



MORE4 study

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

Survey on researchers outside Europe

PPMI, IDEA Consult and WIFO
November 2020

*Research and
Innovation*

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

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MORE4

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1. Introduction

1.1. Objectives of the MORE4 study

The MORE 4 study, titled “Support data collection and analysis concerning mobility patterns and career paths of researchers”, is being carried out under the framework contract 30-CE-0845646/00-02 COMM/D1 - PO/2016-06/01 – Lot I –Evaluation of DG COMM”. It foresees **the updating, improvement and further development of the set of indicators** used in the MORE3 study in order to meet the need for indicators over time and to assess the impact on researchers of policy measures introduced during the implementation of the European Partnership for Researchers (EPR)¹ and to provide new indicators to meet emerging policy needs and priorities.

The main objective of the MORE4 study is defined as:

“Carrying out two major surveys and developing indicators to help monitor progress towards an open labour market for researchers”

In order to realise this overall objective, the study team will build on the previous MORE studies’ results and methodologies, the annual Researchers Reports 2012-2014, the ESF work on “New Concepts of Mobility”, the results of the survey managed by DG Education and Culture on “Research careers in Europe” and recent developments in EU policy. The MORE4 study will update, improve and further develop the existing monitoring system and indicator framework where needed, both methodologically and conceptually.

Four tasks are identified in this regard:

1. Carry out 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)
2. Carry out a survey of researchers currently working outside Europe regarding their mobility patterns, career paths and working conditions (Task 2)
3. Update the set of internationally-comparable indicators on researchers (Task 3)
4. Draft a final report that provides a comparative, policy-relevant analysis of the mobility patterns, working conditions and career paths of researchers (Task 4)

The underlying report is the fourth interim report of MORE4. It presents the final results of Task 2, the Global Survey of researchers working outside Europe.

¹ COM(2008) 317 final: Communication from the Commission to the Council and the European Parliament of 23 May 2008 “Better careers and more mobility: a European partnership for researchers”.

1.2. Scope of the Global Survey

The Global Survey focuses on mobility patterns, career paths, employment and working conditions of researchers currently working outside Europe. The topics are similar to those in the Task 1 EU HE survey, but the focus is different:

	TASK 1 EU HE SURVEY	TASK 2 GLOBAL SURVEY ²
Target region of employment	Researchers currently working IN the EU	Researchers currently working OUTSIDE the EU
Target sector ³	Researchers working in higher education institutions (HEI)	No specific sectoral focus (both researchers from higher education institutions (HEI) and other organisations can participate)
Career stage focus	Differentiates between PhD-mobility (R1) and post-PhD mobility (R2-R4)	Does not differentiate between PhD mobility (R1) and post-PhD mobility (R2-R4)*
Representative data	Provides representative data at the EU28 and country level	Does not provide representative data at the EU28 and country level

An important remark here is that this Global Survey **does not provide representative data at the level of the countries covered**. The sample was not set up to reflect the proportion of researchers currently working outside the EU. Consequently, the dataset does not provide representative data on the number of researchers and their mobility patterns from and to specific countries. Therefore, results will need to be interpreted with care and no generalisations/extrapolations can be made in this regard.

The target population of the Global Survey consists of the following subgroups (in line with the analysis in previous MORE studies⁴):

- TG1: EU researchers currently working outside the EU⁵;
- TG2: Non-EU researchers who have worked in the EU in the past;
- TG3: Non-EU researchers who have worked abroad but not in the EU;
- TG4: Non-EU researchers who have never worked abroad.

The MORE4 Global Survey was launched on the 5th of March 2020 and was closed on the 3rd of July 2020. The situation related to COVID-19 could potentially have a significant impact on researchers' views on mobility. However, the survey did not include specific questions on the impacts of COVID. Future research would need to take into account the possible impact of COVID on mobility patterns.

² Consistent with the MORE2 and MORE3 approach.

³ A broad definition of 'sector' is used here: it is based on the difference between Higher Education Institutions; private-not-for-profit organisations; public sector and government; large companies; and SMEs.

⁴ IDEA Consult et al, 2013. MORE2 - Support for continued data collection and analysis concerning mobility patterns and career paths of researchers, Extra-EU report (WP2). European Commission, DG Research and Innovation; and IDEA Consult et al, 2017. Survey on researchers outside of Europe. Annex to MORE3 study: support data collection and analysis concerning mobility patterns and career paths of researchers. European Commission, DG Research and Innovation.

⁵ EU refers to EU28 + 3 associated countries (Switzerland, Norway and Iceland).

1.3. Guide to the reader

In what follows, we first summarise the general conceptual framework of the MORE4 study in section 2. In section 3, we present the main features of the methodology and the implications for the interpretation of the results.

Sections 4 to 7 contain the results of the Global Survey in Task 2 of the study, structured according to the conceptual framework:

- Section 4: Characteristics of researchers and career paths
- Section 5: Working conditions in current position
- Section 6: Mobility and collaboration, broken down into:
 - International mobility
 - Interdisciplinary mobility
 - Intersectoral mobility
 - Collaboration
- Section 7: Attractiveness of the European Research Area (ERA)
- Section 8: Estimation of the number of EU researchers outside Europe
- Section 8: Summary of the main findings of these sections in relation to the policy context.

More details on the survey methodology and the questionnaire are provided in the Annexes, as well as additional data and tables (per chapter).

2. Conceptual framework and definitions

The conceptual framework defines and structures a set of overarching concepts that are applied consistently in the four different tasks of the MORE4 study (including the Global Survey). It is hence the basis for structuring and interpreting the findings in each of the tasks and integrating them in the final report. For reasons of consistency and comparability, the conceptual framework is also strongly based on the framework used in MORE2 (2012) and MORE3 (2016). We introduce this framework briefly in the first subsection of this chapter.

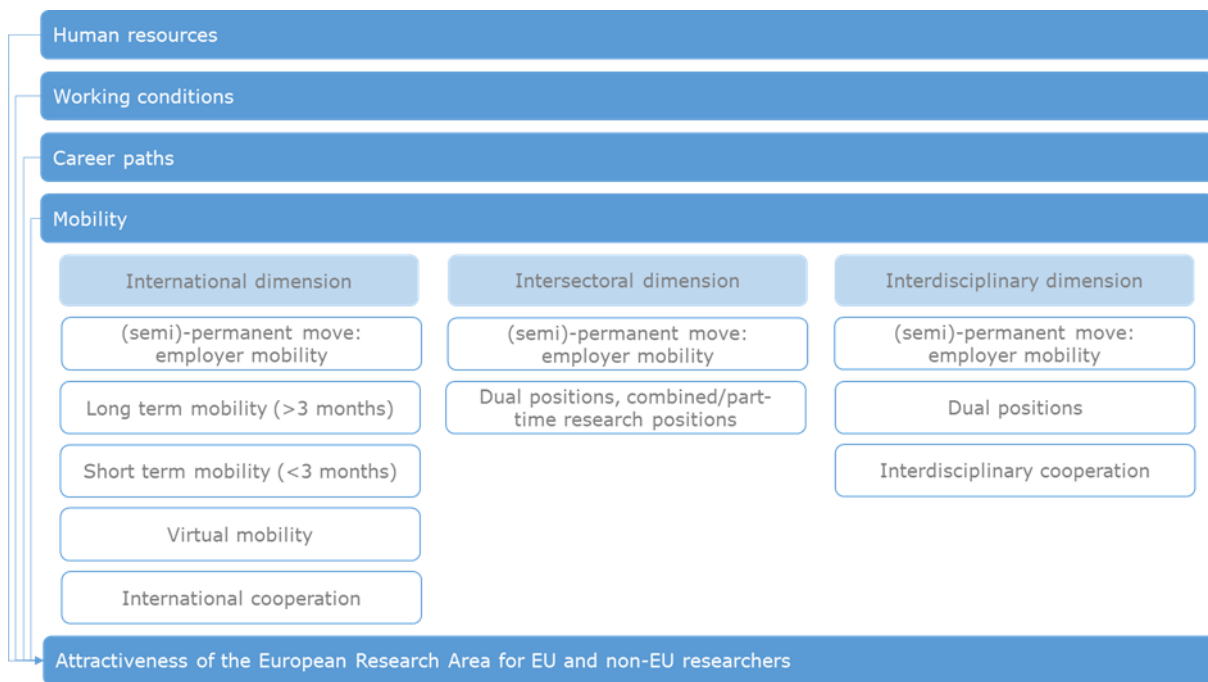
In the second subsection of this chapter, we present the definitions of the key concepts used in the study (consistently across tasks of MORE4 and with previous MORE studies): researchers, fields of science, research career stages and sectors. Furthermore, we elaborate on the key concept of mobility and how it has evolved on the basis of the findings of MORE2 and MORE3. Finally, the definition of the target groups of the survey, based on citizenship and mobility patterns, is presented.

2.1. Conceptual framework

Figure 1 shows the conceptual framework as it was developed for Task 1 of MORE4 – EU HE survey. It is based on the conceptual framework of MORE2 and MORE3. The MORE framework brings together the variables and indicators at three different levels: human resources and working conditions relate to the system and organisation level; career paths and mobility fit in the individual researcher perspective; and the attractiveness of the ERA corresponds to the system level.

In the MORE conceptual framework, human resources are the starting point, as the stock of human resources is the basis to define our population of interest. Career paths of researchers can be seen as an important element of working conditions; taken together, both are important factors which influence the various forms of mobility, e.g. taking the next career step may necessarily involve international mobility to gain access to international networks, or poor working conditions and differences in remuneration levels may drive researchers away to other countries within the same sector (e.g. the phenomenon of brain-drain) or to other sectors within the same country. Working conditions and career paths determine to a large extent the attractiveness of the European Research Area for EU and non-EU researchers, whereas different forms of mobility can *inter alia* be seen as indicators or as monitoring tools for issues relating to the relative attractiveness of working as a researcher within the ERA in general, and in specific countries in particular.

Figure 1: Conceptual framework for the MORE4 study.



Source: IDEA Consult based on previous MORE studies and literature review.

For each of the concepts (in dark blue in Figure 2) and their dimensions (in light blue), a number of key indicators are identified for data collection and analysis in (each of the tasks in) MORE4. Each of these indicators are further elaborated and detailed in the analysis sections (sections 4 to 7).

Figure 2: Framework for definition of indicators in the MORE studies.



Source: Based on previous MORE studies and literature review.

An important remark is that this Global Survey does not provide representative data at the level of the countries covered. The sample was not set up to reflect the proportion of researchers currently working outside the EU within the overall population of researchers currently working outside the EU. Therefore, the main focus of this task is on the ERA attractiveness (section 7) and on the comparative perspective between working in the EU and outside the EU.

Before turning to the analysis of the indicators, we explain in the following sections the definitions of concepts used in the indicators as well as the policy-driven developments that have an impact on the definition, scope or interpretation of the indicators.

2.2. Definitions

For the MORE4 project, we build further on the definitions used in MORE2 and MORE3 for the main concepts of the analysis:

- researchers,
- fields of science,
- career stages,
- sectors,
- mobility (and how it has evolved on the basis of the findings of MORE2 and MORE3),
- the target groups of the Global Survey, based on citizenship and mobility patterns.

2.2.1. Researchers

The same definition of a researcher has been applied in the four MORE studies to date. This definition is based on the concepts used in the Canberra Manual, covering Human Resources devoted to Science and Technology (HRST), and in the Frascati Manual, covering Research and experimental development and R&D personnel.

Definition from the Canberra Manual⁶:

- HRST: people who fulfil one or other of the following conditions:
 - Successfully completed education at the third level in an S&T field of study (HRSTE).
 - Not formally qualified as above, but employed in an S&T occupation where the above qualifications are normally required (HRSTO).

