowledged the importance of transferring pensions/social security as barrier for post-PhD mobility**. This constituted an **increase of 18% (in the case of transferability of pensions) and an increase of 14% (in the case of transferability of social security)** since 2016 when MORE3 study was conducted.
- The **highest proportions of researchers reporting problems related to the transferability of pensions were in the Netherlands (68%), Germany (60%), Spain (54%), Lithuania/Luxembourg (52% in both countries) and Denmark (48%)**.
- The **highest proportions of researchers reporting problems related to the transferability of social security were in the Netherlands (64%), Lithuania (59%), Germany (58%), Spain (57%) and Denmark (54%).**
- In the case of transferability both of pensions and social security, the **indicator scores for EFTA countries were lower compared to the EU28 average**.

Table 44: Sub-indicator 1: share of researchers acknowledging the importance of transferring pensions as barrier for post-PhD mobility

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**Total**	**Total**	**total**		**Total**
Austria	18%	43%	25	↑	●
Belgium	10%	16%	6	↑	●
Bulgaria		30%		↑	●
Croatia	12%	41%	29	↑	●
Cyprus	27%	32%	5	↑	●
Czechia		38%		↑	●
Denmark	9%	48%	39	↑	●
Estonia	16%	na			
Finland	24%	12%	-12	↓	●
France	26%	27%	1	↑	●
Germany	18%	60%	42	↑	●
Greece	20%	26%	6	↑	●
Hungary	19%	21%	2	↑	●
Ireland	19%	27%	8	↑	●
Italy	13%	10%	-3	↓	●
Latvia		na			
Lithuania		52%		↑	●
Luxembourg	12%	52%	40	↑	●
Malta		na			
Netherlands	15%	68%	53	↑	●
Poland	34%	na			
Portugal		na			
Romania		7%	7	↑	●
Slovakia	9%	26%	17	↑	●
Slovenia	25%	30%	5	↑	●
Spain	11%	54%	43	↑	●
Sweden	14%	24%	10	↑	●
UK	23%	22%	-1	↓	●
EU28	19%	37%	18	↑	●
Iceland	21%	10%	-11	↓	●
Norway	25%	16%	-9	↓	●
Switzerland	31%	30%	-1	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 45: Sub-indicator 2: share of researchers acknowledging the importance of transferring social security as barrier for post-PhD mobility

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**Total**	**Total**	**Total**		**Total**
Austria	19%	44%	25	↑	🟡
Belgium	16%	23%	7	↑	🟢
Bulgaria		35%		↑	🟡
Croatia	17%	46%	29	↑	🔴
Cyprus	27%	35%	8	↑	🟡
Czechia	17%	37%	20	↑	🟡
Denmark	13%	54%	41	↑	🔴
Estonia	23%	na			
Finland	29%	14%	-15	↓	🟢
France	30%	26%	-4	↓	🟢
Germany	21%	58%	37	↑	🔴
Greece	25%	26%	1	↑	🟢
Hungary	31%	25%	-6	↓	🟢
Ireland	22%	25%	3	↑	🟢
Italy	19%	17%	-2	↓	🟢
Latvia	14%	na			
Lithuania	45%	59%	14	↑	🔴
Luxembourg	16%	53%	37	↑	🔴
Malta	37%	na			
Netherlands	16%	64%	48	↑	🔴
Poland	41%	na			
Portugal	13%	na			
Romania	27%	9%	-18	↓	🟢
Slovakia	14%	38%	24	↑	🟡
Slovenia	33%	30%	-3	↓	🟢
Spain	20%	57%	37	↑	🔴
Sweden	20%	28%	8	↑	🟢
UK	23%	19%	-4	↓	🟢
EU28	23%	37%	14	↑	🟡
Iceland	32%	13%	-19	↓	🟢
Norway	34%	28%	-6	↓	🟢
Switzerland	19%	33%	14	↑	🟡

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.2.7. Satisfaction in current academic position regarding pensions/social security researchers

No	Indicator	Rationale	Data source
2-7	Satisfaction in current academic position regarding pensions/social security of researchers.	The indicator provides an insight into the current level of satisfaction related to pension/social security for academic researchers.	MORE3/MORE4 surveys

This indicator is also divided into two sub-indicators:

- Share of researchers satisfied with their pension plan in the current academic position
- Share of researchers satisfied with their social security rights and benefits plan in the current academic position

Key descriptive insights:

- Overall, around **78% of researchers in EU28 were satisfied with their pension plan in their current academic position – around 5 p.p. increase since 2016**. There are **significant differences in this indicator score between different European countries**. Female researchers were slightly less satisfied with their pension plan (73%) compared to the general population of researchers.
- Countries with the **highest proportion of researchers satisfied with their pension plan were the Netherlands (97%), Denmark (95%) and Luxembourg (93%)**. Countries with the **lowest indicator score included Greece (39%), Lithuania (55%), Croatia (56%), Estonia (58%) and Portugal (60%)**.
- The most significant increases in the indicator scores between 2016 and 2019 were in Romania (+31 p.p.), Hungary (+20 p.p.) and Slovenia (+18 p.p.). The most significant decreases were in Croatia (-9 p.p.) and France (-6 p.p.).
- Around **87% (84% for female researchers) of researchers in EU28 were satisfied with their social security rights and benefits in the current academic position – a 4 p.p. increase since 2016**. Except for Greece, there were **no significant differences between Member States for this indicator**.
- Indicator scores were the **highest in Luxembourg (99%), the Netherlands (96%) and Austria/Sweden (95% for both countries)**. Indicator scores were the **lowest in Greece (55%), Hungary (71%) and Lithuania/Cyprus (73% in both countries)**.
- **Satisfaction in current academic position regarding both pensions and social security of researchers was much higher in EFTA countries** compared to the EU28 average.

Table 46: Sub-indicator 1: share of researchers satisfied with their pension plan in the current academic position

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**Total**		**total**
Austria	87%	90%	3	↑	●
Belgium	82%	83%	1	↑	●
Bulgaria	61%	64%	3	↑	●
Croatia	65%	56%	-9	↓	●
Cyprus	55%	62%	6	↑	●
Czechia	70%	80%	10	↑	●
Denmark	94%	95%	1	↑	●
Estonia	58%	58%	0	↓	●
Finland	86%	92%	5	↑	●
France	83%	77%	-6	↓	●
Germany	79%	91%	12	↑	●
Greece	26%	39%	13	↑	●
Hungary	45%	65%	20	↑	●
Ireland	81%	86%	6	↑	●
Italy	56%	66%	10	↑	●
Latvia	63%	66%	3	↑	●
Lithuania	45%	55%	10	↑	●
Luxembourg	86%	93%	7	↑	●
Malta	58%	64%	5	↑	●
Netherlands	93%	97%	3	↑	●
Poland	72%	70%	-2	↓	●
Portugal	55%	60%	4	↑	●
Romania	50%	80%	31	↑	●
Slovakia	50%	66%	16	↑	●
Slovenia	64%	83%	18	↑	●
Spain	60%	76%	16	↑	●
Sweden	86%	90%	4	↑	●
UK	76%	75%	-1	↓	●
EU28	73%	78%	5	↑	●
Iceland	84%	94%	10	↑	●
Norway	94%	95%	1	↑	●
Switzerland	92%	92%	0	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows

Table 47: Sub-indicator 1: share of female researchers satisfied with their pension plan in the current academic position

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**Total**		**female**
Austria	84%	87%	3	↑	●
Belgium	77%	75%	-2	↓	●
Bulgaria	58%	58%	0	↑	●
Croatia	58%	55%	-2	↓	●
Cyprus	49%	55%	6	↑	●
Czechia	63%	70%	8	↑	●
Denmark	92%	92%	0	↓	●
Estonia	47%	49%	1	↑	●
Finland	85%	93%	9	↑	●
France	78%	71%	-6	↓	●
Germany	75%	85%	10	↑	●
Greece	27%	33%	6	↑	●
Hungary	51%	55%	4	↑	●
Ireland	83%	82%	-1	↓	●
Italy	54%	56%	3	↑	●
Latvia	60%	59%	-1	↓	●
Lithuania	40%	48%	9	↑	●
Luxembourg	84%	95%	11	↑	●
Malta	57%	59%	2	↑	●
Netherlands	94%	98%	4	↑	●
Poland	65%	65%	0	↑	●
Portugal	51%	56%	5	↑	●
Romania	47%	77%	30	↑	●
Slovakia	46%	63%	17	↑	●
Slovenia	62%	84%	22	↑	●
Spain	62%	74%	12	↑	●
Sweden	86%	92%	6	↑	●
UK	69%	70%	2	↑	●
EU28	68%	73%	5	↑	●
Iceland	87%	93%	6	↑	●
Norway	93%	95%	2	↑	●
Switzerland	88%	90%	2	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 48: Sub-indicator 2: share of researchers satisfied with their social security rights and benefits in the current academic position

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**Total**		**total**
Austria	94%	95%	1	↑	●
Belgium	91%	93%	2	↑	●
Bulgaria	75%	78%	3	↑	●
Croatia	82%	86%	4	↑	●
Cyprus	69%	73%	5	↑	●
Czechia	86%	87%	1	↑	●
Denmark	96%	94%	-2	↓	●
Estonia	77%	82%	5	↑	●
Finland	91%	94%	3	↑	●
France	92%	91%	-1	↓	●
Germany	87%	90%	4	↑	●
Greece	42%	55%	13	↑	●
Hungary	58%	71%	13	↑	●
Ireland	84%	91%	7	↑	●
Italy	72%	84%	12	↑	●
Latvia	61%	74%	13	↑	●
Lithuania	60%	73%	13	↑	●
Luxembourg	97%	99%	1	↑	●
Malta	89%	76%	-13	↓	●
Netherlands	95%	96%	1	↑	●
Poland	84%	81%	-3	↓	●
Portugal	73%	83%	10	↑	●
Romania	83%	88%	5	↑	●
Slovakia	59%	75%	15	↑	●
Slovenia	84%	91%	6	↑	●
Spain	83%	92%	9	↑	●
Sweden	91%	95%	4	↑	●
UK	85%	85%	1	↑	●
EU28	83%	87%	4	↑	●
Iceland	91%	96%	5	↑	●
Norway	97%	96%	-2	↓	●
Switzerland	90%	92%	2	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 49: Sub-indicator 2: share of female researchers satisfied with their social security rights and benefits in the current academic position

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**Total**		**female**
Austria	93%	92%	-1	↓	🟡
Belgium	91%	88%	-3	↓	🟡
Bulgaria	69%	74%	5	↑	🟡
Croatia	77%	87%	10	↑	🟡
Cyprus	67%	67%	0	↑	🔴
Czechia	81%	82%	1	↑	🟡
Denmark	96%	92%	-4	↓	🟡
Estonia	75%	81%	6	↑	🟡
Finland	90%	94%	3	↑	🟡
France	93%	86%	-6	↓	🟡
Germany	85%	84%	-1	↓	🟡
Greece	38%	51%	13	↑	🔴
Hungary	67%	69%	2	↑	🟡
Ireland	86%	90%	5	↑	🟡
Italy	72%	85%	13	↑	🟡
Latvia	55%	68%	13	↑	🟡
Lithuania	55%	68%	13	↑	🟡
Luxembourg	95%	98%	3	↑	🟡
Malta	87%	67%	-19	↓	🟡
Netherlands	95%	96%	2	↑	🟡
Poland	80%	80%	0	↓	🟡
Portugal	72%	82%	10	↑	🟡
Romania	80%	85%	4	↑	🟡
Slovakia	56%	74%	18	↑	🟡
Slovenia	84%	90%	6	↑	🟡
Spain	87%	90%	2	↑	🟡
Sweden	91%	94%	3	↑	🟡
UK	76%	82%	6	↑	🟡
EU28	81%	84%	3	↑	🟡
Iceland	90%	99%	9	↑	🟡
Norway	98%	95%	-3	↓	🟡
Switzerland	85%	90%	5	↑	🟡

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrow.

4.2.8. Number of HRS4R acknowledged institutions per thousand researchers

No	Indicator	Rationale	Data source
2-8	Number of HRS4R acknowledged institutions per thousand researchers	These institutions have signed the Code of Conduct and provided the Commission with a gap analysis and a solid action plan on how to concretely implement the elements of the Code of Conduct. This indicates the strong commitment of the institutions of the countries.	EURAXESS: HRS4R Acknowledged Institutions (extracted from https://euraxess.ec.europa.eu/jobs/hrs4r) and Eurostat (total number of researchers)

The source for the number of HRS4R Acknowledged Institutions in calculating this indicator was the EURAXESS website[4]. When the year of the HRS4R award for an institution was not specified on the EURAXESS website, the necessary information was extracted from institution's website. The metric was calculated by dividing the number of institutions with total number of researchers, which was extracted from Eurostat.

Please note that the limitation of this indicator is the significant percentage point fluctuations in the short-term. This is due to the limited sample size of institutions that have attained the HR Excellence in Research award per country. As an example, a country may see an increase of only a couple additional institutions that received the award, but in percentage points, this could seem as a drastic increase. Overall, this may lead to overestimations of the actual progress.

Key descriptive insights:

- There are **445 HRS4R acknowledged institutions in EU MS in 2019**, which corresponds to close to 0.23 institutions per thousand researchers. This constitutes **an increase of 0.09 institutions per thousand researchers since 2015**.
- Countries with the **largest number of these institutions per researcher were Croatia (1.79), Poland (0.75), Spain (0.74)**.
- The indicator score was the **lowest in Germany (0.04), Sweden/Greece (0.06 in both countries) and Slovakia (0.07).**
- Between 2015 and 2019 **the largest increase in the number of HRS4R acknowledged institutions per thousand researchers were in Poland (+520%), France (+509%) and Germany (+166%)**. The **largest decreases were in Slovenia (-43%) and Croatia (-29%)**.

[4] https://euraxess.ec.europa.eu/jobs/hrs4r

Table 50: Number of HRS4R acknowledged institutions per thousand researchers - Scorecard

Country	2015	2019	2015-2019 % change	Comparison with EU average	Long-term trend
Austria	0.11	0.11	-8%		
Belgium	0.23	0.29	26%		
Bulgaria	0.07	0.13	89%		
Croatia	2.51	1.79	-29%		
Cyprus	0.31	0.38	22%		
Czechia	0.00	0.28			
Denmark	0.05	0.07	41%		
Estonia					
Finland	0.27	0.30	11%		
France	0.01	0.07	509%		
Germany	0.02	0.04	166%		
Greece	0.06	0.06	-1%		
Hungary					
Ireland	0.40	0.54	33%		
Italy	0.08	0.12	48%		
Latvia					
Lithuania	0.00	0.11			
Luxembourg	0.79	0.73	-7%		
Malta					
Netherlands	0.14	0.15	10%		
Poland	0.12	0.75	520%		
Portugal	0.03	0.07	158%		
Romania	0.11	0.23	99%		
Slovakia	0.00	0.07			
Slovenia	0.38	0.22	-43%		
Spain	0.31	0.74	137%		
Sweden	0.00	0.06			
UK	0.31	0.35	14%		
EU28	**0.13**	**0.23**	71%		
Iceland	0.51	0.49	-5%		
Norway	0.26	0.26	1%		

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%), diagonal upwards (below 20% but above 0%), diagonal downwards (below 0% but above -20%) and downwards (below -20%) arrows.