Definitions from the Frascati Manual⁷:

- Research and experimental development (R&D):
 - “Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge.”
- R&D personnel:
 - “In broad terms, R&D personnel include highly trained researchers, specialists with high levels of technical experience and training, and other supporting staff

⁶ OECD (1995), The Measurement of Scientific and Technological Activities. Manual on the Measurement of Human Resources Devoted to S&T. “Canberra Manual”, OECD, Paris. (Section 3.1.1.).

⁷ OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264239012-en>.

who contribute directly to carrying out R&D projects and activities. [...], the scope of this concept encompasses all knowledge domains.”

- “R&D personnel in a statistical unit include all persons engaged directly in R&D, whether they are employed by the statistical unit or are external contributors fully integrated into the statistical unit’s R&D activities, as well as those providing direct services for the R&D activities (such as R&D managers, administrators, technicians and clerical staff). All persons employed directly on R&D should be counted, as well as those providing direct services such as R&D managers, administrators, and clerical staff.”
- Researchers:
 - “Professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods.”
 - “For practical reasons, doctoral students engaged in R&D should be counted as researchers.”

For this study, a researcher is defined in accordance with the Frascati manual⁸ as

“professionals engaged in the conception or creation of new knowledge, conducting research and improving or developing concepts, theories, models, techniques instrumentation, software or operational methods”.

The European Charter for Researchers and Code of Conduct for the Recruitment of Researchers⁹, which are key elements in the European Union’s policy to make research an attractive career, as well as the European Commission’s communication on “Towards a European framework for research careers”¹⁰, also refer to the 2002 version of this definition of researchers.¹¹

As with the other MORE surveys, the MORE4 Global Survey included the following self-selection paragraph in the introduction. The objective was to clearly define the concept of “researcher” to the respondents and allow them to assess whether they belong to this category:

⁸ OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264239012-en>.

⁹ http://ec.europa.eu/euraxess/pdf/brochure_rights/am509774CEE_EN_E4.pdf

¹⁰ “Towards a European Framework for Research Careers” (European Commission 2011, p. 2

http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf

¹¹ In Proposed Standard Practice for Surveys on Research and Experimental Development, Frascati Manual, OECD, 2002: “Professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned.”

We specifically target “researchers” within this survey, including people:

- carrying out research OR
- supervising research OR
- improving or developing new products/processes/services OR
- supervising the improvement or development of new products/processes/services.

If you consider yourself to fall into one or more of the above categories, we kindly ask you to complete the questionnaire.

2.2.2. *Field of Science*

Fields of science (FOS) are defined according to Fields of Research and Development (FORD) classifications proposed by the OECD in the 2015 Frascati Manual¹²:

- Field 1: Natural Sciences
- Field 2: Engineering and Technology
- Field 3: Medical and health sciences
- Field 4: Agricultural and veterinary sciences
- Field 5: Social Sciences¹³
- Field 6: Humanities and the Arts

As in the other MORE surveys, these six categories can be aggregated in three categories:

- NATURAL: Field 1 (Natural Sciences) and Field 2 (Engineering and Technology)
- HEALTH: Field 3 (Medical and health sciences) and Field 4 (Agricultural and veterinary sciences)
- SOCIAL: Field 5 (Social Sciences) and Field 6 (Humanities and the Arts)

2.2.3. *Research careers*

There is a wide but diverse range of literature on the definition and typology of research careers. An overview is provided in the article ‘A conceptual framework for studying science research careers’¹⁴. According to this overview, three theoretical approaches can be identified to research careers: that of the individual agency¹⁵, of institutional and collectively produced processes¹⁶ and another approach that combines insights from the previous two¹⁷. Based on these, careers are structured in stages. Four explicit models of career stages are identified in the abovementioned article, each focusing on different defining factors such as role sets/interdependence and authority¹⁸; competences/independence and leadership (EC); positions/independence (ESF) and positions/ranks (LERU).

¹² OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/9789264239012-en>.

¹³ Including Economic Sciences.

¹⁴ Cañibano, C., Woolley, R., Iversen, E. J., Hinze, S., Hornbostel, S., & Tesch, J. (2019). A conceptual framework for studying science research careers. *The Journal of Technology Transfer*, 44(6), 1964-1992.

¹⁵ The sociological model of the institutional processes that structure research careers (Gläser 2001; Laudel and Gläser 2008).

¹⁶ Economics of sciences (Black and Stephan 2010; Fox and Stephan 2001; Sauermann and Stephan 2012; Stephan 2008).

¹⁷ The scientific and technical human capital approach (Bozeman, Dietz, and Gaughan 2001; Bozeman and Rogers 2002).

¹⁸ See Laudel & Gläser 2007.

The MORE4 study, as with its predecessors, takes the perspective of the individual researcher within academic careers and applies the EC model for career stages.¹⁹ Task 2 on the Global Survey also includes individual researchers working outside academia. The same EC model for career stages is applied for these non-academic researchers. As such, it is situated in this context in the individual agency perspective, defined by competences/independence and leadership.

The choice to apply the career stage model defined in the European Commission's communication "Towards a European Framework for Research Careers" (European Commission 2011, p. 2)²⁰ is because, with its focus on competences and leadership, it best fits the purpose of the study whilst allowing for a high degree of standardisation across different related studies.

These four career stages are (more details are provided in Annex 2):

- R1: First Stage Researcher (up to the point of PhD);
- R2: Recognised Researcher (PhD holders or equivalent who are not yet fully independent);
- R3: Established Researcher (researchers who have developed a level of independence);
- R4: Leading Researcher (researchers leading their research area or field).

As this classification is not known in formal data sources on researchers, the classification has been used by means of the self-selection of researchers in the surveys.

2.2.4. Sectors

As indicated in the introduction, the Global Survey does not solely focus on academic researchers. Due to the nature of the sampling (partly targeted towards academic researchers and an open web link available for all researchers), both academic and non-academic researchers are able to participate in the survey. The following types of organisations are considered as sectors for the purposes of this study:

- University or higher education institutions
- Public or government sector (e.g. research performing organisation)
- Private, not-for-profit sector (e.g. research foundation, NGO)
- Private industry
 - large firm
 - SME or start-up

2.2.5. Mobility of researchers

Researcher "mobility" refers to the movements researchers make during their career, which can be of varying lengths, with different goals, with different types of destinations and coming from different countries of origin.

In the subsequent MORE studies, the definitions of mobility were improved and updated as new concepts of researcher mobility developed, and policies towards mobility and the evaluation of

¹⁹ The classification describes four broad profiles that apply to all researchers, independent of where they work in the private or public sector: in companies, NGOs, research institutes, research universities or universities of applied sciences. Source: <https://euraxess.ec.europa.eu/europe/career-development/training-researchers/research-profiles-descriptors>.

²⁰http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf

researchers' achievements had to be revisited.²¹ However, the MORE4 definitions are consistent with the MORE3 definitions. In the following sections, we first resume the main definitions of (different types of) mobility and the link with motives for mobility (escape, expected and exchange mobility).

Mobility definitions

According to the Expert Group on the Research Profession,²² at least four types of mobility can be identified:

- Geographical or international mobility;
- Intersectoral mobility;
- Virtual mobility (based on tangible cross-border research collaboration);
- Mobility related to change of topics or disciplines.

In MORE1, the analysis mainly focused on “geographical” and “sectoral mobility”. As mobility could no longer be seen only in physical and geographical/international terms, “virtual mobility” was included for the first time in the MORE2 study. Mobility related to a change of topic or discipline was not explicitly included in the MORE2 study but was developed and included in MORE3 and MORE4. Consistently with the focus of the MORE3 Global Survey, the MORE4 Global Survey (Task 2) focuses on geographical mobility. Intersectoral and interdisciplinary mobility are touched upon, but virtual mobility is not surveyed.

The definitions of types of mobility are based on those formulated in MORE2 and MORE3. As described in Table 1, the definitions are structured along the dimensions of type of mobility, phase in which mobility takes place, duration and purpose of mobility. The definitions on geographical or international mobility,²³ intersectoral and interdisciplinary mobility in this table are analysed in this report in the indicated sections.

Table 1: Definitions of mobility.

		PHD MOBILITY	POST-PHD MOBILITY	
		Mobility of researchers enrolled in a PhD programme during their R1 career stage	Mobility in any of the following research career stages and, even though the terminology selected for simplicity suggests otherwise, regardless of whether or not the researcher has obtained a PhD.	
Geographical or international mobility	Moving to another country	PhD degree mobility: Mobility with the purpose of obtaining the PhD in another country	>3 month mobility: Mobility with duration of 3 months or more	Employer mobility: Mobility including a change of employer
		>3 month mobility during PhD: Mobility of three months or more during the PhD while		Mobility without employer change

²¹ New concepts of researcher mobility – a comprehensive approach including combined/part-time positions. Science Policy Briefing, ESF, April 2013.

²² “Excellence, Equality and Entrepreneurialism building sustainable research careers in the European Research Area” (2012), by the Expert Group on the Research Profession.

²³ In the Global survey, only PhD degree mobility is included.

		PHD MOBILITY	POST-PHD MOBILITY
		still obtaining the PhD in the home country	
		PhD non-mobility: Having never been mobile for PhD degree or during PhD to another country	Non-mobility: Having never been mobile to another country for >3 months at a time
			<3 month mobility: Mobility with duration of less than 3 months
Intersectoral mobility	Moving to another sector (working in non-academic sectors).		
Interdisciplinary mobility	Having switched to another (sub)field during the academic research career ²⁴		
Virtual mobility	The use of web-based or virtual technology to collaborate internationally or interdisciplinary - based on tangible cross-border or cross-domain research collaboration (Not included in MORE3 and MORE4 Global Surveys)		

Source: IDEA Consult.

Motives: escape, expected and exchange mobility

MORE2 results indicated that international mobility can be driven by push factors more than by pull factors. In some cases, the effects of mobility were even negative. To explore the explanations for these dynamics and outcomes in more detail, MORE3 and MORE4 surveys analyse international mobility from three different perspectives: escape mobility, expected mobility and exchange mobility.

- Escape mobility is the case where a researcher is ‘pushed’ away from his or her environment because of lack of funding, positions, etc. – if they want to pursue a career as a researcher, they have to change countries. The hypothesis is that this kind of forced mobility may show a different pattern of effects. Compared to the other types of mobility, the negative effects of escape mobility might be more pronounced, such as the loss of network at home or a deterioration of working conditions.
- As a second perspective, we also ask about situations where mobility may be ‘natural’ as a step in a research career, though not required. This is referred to as ‘expected mobility’.
- Finally, exchange mobility refers to the situation where a researcher chooses to move (positive motivation, self-chosen) with the aim of exchanging knowledge and work in an international network, or with the aim to use international mobility as a way to boost one’s career. The latter is expected to have more positive effects in terms of expanding a researcher’s network and improving career progression opportunities. The latter also closely relates to the concept of Open Science, where global cooperation becomes increasingly important.

²⁴ Which is to be distinguished from interdisciplinary research as such.

2.2.6. Target groups

The target population of the Global Survey consists of researchers currently working outside the EU. The following target groups are distinguished (in-line with the analysis in MORE2 and MORE3):

- TG1: EU researchers²⁵ currently working outside the EU;
EU researchers, by citizenship, who are currently mobile²⁶ (and thus working) outside the EU (i.e. the last international long-term move was outside the EU and is still ongoing).
- TG2: Non-EU researchers who have worked in the EU in the past;
Non-EU researchers, by citizenship, who have worked in the EU for more than 3 months in the past 10 years but have returned or moved to another place outside the EU afterwards (i.e. there was an international move to the EU in the past which is no longer ongoing).
- TG3: Non-EU researchers who have worked abroad but not in the EU;
Non-EU researchers, by citizenship, who have not worked in the EU in the past 10 years but who have worked in other non-EU countries than their country of citizenship.
- TG4: Non-EU researchers who have never worked abroad;
Non-EU researchers, by citizenship, who have not undertaken international long-term mobility in the past 10 years (nor to an EU country, nor to another non-EU country).

It is important to bear in mind that EU and non-EU researchers currently working in the EU have been studied through the MORE4 EU HE Survey.

²⁵ EU28 + 3 associated countries (Switzerland, Norway and Iceland).

²⁶ With mobility defined as “international mobility experience as a researcher after gaining their highest education qualifications (PhD or other)”.

3. Methodology

This section first gives an overview of country focus of the Global Survey. It then outlines the sampling and the distribution strategy and, finally, presents the survey implementation, response rate and sample composition.

3.1. Country focus

The Global Survey is directed towards researchers currently working outside the EU; it is therefore global in its outlook. The survey puts a special focus on those countries with whom the EU has an S&T agreement and those associated with the Framework Programme that are not covered by the survey under Task 1 – EU HE survey (see Table 2). Researchers who are currently working in countries that are not included in this list were not excluded from the survey, but they were not specifically targeted by the communication strategy.

Table 2: Countries with which the EU has an S&T agreement and/or associated with FP programmes.

S&T AGREEMENT²⁷	ASSOCIATED WITH H2020²⁸
Algeria	Albania
Argentina	Armenia
Australia	Bosnia and Herzegovina
Brazil	Faroe Islands
Canada	Georgia
Chili	Iceland*
China	Israel
Egypt	North Macedonia
India	Moldova
Japan	Montenegro
Korea	Norway*
Mexico	Serbia
Morocco	Switzerland*
New Zealand	Tunisia
Russia	Turkey
South Africa	Ukraine

²⁷ <http://ec.europa.eu/research/iscp/index.cfm?pg=countries>

²⁸ <https://ec.europa.eu/research/iscp/index.cfm?pg=associated>

S&T AGREEMENT ²⁷	ASSOCIATED WITH H2020 ²⁸
Tunisia	
Ukraine	
United States	

* Not part of the scope of Task 2 as these countries are included in the EU HEI survey.

Box 1: Limitations of the sampling and methodology.

As indicated, this Global Survey does not provide representative data at the level of the countries covered. This means that the dataset does not provide representative data on the number of researchers and their mobility patterns from and to specific countries. This sample does not reflect the proportion of researchers currently working outside the EU within the overall population of researchers currently working outside the EU. Therefore, results need to be interpreted with care and no generalisations/extrapolations can be made in this regard.

3.2. Sampling and distribution strategy

The sampling approach for the Global Survey is characterised as ‘convenience’ sampling (similar to the MORE2 and MORE3 Global Surveys). A multichannel approach was applied:

- Via a web-based contact collection approach, email addresses of researchers currently working outside the EU were obtained. These researchers were contacted via email, including a personalised link to the online survey (more detailed information is provided in section 0);
- Via the Euraxess Links (Officers), email addresses of researchers were obtained. These researchers were also contacted via email, including a personalised link to the online survey;
- Via an open communication strategy: A link to the Global Survey was included on the websites of MORE4 project, the European Commission and the project partners. Intermediary organisations were contacted with the request to distribute the link to the Global Survey via their own communication channels (website, newsletter, social media etc.).

Below, more details are provided on these different contacting and communication approaches (summary overview in Table 3).

Table 3: Overview of communication strategy.

COMMUNICATION STRATEGY	PANEL VERSUS NON-PANEL	FOCUS
Targeted email approach towards researchers – contacts obtained via web-based approach	“panel responses”: the researchers received an email including a personalised link to the Global Survey.	Focus on HE researchers.

COMMUNICATION STRATEGY	PANEL VERSUS NON-PANEL	FOCUS
Targeted email approach towards researchers – contacts obtained via Euraxess Links officers	“panel responses”: the researchers received an email including a personalised link to the Global Survey.	No focus on HE researchers. Euraxess is open to HE and non-HE researchers, but there is a high bias towards HE researchers.
Communication via websites, intermediary organisations, etc.	“non-panel response”: there was a non-personalised open link to the Global Survey.	No focus on HE researchers. The open approach reaches both HE and non-HE researchers.

Source: The consortium.

Email to researchers using the web-based contact collection approach

Email addresses of HE researchers (working outside Europe) were collected using a web-based contact collection approach (similar to MORE2 and MORE3):

- The first step of the method is to collect a large sample of the URLs of academics’ home pages. This is achieved through Bing advanced site-specific searches of a list of thousands of university websites for keywords like “home page”, “homepage”, “CV” or “Curriculum Vitae”. The searches are conducted twice, once for normal HTML pages and once for PDF files, since it is common to post CVs online in PDF format. These searches can be targeted at academics with particular profiles by adding appropriate keywords. For example, to target academics that have moved to the US, the searches would be run with names of prominent US universities as additional keywords. This method is imperfect as it can match conferences listed in CVs instead of previous employment histories but in previous MORE studies it had a reasonable success rate.
- The second step is to automatically download all the home pages and CVs identified from the searches and to automatically extract email addresses from them. A limitation of this step is that some academics omit or obscure their email address, but the method still gives reasonable results. The main limitation of this method is that it might under-represent universities that have a standard home page format for all their academics that does not include email addresses or that obscures their email address. In countries for which this method was insufficient (e.g. very large countries), efforts were made to extract additional email addresses from publications included in the Web of Science.

In MORE2, the main focus of this approach was on US researchers. MORE3 and MORE4 Global Surveys have a larger geographical scope (non-European countries) and therefore the strategy entailed a broader outreach (see also section 2).

Email to researchers via Euraxess Links officers

Euraxess Links is a networking tool for the community of European Researchers abroad.²⁹ As a part of the networking purpose, it also focuses on disseminating information and fostering collaboration with researchers in Europe and helping the expatriate researchers to return to Europe. Euraxess Links was launched in 2006 in the US. Now there are Euraxess links officers in North America, Japan, China,

²⁹ <https://euraxess.ec.europa.eu/>

India, Korea, ASEAN (Singapore, Malaysia, Indonesia and Thailand), Australia and New Zealand, and Latin America and Caribbean (LAC).

The contact details (email) of researchers who are connected with Euraxess Links countries were obtained through the Euraxess Links officers and the researchers received an email invitation to participate to the survey.

Open communication strategy

Aside from contacting researchers directly via email including a personalised weblink, there was also an “open” weblink to the online survey. This allowed all those interested to participate in the survey. A drawback of the approach is that the research team did not have control over who participates in the study and was not able to address/remind them personally. It was thus not possible to support or steer the response rate for specific countries through this channel. In addition, a certain self-selection bias is possible: researchers that participated in the study might present some characteristics that distinguish them from the general population. This type of bias is, however, difficult to measure in the absence of population data (i.e. the population of researchers in the world).

There are different channels through which the open weblink was distributed:

- A dedicated website on the MORE4 project with information on the context and set-up of the study was developed. The link to the online Global Survey was placed visibly on the main page of the website so that all visitors could easily access the survey. In addition, if researchers had questions on the survey or required more information on the project they could contact the project team via the designated email address: surveyGLOBAL@more-4.eu.
- The open weblink has been communicated via the EC’s own communication channels, more specifically Euraxess Worldwide website and social media accounts.
- Aiming at a broad outreach, the online Global Survey link was disseminated as widely as possible. Therefore, relevant intermediary organisations were asked to distribute the link, among which were national research funding agencies and EU Centres of Excellence across the world. The link was also shared on the company websites of the MORE4 partners.

Snowballing

In addition to the different approaches explained above, “snowballing” was also used as a source to increase the survey sample. All respondents to the survey had the opportunity to forward the survey link to other researchers (these are then included in the non-panel responses).

3.3. Survey implementation and response

3.3.1. Survey implementation

The survey was launched on the 5th of March 2020 and was closed on the 3rd of July 2020. The collected email addresses were included in the online survey tool in different batches spread over the period of the survey. The survey was composed of 85 questions and was available in English. The average time needed to complete the survey was 25 minutes and 16 seconds. More information is provided in Annex 4.

3.3.2. Response

The entire panel size (collected email addresses) consists of 312,755 people identified by the sampling method mentioned above:

- 4.2% of the emails bounced (8.3% in MORE3);
- 0.5% of the emails were refused (0.6% in MORE3);
- 13.4% opened the invitation email (12.4% in MORE3).

Table 4 provides further details of the level of response obtained in the MORE4 Global Survey. The survey has a total response of 5,542 respondents of which 2,438 were obtained from the panel and 3,104 from the non-panel approach. These figures include partial responses and responses that came from respondents that are not part of the target population. If we only consider the responses that are taken into account for the analysis – i.e. complete questionnaires coming from researchers that are part of the target population – the total number of responses reaches 3,011 respondents. Of these, 53% are obtained via the panel and 47% via the non-panel approach. These shares demonstrate that the combination of both channels has been a successful methodological choice and that both were well implemented.

Table 5 provides information on the level of response obtained in MORE3. It can be seen that the number of valid responses (i.e. complete and within the target groups) is 1.5 times higher in MORE4 than in MORE3. The main reason behind this increase is the higher level of non-panel responses obtained in 2020 thanks to a better communication strategy and the collaboration of Euraxess in the communication of the survey.

Table 4: Survey response in 2020.

	TOTAL	PANEL	NON-PANEL
Invited		312,755	
Answered	5,542	2,438	3,104
Incomplete	1,002	343	659
Not part of the target population	1,481	505	1,003
Completed questionnaires and part of the target population	3,011	1,590	1,421

Source: MORE4 Global Survey (2020).

Table 5: Survey response in 2017.

	TOTAL	PANEL	NON-PANEL
Invited		305,128	
Answered	2,876	2,659	217
Incomplete	461	411	50
Not part of the target population	475	399	76
Completed	1,940	1,849	91

Source: MORE3 Global Survey (2017).

3.3.3. *Sample composition*

Target groups

Researchers were classified ex-post in four subgroups based on the information provided in the questionnaire. An overview of the number of responses by researcher/target group is provided in Table 6 below.

A total of 3,011 complete questionnaires were collected from researchers that are part of the target population. Of these, 165 were obtained from EU researchers who have been mobile more than 10 years or who have not been mobile. To remain focused on the topics of mobility and career paths in the past ten years, these responses were not considered for further analysis (this is also consistent with the approach of the MORE2 and MORE3 Global Surveys). Therefore, a total of 2,846 responses are considered within the scope of the MORE4 Global Survey.

Table 6: Survey responses per target group (completed responses).

TARGET GROUPS		WHO WERE MOBILE FOR MORE THAN 3 MONTHS IN THE PAST TEN YEARS	WHO WERE MOBILE FOR MORE THAN 3 MONTHS BUT MORE THAN 10 YEARS AGO	WHO HAVE NEVER BEEN MOBILE	TOTAL (N)	SHARE (%)
TG1: EU researchers currently working abroad	2017	417	(81)	(132)*	630	32.5%
	2020	327	(87)	(78)*	492	16.3%
TG2: Non-EU researchers who have worked abroad in the EU in the last ten years	2017	263			263	13.6%
	2020	463			463	15.4%
TG3: Non-EU researchers who have worked abroad but not in the EU	2017	178			178	10%
	2020	271			271	9%
TG4: Non-EU researchers who have never worked abroad (or have done so more than ten years ago)	2017		211	658	869	44.8%
	2020		391	1,394	1,785	59%
Total	2017	858	292	790	1,940	
	2020	1,061	478	1,472	3,011	
Of which: Responses outside the scope	2017				213 (81+132)	
	2020				165 (87+78)	
Total sample within the scope	2017				1,727	
	2020				2,846	

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017)

*Note: There were 78 researchers currently working outside the EU, who have never been mobile, and who have an EU citizenship (132 in MORE3). These cases can refer to very diverse circumstances, e.g.:

- People with double citizenship (EU and non-EU) but who have never been to the EU (e.g. people who were born outside Europe or that moved as a child but retained EU citizenship).
- People who moved to another country to do their Master degree, these are not considered “mobile” in this study.
- Due to the heterogeneity of this group, these researchers are not considered for the analysis.