Table 51: Number of HRS4R acknowledged institutions per thousand researchers

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018		2019	
Austria	0,03	0,05	0,10	0,10	0,09	0,11	0,11	0,11	0,11	f	0,11	f
Belgium	0,02	0,12	0,13	0,19	0,22	0,23	0,24	0,27	0,27	f	0,29	f
Bulgaria	0,00	0,00	0,09	0,08	0,08	0,07	0,06	0,13	0,13	f	0,13	f
Croatia	0,14	0,88	1,35	2,14	2,29	2,51	2,05	1,79	1,79	f	1,79	f
Cyprus	0,00	0,00	0,00	0,15	0,16	0,31	0,26	0,38	0,38	f	0,38	f
Czechia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,10	f	0,28	f
Denmark	0,00	0,00	0,02	0,03	0,02	0,05	0,04	0,04	0,07	f	0,07	f
Estonia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	f	0,00	f
Finland	0,00	0,00	0,00	0,08	0,16	0,27	0,28	0,30	0,30	f	0,30	f
France	0,00	0,00	0,00	0,01	0,01	0,01	0,01	0,04	0,05	f	0,07	f
Germany	0,00	0,00	0,00	0,00	0,01	0,02	0,02	0,03	0,03	f	0,04	f
Greece	0,00	0,00	0,08	0,07	0,07	0,06	0,07	0,06	0,06	f	0,06	f
Hungary	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	f	0,00	f
Ireland	0,00	0,07	0,09	0,21	0,24	0,40	0,46	0,54	0,54	f	0,54	f
Italy	0,03	0,03	0,04	0,06	0,07	0,08	0,08	0,09	0,11	f	0,12	f
Latvia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	f	0,00	f
Lithuania	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,11	f	0,11	f
Luxembourg	0,00	0,35	0,43	0,80	0,76	0,79	0,80	0,73	0,73	f	0,73	f
Malta	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	f	0,00	f
Netherlands	0,00	0,00	0,01	0,07	0,09	0,14	0,14	0,14	0,14	f	0,15	f
Poland	0,00	0,00	0,01	0,04	0,05	0,12	0,33	0,52	0,57	f	0,75	f
Portugal	0,00	0,00	0,00	0,03	0,03	0,03	0,02	0,07	0,07	f	0,07	f
Romania	0,00	0,00	0,00	0,05	0,11	0,11	0,11	0,11	0,17	f	0,23	f
Slovakia	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,07	f	0,07	f
Slovenia	0,00	0,00	0,23	0,23	0,35	0,38	0,37	0,22	0,22	f	0,22	f
Spain	0,00	0,01	0,02	0,05	0,11	0,31	0,34	0,49	0,65	f	0,74	f
Sweden	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	f	0,06	f
United Kingdom	0,07	0,12	0,22	0,29	0,30	0,31	0,31	0,33	0,34	f	0,35	f
EU28	**0,01**	**0,03**	**0,06**	**0,09**	**0,10**	**0,13**	**0,14**	**0,17**	**0,20**	**f**	**0,23**	**f**
Iceland	0,44	0,44	0,48	0,51	0,51	0,51	0,45	0,49	0,49	f	0,49	f
Norway	0,11	0,11	0,18	0,21	0,27	0,26	0,28	0,26	0,26	f	0,26	f

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years. EU28 based on real averages.

4.3. Career paths

This section presents key indicators related to the career paths of researchers.

According to MORE4 survey evidence, around 46% of researchers in EU28 countries were **receiving transferable skills** training during PhD (including via work experience) – a decrease of more than 4% since the MORE3 study. The highest rates were found in Romania, Hungary, Denmark, Austria, Italy and Belgium and the lowest rates were in Bulgaria, Luxembourg, Germany, Slovenia and Poland.

A vast majority of around 86% of researchers in EU28 countries **acknowledged transferable skills as positive factors for career progression** – an increase of 5 p.p. since MORE3 survey, with no significant differences between countries in terms of the indicator scores.

EU28 researchers were **satisfied with different aspects of the current academic position**, with the overall the degree of satisfaction of 0.81 on a scale from 0 to 1, an increase of 0.04 points since MORE3. Countries with the

highest performance were Slovenia, Czech Republic, Latvia, Austria and the Netherlands, whereas the lowest performance was in Italy, Portugal, France, Greece and Cyprus. The degree of satisfaction with different aspects of the current academic position among female researchers was 5 p.p. lower compared to the general population of researchers. The indicator score in EFTA countries was higher compared to the EU28 average.

Similarly, the majority (75%) of researchers in EU28 **considered that professional advancement in HEIs is transparent and merit-based** - an increase of around 8 p.p. since MORE3 survey. There were no significant differences between countries for this indicator, except for Portugal and Luxembourg, where researchers were less positive about meritocracy and transparency in career advancement. Female researchers were 5 p.p. less positive regarding transparency and meritocracy in career advancement.

In terms of the career paths of female researchers, the **proportion of women as Grade A academic staff** in EU28 was 26% in 2017 – a small increase of 2% since 2014. On the other hand, the **proportion of women on boards** was 31% in 2017 – the same share as in 2014.

4.3.1. Share of researchers receiving transferable skills training during PhD

No	Indicator	Rationale	Data source
3-1	Share of researchers receiving transferable skills training during PhD	The indicator assesses the extent of the countries' move towards more transferable skills training at the PhD stage.	MORE3/MORE4 surveys

Key descriptive insights:

- According to MORE4 survey evidence, a**round 46% of researchers in EU28 countries were receiving transferable skills training during PhD (including via work experiences) – a decrease of more than 4% since MORE3 study**.
- The indicator scores were **the highest in Romania (89%), Hungary (73%), Denmark (70%), Austria/Italy (67% in both countries) and Belgium (61%).**
- The countries with the **smallest proportion of researchers receiving transferable skills training during PhD included Bulgaria (31%), Luxembourg (33%), Germany (35%) and Slovenia/Poland (41% in both countries)**.
- Between 2016 and 2019 **the most significant increases in the proportion of researchers receiving transferable skills training during PhD were Austria (+44%), Romania (+43%) and Hungary (+22%).** The countries with the **most significant decreases in the indicator score included Bulgaria (-36%), Luxembourg (-33%) and Ireland (-25%)**.
- The proportion of **female researchers receiving transferable skills training during PhD was slightly higher** (49%) compared to the general population of researchers (46%).
- Concerning EFTA countries, the indicator score was higher in Norway and lower in Switzerland compared to EU28.

Table 52: Share of researchers receiving transferable skills training during PhD

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	19%	21%	15%	-6	↓	
Belgium	16%	21%	16%	-5	↓	
Bulgaria	16%	12%	13%	1	↑	
Croatia	6%	5%	12%	7	↑	
Cyprus						
Czechia	14%	7%	10%	3	↑	
Denmark	24%	19%	32%	13	↑	
Estonia	12%	10%	18%	8	↑	
Finland	22%	15%	10%	-5	↓	
France	9%	15%	18%	3	↑	
Germany	17%	12%	13%	1	↑	
Greece		46%				
Hungary	16%	9%	52%	43	↑	
Ireland	32%	43%	50%	6	↑	
Italy	17%	15%	18%	3	↑	
Latvia	20%	12%	17%	5	↑	
Lithuania	19%	11%	7%	-4	↓	
Luxembourg	83%	60%	50%	-10	↓	
Malta		46%				
Netherlands	32%	30%	25%	-4	↓	
Poland	1%	19%	9%	-10	↓	
Portugal	10%	4%	6%	2	↑	
Romania	10%	15%	2%	-14	↓	
Slovakia	16%	10%	9%	-1	↓	
Slovenia	10%	19%	6%	-13	↓	
Spain	18%	15%	17%	2	↑	
Sweden	26%	17%	25%	8	↑	
UK	16%	24%	15%	-9	↓	
EU27-EU28	15%	16%	16%	-1	↓	
Iceland		64%				
Norway	33%	37%	32%	-4	↓	
Switzerland	40%	40%	30%	-11	↓	

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 53: Share of female researchers receiving transferable skills training during PhD

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**Total**		**female**
Austria	26%	70%	44	↑	●
Belgium	61%	65%	4	↑	●
Bulgaria	70%	26%	-44	↓	●
Croatia	62%	50%	-12	↓	●
Cyprus		na			
Czechia		na			
Denmark	47%	69%	22	↑	●
Estonia	52%	na			
Finland	58%	40%	-18	↓	●
France	48%	58%	9	↑	●
Germany	47%	39%	-8	↓	●
Greece					
Hungary		na			
Ireland	73%	42%	-31	↓	●
Italy	42%	74%	32	↑	●
Latvia		45%	45	↑	●
Lithuania	47%				
Luxembourg	70%				
Malta					
Netherlands	59%				
Poland	58%				
Portugal	39%	56%	17	↑	●
Romania		80%		→	●
Slovakia	53%	42%	-11	↓	●
Slovenia	74%	44%	-30	↓	●
Spain	71%	35%	-36	↓	●
Sweden	62%	56%	-6	↓	●
UK	60%	58%	-2	↓	●
EU28	52%	49%	-3	↓	●
Norway	79%	51%	-29	↓	●
Switzerland	61%	41%	-20	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.3.2. Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc.) are regarded as positive factors for career progression

No	Indicator	Rationale	Data source
3-2	Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc.) are regarded as positive factors for career progression	The indicator assesses the importance of transferable skills in the shaping of career paths.	MORE3/MORE4 surveys

This indicator is measured as the share of researchers who agree that transferable skills are regarded as a positive factor for career progress in their home institution.

Key descriptive insights:

- Around **86% of researchers in EU28 countries acknowledged transferable skills as positive factors for career progression – an increase of 5 p.p. since MORE3 survey**.
- There were **no significant differences between countries** in terms of the indicator scores.
- **Nearly all the countries experienced the increase of indicator score between 2016 and 2019**. Countries with the most significant increase included Hungary (+20 p.p.), Cyprus (+16 p.p.) and Finland (15 p.p.).
- There was equally **no significant differences between female and male researchers** in terms of appreciation of transferable skills as positive factors for career progression.

Table 54: Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc. are regarded as positive factors for career progression)

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**Total**		**total**
Austria	84%	88%	4	↑	●
Belgium	87%	90%	2	↑	●
Bulgaria	73%	87%	14	↑	●
Croatia	73%	76%	3	↑	●
Cyprus	71%	88%	16	↑	●
Czechia	84%	89%	4	↑	●
Denmark	79%	86%	7	↑	●
Estonia	84%	90%	6	↑	●
Finland	70%	85%	15	↑	●
France	79%	85%	6	↑	●
Germany	86%	90%	4	↑	●
Greece	75%	78%	2	↑	●
Hungary	67%	88%	20	↑	●
Ireland	80%	85%	5	↑	●
Italy	75%	76%	0	↑	●
Latvia	92%	94%	2	↑	●
Lithuania	74%	85%	11	↑	●
Luxembourg	82%	84%	2	↑	●
Malta	82%	90%	8	↑	●
Netherlands	83%	92%	10	↑	●
Poland	79%	84%	5	↑	●
Portugal	75%	76%	0	↑	●
Romania	90%	89%	-1	↓	●
Slovakia	82%	86%	4	↑	●
Slovenia	80%	92%	12	↑	●
Spain	76%	84%	8	↑	●
Sweden	85%	86%	1	↑	●
UK	81%	88%	7	↑	●
EU28	81%	86%	6	↑	●
Iceland	84%	93%	9	↑	●
Norway	74%	86%	12	↑	●
Switzerland	82%	89%	7	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 55: Appreciation of transferable skills (e.g. project management, data cleaning, networking, etc. are regarded as positive factors for career progression) among female researchers

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**Total**		**female**
Austria	78%	89%	11	↑	●
Belgium	90%	91%	1	↑	●
Bulgaria	71%	87%	16	↑	●
Croatia	71%	76%	5	↑	●
Cyprus	78%	84%	6	↑	●
Czechia	81%	86%	5	↑	●
Denmark	83%	85%	2	↑	●
Estonia	86%	89%	3	↑	●
Finland	66%	85%	19	↑	●
France	72%	83%	10	↑	●
Germany	87%	91%	3	↑	●
Greece	75%	77%	2	↑	●
Hungary	62%	84%	22	↑	●
Ireland	78%	86%	8	↑	●
Italy	77%	73%	-4	↓	●
Latvia	91%	93%	1	↑	●
Lithuania	74%	83%	9	↑	●
Luxembourg	78%	78%	0	↓	●
Malta	80%	87%	7	↑	●
Netherlands	79%	93%	14	↑	●
Poland	82%	83%	1	↑	●
Portugal	73%	71%	-3	↓	●
Romania	89%	83%	-7	↓	●
Slovakia	80%	88%	7	↑	●
Slovenia	83%	95%	12	↑	●
Spain	84%	82%	-2	↓	●
Sweden	89%	84%	-5	↓	●
UK	76%	82%	6	↑	●
EU28	80%	84%	4	↑	●
Iceland	82%	95%	12	↑	●
Norway	76%	84%	8	↑	●
Switzerland	82%	92%	9	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.3.3. *Degree of satisfaction with different aspects of the current academic position*

No	Indicator	Rationale	Data source
3-3	Degree of satisfaction with different aspects of the current academic position. Composite indicator with career related aspects.	The indicator assesses the appreciation from the researcher's point of view of the different dimensions related to his/her career path.	MORE2/MORE3/ MORE4 surveys

This indicator is a composite indicator with a 0-1 scale measuring the satisfaction in current academic position with:

- Level of responsibility;
- Opportunities for advancement (MORE2) or career perspectives (MORE3/MORE4);
- Mobility perspectives.

Each dimension has the same weight in the indicator presented.

Key descriptive insights:

- Overall, EU28 researchers were satisfied with different aspects of the current academic position: **the degree of satisfaction measured by this indicator was 0.81 on a scale from 0 to 1, an increase of 0.04 points since MORE3 and a further increase of 0.09 since MORE2 study**.
- EU28 countries with the **highest indicator score included Slovenia/Czech Republic (0.91 in both countries), Latvia/Austria/the Netherlands (0.88) and Malta/Germany** (0.87). Countries with the **lowest indicator score were Italy/Portugal (0.64), France (0.71), Greece/Cyprus** (0.75).
- Between 2016 and 2019 **the most significant increases in degree of satisfaction with different aspects of the current academic position were in Slovenia (+0.18), Spain (+0.13) and Austria (+0.1)**. **Countries with the most significant decreases included Belgium (-0.07), Poland (-0.05) and France (-0.03**).
- The **degree of satisfaction with different aspects of the current academic position among female researchers was somewhat lower** (0.76) compared to the general population of researchers (0.81).
- The indicator score in EFTA countries was higher compared to the EU28 average.

Table 56: Degree of satisfaction with different aspects of the current academic position

Satisfaction in current academic position with: level of responsbility, career perspectives and mobility perspectives

	2012	2016	2019	2016-2019 change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	0,70	0,82	0,88	0,06	⇧	●
Belgium	0,74	0,86	0,83	-0,02	⇩	●
Bulgaria	0,71	0,73	0,80	0,07	⇧	●
Croatia	0,69	0,80	0,83	0,04	⇧	●
Cyprus	0,68	0,70	0,75	0,06	⇧	●
Czechia	0,79	0,86	0,91	0,05	⇧	●
Denmark	0,79	0,83	0,85	0,02	⇧	●
Estonia	0,80	0,80	0,81	0,01	⇧	●
Finland	0,75	0,84	0,85	0,00	⇧	●
France	0,70	0,74	0,71	-0,03	⇩	●
Germany	0,76	0,79	0,87	0,07	⇧	●
Greece	0,66	0,69	0,75	0,06	⇧	●
Hungary	0,70	0,67	0,78	0,11	⇧	●
Ireland	0,64	0,77	0,79	0,02	⇧	●
Italy	0,46	0,62	0,64	0,02	⇧	●
Latvia	0,81	0,83	0,88	0,05	⇧	●
Lithuania	0,70	0,73	0,80	0,06	⇧	●
Luxembourg	0,73	0,75	0,79	0,04	⇧	●
Malta	0,74	0,89	0,87	-0,02	⇩	●
Netherlands	0,78	0,81	0,88	0,07	⇧	●
Poland	0,75	0,84	0,80	-0,04	⇩	●
Portugal	0,58	0,57	0,64	0,07	⇧	●
Romania	0,61	0,83	0,85	0,03	⇧	●
Slovakia	0,75	0,82	0,86	0,04	⇧	●
Slovenia	0,73	0,78	0,91	0,13	⇧	●
Spain	0,69	0,68	0,81	0,13	⇧	●
Sweden	0,79	0,83	0,83	0,00	⇧	●
UK	0,77	0,82	0,83	0,01	⇧	●
EU27-EU28	0,72	0,77	0,81	0,04	⇧	●
Iceland	0,79	0,89	0,93	0,03	⇧	●
Norway	0,79	0,85	0,90	0,05	⇧	●
Switzerland	0,77	0,81	0,90	0,09	⇧	●

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 57: Degree of satisfaction with different aspects of the current academic position among female researchers

Satisfaction in current academic position with: level of responsbility, career perspectives and mobility perspecti

	2016	2019	2016-2019 change		Comparison with EU28
Country	**female**	**female**	**total**		**female**
Austria	0,73	0,84	0,10	⇧	🟡
Belgium	0,84	0,77	-0,07	⇩	🟡
Bulgaria	0,69	0,78	0,09	⇧	🟡
Croatia	0,76	0,81	0,05	⇧	🟡
Cyprus	0,70	0,73	0,04	⇧	🟡
Czechia	0,81	0,83	0,02	⇧	🟡
Denmark	0,78	0,81	0,03	⇧	🟡
Estonia	0,77	0,78	0,01	⇧	🟡
Finland	0,83	0,82	-0,02	⇩	🟡
France	0,71	0,68	-0,03	⇩	🟡
Germany	0,78	0,80	0,02	⇧	🟡
Greece	0,66	0,72	0,06	⇧	🟡
Hungary	0,70	0,75	0,05	⇧	🟡
Ireland	0,73	0,75	0,02	⇧	🟡
Italy	0,58	0,57	-0,02	⇩	🔴
Latvia	0,85	0,84	-0,01	⇩	🟡
Lithuania	0,72	0,78	0,06	⇧	🟡
Luxembourg	0,67	0,74	0,07	⇧	🟡
Malta	0,86	0,84	-0,01	⇩	🟡
Netherlands	0,78	0,83	0,05	⇧	🟡
Poland	0,82	0,78	-0,05	⇩	🟡
Portugal	0,53	0,61	0,08	⇧	🟡
Romania	0,80	0,82	0,02	⇧	🟡
Slovakia	0,79	0,87	0,08	⇧	🟡
Slovenia	0,73	0,91	0,18	⇧	🟡
Spain	0,66	0,79	0,13	⇧	🟡
Sweden	0,78	0,84	0,06	⇧	🟡
UK	0,73	0,77	0,04	⇧	🟡
EU27-EU28	0,73	0,76	0,03	⇧	🟡
Iceland	0,90	0,93	0,03	⇧	🟢
Norway	0,83	0,88	0,05	⇧	🟡
Switzerland	0,81	0,87	0,06	⇧	🟡

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.3.4. *Transparency and meritocracy in professional advancement in HEIs (composite indicator)*

No	Indicator	Rationale	Data source
3-4	Transparency and meritocracy in professional advancement in HEIs (composite indicator)	The indicator expresses the assessment by researchers of the level of transparency and meritocracy in the careers progression in their institutions.	MORE3/MORE4 surveys

This indicator is a composite indicator based on the following indicators (with equal weights):

- Share of researchers who agree that the different types of career paths are clear and transparent at their home institution;
- Share of researchers who agree that career progression is sufficiently merit-based at their home institution;
- Share of researchers who agree that obtaining a tenured contract based on merit only is common practice at their home institution.

Key descriptive insights:

- According to MORE4 survey evidence**, around 75% of EU28 researchers agreed that professional advancement in HEIs is transparent and merit-based**. This is an **increase of around 8%** since 2016. **Female researchers were slightly less positive** (70%) regarding transparency and meritocracy in career advancement.
- Generally, there were **no significant differences between countries for this indicator**, except for Portugal and Luxembourg, where researchers were less positive about meritocracy and transparency in career advancement.
- Countries with the **highest indicator score were Romania (88%), Czechia (86%) and Iceland** (84%).
- Countries with the **lowest indicator scores were Portugal (50%), Luxembourg (59%) and Austria/Italy** (62% in both countries).
- **Most of the countries experienced increase in the indicator score between 2016 and 2019**, Countries with the highest increase included Slovakia (+18 p.p.), Slovenia/Spain (+17 p.p. in both countries) and the Netherlands (+16 p.p.).

Table 58: Transparency and meritocracy in professional advancement in HEIs

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	68%	62%	-5	↓	●
Belgium	72%	75%	3	↑	●
Bulgaria	65%	74%	9	↑	●
Croatia	59%	68%	9	↑	●
Cyprus	69%	72%	3	↑	●
Czechia	80%	86%	6	↑	●
Denmark	69%	76%	6	↑	●
Estonia	70%	74%	4	↑	●
Finland	70%	72%	2	↑	●
France	60%	67%	6	↑	●
Germany	68%	77%	9	↑	●
Greece	70%	71%	1	↑	●
Hungary	53%	68%	15	↑	●
Ireland	59%	67%	9	↑	●
Italy	55%	62%	7	↑	●
Latvia	79%	83%	4	↑	●
Lithuania	66%	74%	8	↑	●
Luxembourg	58%	59%	1	↑	●
Malta	73%	81%	7	↑	●
Netherlands	67%	83%	16	↑	●
Poland	80%	80%	-1	↓	●
Portugal	52%	50%	-1	↓	●
Romania	79%	88%	10	↑	●
Slovakia	63%	80%	18	↑	●
Slovenia	66%	83%	17	↑	●
Spain	53%	70%	17	↑	●
Sweden	74%	75%	1	↑	●
UK	72%	81%	9	↑	●
EU28	67%	75%	8	↑	●
Iceland	80%	84%	4	↑	●
Norway	69%	79%	10	↑	●
Switzerland	67%	78%	11	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 59: Transparency and meritocracy in professional advancement in HEIs (female)

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**total**		**female**
Austria	58%	63%	5	↑	●
Belgium	70%	63%	-7	↓	●
Bulgaria	62%	67%	5	↑	●
Croatia	55%	65%	10	↑	●
Cyprus	68%	64%	-4	↓	●
Czechia	70%	82%	12	↑	●
Denmark	59%	69%	11	↑	●
Estonia	66%	71%	5	↑	●
Finland	59%	69%	10	↑	●
France	57%	60%	3	↑	●
Germany	69%	75%	6	↑	●
Greece	60%	67%	6	↑	●
Hungary	57%	63%	6	↑	●
Ireland	59%	60%	1	↑	●
Italy	55%	58%	3	↑	●
Latvia	78%	80%	2	↑	●
Lithuania	61%	71%	10	↑	●
Luxembourg	52%	58%	7	↑	●
Malta	72%	75%	3	↑	●
Netherlands	63%	72%	9	↑	●
Poland	76%	79%	3	↑	●
Portugal	47%	48%	0	↑	●
Romania	78%	88%	10	↑	●
Slovakia	58%	78%	20	↑	●
Slovenia	65%	85%	20	↑	●
Spain	56%	68%	12	↑	●
Sweden	68%	72%	4	↑	●
UK	62%	79%	17	↑	●
EU28	62%	70%	8	↑	●
Iceland	79%	83%	3	↑	●
Norway	63%	74%	11	↑	●
Switzerland	66%	75%	9	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.3.5. Proportion of women as Grade A academic staff

No	Indicator	Rationale	Data source
3-5	Proportion of women as Grade A academic staff	The indicator measures gender (in)equality and thereby helps to assess and understand the difficulties for women in entering in a research career. The gender dimension provides an indication of the progress made towards implementing measures of gender equal opportunities.	WIS database/ SHE figures

Key descriptive insights:

- Proportion of women as Grade **A academic staff in EU28 was 26% in 2017 – a small increase of 2 p.p. since 2014**.
- In period 2014-2017, the **largest increases** in the **proportion of women as Grade A academic staff** were registered in Lithuania (+8 p.p.), **Romania** (+6 p.p.) and **Latvia** (+5 p.p.). The **only decrease** was observed in **Hungary** (-2 p.p.).
- The highest overall proportion of women as Grade A academic staff in 2017 is found in **Romania** (54%), **Cyprus** (41%) and **Latvia** (41%). The **lowest overall** share in 2016 is found in **Croatia** (13%), **Czechia** (15%) and **Luxembourg** (17%).
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has significantly increased**: proportion of women as Grade A academic staff decreased increased from **12%** in 2000 to **26%** in 2017, while peaking in **2016-2017** with **26%**.
- Concerning EFTA countries, **Switzerland's indicator score was lower, whereas Norway's – higher compared to the EU28 average**.

Table 60: Proportion of women as grade A academic staff - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	22%	23%	1		-5%	
Belgium	16%	18%	2		1%	
Bulgaria	33%	37%	4		2%	
Croatia	13%	13%	0		-3%	
Cyprus	38%	41%	3		-3%	
Czechia	14%	15%	0		-4%	
Denmark	20%	21%	1		-3%	
Estonia			0			
Finland	28%	29%	2		-3%	
France	21%	22%	0		-6%	
Germany	18%	19%	1		-1%	
Greece	20%	22%	1		-3%	
Hungary	22%	20%	-2		-15%	
Ireland	20%	21%	1		-3%	
Italy	22%	22%	0		-6%	
Latvia	37%	41%	5		5%	
Lithuania	31%	39%	8		21%	
Luxembourg	17%	17%	0		-6%	
Malta			0			
Netherlands	17%	19%	2		0%	
Poland	23%	24%	1		-4%	
Portugal	25%	26%	1		-5%	
Romania	48%	54%	6		6%	
Slovakia	24%	25%	1		-4%	
Slovenia	26%	29%	3		3%	
Spain	22%	21%	0		-9%	
Sweden	25%	25%	1		-6%	
UK	25%	26%	1		-4%	
EU28	**24%**	**26%**	2			
Norway	26%	28%	2		-2%	
Switzerland	22%	23%	1		-3%	

Note: p.p. change = change in percentage points. EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 61: Proportion of women as grade A academic staff

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria						31,00 b	31,00 b	31,00 b	31,00	32,75 i31	34,50 i32	36,25 i33	38,00	37,84 i21	37,92 i22	37,76
Belgium			21,00 b	21,00 b	21,00 b	21,00	20,71 i61	20,43 i62	20,14 i63	19,86 i64	19,57 i65	19,29 i66	19,00	18,86 i21	18,71 i22	18,57
Bulgaria				37,00 b	37,00 b	37,00	34,33 i21	31,67 i22	29,00	31,75 i31	34,50 i32	37,25 i33	40,00	42,11 i21	44,23 i22	46,34
Croatia				38,00 b	38,00 b	38,00	38,00 i21	38,00 i22	38,00	34,25 i61	30,49 i62	26,74 i63	22,98 i64	19,23 i65	15,47 i66	11,72
Cyprus			12,00 b	12,00 b	12,00 b	12,00	14,00 i21	16,00 i22	18,00	16,83 i31	15,67 i32	14,50 i33	13,33	13,33 i21	13,33 i21	13,33
Czechia				12,00 b	12,00 b	12,00 b	12,00									16,99
Denmark			37,00 b	37,00 b	37,00 b	37,00	36,33 i21	35,67 i22	35,00	37,00 i31	39,00 i32	41,00 i33	43,00	39,68 i21	36,36 i22	33,04
Estonia			25,00 b	25,00 b	25,00 b	25,00	25,33 i21	25,67 i22	26,00	22,50 i31	19,00 i32	15,50 i33	12,00	12,86 i21	13,72 i22	14,58
Finland			44,00 b	44,00 b	44,00 b	44,00	44,33 i21	44,67 i22	45,00	46,25 i31	47,50 i32	48,75 i33	50,00	48,37 i21	46,73 i22	45,10
France	27,00	27,00 f	27,00 f	27,00 f												35,90
Germany			20,00 b	20,00 b	20,00 b	20,00	20,33 i21	20,67 i22	21,00	22,00 i31	23,00 i32	24,00 i33	25,00	24,00 i1	23,00	23,00
Greece										11,00 b	11,00 b	11,00 b	11,00	12,97 i21	14,93 i22	16,90
Hungary			19,00 b	19,00 b	19,00 b	19,00	19,00 i21	19,00 i22	19,00	20,00 i31	21,00 i32	22,00 i33	23,00	23,63 i21	24,25 i22	24,88
Ireland	22,00 b	22,00 b	22,00	22,00 f	22,00 f	22,00 f										44,12
Italy				28,00 b	28,00 b	28,00 b	28,00	22,50 i1	17,00	21,50 i31	26,00 i32	30,50 i33	35,00	29,91 i21	24,83 i22	19,74
Latvia			20,00 b	20,00 b	20,00 b	20,00	23,33 i21	26,67 i22	30,00	i31	i32	i33	32,00	32,00 f	32,00 f	32,00 f
Lithuania			18,00 b	18,00 b	18,00 b	18,00	i61	i62	i63	i64	i65	i66	31,03	31,03 f	31,03 f	31,03 f
Luxembourg			4,00 b	4,00 b	4,00 b	4,00	7,67 i21	11,33 i22	15,00	24,50 i31	34,00 i32	43,50 i33	53,00	53,11 i21	53,22 i22	53,33
Malta													37,50 b	37,50 b	37,50 b	37,50
Netherlands			20,00 b	20,00 b	20,00 b	20,00	23,00 i21	26,00 i22	29,00	34,25 i31	39,50 i32	44,75 i33	50,00	44,44 i21	38,89 i22	33,33
Poland	7,00												20,00	21,19 i21	22,38 i22	23,57
Portugal	24,00 b	24,00	26,33 i51	28,67 i52	31,00 i53	33,33 i54	35,67 i55	38,00	34,60 i41	31,20 i42	27,80 i43	24,40 i44	21,00	24,14 i21	27,29 i22	30,43
Romania										36,00 b	36,00 b	36,00 b	36,00	40,67 i21	45,33 i22	50,00
Slovakia				17,00 b	17,00 b	17,00 b	17,00	20,00 i1	23,00	22,50 i31	22,00 i32	21,50 i33	21,00	21,73 i21	22,47 i22	23,20
Slovenia						28,00	26,33 i21	24,67 i22	23,00	25,25 i31	27,50 i32	29,75 i33	32,00	35,39 i21	38,77 i22	42,16
Spain						34,00 b	34,00 b	34,00 b	34,00	33,50 i31	33,00 i32	32,50 i33	32,00	34,32 i21	36,65 i22	38,97
Sweden			49,00 b	49,00 b	49,00 b	49,00	49,86 i61	50,71 i62	51,57 i63	52,43 i64	53,29 i65	54,14 i66	55,00	54,05 i21	53,09 i22	52,14
UK			25,00 b	25,00 b	25,00 b	25,00	28,00 i1	31,00	31,00 f	31,00 f	31,00 f					
EU	**20,00**	**24,33**	**24,33**	**24,94**	**24,95**	**25,84**	**27,06**	**28,38**	**28,52**	**28,87**	**29,78**	**30,67**	**31,37**	**31,35**	**31,34**	**31,47**
Iceland			37,00 b	37,00 b	37,00 b	37,00	38,00 i21	39,00 i22	40,00	41,75 i31	43,50 i32	45,25 i33	47,00	46,72 i21	46,43 i22	46,15
Norway			45,00 b	45,00 b	45,00 b	45,00	45,33 i21	45,67 i22	46,00	44,50 i31	43,00 i32	41,50 i33	40,00	44,67 i21	49,33 i22	54,00
Switzerland			19,00 b	19,00 b	19,00 b	19,00	19,67 i21	20,33 i22	21,00	21,50 i31	22,00 i32	22,50 i33	23,00	24,22 i21	25,45 i22	26,67
Israel				11,00 b	11,00 b	11,00 b	11,00	19,00 i1	27,00	26,75 i31	26,50 i32	26,25 i33	26,00	24,80 i1	23,61	23,61

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.3.6. Proportion of women on boards

No	Indicator	Rationale	Data source
3-6	Proportion of women on boards	The indicator measures gender (in)equality and thereby helps to assess and understand the difficulties for women in entering and progressing in the research career. The gender dimension provides an indication of the progress made towards implementing measures of gender equal opportunities.	WIS database/ SHE figures

Key descriptive insights:

- In the EU28 the proportion of women on boards was 31% in 2017 – the same share as in 2014.
- In period 2014-2017, the **largest increases** in the **proportion of women on boards** were registered in **Romania** (+14 p.p.), **Slovenia** (+10 p.p.) and **Portugal** (+9 p.p.). The **largest decreases** were observed in **Netherlands** (-17 p.p.), **Italy** (-15 p.p.) and **Croatia** (-11 p.p.).
- The **highest overall** proportion of women on boards in 2017 is found in **Luxembourg** (53%), **Sweden** (52%) and **Romania** (50%). The **lowest overall** share in 2017 is found in **Croatia** (12%), **Cyprus** (13%) and **Estonia** (15%).
- In the **long-term perspective** (i.e. over the reference period 2000-2017), the **EU average has significantly increase**: proportion of women on boards decreased increased from **20%** in 2000 to **31%** in 2017, while peaking in **2014-2017** with **31%**.
- Concerning EFTA countries, the proportion of women on boards was significantly higher in Iceland and Norway but lower in Switzerland compared to the EU28 average.