Geographical profile and comparison MORE3-MORE4

Respondents to the MORE4 Global Survey were asked to indicate their country of citizenship, residence, current employment and country where they obtained or will obtain their PhD. This information provides valuable insights into the geographical profiles of the researchers, and at the same time enables the comparison of the sample composition of the different MORE Global Surveys, which has implications for comparison of results over time.

Individual researchers: overlap between geographical variables

When we look into the overlap between the different geographical variables per individual researcher (country of citizenship, residence, current employment and country where they obtained or will obtain their PhD), this percentage of overlap is high between the different variables. Specifically, the overlap between country of current employment and country of residence is as high as in MORE3 (98%, cf. Table 7). We focus the analysis on country of current employment, country of citizenship and country of PhD (consistent with the MORE4 EU HE Survey).

Table 7: Overlap between reference countries in the MORE4 Global Survey.

	COUNTRY OF CITIZENSHIP	COUNTRY OF RESIDENCE	COUNTRY OF CURRENT EMPLOYMENT	COUNTRY OF PHD
	(n = 2,846)	(n = 2,846)	(n = 2,846)	(n 2,490) ³⁰
Country of citizenship ³¹	-	82.6%	82.2%	69.3%
Country of residence	82.6%	-	97.9%	67.5%
Country of current employment	82.2%	97.9%	-	67.0%
Country of PhD ³²	60.7%	59.0%	58.6%	-

Source: MORE4Global Survey (2020).

³⁰ 112 respondents indicated that they did not obtain a PhD or that they are currently not working on a PhD.

³¹ Double citizenship is possible (195 respondents indicated that they have dual citizenship).

³² It is possible to obtain a joint degree officially issued by two institutions located in two different countries. As such, two countries of PhD are possible.

Sample composition and weighting procedure for the comparison MORE3-MORE4

The total sample within the scope of the Global Survey consists of 327 EU citizens and 2,519 non-EU citizens (i.e. total of n= 2,846). Table 8 shows the distribution of researchers across countries of current employment and target group. The totals for MORE3 are also displayed. These figures show that the current work location of respondents in MORE4 is more diverse than in MORE3: In 2020, there were more respondents and a higher number of countries represented in the sample than in the MORE3 Global Survey (2017). This means that the quality of the data has improved in terms of a more global scope. There are, however, some differences worth noting:

- The number of Australian researchers included in the sample is much smaller in MORE4 than in MORE3 despite the increased efforts to reach to researchers in this country (i.e. more invitation emails have been sent).
- The number of Ukrainian respondents in MORE4 is much higher than in the MORE3 Global Survey. The Ukrainian government, through the Ministry of Education and Science launched a communication campaign both from the Ministry and from universities inviting researchers to fill in the MORE4 Global Survey. As a result, this group of researchers represent 21.1% of the total sample. This unusually high number of responses can jeopardize the comparability of the results across MORE studies.
 - The research team therefore analysed different alternatives to address this and it was decided to calibrate the sample in such a way that the number of Ukrainian respondents would have the same weight in the sample as the average share of respondents in the 5 non-EU countries with a higher number of respondents in MORE4.
 - This entails that, in the analyses presented in this report, Ukrainian respondents will be attributed a weight that makes them represent 6.2% of the sample (the average share of respondents across: India, Brazil, Canada, United States and Mexico), instead of 21.1%. This weighting procedure constitutes a balanced solution to ensure the comparability of the overall results of the MORE studies over time, avoiding the overrepresentation of researchers from a single country, while maintaining the information provided by these researchers in the study.
 - The total sample size after weighting is also indicated in Table 9 below, resulting in a total sample size of n=2,369 within scope and taking into account the weighting procedure.³³

³³ The small differences with the total number of weighted observations in some of the analyses presented in this report are due to rounding (e.g. when rounding the number of observations in each target group).

Table 8: Distribution of respondents by country of current employment and target group.

COUNTRY OF CURRENT EMPLOYMENT	EUROPEAN RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU	NON-EUROPEAN RESEARCHERS WHO HAVE WORKED IN THE EU IN THE PAST	NON-EUROPEAN RESEARCHERS WHO HAVE WORKED ABROAD, BUT NOT IN THE EU	NON-EUROPEAN RESEARCHERS WHO HAVE NEVER WORKED ABROAD	TOTAL IN MORE4	TOTAL IN MORE3
Ukraine	0	73	22	535	630	<10 respondents
Brazil	20	64	28	110	222	119
India	4	27	14	173	218	31
Canada	51	32	26	101	210	222
United States	56	19	13	84	172	236
China	41	32	14	45	132	30
New Zealand	28	20	12	50	110	144
Mexico	6	15	10	69	100	61
Argentina	20	21	4	52	97	38
Japan	28	10	11	34	83	69
Turkey	3	16	10	47	76	52
Chile	7	14	8	34	63	58
Malaysia	1	7	8	43	59	<10 respondents
Russia	4	5	6	43	58	53
Thailand	1	20	7	29	57	<10 respondents
Bosnia and Herzegovina	1	9	5	41	56	<10 respondents
Indonesia	2	8	5	39	54	<10 respondents
Colombia	4	13	9	26	52	81
South Africa	9	5	4	34	52	87
Vietnam	0	10	10	22	42	<10 respondents
Singapore	19	7	3	8	37	<10 respondents
Albania	0	2	0	19	21	<10 respondents

COUNTRY OF CURRENT EMPLOYMENT	EUROPEAN RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU	NON-EUROPEAN RESEARCHERS WHO HAVE WORKED IN THE EU IN THE PAST	NON-EUROPEAN RESEARCHERS WHO HAVE WORKED ABROAD, BUT NOT IN THE EU	NON-EUROPEAN RESEARCHERS WHO HAVE NEVER WORKED ABROAD	TOTAL IN MORE4	TOTAL IN MORE3
Israel	2	1	4	11	18	39
Korea, South	3	2	6	6	17	<10 respondents
Nigeria	0	1	3	12	16	<10 respondents
Philippines	2	3	1	10	16	<10 respondents
Peru	0	3	0	11	14	<10 respondents
Australia	4	0	2	6	12	297
Algeria	0	2	0	8	10	<10 respondents
Other (<10 respondents per country) 57 countries					142	110

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017)

Table 9: Survey responses per target group after weighting (completed responses).

TARGET GROUPS		WHO WERE MOBILE FOR MORE THAN 3 MONTHS IN THE PAST TEN YEARS	WHO WERE MOBILE FOR MORE THAN 3 MONTHS BUT MORE THAN 10 YEARS AGO	WHO HAVE NEVER BEEN MOBILE	TOTAL (N)	SHARE (%)
TG1: EU researchers currently working abroad	2017	417	(81)	(132)*	630	32.5%
	2020	327	(87)	(78)*	492	16.3%
	2020 (weighted**)	327	(87)	(78)*	492	19.4%
	2017	263			263	13.6%
	2020	463			463	15.4%

TARGET GROUPS		WHO WERE MOBILE FOR MORE THAN 3 MONTHS IN THE PAST TEN YEARS	WHO WERE MOBILE FOR MORE THAN 3 MONTHS BUT MORE THAN 10 YEARS AGO	WHO HAVE NEVER BEEN MOBILE	TOTAL (N)	SHARE (%)
TG2: Non-EU researchers who have worked abroad in the EU in the last ten years	2020 (weighted**)	407			407	16.1%
TG3: Non-EU researchers who have worked abroad but not in the EU	2017	178			178	10%
	2020	271			271	9%
	2020 (weighted**)	254			254	10%
TG4: Non-EU researchers who have never worked abroad (or have done so more than years ago)	2017		211	658	869	44.8%
	2020		391	1,394	1,785	59%
	2020 (weighted**)		359	1,021	1,380	54,5%
Total	2017	858	292	790	1,940	
	2020	1,061	478	1,472	3,011	
	2020 (weighted**)	989	446	1,098	2,534	
Of which: Responses outside the scope	2017				213 (81+132*)	
	2020				165 (87+78*)	
	2020 (weighted**)				165 (87+78*)	
Total sample within the scope	2017				1,727	
	2020				2,846	

TARGET GROUPS		WHO WERE MOBILE FOR MORE THAN 3 MONTHS IN THE PAST TEN YEARS	WHO WERE MOBILE FOR MORE THAN 3 MONTHS BUT MORE THAN 10 YEARS AGO	WHO HAVE NEVER BEEN MOBILE	TOTAL (N)	SHARE (%)
	2020 (weighted**)				2,369	

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017)

*Note:

There were 78 researchers currently working outside the EU, who have never been mobile, and who have an EU citizenship (132 in MORE3). These cases can refer to very diverse circumstances, e.g.:

- People with double citizenship (EU and non-EU) but who have never been to the EU (e.g. people who were born outside Europe or that moved as a child but retained EU citizenship).
- People who moved to another country to do their Master degree, these are not considered “mobile” in this study.
- Due to the heterogeneity of this group, these researchers are not considered for the analysis.

** Note: Number of respondents after the application of weights.

For the analysis of the responses in this report, countries are often clustered into 5 country groups by country of current employment of the researchers (cf. tables in Annex 5 for more detail):

- 1) non-EU OECD (including the US);
- 2) Anglo-Saxon countries (including the US);
- 3) the US separately;
- 4) the BRICS countries (Brazil, Russia, India, China and South Africa);
- 5) other non-EU and non-OECD countries.

These country groups are used in this report to analyse the differences across countries from different perspectives. These groups therefore are not mutually exclusive and there is some overlap between them. Table 10 shows which countries are considered in each group as well as the countries that are considered in more than one group.

Table 10: composition of country groups and degree of overlap between them.

		TOTAL	ANGLO-SAXON COUNTRIES	UNITED STATES	BRICS COUNTRIES	NON-EU OECD COUNTRIES
Anglo-Saxon countries	Australia, Canada, New Zealand, South Africa, United States	658		214 (US)	56 (South Africa)	602 (Australia, Canada, New Zealand)
United States	United States	214	214			214 (United States)
BRICS countries	Brazil, China, India, Russia, South Africa	699	56			
Non-EU OECD countries	Australia, Canada, Chile, Colombia, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	962	602 (Australia, Canada, New Zealand)	214 (US)		

A more precise comparison (i.e. by countries) is not possible for most countries given the too low observation numbers.

Implications for comparison over time

In the MORE4 EU HE report, a comparison was often made between the results of the MORE3 EU HE survey and the MORE4 EU HE Survey. This was possible as the results of both surveys are based on a representative sample of researchers currently working in the EU (and United Kingdom, Iceland, Switzerland and Norway).

Such a comparison between the MORE3 and MORE4 is not as accurate for the Global Survey as it is for the EU HE survey because the Global Survey is not based on a representative sample of researchers. In addition, the scope of the Global Survey has increased over time. While in the MORE2 extra-EU survey the main focus was on US researchers, the scope was broadened in MORE3 and

MORE4 with (large) countries with which the EU has an S&T agreement, ASEAN countries, as well as other Associated Countries with H2020 and FP7 being included. The composition of the sample is also different in MORE4 with respect to MORE3: the number of countries is higher in the 2020 sample and the number of researchers is more homogeneously distributed. A comparison of the geographical composition of the samples across MORE studies is provided in the table below. It shows the top five countries (of current employment) with the highest number of respondents. The figures for MORE4 include both the shares for the weighted numbers and the raw figures (i.e. without correction for the high number of Ukrainian citizens in the sample).