Table 62: Proportion of women on boards - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p. change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	38%	38%	0		-1%	
Belgium	19%	19%	0		-2%	
Bulgaria	40%	46%	6		20%	
Croatia	23%	12%	-11		-36%	
Cyprus	13%	13%	0		0%	
Czechia			0			
Denmark	43%	33%	-10		-32%	
Estonia	12%	15%	3		8%	
Finland	50%	45%	-5		-16%	
France			0			
Germany	25%	23%	-2		-7%	
Greece	11%	17%	6		19%	
Hungary	23%	25%	2		6%	
Ireland			0			
Italy	35%	20%	-15		-49%	
Latvia	32%	32%	0		0%	
Lithuania	31%	31%	0		0%	
Luxembourg	53%	53%	0		1%	
Malta			0			
Netherlands	50%	33%	-17		-53%	
Poland	20%	24%	4		11%	
Portugal	21%	30%	9		30%	
Romania	36%	50%	14		44%	
Slovakia	21%	23%	2		7%	
Slovenia	32%	42%	10		32%	
Spain	32%	39%	7		22%	
Sweden	55%	52%	-3		-10%	
UK			0			
EU28	**31%**	**31%**	0			
Iceland	47%	46%	-1		-3%	
Norway	40%	54%	14		44%	
Switzerland	23%	27%	4		11%	
Israel	26%	24%	-2		-8%	

Note: p.p. change = change in percentage points. EU28 = arithmetic average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 63: Proportion of women on boards

Country	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria						31,00 b	31,00 b	31,00 b	31,00	32,75 i31	34,50 i32	36,25 i33	38,00	37,84 i21	37,92 i22	37,76
Belgium			21,00 b	21,00 b	21,00 b	21,00	20,71 i61	20,43 i62	20,14 i63	19,86 i64	19,57 i65	19,29 i66	19,00	18,86 i21	18,71 i22	18,57
Bulgaria				37,00 b	37,00 b	37,00	34,33 i21	31,67 i22	29,00	31,75 i31	34,50 i32	37,25 i33	40,00	42,11 i21	44,23 i22	46,34
Croatia				38,00 b	38,00 b	38,00	38,00 i21	38,00 i22	38,00	34,25 i61	30,49 i62	26,74 i63	22,98 i64	19,23 i65	15,47 i66	11,72
Cyprus			12,00 b	12,00 b	12,00 b	12,00	14,00 i21	16,00 i22	18,00	16,83 i31	15,67 i32	14,50 i33	13,33	13,33 i21	13,33 i21	13,33
Czechia				12,00 b	12,00 b	12,00 b	12,00									16,99
Denmark			37,00 b	37,00 b	37,00 b	37,00	36,33 i21	35,67 i22	35,00	37,00 i31	39,00 i32	41,00 i33	43,00	39,68 i21	36,36 i22	33,04
Estonia			25,00 b	25,00 b	25,00 b	25,00	25,33 i21	25,67 i22	26,00	22,50 i31	19,00 i32	15,50 i33	12,00	12,86 i21	13,72 i22	14,58
Finland			44,00 b	44,00 b	44,00 b	44,00	44,33 i21	44,67 i22	45,00	46,25 i31	47,50 i32	48,75 i33	50,00	48,37 i21	46,73 i22	45,10
France	27,00	27,00 f	27,00 f	27,00 f												35,90
Germany			20,00 b	20,00 b	20,00 b	20,00	20,33 i21	20,67 i22	21,00	22,00 i31	23,00 i32	24,00 i33	25,00	24,00 i1	23,00	23,00
Greece										11,00 b	11,00 b	11,00 b	11,00	12,97 i21	14,93 i22	16,90
Hungary			19,00 b	19,00 b	19,00 b	19,00	19,00 i21	19,00 i22	19,00	20,00 i31	21,00 i32	22,00 i33	23,00	23,63 i21	24,25 i22	24,88
Ireland	22,00 b	22,00 b	22,00	22,00 f	22,00 f	22,00 f										44,12
Italy				28,00 b	28,00 b	28,00 b	28,00	22,50 i1	17,00	21,50 i31	26,00 i32	30,50 i33	35,00	29,91 i21	24,83 i22	19,74
Latvia			20,00 b	20,00 b	20,00 b	20,00	23,33 i21	26,67 i22	30,00	i31	i32	i33	32,00	32,00 f	32,00 f	32,00 f
Lithuania			18,00 b	18,00 b	18,00 b	18,00	i61	i62	i63	i64	i65	i66	31,03	31,03 f	31,03 f	31,03 f
Luxembourg			4,00 b	4,00 b	4,00 b	4,00	7,67 i21	11,33 i22	15,00	24,50 i31	34,00 i32	43,50 i33	53,00	53,11 i21	53,22 i22	53,33
Malta													37,50 b	37,50 b	37,50 b	37,50
Netherlands			20,00 b	20,00 b	20,00 b	20,00	23,00 i21	26,00 i22	29,00	34,25 i31	39,50 i32	44,75 i33	50,00	44,44 i21	38,89 i22	33,33
Poland	7,00												20,00	21,19 i21	22,38 i22	23,57
Portugal	24,00 b	24,00	26,33 i51	28,67 i52	31,00 i53	33,33 i54	35,67 i55	38,00	34,60 i41	31,20 i42	27,80 i43	24,40 i44	21,00	24,14 i21	27,29 i22	30,43
Romania										36,00 b	36,00 b	36,00 b	36,00	40,67 i21	45,33 i22	50,00
Slovakia				17,00 b	17,00 b	17,00 b	17,00	20,00 i1	23,00	22,50 i31	22,00 i32	21,50 i33	21,00	21,73 i21	22,47 i22	23,20
Slovenia						28,00	26,33 i21	24,67 i22	23,00	25,25 i31	27,50 i32	29,75 i33	32,00	35,39 i21	38,77 i22	42,16
Spain						34,00 b	34,00 b	34,00 b	34,00	33,50 i31	33,00 i32	32,50 i33	32,00	34,32 i21	36,65 i22	38,97
Sweden			49,00 b	49,00 b	49,00 b	49,00	49,86 i61	50,71 i62	51,57 i63	52,43 i64	53,29 i65	54,14 i66	55,00	54,05 i21	53,09 i22	52,14
UK			25,00 b	25,00 b	25,00 b	25,00	28,00 i1	31,00	31,00 f	31,00 f	31,00 f					
EU	**20,00**	**24,33**	**24,33**	**24,94**	**24,95**	**25,84**	**27,06**	**28,38**	**28,52**	**28,87**	**29,78**	**30,67**	**31,37**	**31,35**	**31,34**	**31,47**
Iceland			37,00 b	37,00 b	37,00 b	37,00	38,00 i21	39,00 i22	40,00	41,75 i31	43,50 i32	45,25 i33	47,00	46,72 i21	46,43 i22	46,15
Norway			45,00 b	45,00 b	45,00 b	45,00	45,33 i21	45,67 i22	46,00	44,50 i31	43,00 i32	41,50 i33	40,00	44,67 i21	49,33 i22	54,00
Switzerland			19,00 b	19,00 b	19,00 b	19,00	19,67 i21	20,33 i22	21,00	21,50 i31	22,00 i32	22,50 i33	23,00	24,22 i21	25,45 i22	26,67
Israel				11,00 b	11,00 b	11,00 b	11,00	19,00 i1	27,00	26,75 i31	26,50 i32	26,25 i33	26,00	24,80 i1	23,61	23,61

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years

4.4. International mobility

This section presents key indicators related to the international mobility of researchers.

In terms of the longer-term mobility, according to MORE4 data **the share of researchers (post-PhD) that have worked abroad as researcher for more than 3 months** in the last 10 years was around 27% for EU28 countries - roughly the same share as in 2016 and around 4 p.p. lower than in 2012. As in the MORE3 study, in 2019 EFTA countries have higher shares of long-term mobility than the EU28 average.

Concerning short-term mobility, **the share of researchers that have worked abroad for less than 3 months in the last ten years (post PhD)** was 32% in 2019 – a 5 p.p. difference with 2016 and 9 p.p. difference with 2012. There were no differences between male and female researchers in terms of short term mobility.

The share of researchers that consider **virtual mobility as a substitute for international mobility** was 69% in EU28 countries – an increase of 10 p.p. since MORE3[5].

The average **percentage of international co-publications in EU28 corresponded to 56% of total publications in 2018**. This is an increase of around 5 p.p. since 2015 (51%). This indicator score has been gradually increasing over the last ten years. The share of international co-publications was the highest in Belgium, Croatia and Luxembourg and lowest in Poland, Romania and Latvia. The share of international co-publications in EFTA countries remain higher than EU28 average.

Around 15% of **EU R1-R2 researchers are obtaining or have obtained a PhD in another country** than the country of their previous education giving direct access to the PhD. This is not significantly different compared to MORE3 (16%) and the same share as in MORE2 (15%). The highest rates were in Hungary, Luxembourg, Ireland and Denmark, whereas the lowest performance was in Romania, Slovenia, Portugal, Lithuania, Slovakia and Poland. R1-R2 PhD degree mobility was significantly higher in EFTA countries compared to EU28.

4.4.1. Share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years

No	Indicator	Rationale	Data source
4-1	Share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years.	The indicator measures medium- to long-term international mobility.	MORE2/MORE3/MORE4 surveys

This indicator corresponds to the percentage of R2-3-4 researchers that have worked abroad for 3 months or more at least once in the last ten years of their post-PhD career.

[5] MORE2 included a question on virtual mobility but the findings are not comparable with those of MORE3 and MORE4 as the respondents were forced to select only one option while in MORE3 and MORE4 respondents could select multiple options.

Key descriptive insights:

- In 2019 the share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years was around **27% for EU2018 countries**. This was **roughly the same share as in 2016** and around 4 p.p. less than in 2012 (31%).
- EU28 countries with the **highest score in long-term researcher mobility included Luxembourg (63%), Austria (41%) and Denmark (35%).**
- **Countries with the lowest indicator score included Malta (13%), Croatia (15%), Bulgaria/Latvia (19% in both countries) and Poland/Portugal (21% in both countries)**.
- Between 2016 and 2019 the highest increase in the proportion of long-term mobile researchers was in Romania (+15 p.p.), Lithuania/Latvia (+7 p.p. in both countries) and Czech Republic (+6 p.p.). The highest decrease in the indicator score was in **Cyprus (-12 p.p.), France (-8 p.p.), Norway/The Netherlands (-6 p.p. in both countries)**.
- There was **no significant difference between females and males** regarding the share of mobile researchers.
- As in the MORE3 study, in 2019 EFTA countries have higher shares of long-term mobility than the EU28 average.

Table 64: Share of researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	total	total	total	total		total
Austria	45%	38%	41%	2	↑	●
Belgium	46%	33%	34%	0	↑	●
Bulgaria	18%	21%	19%	-3	↓	●
Croatia	19%	19%	15%	-4	↓	●
Cyprus	44%	38%	26%	-12	↓	●
Czechia	16%	19%	25%	6	↑	●
Denmark	53%	30%	35%	5	↑	●
Estonia	27%	28%	26%	-2	↓	●
Finland	42%	25%	25%	0	↓	●
France	26%	35%	27%	-8	↓	●
Germany	45%	33%	33%	-1	↓	●
Greece	34%	24%	25%	1	↑	●
Hungary	34%	33%	30%	-3	↓	●
Ireland	37%	32%	31%	-2	↓	●
Italy	25%	22%	25%	2	↑	●
Latvia	20%	12%	19%	7	↑	●
Lithuania	18%	17%	24%	7	↑	●
Luxembourg	47%	61%	63%	1	↑	●
Malta	24%	17%	13%	-4	↓	●
Netherlands	46%	33%	27%	-6	↓	●
Poland	9%	20%	21%	1	↑	●
Portugal	27%	17%	21%	4	↑	●
Romania	20%	13%	28%	15	↑	●
Slovakia	28%	24%	22%	-2	↓	●
Slovenia	34%	23%	29%	5	↑	●
Spain	32%	29%	27%	-2	↓	●
Sweden	39%	28%	27%	-1	↓	●
UK	29%	26%	23%	-3	↓	●
EU27-EU28	31%	27%	27%	-1	↓	●
Iceland	49%	31%	28%	-3	↓	●
Norway	43%	40%	34%	-6	↓	●
Switzerland	53%	48%	49%	1	↑	●

Note: p.p. change = change in percentage points .EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 65: Share of female researchers (post PhD) that have worked abroad as researcher for more than 3 months in the last 10 years

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	45%	39%	44%	5	↑	🟢
Belgium	49%	28%	26%	-1	↓	🟡
Bulgaria	17%	21%	17%	-5	↓	🔴
Croatia	15%	18%	16%	-2	↓	🔴
Cyprus	25%	39%	23%	-17	↓	🟡
Czechia	9%	14%	16%	2	↑	🔴
Denmark	54%	33%	36%	3	↑	🟢
Estonia	22%	30%	28%	-2	↓	🟡
Finland	33%	23%	22%	-1	↓	🟡
France	20%	33%	27%	-6	↓	🟡
Germany	30%	34%	24%	-10	↓	🟡
Greece	30%	22%	26%	4	↑	🟡
Hungary	29%	33%	32%	-2	↓	🟢
Ireland	35%	26%	24%	-2	↓	🟡
Italy	24%	21%	23%	1	↑	🟡
Latvia	22%	13%	18%	5	↑	🔴
Lithuania	17%	15%	18%	3	↑	🔴
Luxembourg		64%	66%	2	↑	🟢
Malta	25%	15%	14%	0	↓	🔴
Netherlands	44%	33%	34%	1	↑	🟢
Poland	6%	13%	18%	4	↑	🔴
Portugal	25%	14%	21%	7	↑	🟡
Romania	16%	13%	28%	15	↑	🟡
Slovakia	27%	17%	15%	-2	↓	🔴
Slovenia	27%	19%	23%	4	↑	🟡
Spain	28%	28%	25%	-3	↓	🟡
Sweden	31%	27%	27%	0	↓	🟡
UK	25%	23%	26%	3	↑	🟡
EU27-EU28	25%	25%	25%	0	↓	🟡
Iceland		25%	23%	-2	↓	🟡
Norway	41%	41%	38%	-3	↓	🟢
Switzerland	54%	50%	54%	3	↑	🟢

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.4.2. Share of researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last 10 years

No	Indicator	Rationale	Data source
4-2	Share of researchers (post PhD) that have worked abroad as researcher for less than 3 months in the last 10 years.	The indicator measures short-term international mobility.	MORE2/MORE3/MORE4 surveys

Key descriptive insights:

- **The share of researchers that have worked abroad for less than 3 months in the last ten years (post PhD) was 32% in 2019**. This **is 5 p.p.** decrease since the MORE3 study and 9 p.p. decrease since the MORE2 study. There was no difference between male and female researchers regarding this indicator.
- Countries with the **highest indicator score included Romania (42%), Italy (41%) and Belgium (39%).**
- Countries with the **lowest score of short-term research mobility were Latvia (24%), Malta (26%) and Ireland/Estonia** (27% in both countries).
- Most of the countries experience decrease in the indicator score between 2016 and 2019, except for **Romania (+19 p.p.), Croatia/Luxembourg (+8 p.p. in both countries) and Switzerland (+4 p.p.)**.
- Countries with the most significant drops in the indicator score were **Slovenia (-21 p.p.), Malta (-13 p.p.) and Greece/Norway (-12 p.p. in both countries)**.
- Indicator score was **slightly lower in Norway but higher in Switzerland** and equal in Iceland compared to the EU28 average.

Table 66: Share of researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last ten years

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	52%	39%	33%	-6	↓	
Belgium	54%	41%	39%	-2	↓	
Bulgaria	41%	42%	37%	-5	↓	
Croatia	40%	30%	38%	8	↑	
Cyprus	41%	36%	28%	-8	↓	
Czechia	45%	41%	33%	-8	↓	
Denmark	56%	36%	37%	1	↑	
Estonia	45%	37%	27%	-10	↓	
Finland	43%	41%	29%	-11	↓	
France	33%	34%	35%	1	↑	
Germany	48%	40%	30%	-10	↓	
Greece	44%	40%	28%	-12	↓	
Hungary	61%	44%	36%	-8	↓	
Ireland	40%	33%	27%	-5	↓	
Italy	37%	46%	41%	-4	↓	
Latvia	45%	34%	24%	-10	↓	
Lithuania	40%	36%	32%	-4	↓	
Luxembourg	51%	29%	38%	8	↑	
Malta	37%	38%	26%	-13	↓	
Netherlands	44%	37%	32%	-5	↓	
Poland	29%	34%	30%	-5	↓	
Portugal	44%	34%	30%	-4	↓	
Romania	55%	22%	42%	19	↑	
Slovakia	44%	42%	33%	-9	↓	
Slovenia	45%	49%	28%	-21	↓	
Spain	42%	41%	33%	-8	↓	
Sweden	44%	36%	29%	-7	↓	
UK	37%	34%	30%	-4	↓	
EU27-EU28	41%	37%	32%	-5	↓	
Iceland	56%	39%	32%	-6	↓	
Norway	42%	42%	30%	-12	↓	
Switzerland	41%	35%	38%	4	↑	

Note: p.p. change = change in percentage points. EU27= average of 27 EU MS in MORE2. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 67: Share of female researchers (post PhD) that have worked abroad as a researcher for less than 3 months in the last ten years

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	53%	35%	41%	6	↑	🟢
Belgium	48%	35%	34%	-2	↓	🟡
Bulgaria	42%	45%	37%	-8	↓	🟡
Croatia	43%	31%	33%	3	↑	🟡
Cyprus	42%	49%	26%	-23	↓	🟡
Czechia	47%	41%	27%	-14	↓	🟡
Denmark	52%	30%	30%	-1	↓	🟡
Estonia	43%	41%	29%	-12	↓	🟡
Finland	31%	42%	30%	-12	↓	🟡
France	27%	31%	38%	6	↑	🟡
Germany	48%	35%	29%	-6	↓	🟡
Greece	47%	35%	27%	-8	↓	🟡
Hungary	59%	56%	39%	-16	↓	🟢
Ireland	34%	32%	22%	-10	↓	🔴
Italy	37%	44%	44%	0	↓	🟢
Latvia	40%	32%	22%	-10	↓	🔴
Lithuania	40%	41%	31%	-10	↓	🟡
Luxembourg		25%	39%	15	↑	🟢
Malta	44%	46%	34%	-11	↓	🟡
Netherlands	45%	35%	35%	-1	↓	🟡
Poland	26%	33%	28%	-4	↓	🟡
Portugal	53%	36%	29%	-7	↓	🟡
Romania	45%	19%	38%	19	↑	🟡
Slovakia	37%	36%	35%	-1	↓	🟡
Slovenia	41%	51%	27%	-24	↓	🟡
Spain	35%	35%	28%	-7	↓	🟡
Sweden	35%	40%	30%	-10	↓	🟡
UK	30%	32%	32%	0	↓	🟡
EU27-EU28	37%	35%	32%	-3	↓	🟡
Iceland		35%	38%	3	↑	🟡
Norway	46%	37%	28%	-10	↓	🟡
Switzerland	41%	39%	43%	4	↑	🟢

Note: p.p. change = change in percentage points. EU27= average of 27 EU MS in MORE2. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.4.3. *Share of HEI researchers that consider virtual mobility as substitute for short or long-term mobility*

No	Indicator	Rationale	Data source
4-3	Share of HEI researchers that consider virtual mobility as substitute for short or long-term mobility	The indicator gives information about the relevance of ICT in reducing physical mobility while maintaining international scientific collaboration.	MORE2/MORE3/MORE4 surveys

This indicator corresponds to the share of researchers for whom the use of web-based or virtual technology in international collaboration reduces either visits of less than 3 months or visits of 3 months or more.

Key descriptive insights:

- The share of researchers that consider virtual mobility as a substitute for international mobility was **69% in EU28 countries – an increase of 10 p.p. since MORE3**[6]. The indicator score was not significantly different for female researchers.
- The indicator score was the **highest in Romania/Slovenia (92% in both), Luxembourg (77%), Italy/Malta (76% in both countries) and Belgium (75%)**.
- The indicator score was **the lowest in Hungary (57%) and Czech Republic/Slovakia (60% in both countries) and Bulgaria (61%).**
- The most significant increases in the share of researchers considering virtual mobility were in **Slovenia (+36 p.p.), Germany (+22 p.p.) and Denmark (+18 p.p.)**.
- More significant decreases in the indicator score were found in **Portugal (-12 p.p.), Hungary (-9 p.p.) and Finland/Norway (-6 p.p.)**.

[6] MORE2 included a question on virtual mobility but the findings are not comparable with those of MORE3 and MORE4 as the respondents were forced to select only one option while in MORE3 and MORE4 respondents could select multiple options.

Table 68: Share of HEI researchers that consider virtual mobility as substitute for short or long term mobility

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	58%	72%	14	↑	●
Belgium	60%	75%	15	↑	●
Bulgaria	57%	61%	4	↑	●
Croatia	56%	64%	8	↑	●
Cyprus	69%	74%	4	↑	●
Czechia	63%	60%	-3	↓	●
Denmark	45%	63%	18	↑	●
Estonia	56%	65%	9	↑	●
Finland	72%	66%	-6	↓	●
France	49%	66%	16	↑	●
Germany	45%	67%	22	↑	●
Greece	68%	67%	-1	↓	●
Hungary	65%	57%	-9	↓	●
Ireland	59%	64%	6	↑	●
Italy	73%	76%	3	↑	●
Latvia	67%	70%	2	↑	●
Lithuania	62%	71%	9	↑	●
Luxembourg	59%	77%	17	↑	●
Malta	67%	76%	9	↑	●
The Netherlands	60%	71%	11	↑	●
Poland	65%	74%	9	↑	●
Portugal	83%	71%	-12	↓	●
Romania	80%	92%	12	↑	●
Slovakia	57%	60%	3	↑	●
Slovenia	56%	92%	36	↑	●
Spain	70%	74%	4	↑	●
Sweden	66%	66%	0	↓	●
UK	55%	68%	13	↑	●
EU27-EU28	59%	69%	10	↑	●
Iceland	60%	74%	14	↑	●
Norway	59%	53%	-6	↓	●
Switzerland	59%	62%	3	↑	●

Note: p.p. change = change in percentage points. EU27= average of 27 EU MS in MORE2. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 69: Share of HEI female researchers that consider virtual mobility as substitute for short or long term mobility

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**		**female**
Austria	63%	68%	5	↑	
Belgium	57%	70%	13	↑	
Bulgaria	59%	62%	3	↑	
Croatia	50%	62%	13	↑	
Cyprus	72%	74%	3	↑	
Czechia	64%	49%	-15	↓	
Denmark	40%	60%	20	↑	
Estonia	55%	62%	7	↑	
Finland	73%	62%	-11	↓	
France	50%	64%	14	↑	
Germany	40%	79%	38	↑	
Greece	66%	66%	0	↑	
Hungary	68%	51%	-16	↓	
Ireland	61%	62%	1	↑	
Italy	77%	77%	0	↑	
Latvia	76%	68%	-8	↓	
Lithuania	62%	72%	10	↑	
Luxembourg	63%	85%	22	↑	
Malta	71%	71%	0	↑	
The Netherla	52%	69%	18	↑	
Poland	62%	80%	18	↑	
Portugal	79%	72%	-7	↓	
Romania	80%	92%	11	↑	
Slovakia	53%	65%	11	↑	
Slovenia	53%	95%	42	↑	
Spain	72%	75%	3	↑	
Sweden	70%	74%	4	↑	
UK	56%	68%	13	↑	
EU27-EU28	59%	71%	11	↑	
Iceland	65%	75%	10	↑	
Norway	65%	48%	-17	↓	
Switzerland	62%	58%	-4	↓	

Note: p.p. change = change in percentage points. EU27= average of 27 EU MS in MORE2. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.4.4. *Percentage of co-publications of the country with an author from another country*

No	Indicator	Rationale	Data source
4-4	Percentage of co-publications of the country with an author from another country	The indicator is a proxy for scientific output effects of researcher mobility while maintaining international scientific collaboration.	SCOPUS

Key descriptive insights:

- The average **percentage of international co-publications in EU28 corresponded to 56% of total publications in 2018. This is an increase of around 5 p.p. since 2015 (51%).** This indicator score has been gradually increasing over the last ten years.
- EU countries with the highest percentages of international co-publications include **Belgium (69%), Croatia (68%) and Luxembourg 76%**.
- EU Countries with the lowest indicator score include **Poland (33%), Romania (36%), and Latvia (43%)**.
- Between 2015 and 2015 the percentage of international co-publications increased in all countries. Baltic countries– **Estonia (+11 p.p.), Lithuania (+10 p.p.) and Latvia (7 p.p.)** - showed the highest growth in the indicator value during this period.
- **The share of international co-publications in EFTA countries remain higher than EU28 average**, especially in Iceland (78%) and Switzerland (71%).
- The indicator scores in the **US (38%), China (22%), Japan (30%) and South Korea (29%) are significantly lower compared to the EU28 average**.

Table 70: Percentage of co-publications of the country with an author from another country – Scorecard (articles, reviews, and conference proceedings (i.e., peer reviewed material)

Scorecard						
Country	**2015**	**2018**	**2015-2018 p.p. change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	62%	67%	5		-1%	
Belgium	64%	69%	5		-2%	
Bulgaria	47%	46%	0		-9%	
Croatia	66%	68%	2		-8%	
Cyprus	38%	44%	6		4%	
Czechia	40%	46%	6		4%	
Denmark	60%	66%	6		1%	
Estonia	55%	66%	11		10%	
Finland	57%	62%	5		-1%	
France	53%	58%	5		1%	
Germany	49%	53%	3		-2%	
Greece	50%	54%	5		0%	
Hungary	49%	52%	3		-3%	
Ireland	58%	63%	4		-2%	
Italy	45%	49%	4		0%	
Latvia	36%	43%	7		7%	
Lithuania	40%	50%	10		11%	
Luxembourg	77%	76%	0		-13%	
Malta	58%	61%	3		-4%	
Netherlands	59%	64%	5		-1%	
Poland	29%	33%	4		1%	
Portugal	51%	56%	5		1%	
Romania	32%	36%	4		1%	
Slovakia	42%	46%	4		0%	
Slovenia	48%	54%	6		3%	
Spain	47%	51%	4		-1%	
Sweden	61%	66%	5		-1%	
UK	54%	60%	6		2%	
EU28	51%	56%	5		0%	
Iceland	77%	78%	2		-10%	
Norway	59%	62%	3		-4%	
Switzerland	67%	71%	4		-4%	
United States	34%	38%	4		1%	
China	19%	22%	2		1%	
Japan	26%	30%	4		3%	
South Korea	27%	29%	1		-2%	

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%), diagonal upwards (below 20% but above 0%), diagonal downwards (below 0% but above -20%) and downwards (below -20%) arrows.

Table 71: Percentage of co-publications of the country with an author from another country (articles, reviews, and conference proceedings (i.e., peer reviewed material)

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Austria	42%	41%	42%	47%	50%	51%	51%	53%	54%	54%	56%	57%	58%	60%	61%	62%	64%	64%	67%
Belgium	42%	40%	44%	49%	50%	51%	52%	53%	54%	55%	56%	58%	59%	60%	62%	64%	65%	67%	69%
Bulgaria	38%	40%	41%	48%	50%	50%	52%	48%	48%	46%	46%	47%	46%	46%	47%	47%	50%	51%	46%
Croatia	52%	57%	57%	60%	64%	62%	64%	64%	65%	62%	65%	64%	66%	64%	64%	66%	66%	65%	68%
Cyprus	20%	22%	22%	27%	27%	25%	27%	26%	26%	27%	29%	30%	34%	34%	37%	38%	41%	41%	44%
Czechia	32%	31%	32%	36%	37%	37%	37%	36%	36%	37%	35%	34%	36%	38%	40%	40%	41%	42%	46%
Denmark	42%	41%	42%	48%	49%	50%	51%	53%	53%	54%	55%	55%	56%	57%	57%	60%	62%	63%	66%
Estonia	47%	44%	45%	48%	50%	51%	45%	44%	44%	46%	46%	49%	51%	53%	52%	55%	60%	60%	66%
Finland	35%	33%	35%	41%	40%	41%	43%	45%	46%	46%	48%	49%	52%	54%	55%	57%	59%	61%	62%
France	34%	33%	35%	40%	41%	42%	42%	44%	44%	45%	46%	47%	48%	50%	51%	53%	54%	56%	58%
Germany	33%	32%	34%	40%	41%	41%	42%	43%	43%	44%	45%	45%	46%	47%	48%	49%	50%	51%	53%
Greece	34%	32%	31%	36%	35%	34%	35%	36%	36%	38%	39%	41%	44%	45%	47%	50%	51%	53%	54%
Hungary	40%	38%	39%	45%	45%	44%	44%	44%	41%	44%	45%	45%	47%	48%	48%	49%	52%	51%	52%
Ireland	40%	37%	39%	46%	46%	46%	47%	47%	49%	50%	49%	49%	52%	54%	55%	58%	60%	60%	63%
Italy	29%	28%	30%	33%	35%	36%	36%	37%	38%	38%	40%	41%	42%	43%	44%	45%	47%	48%	49%
Latvia	48%	41%	45%	55%	55%	47%	48%	45%	40%	36%	32%	28%	32%	33%	37%	36%	42%	41%	43%
Lithuania	39%	36%	29%	36%	33%	32%	29%	33%	27%	29%	28%	31%	35%	36%	38%	40%	43%	46%	50%
Luxembourg	56%	60%	58%	70%	64%	68%	74%	75%	70%	73%	74%	71%	77%	74%	75%	77%	75%	77%	76%
Malta	50%	48%	40%	42%	49%	65%	62%	47%	42%	45%	47%	50%	52%	52%	57%	58%	59%	58%	61%
Netherlands	38%	36%	38%	45%	46%	45%	47%	48%	48%	49%	51%	52%	54%	56%	57%	59%	61%	62%	64%
Poland	28%	27%	27%	30%	29%	29%	28%	29%	27%	29%	28%	28%	28%	28%	29%	29%	30%	32%	33%
Portugal	41%	39%	41%	45%	46%	46%	46%	45%	47%	46%	46%	46%	48%	49%	49%	51%	53%	54%	56%
Romania	36%	36%	39%	44%	44%	42%	41%	37%	31%	27%	26%	27%	29%	31%	33%	32%	34%	33%	36%
Slovakia	36%	34%	37%	43%	47%	42%	45%	45%	44%	46%	43%	42%	42%	40%	41%	42%	42%	42%	46%
Slovenia	32%	32%	32%	37%	38%	39%	38%	39%	40%	39%	40%	40%	44%	45%	45%	48%	50%	49%	54%
Spain	28%	27%	29%	34%	34%	35%	36%	36%	38%	38%	40%	41%	42%	44%	45%	47%	49%	49%	51%
Sweden	39%	38%	40%	46%	46%	47%	48%	51%	51%	53%	54%	55%	56%	58%	58%	61%	63%	64%	66%
UK	29%	29%	30%	36%	38%	39%	40%	41%	42%	44%	45%	46%	48%	50%	52%	54%	56%	58%	60%
EU28	38%	37%	38%	43%	44%	44%	45%	44%	44%	44%	45%	45%	47%	48%	49%	51%	53%	53%	56%
Iceland	58%	58%	52%	65%	62%	65%	63%	71%	69%	71%	73%	70%	69%	74%	74%	77%	77%	79%	78%
Norway	37%	37%	38%	45%	47%	46%	48%	49%	51%	51%	52%	52%	54%	55%	57%	59%	60%	61%	62%
Switzerland	46%	45%	48%	55%	56%	56%	57%	60%	60%	61%	62%	63%	64%	65%	66%	67%	68%	69%	71%
United States	19%	18%	19%	23%	23%	24%	25%	26%	26%	27%	28%	29%	30%	32%	33%	34%	36%	36%	38%
China	14%	12%	13%	16%	14%	13%	13%	13%	13%	13%	14%	15%	16%	18%	18%	19%	20%	21%	22%
Japan	15%	15%	16%	19%	20%	20%	20%	21%	21%	22%	22%	23%	24%	24%	25%	26%	28%	28%	30%
South Korea	21%	21%	23%	26%	25%	26%	25%	24%	24%	25%	25%	26%	27%	27%	27%	27%	28%	28%	29%

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years.

4.4.5. R1-R2 PhD degree mobility

No	Indicator	Rationale	Data source
4-5	R1-R2 PhD degree mobility	The indicator measures the proportion of mobile PhD candidates as a measurement of international mobility at early career stages.	MORE2/MORE3/ MORE4 surveys

This indicator corresponds to the share of R1-R2 researchers obtaining or having obtained a PhD in another country than the country of their previous education giving direct access to the PhD.