Table 11: Comparison with MORE2 extra-EU survey and MORE3 Global Survey.

MORE2 EXTRA-EU SURVEY RESPONSE BY COUNTRY OF CURRENT EMPLOYMENT (N=4,090)		MORE3 GLOBAL SURVEY RESPONSE BY COUNTRY OF CURRENT EMPLOYMENT (N=1,727)		MORE4 GLOBAL SURVEY RESPONSE BY COUNTRY OF CURRENT EMPLOYMENT (N=2,846) N=2,369	
United States	55.3%	Australia	17.2%	Brazil	(7.9%) 9.4%
Australia	10.9%	United States	13.7%	India	(7.6%) 9.2%
Turkey	6.7%	Canada	12.9%	Canada	(7.4%) 8.8%
Brazil	3.6%	New Zealand	8.3%	United States	(6.0%) 7.2%
Israel	2.3%	Brazil	6.9%	Ukraine	(22.1%) 6.6%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017)

Notes:

- Data in parentheses for MORE4 indicates the shares before weights are applied.

4. Characteristics of researchers and career paths

As in the MORE4 EU HE Survey, this chapter follows a sequential structure with respect to researchers' characteristics and careers, with less detail due to the more limited nature of the data gained in the Global Survey. First, this section presents the distribution of the main sociodemographic variables that are used in the different analyses presented in this report: composition of the target groups, career stage, field of science and gender.

Second, we continue with the analysis of PhD studies as the main point of entry into academic research careers. The quality and content of PhD studies are very relevant for research performance, attractiveness for foreign students and training in broader skills which open up labour market options for researchers. 78% (MORE3: 80%) of researchers in the sample have obtained a PhD and a further 12% (MORE3: 14%) are enrolled in PhD studies, allowing for a more detailed analysis of quality and content of PhD studies.

Third, another important factor in a researcher's career is recruitment, the design of which determines whether those with better training and future potential get the jobs. Recruitment conditions might play a role in mobility decisions and career planning. Thus, one central task in this section is to evaluate how researchers perceive the recruitment processes in their home institution and which factors are perceived to have positive or negative impacts for recruitment. In order to identify any differences in the perceived recruitment process, a distinction is made between various country groups.

Fourth, an analysis of career stages in relation to recruitment conditions is made together with a description of how career progression takes place. Researchers' perceptions of whether career paths are clear and transparent, and of whether career progression is based on merit is analysed. Moreover, researchers' perceptions of factors positively and negatively affecting career progression and of skills that are the driving factors to work one's way up are examined. Finally, the focus is on the researcher's confidence about the future prospects for their research career.

As these sections show, these factors determine to a certain extent the ability and predisposition of researchers to be internationally, intersectorally and interdisciplinary mobile. Therefore, this overview allows for a better understanding and contextualisation of the findings presented in the more detailed sections of this report.

Box 2: Main research questions on career paths.

- **PhD studies**
 - How are PhD studies structured (traditional master-apprenticeship studies vs. supervisory committees and doctoral schools)?
 - What are the main skills focused on in PhD studies?
- **Recruitment**
 - How do researchers perceive the recruitment process in their home institution?
 - Which factors play a role in recruitment?

- **Career progression**
 - Do researchers perceive their career progression process as clear, transparent, and merit-based?
 - Which factors play a role in career progression?
 - Which skills are perceived beneficial for career progression of researchers?
 - How confident are researchers about their future prospects for their research careers?

4.1. Sociodemographic information

Analogous to the MORE4 EU HE Survey, the MORE4 Global Survey includes questions referring to the background of the responding researchers. This section provides information about these sociodemographic characteristics of the individuals that responded to the survey, like age, gender, marital status, countries of residence and citizenship. In addition, background information on the current employment characteristics of the researchers regarding their main field of science (FOS) and their career stage are provided. In what follows, we present an overview of the key sociodemographic characteristics (see Table 12). The results for each sociodemographic variable are then described in more detail.

The distribution of these main sociodemographic variables of researchers currently working outside the EU are presented across the following four important target groups of this report.

- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have worked abroad but not in the EU
- TG4: Non-EU researchers who have never worked abroad

The attribution of researchers into these subgroups is based on their long-term mobility pattern and citizenship.³⁴ Together TG1 and TG2 constitute 31%% (MORE3: 39%) of the sample (Table 12). More than half of the responses come from non-EU researchers who have never worked abroad (TG4). Non-EU researchers who have worked abroad but not in the EU (TG3) add up to a smaller part of the sample (11%).

Of the total sample of researchers currently working outside the EU, female researchers account for 40% of the responses. The average age of all respondents is 45.8 years and the majority are living together with a partner.

According to the self-classification of respondents in terms of field of research, nearly one-fourth works in social sciences, one-fifth in natural sciences and 21% in engineering and technology. Fewer researchers work in medical sciences, humanities and agricultural sciences. Researchers were also asked to select their current career stage.³⁵ The largest share in the sample are established researchers (R3: 39%), followed by leading researchers (R4: 25%). The percentage of recognised and first stage researchers is lower (R2: 19%; R1: 16%).

Due to the sampling method – based on "convenience sampling" in the absence of a reliable sampling framework³⁶ – it is not possible to judge whether the sample is truly representative or not.³⁷

³⁴ For more details on the four subgroups (TG1 – TG4) see section 2.2.6 "Target groups based on citizenship and mobility patterns" and section 3.3.3 "Sample composition".

³⁵ For more details on the definition of the four career stages see section 2.2.3.

³⁶ A web-based method was used to collect a preferably large sample, and responses were obtained by snowballing. For an overview of the sampling approach see section 3.3 and annex 4.

³⁷ There are no global benchmark data available which would allow one to judge the representativity of the sample.

Table 12: Sociodemographic information of researchers currently working outside the EU.

CHARACTERISTICS OF RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU				
	by target group	by gender	by field of science	by current careerstage
2020 (n=2,369)	TG1: 13.8% TG2: 17.2% TG3: 10.7% TG4: 58.3%	F: 39.7% M: 60.3%	AGR: 6.9% ENG: 21.0% HUM: 11.1% MED: 12.8% NAT: 23.2% SOC: 25.1%	R1: 16.1% R2: 19.3% R3: 39.1% R4: 25.3%
2017 (n=1,727)	TG1: 24.1% TG2: 15.2% TG3: 10.3% TG4: 50.3%	F: 39.8% M: 60.2%	AGR:3.8% ENG:18.4% HUM:10.1% MED:14.8% NAT:20.4% SOC:32.5%	R1: 15.% R2: 21.5% R3: 39.1% R4: 24.4%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 2: "What is your gender" and question 8: "What is your main field of research in your current position?" and question 10: "In which career stage would you currently situate yourself?"

Researchers were also asked to indicate their country of residence, current employment and citizenship.

Country of residence: Among the 90 countries of residence named by all respondents of the sample, India, Brazil and Canada are the countries most frequently named, followed by the United States and Ukraine (see Figure 107 in annex 5). Within the group of EU researchers currently working outside the EU (TG1) the most frequently mentioned countries of residence are the United States (52) and Canada (51), followed by China (37), New Zealand (28) and Japan (27).

Country of current employment: Among the 86 countries of current employment indicated by all respondents of the sample, India, Brazil, Canada and the United States are the ones most frequently named, followed by Ukraine, China, New Zealand and Mexico (see Table 8 in section 3.3.3 and Figure 107 in annex 5). As indicated in section 3.3.3, the percentage of overlap is high between the country of current employment and country of residence (98%). Therefore, we focus the analysis on country of current employment and not on country of residence.

Country of citizenship: Among the 106 countries of citizenship³⁸ named by all respondents of the sample, again India, Brazil, Ukraine, Canada, the United States and China are those most frequently

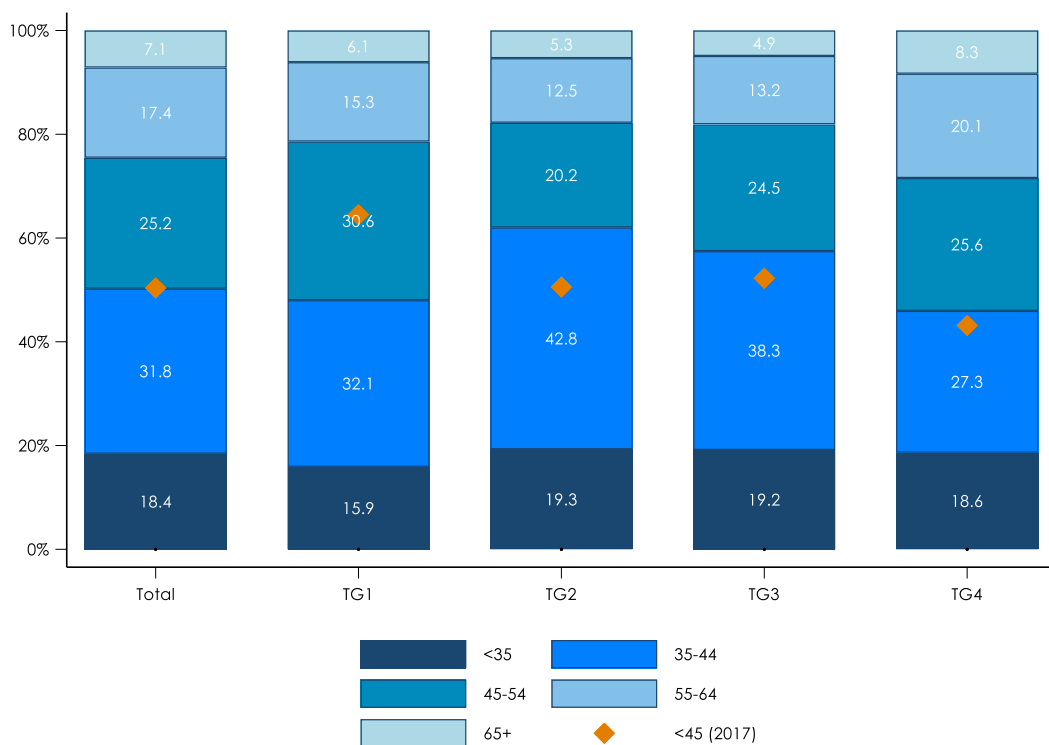
³⁸ 157 indicated that they have a double citizenship.

named (see Figure 108 in annex 5). Not surprisingly, within the group of EU researchers currently working outside the EU (TG1), many come from the largest countries: Germany (85), Italy (51), United Kingdom (41), France (39) and Spain (28). The analysis of the non-EU respondents who were mobile, but not to the EU (TG3) shows that more than one third of respondents originate from four of the countries that dominate the total sample (Brazil, Canada, Ukraine and India). Among the target group TG2 (Non-EU researchers who have worked in the EU in the past), the top 6 countries of citizenship are Ukraine, Brazil, China, Canada and India. Among TG4, the top 6 countries are Ukraine, Brazil, India, Canada, United States and China (see table 8 in section 3.3.3).

Due to the sampling strategy of this survey,³⁹ the distribution cannot be considered representative of the real proportions of the populations outside the EU.

Age structure: On average, researchers that participated in the MORE4 Global Survey are 46 years old. 18% of the total sample of researchers currently working outside the EU is younger than 35, and less than one-tenth is older than 64. The largest age group is that comprised of researchers between 35 and 44 years old (32%), followed by the 45 - 54 years olds (25%).

Figure 3: Age structure and target group.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)

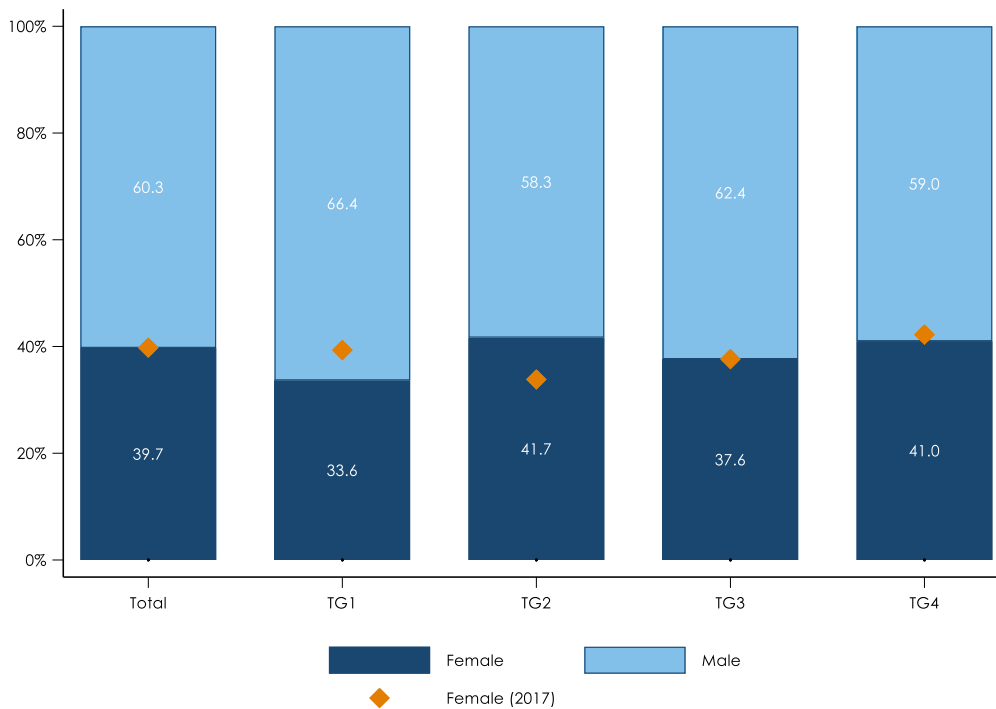
³⁹ For details see section 3.3 on the "Methodology".

- TG4: Non-EU researchers who have never worked abroad (n=1380)
- Based on question 3: "What is your year of birth"

Figure 3 shows that the age distribution differs across the target groups. The share of younger researchers is highest in the group of non-EU researchers who have worked in the EU in the past (TG2). Almost 2 out of 3 (62%) are younger than 45 years. 19% within this group were younger than 35 and another 43% were between 35 and 45. Within non-EU researchers who worked abroad but not in the EU (TG3), the share of the youngest age group (<35) also equals about 19%, but the respective share is about 6 percentage points lower for those who are 35 to 44 years old. The share of the oldest researchers is highest in TG4: about 8% of researchers who never worked abroad are at least 65 years old. Almost 1 out of 3 (31%) surveyed EU researchers who currently work abroad is between 45 and 54 years old. Compared to MORE3, the share of younger researchers (44 years old or younger) is significantly lower. In 2017, 65% of EU researchers working abroad were not older than 44. In contrast, in TG2 the share of younger researchers has increased since 2017. In particular, the age category 35-44 gained 12 percentage points in TG2.

Gender: About 40% of all researchers in the sample currently working outside the EU are female. Compared to MORE3, the aggregate results have remained stable (MORE3: 40% female researchers). Figure 4 gives an overview of the distribution by gender over the four target groups. Little differences between target groups are observed. Women are less represented in the group of EU researchers currently working outside the EU (34% in TG1 as compared to the average share of 40%). The group of researchers who has been mobile to the EU (TG2) has the highest share of female researchers (42%), although very close to the average. Overall, the share of female researchers is slightly lower in the group of mobile researchers than in the group of non-mobile researchers.

Figure 4: Female representation across target groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

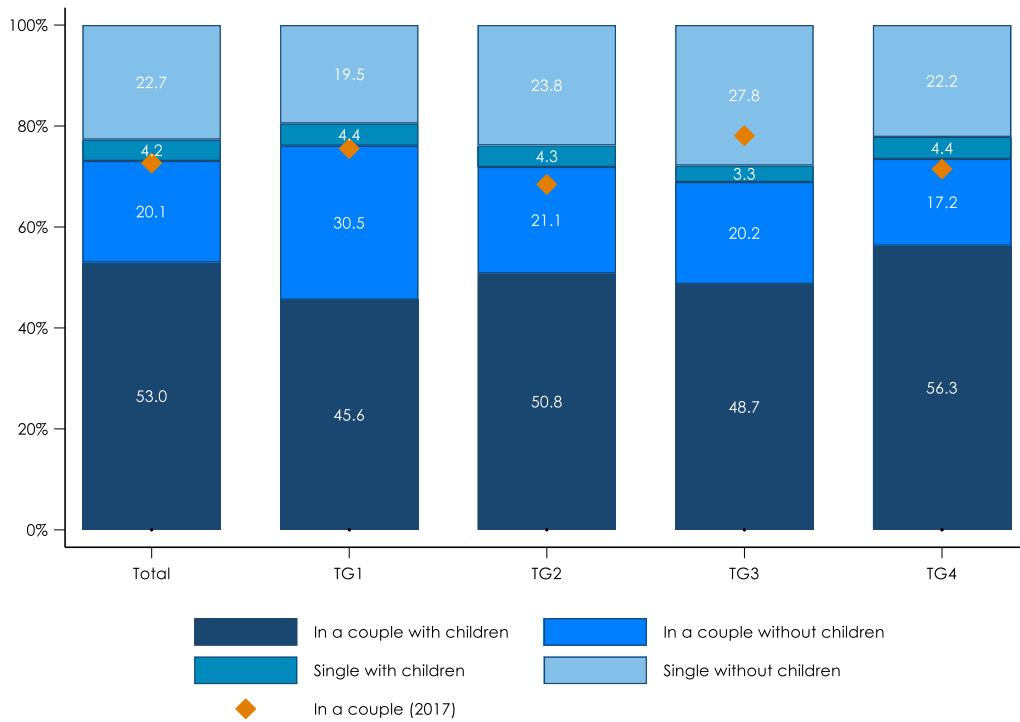
Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 2: “What is your gender”

Looking at the same information the other way round (Figure 109 in annex 5) confirms that the differences in terms of gender composition across the four target groups are only small. Among all female researchers currently working outside the EU, the subgroups of non-EU women who have never worked abroad in the past is slightly larger (TG4: 60%) than among all male researchers (TG4: 57%). Besides, the largest differences between female and male researchers (3 percentage points) is found with respect to EU-researchers currently working abroad (female: 12% TG1 researchers; male: 15% TG1 researchers).

Family composition: Researchers were asked to indicate their marital status. 6% preferred not to disclose this information. 25% (MORE3: 22%) are living as a single household (4% of the total as a single with children), whereas the majority (69%) are living with a partner. In the total sample of all researchers who answered the questions referring to their marital status, again more than one-fifth are living as singletons (Figure 5). In the remaining group of couples, nearly two-thirds have children. In terms of family status, it seems that EU researchers working outside the EU (TG1) are less likely to have children (either as a couple or as a single) compared to non-EU researchers. The lowest share of researchers living in a partnership with children is found in the group of EU researchers currently working abroad (46%), while the largest share is found in the group of non-EU researchers who have never been mobile (56%). Compared to MORE3 only small changes are observed. This pattern has remained stable compared to MORE3.

Figure 5: Marital status and target group.



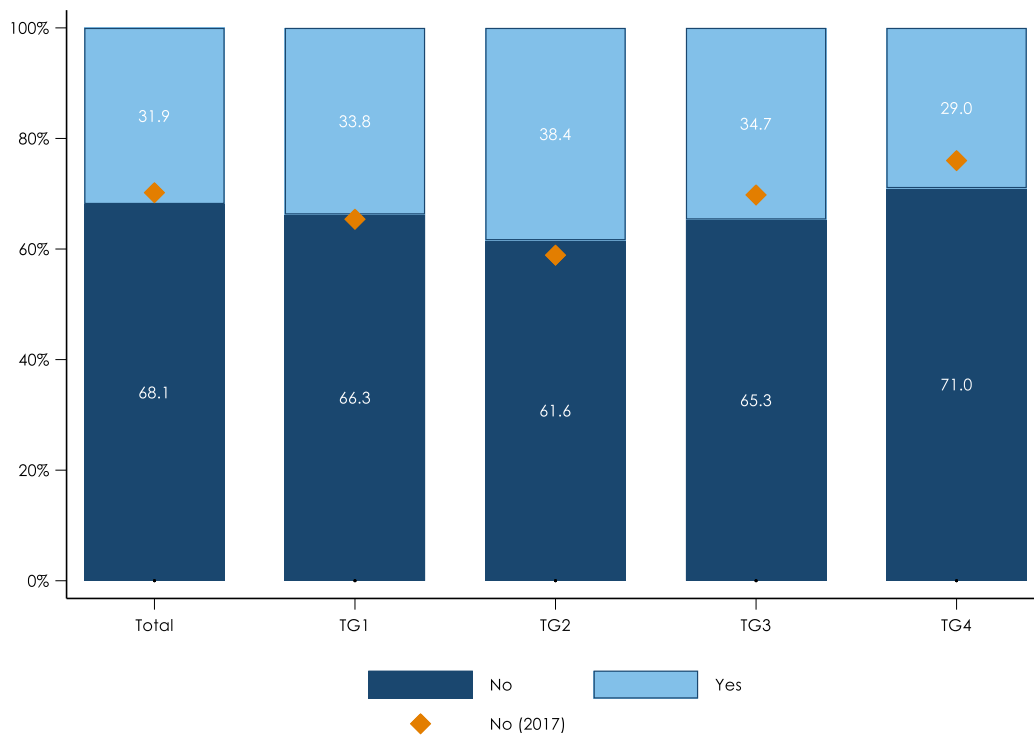
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,226, 2017: n=1,637)
- TG1: EU researchers currently working outside the EU (n=318)
- TG2: Non-EU researchers who have worked in the EU in the past (n=380)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=245)
- TG4: Non-EU researchers who have never worked abroad (n=1,283)
- Respondents who preferred not to disclose their marital status were excluded in this figure.
- Based on question 6: “What is your current status”

Partner also a researcher: Among all of those who indicated that they have a partner and that disclosed whether their partner works as a researcher, 32% (MORE3: 29%) have a researcher as partner (see Figure 6 below). In two of the mobile target groups (T1 and T2), the share of researchers living together with a researcher as a partner (T1: 34%, T2: 39%) is higher than for the non-mobile target group (T4: 29%). Since 2017, the differences between target groups have slightly diminished.

Figure 6: share of researchers whose partner also works as a researcher by target group.