Key descriptive insights:

- According to MORE4 data, **around 16% of EU R1-R2 researchers are obtaining or have obtained a PhD in another country than the country** of their previous education giving direct access to the PhD. This is **the same score as in MORE3 (16%) and similar to MORE2 (15%).**
- There were **very significant differences between countries** in terms of PhD degree mobility at early career stages.
- Countries (defined as countries of PhD, so the destination countries for PhD degree mobility) with the **highest indicator score were Hungary (52%), Luxembourg/Ireland (50% in both) and Denmark (32%**).
- **Romania (2%), Slovenia/Portugal (6% in all three countries) and Lithuania (7%) had the lowest PhD degree mobility** at early career stages.
- The indicator score for females was not significantly different from the general population of researchers.
- R1-R2 PhD degree mobility was significantly higher to EFTA countries compared to EU28.

Table 72: R1-R2 PhD degree mobility

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	19%	21%	15%	-6	↓	●
Belgium	16%	21%	16%	-5	↓	●
Bulgaria	16%	12%	13%	1	↑	●
Croatia	6%	5%	12%	7	↑	●
Cyprus						
Czechia	14%	7%	10%	3	↑	●
Denmark	24%	19%	32%	13	↑	●
Estonia	12%	10%	18%	8	↑	●
Finland	22%	15%	10%	-5	↓	●
France	9%	15%	18%	3	↑	●
Germany	17%	12%	13%	1	↑	●
Greece		46%				
Hungary	16%	9%	52%	43	↑	●
Ireland	32%	43%	50%	6	↑	●
Italy	17%	15%	18%	3	↑	●
Latvia	20%	12%	17%	5	↑	●
Lithuania	19%	11%	7%	-4	↓	●
Luxembourg	83%	60%	50%	-10	↓	●
Malta		46%				
Netherlands	32%	30%	25%	-4	↓	●
Poland	1%	19%	9%	-10	↓	●
Portugal	10%	4%	6%	2	↑	●
Romania	10%	15%	2%	-14	↓	●
Slovakia	16%	10%	9%	-1	↓	●
Slovenia	10%	19%	6%	-13	↓	●
Spain	18%	15%	17%	2	↑	●
Sweden	26%	17%	25%	8	↑	●
UK	16%	24%	15%	-9	↓	●
EU27-EU28	15%	16%	16%	-1	↓	●
Iceland		64%				
Norway	33%	37%	32%	-4	↓	●
Switzerland	40%	40%	30%	-11	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 73: R1-R2 PhD degree mobility (female)

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	20%	32%	18%	-14	↓	●
Belgium	13%	17%	15%	-2	↓	●
Bulgaria		9%	10%	1	↑	●
Croatia	9%	4%	12%	8	↑	●
Cyprus						
Czechia	20%					
Denmark	23%	21%	22%	1	↑	●
Estonia	5%	6%				
Finland	21%	8%	13%	5	↑	●
France	4%	16%	15%	-1	↓	●
Germany	17%	10%	11%	1	↑	●
Greece						●
Hungary	17%					●
Ireland	26%	47%	55%	9	↑	●
Italy	8%	26%	29%	3	↑	●
Latvia			7%	7		●
Lithuania	20%	9%				
Luxembourg	78%	67%				
Malta		60%				
Netherlands	25%	19%	16%	-3	↓	●
Poland	2%	15%				
Portugal	8%	2%	1%	0	↓	●
Romania	13%		0%	0		●
Slovakia	16%	5%	10%	5	↑	●
Slovenia	11%	19%	6%	-13	↓	●
Spain	12%	17%	17%	0	↓	●
Sweden	13%	16%	18%	2	↑	●
UK	11%	24%	20%	-4	↓	●
EU27-EU28	13%	16%	15%	-1	↓	●
Iceland						
Norway	29%	33%	19%	-14	↓	●
Switzerland	26%	38%	32%	-7	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.5. Intersectoral mobility

In terms of intersectoral mobility, around 9% of EU28 R2-3-4 researchers have previously worked as **researchers in the private sector**. This is slightly fewer compared to MORE3 and MORE2. The figure was also slightly lower (7%) for female researchers. The indicator score was the highest in Latvia, Hungary, Austria, Bulgaria, Croatia, Greece, the Netherlands and lowest in Belgium, Spain and Slovenia. The share of researchers with experience in private sector remains higher in EFTA countries, especially in Switzerland, compared to the EU.

Around 12% of R2-3-4 researchers have previously worked as **researchers in public or government sector**. The indicator scores were the highest in Luxembourg, Slovakia, Spain, Latvia and Denmark. The indicator scores were the lowest in Germany, Croatia and the Netherlands.

Only 7% of R2-3-4 researchers in EU28 have previously worked as **researchers in the private not-for-profit sector**. The indicator scores were the highest in Romania, Bulgaria, Spain and Hungary. The indicator scores were the lowest in Germany, Slovenia, the Netherlands, Portugal, Luxembourg, Italy and Denmark.

4.5.1. Share of researchers with experience in private sector

No	Indicator	Rationale	Data source
5-1	Share of researchers with experience in private sector	The indicator measures intersectoral (public-private sector) mobility.	MORE2/MORE3/MORE4 surveys

This indicator corresponds to the share of R2-3-4 researchers in HEIs who have worked as a researcher (excluding PhD) in private industry (excluding private not-for profit sector). Please note that only since MORE3 a distinction was made within the private sector between a large firm and an SME or start-up. In MORE2, only the aggregated option 'private sector' was available to the respondents.

Key descriptive insights:

- Around **9% of EU28 R2-3-4 researchers have previously worked as researchers in the private sector**. This is **slightly fewer compared to MORE3 (11%) and MORE2 (12%).**
- The proportion of researchers with experience in private sector was the **highest in Latvia (16%), Hungary (14%), Bulgaria, Croatia, Greece, the Netherlands (13% in each).**
- The indicator score was the **lowest in Belgium (3%), Spain (4%) and Slovenia (5%)**.
- Between 2016 and 2019 the most significant increases in the share of researchers with private sector experience were in **Latvia (+6 p.p.), Cyprus (+4 p.p.).**
- The most significant decreases were in **Belgium/Spain/Bulgaria (-7 p.p.), Ireland/Estonia/Slovenia (-6 p.p.) and Luxembourg/Poland/Finland/Italy (-5 p.p.)**.
- Share of researchers with experience in private sector remains higher in EFTA countries, especially in Switzerland compared to the EU.

Table 74: Share of researchers with experience in private sector

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**	**total**		**total**
Austria	12%	12%	13%	0	↑	●
Belgium	13%	10%	3%	-7	↓	●
Bulgaria	16%	20%	13%	-7	↓	●
Croatia	14%	11%	13%	2	↑	●
Cyprus	16%	7%	11%	4	↑	●
Czechia	12%	13%	10%	-3	↓	●
Denmark	13%	13%	12%	-2	↓	●
Estonia	11%	13%	7%	-6	↓	●
Finland	12%	13%	9%	-5	↓	●
France	10%	6%	7%	2	↑	●
Germany	11%	12%	12%	0	↑	●
Greece	16%	16%	13%	-3	↓	●
Hungary	18%	16%	14%	-2	↓	●
Ireland	16%	15%	9%	-6	↓	●
Italy	6%	12%	8%	-5	↓	●
Latvia	14%	11%	16%	6	↑	●
Lithuania	10%	10%	9%	-1	↓	●
Luxembourg	15%	12%	6%	-5	↓	●
Malta	12%	8%	10%	3	↑	●
Netherlands	12%	14%	13%	-1	↓	●
Poland	15%	12%	7%	-5	↓	●
Portugal	6%	10%	8%	-2	↓	●
Romania	11%	5%	8%	3	↑	●
Slovakia	9%	11%	9%	-2	↓	●
Slovenia	14%	11%	5%	-6	↓	●
Spain	12%	11%	4%	-7	↓	●
Sweden	11%	10%	11%	1	↑	●
UK	14%	10%	7%	-3	↓	●
EU27-28	12%	11%	9%	-2	↓	●
Iceland	23%	8%	11%	3	↑	●
Norway	10%	10%	11%	2	↑	●
Switzerland	15%	15%	17%	3	↑	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.5.2. *Share of female researchers with experience in private sector*

No	Indicator	Rationale	Data source
5-2	Share of female researchers with experience in private sector	This indicator on intersectoral (public-private sector) mobility addresses the gender issue.	MORE2/MORE3/MORE4 surveys

Key descriptive insights:

- Around **7% of female R2-3-4 researchers have previously worked as researchers in the private sector – slightly less compared to MORE3 (8%) and MORE2 (9%)**. This is also slightly **fewer compared to the general population of researchers** (9%).
- Indicator scores were the **highest Latvia (15%), Denmark (13%) and Greece (12%).**
- Indicator scores were the **lowest in Belgium (2%), Spain (3%) and Portugal/Slovakia/Slovenia** (4% in all three countries).
- Between 2016 and 2019 the most significant increases in the share of female researchers with private sector experience were in **Latvia (+8 p.p.) and Norway/Romania (+7 p.p. in both countries)**. The most significant decreases were in **Ireland (-9 p.p.), Hungary (-8 p.p.) and Spain (-7 p.p.)**.

Table 75: Share of female researchers with experience in private sector

	2012	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**female**	**female**		**female**
Austria	10%	10%	8%	-2	↓	🟡
Belgium	15%	1%	2%	1	↑	🔴
Bulgaria	6%	12%	9%	-4	↓	🟡
Croatia	8%	9%	10%	1	↑	🟢
Cyprus	23%	5%	5%	1	↑	🔴
Czechia	8%	11%	8%	-4	↓	🟡
Denmark	8%	13%	13%	0	↓	🟢
Estonia	3%	12%	8%	-4	↓	🟡
Finland	7%	7%	5%	-2	↓	🔴
France	10%	5%	7%	2	↑	🟡
Germany	3%	9%	8%	-1	↓	🟡
Greece	11%	11%	12%	0	↑	🟢
Hungary	5%	15%	7%	-8	↓	🟡
Ireland	9%	16%	6%	-9	↓	🟡
Italy	5%	9%	7%	-2	↓	🟡
Latvia	8%	7%	15%	8	↑	🟢
Lithuania	7%	7%	7%	0	↓	🟡
Luxembourg		11%	8%	-3	↓	🟡
Malta	9%	12%	6%	-6	↓	🟡
Netherlands	10%	12%	11%	-1	↓	🟢
Poland	12%	13%	6%	-6	↓	🟡
Portugal	6%	9%	4%	-5	↓	🔴
Romania	9%	3%	10%	7	↑	🟢
Slovakia	7%	7%	4%	-3	↓	🔴
Slovenia	11%	5%	4%	-1	↓	🔴
Spain	11%	10%	3%	-7	↓	🔴
Sweden	7%	7%	8%	1	↑	🟡
UK	13%	5%	6%	1	↑	🟡
EU27-28	9%	8%	7%	-1	↓	🟡
Iceland		5%	5%	0	↓	🔴
Norway	4%	1%	8%	7	↑	🟡
Switzerland	7%	12%	14%	1	↑	🟢

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.5.3. Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in public or government sector

No	Indicator	Rationale	Data source
5-3	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in public or government sector	The indicator measures intersectoral (academia-public/government sector) mobility.	MORE2/MORE3/MORE4 surveys

This is a new indicator that was not present in MORE2/MORE3 studies and was introduced since MORE4. This indicator corresponds to the share of R2-3-4 researchers in HEIs who have worked as a researcher (excluding PhD) in the public or government sector.

Key descriptive insights:

- Around **12% of R2-3-4 researchers have previously worked as researchers in in public or government sector**. This share among female researchers was only slightly higher (13%).
- The indicator scores were the **highest in Luxembourg/Slovakia (20% in both countries), Spain (18%) and Latvia/Denmark (17%** in both countries).
- The indicator scores were the **lowest in Germany (7%), Croatia (8%) and the Netherlands (9%).**
- The indicator score was not significantly different in Norway and Iceland but higher in Switzerland, compared to the EU28 average**.**

Table 76: Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in public or government sector

	2019	Comparison with EU28
Country	**total**	**total**
Austria	16%	🟢
Belgium	10%	🟡
Bulgaria	14%	🟡
Croatia	8%	🔴
Cyprus	12%	🟡
Czechia	15%	🟡
Denmark	17%	🟢
Estonia	13%	🟡
Finland	14%	🟡
France	12%	🟡
Germany	7%	🔴
Greece	14%	🟡
Hungary	13%	🟡
Ireland	13%	🟡
Italy	13%	🟡
Latvia	17%	🟢
Lithuania	10%	🟡
Luxembour	20%	🟢
Malta	15%	🟢
Netherland	9%	🔴
Poland	15%	🟡
Portugal	10%	🔴
Romania	12%	🟡
Slovakia	20%	🟢
Slovenia	14%	🟡
Spain	18%	🟢
Sweden	16%	🟢
UK	13%	🟡
EU28	12%	🟡
Iceland	13%	🟡
Norway	12%	🟡
Switzerlan	15%	🟢

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

Table 77: Share of R2-3-4 female researchers who have worked as a researcher (excluding PhD) in public or government sector

	2019	Comparison with EU28
Country	**female**	**female**
Austria	13%	🟡
Belgium	11%	🟡
Bulgaria	15%	🟡
Croatia	8%	🔴
Cyprus	14%	🟡
Czechia	14%	🟡
Denmark	20%	🟢
Estonia	10%	🔴
Finland	14%	🟡
France	13%	🟡
Germany	7%	🔴
Greece	13%	🟡
Hungary	20%	🟢
Ireland	12%	🟡
Italy	12%	🟡
Latvia	20%	🟢
Lithuania	12%	🟡
Luxembour	25%	🟢
Malta	20%	🟢
Netherland	9%	🔴
Poland	15%	🟡
Portugal	13%	🟡
Romania	12%	🟡
Slovakia	15%	🟡
Slovenia	15%	🟡
Spain	18%	🟢
Sweden	16%	🟢
UK	14%	🟡
EU28	13%	🟡
Iceland	15%	🟡
Norway	7%	🔴
Switzerlan	17%	🟢

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

4.5.4. Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in the private not-for-profit sector

No	Indicator	Rationale	Data source
5-4	Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in the private not-for-profit sector	The indicator measures intersectoral (academia-private not-for-profit) mobility.	MORE2/MORE3/MORE4 surveys

This is a new indicator that was not present in MORE2/MORE3 studies and was introduced since MORE4. This indicator corresponds to the share of R2-3-4 researchers in HEIs who have worked as a researcher (excluding PhD) in the private not-for-profit sector.

Key descriptive insights:

- Only **7% of R2-3-4 researchers in EU28 have previously worked as researchers in the private not-for-profit sector**. This share among female researchers was similar (8%).
- The indicator scores were the **highest in Romania (14%), Bulgaria/Spain (13% in both countries) and Hungary (11%)**.
- The indicator scores were the **lowest in Germany (3%), Slovenia/the Netherlands (4%) and Portugal/Luxembourg/Italy/Denmark (5%).**
- Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in the private not-for-profit sector was not significantly different in Switzerland and Iceland but higher in Norway compared to the EU28 average.

Table 78: Share of R2-3-4 researchers who have worked as a researcher (excluding PhD) in private not-for-profit sector

	2019	Comparison with EU28
Country	**total**	**total**
Austria	10%	🟢
Belgium	10%	🟢
Bulgaria	13%	🟢
Croatia	6%	🔴
Cyprus	9%	🟢
Czechia	7%	🟡
Denmark	5%	🔴
Estonia	7%	🟡
Finland	7%	🟡
France	8%	🟡
Germany	3%	🔴
Greece	8%	🟡
Hungary	11%	🟢
Ireland	8%	🟡
Italy	5%	🔴
Latvia	10%	🟢
Lithuania	8%	🟡
Luxembour	5%	🔴
Malta	6%	🟡
Netherland	4%	🔴
Poland	8%	🟡
Portugal	5%	🔴
Romania	14%	🟢
Slovakia	9%	🟢
Slovenia	4%	🔴
Spain	13%	🟢
Sweden	6%	🟡
UK	7%	🟡
EU28	7%	🟡
Iceland	6%	🟡
Norway	10%	🟢
Switzerlan	8%	🟡

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

Table 79: Share of R2-3-4 female researchers who have worked as a researcher (excluding PhD) in private not-for-profit sector

	2019	Comparison with EU28
Country	**female**	**female**
Austria	10%	🟢
Belgium	11%	🟢
Bulgaria	13%	🟢
Croatia	4%	🔴
Cyprus	9%	🟡
Czechia	12%	🟢
Denmark	7%	🟡
Estonia	4%	🔴
Finland	7%	🟡
France	8%	🟡
Germany	3%	🔴
Greece	7%	🟡
Hungary	14%	🟢
Ireland	9%	🟡
Italy	5%	🔴
Latvia	7%	🟡
Lithuania	9%	🟡
Luxembour	12%	🟢
Malta	10%	🟢
Netherland	6%	🔴
Poland	11%	🟢
Portugal	5%	🔴
Romania	11%	🟢
Slovakia	7%	🟡
Slovenia	2%	🔴
Spain	14%	🟢
Sweden	7%	🟡
UK	8%	🟡
EU28	8%	🟡
Iceland	2%	🔴
Norway	8%	🟡
Switzerlan	7%	🟡

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

4.6. Interdisciplinary mobility

Around 76% of researchers in EU28 agree that **interdisciplinary mobility is a positive factor for career progression** in their home institution, with no significant differences between countries. This figure is very similar to MORE3 (74%).