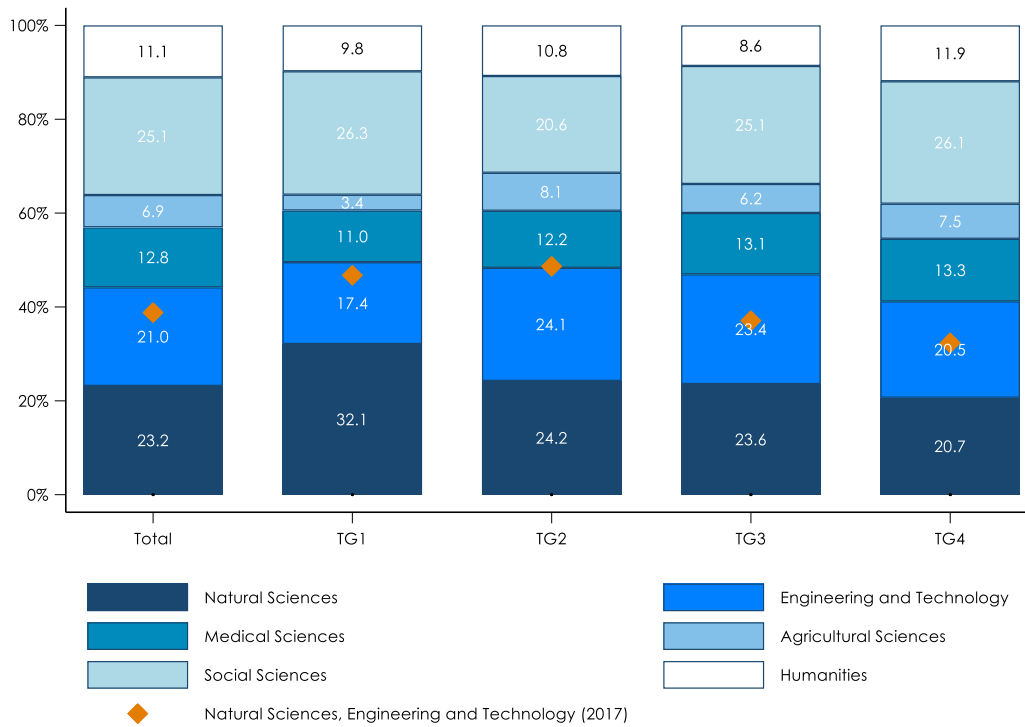
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=1,601, 2017: n=1,248)
- TG1: EU researchers currently working outside the EU (n=240)
- TG2: Non-EU researchers who have worked in the EU in the past (n=269)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=163)
- TG4: Non-EU researchers who have never worked abroad (n=929)
- Only researchers who indicated, that they are in a couple (with or without children).
- Based on question 7: "Is your partner also working as a researcher?"

Field of science: As already mentioned, the MORE4 Global Survey asked all respondents to self-select their field of science from a list of six fields proposed by the OECD (for details see section 2.2.2). Figure 7 shows the overall distribution of respondents across these fields in the first bar, the largest share of respondents corresponds to the Social Sciences (25%; MORE3: 32%), the smallest to Agricultural Sciences (7%, MORE3: 4%). Within the group of EU researchers currently working outside the EU (TG1), Natural Sciences have a prominent weight (TG1: 32%), compared to the average (23%). Overall, the pattern is similar to what was found in MORE3: mobile researchers (TG1-3) are more likely to work in Natural Sciences than non-mobile researchers (TG4). However, except for the large share of researchers in Natural Sciences in TG1, the differences between target groups are rather small.

Figure 7: Fields of science by target group.



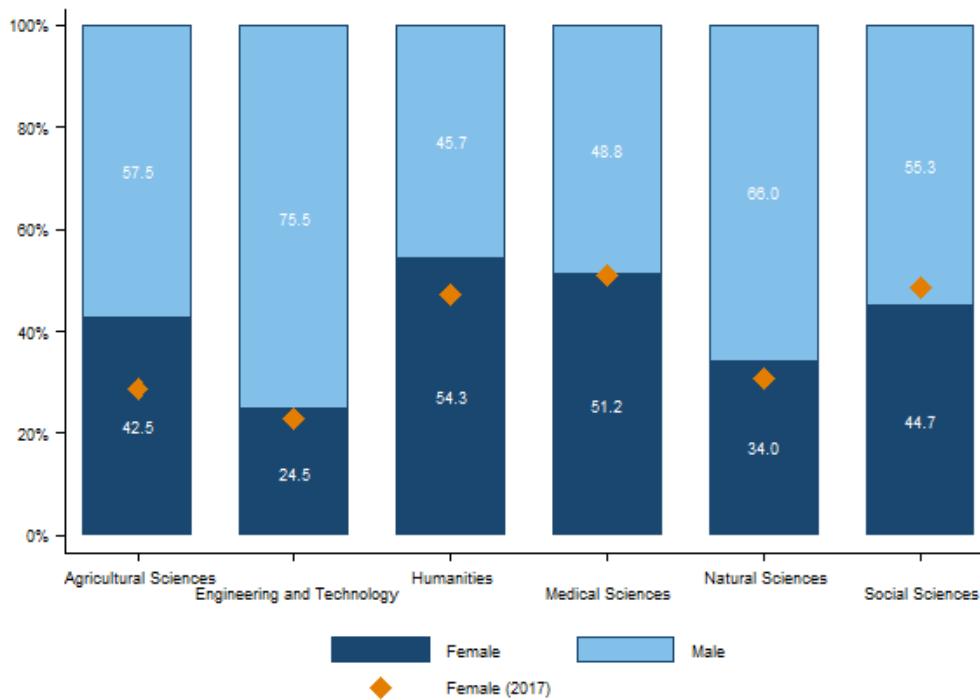
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 8: “What is your main field of research in your current position?”

Male and female researchers are not equally distributed across all fields of science (see Figure 8). The most balanced disciplines are Medical Sciences, Humanities and Social Sciences, in which 51%, 54% and 45% of the researchers are women. However, as in the EU HEI survey, the imbalance is found in Engineering and Technology (25% female) and in Natural Sciences (34%). Also, in Agricultural Sciences (43%) the presence of women is still lower by 15 percentage points. Compared to MORE3, the changes are small. Only in Agricultural Sciences has the share of female researchers increased considerably, from 29% in 2017 to 43% in 2020.

Figure 8: Differences in gender across fields of science.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 8: “What is your main field of research in your current position?” and question 2: “What is your gender?”
- (2020: n=2,369, 2017: n=1,727)

Career stage: Researchers were asked to indicate their current career stage from the following four stages: first stage researcher (R1), recognised researcher (R2), established researcher (R3) and leading researcher (R4) (section 2.2.3). Similar to MORE3, established researchers (R3) constitute the largest group (39%; MORE3: 39%). Together with the group of leading researchers (R4) (25%; MORE3: 24%) they represent nearly two-thirds of the sample. First stage researchers (R1) constitute the smallest part of the sample (16%; MORE3: 15%)⁴⁰.

Figure 110 (in annex 5) shows the distribution of researchers across career stages by country of employment.⁴¹ While in certain countries the shares of researchers in some career stages are much larger than in others (e.g. Canada), in other countries the different career stages are more comparable in size (e.g. Indonesia). This points at different patterns, from flat to pyramid distributions. The fact that large differences between countries are observed can point to different structures of higher education systems in terms of the size or the form of the “pyramid”.

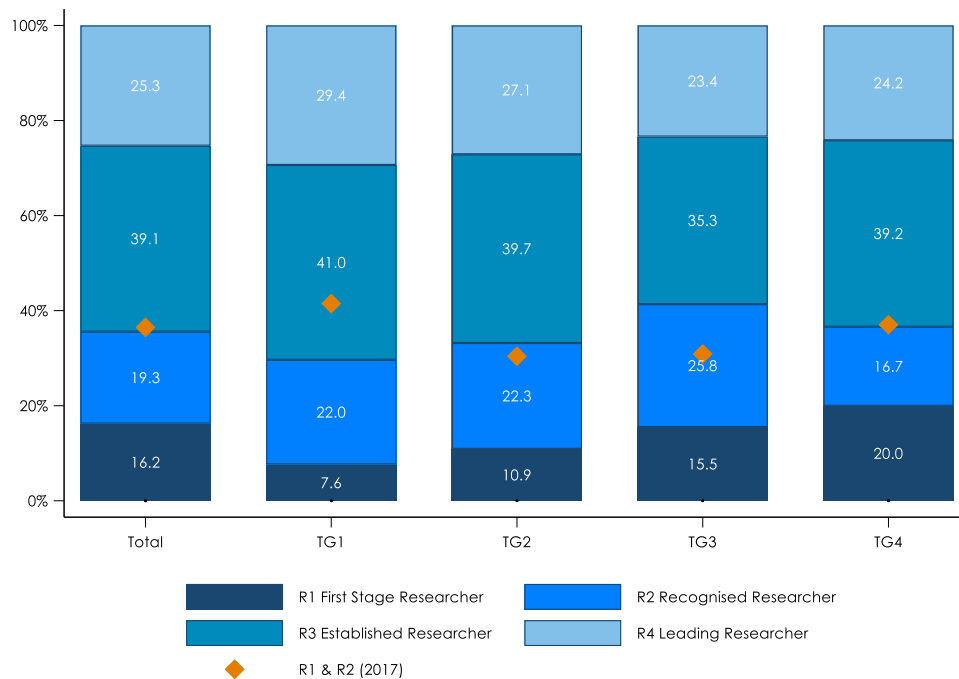
Between target groups, no large differences are observed (Figure 9). The largest variation is found between the share of first stage (12 percentage points) and recognised (9 percentage points) researchers in the total of the target groups. While the share of early researchers is especially small in the group of EU researchers currently working abroad (TG1: 8%), the respective share is larger in the group of non-EU researchers who have never worked abroad (TG4: 20%). In contrast, the shares of

⁴⁰ The majority of responses are obtained via contacts of the web-based email generation process. R1 researchers are often underrepresented via this method, as R1 researchers are overall more difficult to identify/detect at the website of higher education institutions. This is primarily because R1 researchers are not always employed at the higher education institution where they are conducting their PhD studies (e.g. sometimes they are regarded as students).

⁴¹ Only countries with n > 30 are included.

established and leading researchers are slightly larger in the group of EU researchers currently working abroad compared to the other target groups.

Figure 9: Target groups by researchers' career stages.



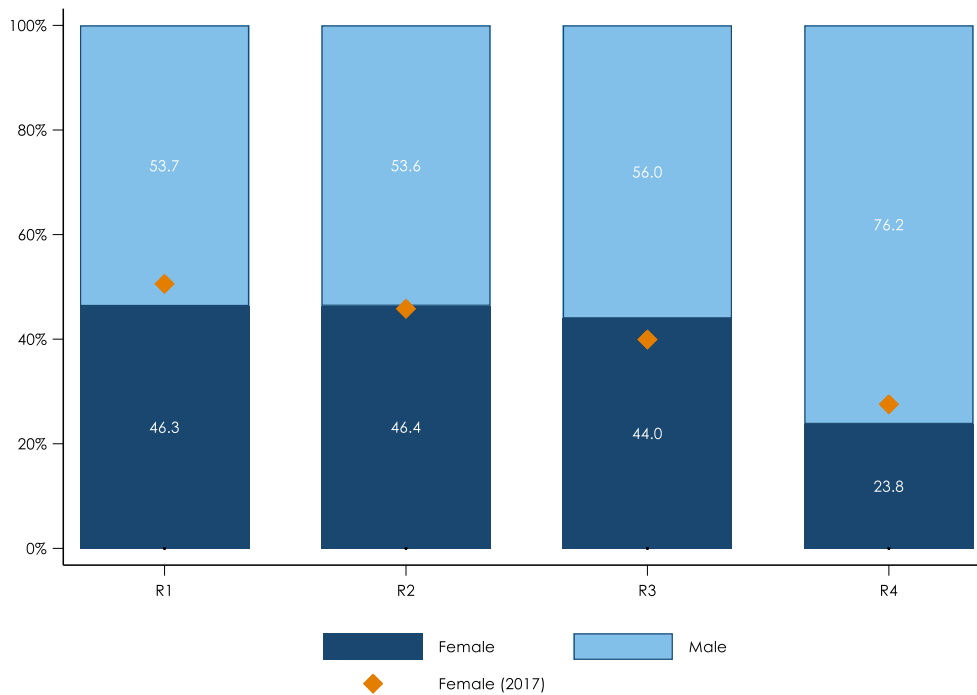
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 10: "In which career stage would you currently situate yourself?"

Similar to the result of MORE3, there is still no evidence in the results of the MORE4 Global Survey that the glass ceiling for women to reach higher career stages has been broken. Among R4 researchers, only 24% (MORE3: 28%) of the total sample are female, whereas female representation is clearly higher in lower career stages (R1: 46%, MORE3: 51%; R2: 46%, MORE3: 46%). Compared to MORE3, no substantial improvements in terms of gender balance have been observed.