4.6.1. Interdisciplinary mobility as a positive factor for career progression

No	Indicator	Rationale	Data source
6-1	Interdisciplinary mobility as a positive factor for career progression	The indicator assesses whether interdisciplinary is facilitating career progression	MORE3/MORE4 surveys

This indicator corresponds to the share of researchers who agree that interdisciplinary mobility is regarded as a positive factor for career progression in their home institution.

Key descriptive insights:

- Around **76% of researchers in EU28 agree that interdisciplinary mobility is a positive factor for career progression in their home institution**. This figure is **very similar to MORE3** (74%).
- The indicator score did not vary significantly between different countries. It was the **highest in Latvia (88%), the Netherlands (87%) and Slovenia/Bulgaria (86% in both countries**).
- Proportion of researchers acknowledging interdisciplinary mobility as a positive factor for career progression was the **lowest in Italy (60%), Croatia (62%) and Portugal (68%).**
- Between 2016 and 2019 the **most significant increases in the indicator score were in Bulgaria (+14 p.p.), Slovenia/Hungary (+13 p.p. in both countries), the Netherlands/Iceland (+12 p.p.).** The most significant **decreases were found in Austria/Romania/Italy (-10 p.p.), Luxembourg (-7 p.p.) and Croatia (-6 p.p.)**.
- **Proportion of female researchers acknowledging interdisciplinary mobility as a positive factor for career progression (75%) was very similar** to the general population of researchers.
- The indicator score was similar in Norway and Switzerland but higher in Iceland, compared to the EU28 average.

Table 80: An interdisciplinary mobility experience or following interdisciplinary research approach are regarded as positive factors for career progression

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**total**	**total**	**total**		**total**
Austria	79%	68%	-10	↓	●
Belgium	74%	82%	8	↑	●
Bulgaria	72%	86%	14	↑	●
Croatia	69%	62%	-6	↓	●
Cyprus	67%	75%	8	↑	●
Czechia	79%	83%	3	↑	●
Denmark	76%	79%	3	↑	●
Estonia	79%	80%	2	↑	●
Finland	72%	83%	11	↑	●
France	62%	72%	10	↑	●
Germany	81%	78%	-3	↓	●
Greece	74%	79%	5	↑	●
Hungary	62%	75%	13	↑	●
Ireland	76%	80%	4	↑	●
Italy	70%	60%	-10	↓	●
Latvia	83%	88%	4	↑	●
Lithuania	75%	76%	1	↑	●
Luxembourg	77%	70%	-7	↓	●
Malta	77%	81%	4	↑	●
Netherlands	75%	87%	12	↑	●
Poland	80%	79%	-2	↓	●
Portugal	71%	68%	-2	↓	●
Romania	85%	75%	-10	↓	●
Slovakia	79%	78%	-1	↓	●
Slovenia	73%	86%	13	↑	●
Spain	70%	74%	5	↑	●
Sweden	78%	75%	-2	↓	●
UK	74%	79%	5	↑	●
EU28	74%	76%	2	↑	●
Iceland	74%	86%	12	↑	●
Norway	73%	72%	0	↓	●
Switzerland	78%	76%	-2	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

Table 81: An interdisciplinary mobility experience or following interdisciplinary research approach are regarded as positive factors for career progression (female)

	2016	2019	2016-2019 p.p. change		Comparison with EU28
Country	**female**	**female**	**total**		**female**
Austria	75%	67%	-8	↓	●
Belgium	74%	85%	12	↑	●
Bulgaria	70%	86%	16	↑	●
Croatia	68%	62%	-6	↓	●
Cyprus	74%	75%	1	↑	●
Czechia	74%	81%	7	↑	●
Denmark	84%	78%	-6	↓	●
Estonia	77%	80%	4	↑	●
Finland	68%	83%	15	↑	●
France	64%	70%	6	↑	●
Germany	82%	82%	0	↑	●
Greece	78%	74%	-4	↓	●
Hungary	63%	73%	10	↑	●
Ireland	76%	80%	4	↑	●
Italy	74%	59%	-15	↓	●
Latvia	84%	84%	-1	↓	●
Lithuania	77%	75%	-2	↓	●
Luxembourg	78%	54%	-24	↓	●
Malta	78%	80%	1	↑	●
Netherlands	77%	84%	6	↑	●
Poland	83%	81%	-2	↓	●
Portugal	70%	62%	-8	↓	●
Romania	85%	68%	-17	↓	●
Slovakia	79%	80%	1	↑	●
Slovenia	78%	91%	13	↑	●
Spain	76%	74%	-2	↓	●
Sweden	80%	78%	-2	↓	●
UK	71%	73%	2	↑	●
EU28	75%	75%	0	↓	●
Iceland	70%	83%	13	↑	●
Norway	77%	67%	-10	↓	●
Switzerland	79%	71%	-8	↓	●

Note: p.p. change = change in percentage points. EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Short-term trend is shown by upwards (above 20%) and downwards (below -20%) arrows.

4.7. Attractiveness of the ERA

In 2018, the proportion of **mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country** was 8% in EU28 - a small increase of 1 p.p. since 2014. The highest rates were found in Luxembourg, Austria and Denmark, whereas the lowest scores were found in Lithuania, Slovenia and Poland - less than 1% of total PhD students of the country.

Around 43% of all researchers consider that **availability of research funding is better in non-EU countries than in the EU**. The share of researchers considering **social security and pension plan better in non-EU countries than in the EU** was even smaller (29% and 32% respectively). These figures were very similar to MORE3 survey results.

4.7.1. Mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country

No	Indicator	Rationale	Data source
7-1	Mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country	The indicator focuses on country of destination measuring mobility of researchers in the first stage of their career, with specific focus on mobility within Europe. It is also a measure of a country's "brain-gain" within EU.	Eurostat: educ_uoe_mobs02/educ_uoe_enrt01

Key descriptive insights:

- In 2018 in EU28 countries there was **8% of mobile PhD students (ISCED 6/8) from abroad, measured as a share of total PhD students of the country. This is small increase of 1 p.p. since 2014**.
- In the period 2014-2017, the **largest increases** in the share of mobile PhD students from abroad of the total PhD students of the country were registered in **Cyprus** (+7 p.p.) and **Malta** (+5 p.p.). The **largest decreases** were observed in **Luxembourg** (-17 p.p.) and **Belgium** (-7 p.p.)
- **The highest overall** share of mobile PhD students from abroad of the total PhD students of the country is found in **Luxembourg** (54%), **Austria** (19%) and **Denmark** (18%). The **lowest overall numbers** are found in **Lithuania** (~ 0%), **Slovenia** (~ 0%) and **Poland** (~ 0%)
- In the **long-term perspective** (i.e. over the reference period 2008-2017), the **arithmetic EU average has slightly increased**: the share of mobile PhD students from abroad of the total PhD students of the country increased from **8%** in 2008 to **9%** in 2017.

Table 82: Mobile PhD students (ISCED 6/8) from abroad as a share (%) of total PhD students of the country - Scorecard

Scorecard						
Country	**2014**	**2017**	**2014-2017 p.p. change**	**Comparison with EU average**	**Progress index**	**Long-term trend**
Austria	16%	19%	↑ 3		↑ 24%	
Belgium	12%	4%	↓ -7		↓ -108%	
Bulgaria	1%	3%	↑ 1		↑ 17%	
Croatia	0%	1%	↑ 1		↑ 10%	
Cyprus	5%	12%	↑ 8		↑ 95%	
Czechia	9%	10%	↑ 1		↑ 9%	
Denmark	15%	18%	↑ 3		↑ 18%	
Estonia	3%	4%	↑ 1		↑ 15%	
Finland	6%	6%	↑ 0		↑ 0%	
France	7%	8%	↑ 1		↑ 10%	
Germany			↑ 0			
Greece			↑ 0			
Hungary	5%	5%	↑ 0		↓ -5%	
Ireland	9%	10%	↑ 1		↑ 8%	
Italy	0%	3%	↑ 3		↑ 45%	
Latvia	4%	5%	↑ 2		↑ 17%	
Lithuania	2%	0%	↓ -1		↓ -17%	
Luxembourg	71%	54%	↓ -17		↓ -291%	
Malta	5%	10%	↑ 5		↑ 57%	
Netherlands	17%	17%	↓ 0		↓ -22%	
Poland	0%	0%	↑ 0		↑ 0%	
Portugal	2%	3%	↑ 1		↑ 16%	
Romania	1%	1%	↑ 0		↑ 5%	
Slovakia	7%	7%	↓ 0		↓ -8%	
Slovenia	3%	0%	↓ -3		↓ -42%	
Spain	4%	4%	↑ 1		↑ 5%	
Sweden	8%	11%	↑ 3		↑ 25%	
UK	12%	13%	↑ 1		↓ -2%	
EU28	**7%**	**8%**	↑ **1**			

Note: p.p. change = change in percentage points. EU28 = real average of EU MS. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average. Long-term trend indicates country's performance over 2000-2017 and highlights (in green) the highest value in the period. Short-term trend is shown by upwards (above 0%) and downwards (below 0%) arrows.

Table 83: Mobile PhD students (ISCED 6/8) from abroad as a share (%) of total PhD students of the country

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Austria	16%	17%	16%	16%	17%	17%	16%	17%	18%	19%
Belgium	12%	12%	13%	13%	14%	11%	12%	12%	13%	4%
Bulgaria	2%	2%	2%	2%	1%	1%	1%	2%	2%	3%
Croatia	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%
Cyprus	6%	8%	7%	8%	9%	3%	5%	9%	11%	12%
Czechia	6%	6%	7%	7%	8%	8%	9%	9%	10%	10%
Denmark	8%	9%	10%	11%	12%	14%	15%	16%	17%	18%
Estonia	2%	2%	3%	3%	3%	3%	3%	4%	4%	4%
Finland	4%	4%	5%	5%	5%	6%	6%	6%	6%	6%
France	7%	7%	7%	7%	7%	7%	7%	8%	8%	8%
Germany										
Greece								1%	1%	1%
Hungary	4%	4%	4%	5%	4%	4%	5%	3%	5%	5%
Ireland	21% b	17% b	15%	16%	16%	12%	9%	8%	10%	10%
Italy	2%	2%	2% i1	2%	2%	2%	0%	3%	3%	3%
Latvia	1%	0%	1%	0%	2%	3%	4%	6%	6%	5%
Lithuania	1%	0%	0%	0%	0%	1%	2%	0%	0%	0%
Luxembourg	60% b	60% b	60% b	60%	64%	71%	71% f	58%	56%	54%
Malta	1%	5%	0%	1%	5%	5%	5%	9%	9%	10%
Netherlands	26%	25%	24%	18%	17%	17%	17%	18%	16%	17%
Poland	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Portugal	2%	2%	3%	3%	3%	4%	2%	3%	3%	3%
Romania	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Slovakia	4%	6%	6%	6%	7%	7%	7%	7%	7%	7%
Slovenia	5%	4%	4%	4%	5%	3%	3%	3%	0%	0%
Spain	5%	5%	5%	5%	6%	4%	4% f	0%	4%	4%
Sweden	7%	8%	8%	9%	9%	8%	8% f	10%	10%	11%
UK	17%	16%	16%	16%	16%	13%	12%	13%	13%	13%
Arithmetic EU28	**8%**	**8%**	**8%**	**8%**	**9%**	**9%**	**9%**	**8%**	**9%**	**9%**
Real EU28						**7%**	**7%**	**7%**	**8%**	**8%**

Note: b: carry-backward imputation, f: carry-forward imputation, ixy: imputation by interpolation for data corresponding to the yth year in a period of x consecutive missing years. EU28 based on real averages.

4.7.2. Share of HEI researchers considering availability of research funding better in non-EU countries than in the EU

No	Indicator	Rationale	Data source
7-2	Share of HEI researchers considering availability of research funding better in non-EU countries than in the EU	The indicator measures the attractiveness of countries in terms of research funding.	MORE2/MORE3/ MORE4 surveys

Key descriptive insights:

- **Around 43% of all researchers consider that availability of research funding is better in non-EU countries than in the EU** (as compared to 'similar' or 'worse'). This figure is very similar to MORE2 (43%) and MORE3 (42%) results.
- The indicator score is **similar among non-EU researchers working in the EU (45%) and EU researchers currently working in the EU** who have previously been mobile outside the EU (43%).
- The share of the **non-EU researchers working in the EU who consider availability of research funding better in non-EU countries than in the EU increased from 38% in 2016 to 45% in 2019**. This share, however, is similar to the indicator score in MORE2 (44%).

Table 84: Share of HEI researchers considering availability of research funding better in non-EU countries than in the EU

	2012	2016	2019	2016-2019 p.p. change	
Non-EU researchers currently working in the EU	44%	38%	45%	7	↑
Non-EU researchers - Female	37%	33%	44%	12	↑
EU researchers currently working in the EU but that have previously been mobile outside the EU	50%	43%	43%	-1	↓
EU researchers - Female	51%	47%	45%	-2	↓
Total EU and non-EU researchers	43%	42%	43%	2	↑

4.7.3. Share of HEI researchers considering social security and pension plan better in non-EU countries than in the EU

No	Indicator	Rationale	Data source
7-3	Share of HEI researchers considering social security and pension plan better in non-EU countries than in the EU	The indicator measures the attractiveness of countries in terms of social security/pension plans.	MORE2/MORE3/ MORE4 surveys

Key descriptive insights:

- **Around 29% and 32% of total EU and non-EU researchers consider that, respectively, social security and pension plans are better in non-EU countries than in the EU** (as compared to 'similar' or 'worse'). These figures are **similar to MORE3 (33% and 32% respectively) and slightly higher than the MORE2 result** (27% for the joint category including social security and pension plan).
- The indicator **score among non-EU researchers currently working in the EU (34-36%) is higher compared to EU researcher currently working in the EU (27-30%).**

Table 85: Share of HEI researchers considering social security and pension plan better in non-EU countries than in the EU

	2012	2016 - Social security	2016 - Pension plan	2016 - average social security and pension	2019 - Social security	2019 - Pension plan	2019 - average social security and pension	2016-2019 p.p. change	
Non-EU researchers currently working in the EU	35%	49%	41%	45%	34%	36%	35%	-10	↓
Non-EU researchers - Female	41%	50%	47%	48%	31%	31%	31%	-18	↓
EU researchers currently working in the EU but that have previously been mobile outside the EU	23%	27%	28%	28%	27%	30%	28%	1	↑
EU researchers - Female	25%	26%	27%	26%	27%	33%	30%	4	↑
Total EU and non-EU researchers	27%	33%	32%	33%	29%	32%	30%	-2	↓

4.8. Open access

In terms of open access in research, a large share (83%) of EU28 researchers **published in (or sent articles for review to) open access journals**, with no significant differences between countries. On the other hand, only around 19% of PhD students in EU28 countries received **training in open science approaches**. Countries with the highest indicator score included Romania, Croatia and Sweden. Countries with the lowest indicator score included Germany, Luxembourg, the Netherlands, Slovenia and Spain.

4.8.1. Share of researchers who published in (or sent articles for review to) open access journals

No	Indicator	Rationale	Data source
8-1	Share of researchers who published in (or sent articles for review to) open access journals	The indicator measures the extent to which researchers engage in open access publishing activities	MORE4 survey

This is a new indicator that was not used on MORE2/MORE3 and has been only introduced for the first time in the MORE4 study. The indicator refers to the share of researchers who published in (or sent articles for review to) open access journals.

Key descriptive insights:

- Overall a **large share (83%) of EU28 researchers published in (or sent articles for review to) open access journals**. This share among female researchers was only slightly smaller (81%).
- There were no significant differences between countries in terms of the share of researchers engaging in open access publishing activities;
- Countries with the **highest indicator score were Romania (96%), Latvia (94%) and Poland (91%)**.
- Countries with the lowest indicator score included **France (69%), Italy (77%) and Norway (78%)**.
- Indicator scores among EFTA countries were slightly lower compared to EU28 average.

Table 86: Share of researchers who published in (or sent articles for review to) open access journals

	2019	Comparison with EU28
Country	**total**	**total**
Austria	84%	🟡
Belgium	80%	🟡
Bulgaria	89%	🟡
Croatia	85%	🟡
Cyprus	82%	🟡
Czechia	83%	🟡
Denmark	80%	🟡
Estonia	81%	🟡
Finland	85%	🟡
France	69%	🟡
Germany	80%	🟡
Greece	82%	🟡
Hungary	80%	🟡
Ireland	84%	🟡
Italy	77%	🟡
Latvia	94%	🟡
Lithuania	89%	🟡
Luxembour	81%	🟡
Malta	80%	🟡
Netherland	89%	🟡
Poland	91%	🟡
Portugal	85%	🟡
Romania	96%	🟡
Slovakia	85%	🟡
Slovenia	86%	🟡
Spain	85%	🟡
Sweden	84%	🟡
UK	87%	🟡
EU28	83%	🟡
Iceland	80%	🟡
Norway	78%	🟡
Switzerlan	82%	🟡

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

Table 87: Share of female researchers who published in (or sent articles for review to) open access journals

	2019	Comparison with EU28
Country	female	female
Austria	82%	
Belgium	81%	
Bulgaria	92%	
Croatia	85%	
Cyprus	82%	
Czechia	86%	
Denmark	76%	
Estonia	81%	
Finland	86%	
France	60%	
Germany	79%	
Greece	85%	
Hungary	73%	
Ireland	81%	
Italy	75%	
Latvia	91%	
Lithuania	88%	
Luxembour	75%	
Malta	74%	
Netherland	88%	
Poland	92%	
Portugal	85%	
Romania	95%	
Slovakia	86%	
Slovenia	85%	
Spain	85%	
Sweden	82%	
UK	80%	
EU28	81%	
Iceland	86%	
Norway	73%	
Switzerlan	82%	

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

4.8.2. Share of PhD students who received training in open science approaches

No	**Indicator**	**Rationale**	**Data source**
8-2	Share of PhD students who received training in open science approaches	This indicator measures the extent to which young researchers in Europe are familiarised with open science approaches (publishing in open access journals, sharing research data, participating in citizen science events, etc.)	MORE4 survey

This is a new indicator that was not used on MORE2/MORE3 and has been only introduced since MORE4 study. The indicator refers to the share of PhD students who received training in open science approaches.

Key descriptive insights:
- Only **around 19% of PhD students in EU28 countries received training in open science approaches**. - Countries with the **highest indicator score included Romania (72%), Croatia (42%) and Sweden (37%).** - Countries with the **lowest indicator score included Germany (11%), Luxembourg/the Netherlands/Slovenia (12% in each country) and Spain (14%**). - The **indicator scores in EFTA countries (Switzerland, Norway) were only slightly lower** compared to EU28 average.

Table 88: Share of PhD candidates who received training in open science approaches

	2019	Comparison with EU28
Country	**total**	**total**
Austria	25%	🟢
Belgium	19%	🟡
Bulgaria	25%	🟢
Croatia	42%	🟢
Cyprus		
Czechia	19%	🟡
Denmark	31%	🟢
Estonia	21%	🟡
Finland	32%	🟢
France	20%	🟡
Germany	11%	🔴
Greece		
Hungary	23%	🟢
Ireland	21%	🟡
Italy	16%	🟡
Latvia	32%	🟢
Lithuania	21%	🟡
Luxembour	12%	🔴
Malta		
Netherland	12%	🔴
Poland	24%	🟢
Portugal	15%	🟡
Romania	72%	🟢
Slovakia	20%	🟡
Slovenia	12%	🔴
Spain	14%	🔴
Sweden	37%	🟢
UK	20%	🟡
EU28	19%	🟡
Iceland		
Norway	18%	🟡
Switzerlan	17%	🟡

Note: EU28=average of 28 EU MS in MORE3/MORE4. Green, yellow and red circles indicate country's performance being, respectively, at least 20% above, between 20% and -20% and below -20% compared to the EU average.

5. Conclusions

5.1. Human resources

POSITIVE DEVELOPMENTS IN THE AREA OF HUMAN RESOURCES BOTH FROM THE SHORT-TERM AND LONG-TERM PERSPECTIVE

The **number of researchers** (FTE) per thousand employees in EU28 has increased by 7% between 2014 and 2017 and has been increasing since 2000. Scandinavian countries (Denmark, Finland, Sweden) were the best overall performers, whereas the score was the lowest in Romania, Cyprus and Malta. The number of researchers (FTE) per thousand employees was higher in EFTA countries compared to EU28 average. In 2017 the EU28 already had a higher number of researchers per thousand employees than the US and significantly higher score compared to China. At the same time the indicator score for EU28 was lower than Japan's and South Korea's.

Similarly, the **number of young PhD graduates** (ISCED8) per thousand population aged 25-29 in EU28 has increased by 6% between 2014 and 2017 and has been continuing to increase over the last decade. The highest numbers of young PhD graduates per thousand population were in the UK, France and Slovakia, whereas the lowest numbers were in Latvia, Croatia and Cyprus. The number of PhD graduates (all ages, ISCED 6/8) per thousand population has also continued to increase.

The **number of new women doctoral graduates** (ISCED 6/8) per thousand population aged 25- 34 in EU28 has been increasing since 2000. The strongest performers were Germany, Denmark and the UK, whereas the lowest numbers were in Latvia, Croatia and Poland. On the other hand, the share of female researchers in the total number of researchers in EU28 remained stable between 2013 and 2016, whereas in the longer term perspective (2000-2017) this share decreased.

The **share of researchers in the private sector** in the total number of researchers has increased both in the short term (2014-2017) and in the long-term perspective (2000-2017). This share was the highest in Sweden, Netherlands, Austria, Hungary and Slovenia and lowest in Latvia, Croatia and Romania. The share of researchers in the private sector in EU28 was slightly lower than in EFTA countries and significantly lower compared to the US , China , Japan and South Korea.

European researchers are generally **satisfied with recruitment process** at home research institution - the overall indicator score in the MORE4 survey was 84% - an increase of around 7 p.p. since MORE3 survey. There were no significant differences between countries in this respect.

5.2. Working conditions

SLOWLY DECREASING PROPORTIONS OF RESEARCHERS EMPLOYED ON FIXED-TERM AND PART-TIME CONTRACTS

In 2019 around 20% of researchers in Europe were employed on **fixed-terms contracts** in their current academic position – a decrease of 6 p.p. since 2016 and a decrease of 14 p.p. since 2012. Most of the countries saw a decrease in the indicator score between the MORE3 and MORE4 surveys, except for Bulgaria, Cyprus, France, Latvia, Malta, Romania, Slovenia and Spain. According to MORE4 data, around 9% of researchers in EU28 countries were in **part-time employment** in their current academic position employment - a very slight decrease (-1 p.p.) compared to 2016 and 2012.

GAP BUT SLOWLY INCREASING GENDER EQUALITY IN CAREER PROGRESSION

In terms of the **Glass Ceiling Index** for EU female researchers, data confirms the existence of the discrepancy between male and female researcher's career progression. However, this gap has been decreasing both from the short term (2013-2016) and long-term perspective. Similarly, analysis confirmed that in 2014 the overall gender pay gap in EU28 was 17% - a small decrease of 1% since 2010.

HETEROGENEITY BETWEEN COUNTRIES WITH RESPECT TO RESEARCHERS' SATISFACTION WITH REMUNERATION, PENSION PLAN, SOCIAL SECURITY RIGHTS AND BENEFITS

The majority (70%) of researchers in EU28 countries **consider themselves well paid or paid a reasonable salary** - a slight increase of around 3 p.p. since 2016. However, there was a great heterogeneity between countries with respect to researchers' satisfaction with remuneration. The indicator scores were the highest in Luxembourg, Germany, the Netherlands, Belgium and Austria/Ireland. The indicator scores were the lowest in Greece, Slovakia, Lithuania, Estonia and Poland

Around 78% of researchers in EU28 were **satisfied with their pension plan in their current academic position** – a 5 p.p. increase since MORE3 survey. There are significant differences in this indicator score between different European countries. The highest indicator scores were observed in the Netherlands, Denmark and Luxembourg, whereas the lowest in Greece, Lithuania, Croatia, Estonia and Portugal. Similarly, around 87% of researchers in EU28 were **satisfied with their social security rights and benefits in the current academic position** – a 7 p.p. increase since MORE3 study. The highest rates were registered in Luxembourg, the Netherlands and Austria/Sweden while the lowest in Greece, Hungary and Lithuania/Cyprus.

GROWING AWARENESS OF THE IMPORTANCE OF TRANSFERRING PENSIONS/SOCIAL SECURITY AS BARRIER FOR POST-PHD MOBILITY

Around 37% of researchers in EU28 acknowledged **the importance of transferring pensions/social security as barrier for post-PhD mobility**. This constituted an increase of 18% (in the case of transferability of pensions) and an increase of 14 p.p. (in the case of transferability of social security) since 2016 when MORE3 study was conducted.

In 2019 there are 445 **HRS4R acknowledged institutions** in EU MS - an increase of 0.09 institutions per thousand researchers since 2015.

5.3. Career paths

THE IMPORTANCE OF TRANSFERABLE SKILLS IS ACKNOWLEDGED BUT THE SUPPLY OF TRAINING IN TRANSFERABLE SKILLS IS STILL LIMITED

According to MORE4 survey evidence, around 46% of researchers in EU28 countries were **receiving transferable skills** training during PhD – a decrease of more than 4 p.p. since MORE3 study. The highest rates were in Romania, Hungary, Denmark, Austria, Italy and Belgium and the lowest rates were in Bulgaria, Luxembourg, Germany, Slovenia and Poland. At the same time, a vast majority of around 86% of researchers in EU28 countries **acknowledged transferable skills as positive factors for career progression** – an increase of 6 p.p. since MORE3 survey, with no significant differences between countries in terms of the indicator scores.

GENERAL SATISFACTION WITH DIFFERENT ASPECTS OF THE CURRENT ACADEMIC POSITION

EU28 researchers were **satisfied with different aspects of the current academic position**, with an overall degree of satisfaction of 0.81 on a scale from 0 to 1, an increase of 0.04 points since MORE3. Countries with the highest performance were Slovenia, Czech Republic, Latvia, Austria, the Netherlands and Slovakia, whereas the lowest performance was in Italy, Portugal, France, Greece and Cyprus.

IMPROVING TRANSPARENCY AND MERITOCRACY OF PROFESSIONAL ADVANCEMENT IN EUROPEAN HEIS

Similarly, the majority (75%) of researchers in EU28 **considered that professional advancement in HEIs is transparent and merit-based** - an increase of around 8% since MORE3 survey. There were no significant differences between countries for this indicator, except for Portugal and Luxembourg, where researchers were less positive about meritocracy and transparency in career advancement. Female researchers were slightly less positive regarding transparency and meritocracy in career advancement.

SLOW INCREASE OF WOMEN AMONG GRADE A ACADEMIC STAFF

In terms of the career paths of female researchers, the **proportion of women as Grade A academic staff** in EU28 was 26% in 2017 – a small increase of 2 p.p. since 2014. On the other hand, the **proportion of women on boards** was 31% in 2017 – the same share as in 2014.

5.4. International mobility

STABLE RATE OF LONG-TERM MOBILITY AND DECREASING RATE OF SHORT-TERM MOBILITY

In terms of the longer-term mobility, according to MORE4 data **the share of researchers (post PhD) that have worked abroad as researcher for more than 3 months** in the last 10 years was around 27% for EU2018 countries - roughly the same share as in 2016 and around 4 p.p. less than in 2012. As in the MORE3 study, in 2019 EFTA countries have higher shares of long-term mobility than the EU28 average. Concerning short-term mobility, **the share of researchers that have worked abroad for less than 3 months in the last ten years (post PhD)** was 32% in 2019 - a 5 p.p. decrease since MORE3 study and 9 p.p. decrease since MORE2 study.

VIRTUAL MOBILITY IS TO SOME EXTENT A SUBSTITUTE FOR INTERNATIONAL MOBILITY

The share of researchers that consider **virtual mobility as a substitute for international mobility** was 69% in EU28 countries – an increase of 10 p.p. since MORE3.

INCREASING NUMBER OF INTERNATIONAL CO-PUBLICATIONS

The average **percentage of international co-publications in the EU28 corresponded to 56% of total publications in 2018**. This is an increase of around 5 p.p. since 2015 (51%). This indicator score has been gradually increasing over the last ten years. The share of international co-publications was the highest in Belgium, Croatia and Luxembourg and lowest in Poland, Romania and Latvia. The share of international co-publications in EFTA countries remain higher than EU28 average.

STABLE NUMBERS OF R1-R2 PHD DEGREE MOBILITY

Around 16% of **EU R1-R2 researchers are obtaining or have obtained a PhD in another country** than the country of their previous education giving direct access to the PhD. This is the same score as in MORE3 (16%) and similar to MORE2 (15%). The highest rates were PhD degree mobility to Hungary, Luxembourg, Ireland and Denmark, whereas the lowest performance was in Romania, Slovenia, Portugal and Lithuania. R1-R2 PhD degree mobility was significantly higher in EFTA countries compared to EU28.

5.5. Intersectoral mobility

SLIGHT DECREASE IN THE SHARE OF RESEARCHERS WITH EXPERIENCE IN THE PRIVATE SECTOR

In terms of intersectoral mobility, around 9% of EU28 R2-3-4 researchers have previously worked as **researchers in the private sector**. This is slightly fewer compared to MORE3 and MORE2. The figure was also lower (7%) for female researchers. The indicator score was the highest in Latvia, Hungary, Bulgaria, Croatia, Greece, the Netherlands and lowest in Belgium, Spain and Slovenia. The share of researchers with experience in private sector remains higher in EFTA countries, especially in Switzerland, compared to the EU.

Around 12% of R2-3-4 researchers have previously worked as **researchers in public or government sector**. At the same time only 7% of R2-3-4 researchers in EU28 have previously worked as **researchers in the private not-for-profit sector**.

5.6. Interdisciplinary mobility

EUROPEAN RESEARCHERS ACKNOWLEDGE INTERDISCIPLINARY MOBILITY IS A POSITIVE FACTOR FOR CAREER PROGRESSION

Around 76% of researchers in EU28 agree that **interdisciplinary mobility is a positive factor for career progression** in their home institution, with no significant differences between countries. This figure is very similar to MORE3 (74%).

5.7. Attractiveness of the ERA

ATTRACTIVENESS OF THE ERA REMAINS STABLE AND RELATIVELY LOW FOR ASPECTS OF RESEARCH FUNDING, SOCIAL SECURITY AND PENSION PLAN

In 2018, the proportion of **mobile PhD students (ISCED 6/8) from abroad as a share of total PhD students of the country** was 8% in EU28 - a small increase of 1 p.p. since 2014. The highest rate was found in Luxembourg,

Austria and Denmark, whereas the lowest scores were found in Lithuania, Slovenia and Poland - less than 1% of total PhD students of the country.

Around 43% of all researchers consider that **availability of research funding is better in non-EU countries than in the EU**. The share of researchers considering **social security and pension plan as better in non-EU countries than in the EU** was even smaller (30%). These figures were very similar to MORE3 survey results.

5.8. Open access

EUROPEAN RESEARCHERS PUBLISH IN OPEN ACCESS JOURNALS ALTHOUGH RECEIVE LIMITED TRAINING IN OPEN SCIENCE APPROACHES

In terms of open access in research, a large share (83%) of EU28 researchers **published in (or sent articles for review to) open access journals**, with no significant differences between countries. On the other hand, only around 19% of PhD students in EU28 countries received **training in open science approaches**. Countries with the highest indicator score included Romania, Croatia and Sweden. Countries with the lowest indicator score included Germany, Luxembourg, the Netherlands, Slovenia and Spain.

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The MORE4 study aims to update, improve and further develop the set of indicators used in previous MORE studies in order to meet the need for indicators over time and to assess the impact on researchers of policy measures introduced to develop an open labour market for researchers. This study gathers data to highlight emerging policy needs and priorities with regard to mobility patterns, career paths and the working conditions of researchers.

The study carries out two surveys: one addressed to researchers currently working in the EU (and EFTA) in higher education institutions, the other addressing researchers currently working outside Europe.

Studies and reports

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