Figure 10: Differences in gender across career stages.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 10: “In which career stage would you currently situate yourself?” and question 2: “What is your gender?”
- (2020: n=2,369, 2017: n=1,727)

Overall, while our sample is not representative at country level, several characteristics are roughly in line with socio-demographics observed in other studies (MORE4 HE survey) or statistics (OECD statistics on researchers). This concerns, for example, the distribution of female researchers across field of sciences (lower shares in natural sciences and engineering) and across career stages (lower shares in higher career stages).

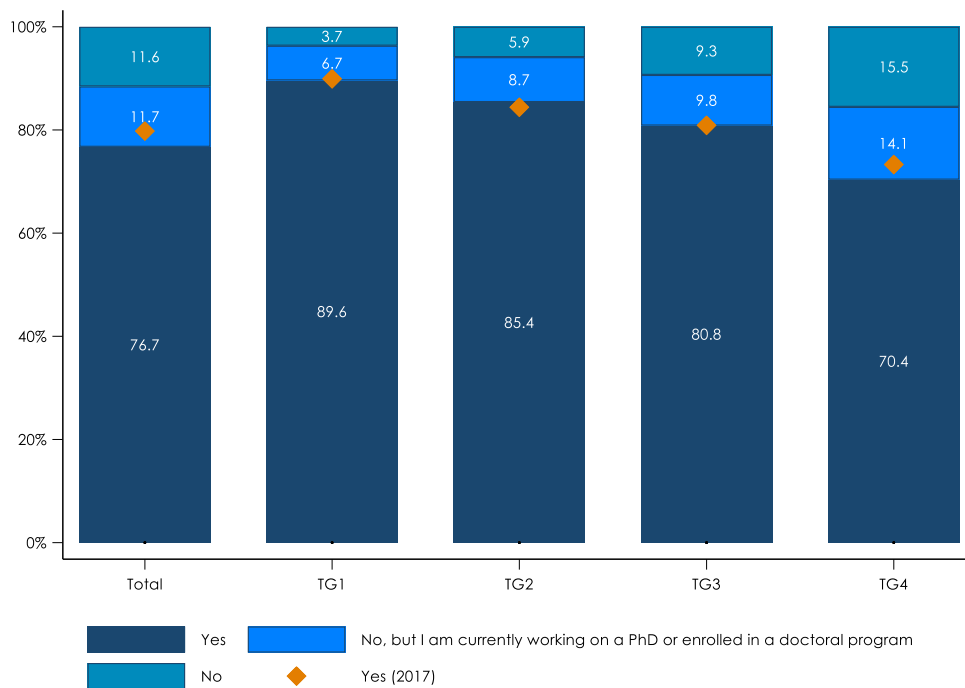
4.2. Education and training: PhD studies

The MORE4 Global Survey included questions on whether respondents obtained a PhD degree or are currently enrolled in PhD studies; on the supervision structure of the PhDs; and on the transferable skills which were part of their PhD studies. The following paragraphs presents the main findings on these aspects.

4.2.1. PhD degree or enrolment in PhD programme

Similar to the results from the MORE4 EU HE Survey, a very high share of researchers has either finished their PhD studies (77%, MORE3: 80%) or is currently enrolled in a PhD program (12%, MORE3: 14%; Figure 11). Compared to MORE3, there are only minor changes in the aggregate, but larger changes appear when differentiating between target groups. Shares of researchers having obtained a PhD and currently enrolled in PhD programs reach 90% (MORE3: 99%) in the group of EU researchers working abroad (TG1), decreasing across target groups down to 70% (MORE3: 73%) in the group of non-mobile researchers (TG4). Since the quality and structure of PhD studies play an important role for the skills of researchers, the structure of PhD studies will be analysed in the next section.

Figure 11: PhD graduation and enrolment in PhD programs by target group.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 11: "Did you obtain a PhD degree?"

Country of graduation: To get an idea about where researchers graduated or will be graduating, Figure 12 shows various country groupings, which are partly overlapping, indicated by a dashed line in the figure:

- The US is part of Anglo-Saxon and the non-EU OECD;
- Some countries of the Anglo-Saxon Group are part of the non-EU OECD (Canada, Australia, New Zealand), some are part of the EU (UK, Ireland) and South Africa is a BRICS country.

More detailed information about the country groups is provided in Table 54 in annex 5.

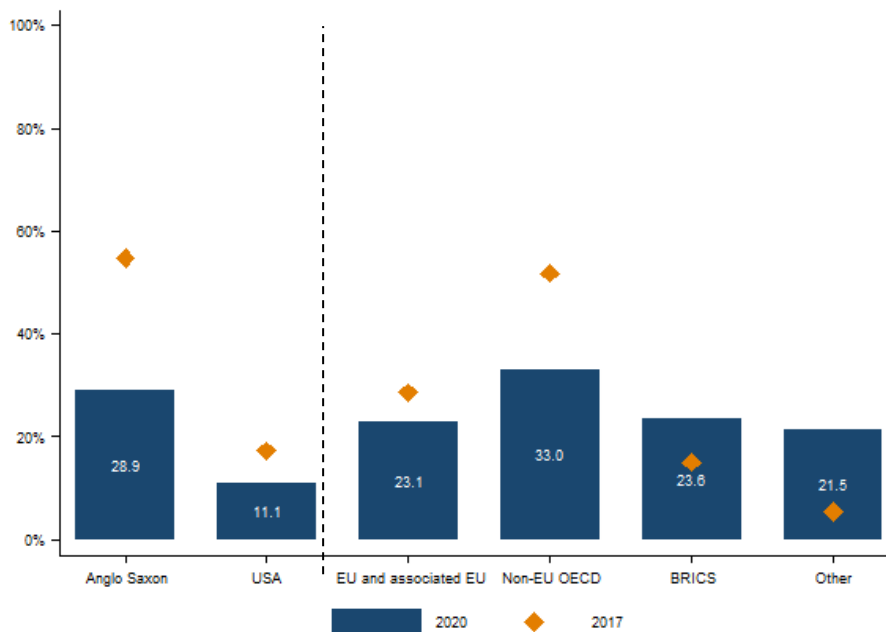
The country groups were formed because of the importance of PhD mobility in Anglo-Saxon countries, which often offer PhD studies to foreign students. The PhD programmes of these countries are often seen as prestigious.⁴² However, less than a third (29%, MORE3: 55%) of the researchers who responded to the survey obtained or will obtain their PhD from an Anglo-Saxon country. This may be due to the characteristics of the MORE4 sample compared to that of MORE3 (more information is

⁴² See Franzoni, C., G. Scellato, and P. Stephan. "Foreign Born Scientists: Mobility Patterns for Sixteen Countries". **NBER Working Paper** 18067 (2012).

provided in chapter 3). About 31% of researchers have obtained or will obtain a PhD in a country from the group 'other' countries (e.g. Ukraine, Argentina, Malaysia, Thailand) and another 26% from a BRICS country or a different country from Asia, South America or Africa. Only 19% of researchers answering the MORE4 Global Survey did or are doing their PhD in the EU or an associated country (Iceland, Norway and Switzerland).

Overall, about 31% of all respondents who have obtained or will obtain a PhD have a different citizenship to their country of graduation.

Figure 12: Country of graduation among researchers who have obtained or are enrolled in PhD studies.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- Graduations are counted twice if researchers finish(ed) their PhD in two countries belonging to two different country groups.
- The dashed line indicates that the Anglo-Saxon countries and the USA are part of the country groups in the right part of the figure (Non-EU OECD)
- (2020: n =2,095)

Target groups: Table 13 shows the differences in terms of country groups of graduation across the target groups. As expected, in target group TG1 (EU researchers currently working abroad), the share (69%) of researchers who did or will graduate in the EU or an associated country is the highest. In addition, one out of three researchers (34%) in TG1 did or will graduate in an Anglo-Saxon country.

Table 13: Country of graduation by target group.

	TOTAL	TG1	TG2	TG3	TG4
Anglo-Saxon	28.9%	33.7%	23.3%	33.4%	28.6%

	TOTAL	TG1	TG2	TG3	TG4
USA	11.1%	8.6%	7.8%	16.5%	11.8%
EU and associated EU	23.1%	69.2%	26.7%	11.3%	11.8%
Non-EU OECD	33.0%	19.4%	27.7%	46.8%	35.7%
BRICS	23.6%	6.7%	26.9%	25.1%	26.7%
Other	21.5%	6.3%	21.3%	16.8%	26.6%

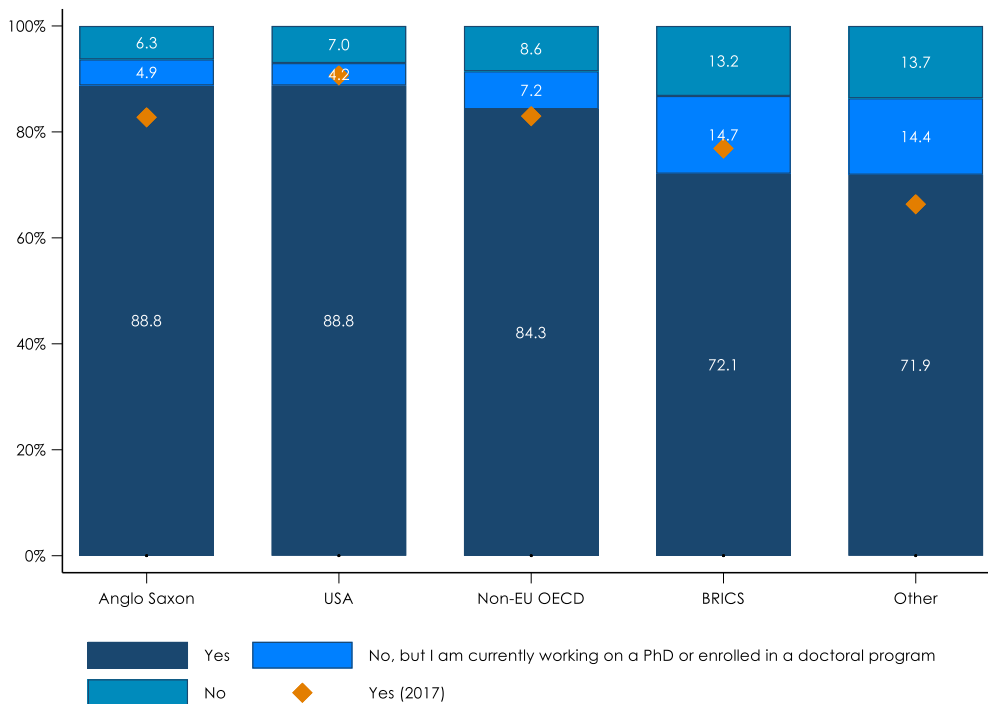
Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,095)
- TG1: EU researchers currently working outside the EU (n=315)
- TG2: Non-EU researchers who have worked in the EU in the past (n=383)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=231)
- TG4: Non-EU researchers who have never worked abroad (n=1,165)
- Based on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- Graduations are counted twice if researchers finish(ed) their PhD in two countries of two different country groups.

Country of current employment: Figure 13 shows the country of employment of researchers by their PhD status. More developed countries, such as the Anglo-Saxon countries and other non-EU OECD countries, show higher shares of PhD graduates among the researchers who responded to the MORE4 Global Survey. This indicates that, in advanced countries, a PhD is the main entry into research careers and that it would be difficult to enter research careers without a PhD. This again points to the crucial role of the quality and quantity of PhD training for attractive research systems. While this pattern has remained broadly stable since 2017, the gap between non-EU OECD countries and BRICS countries has widened, while the gap between BRICS and Other countries has diminished.

Figure 13: PhD status of researchers by country of employment.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

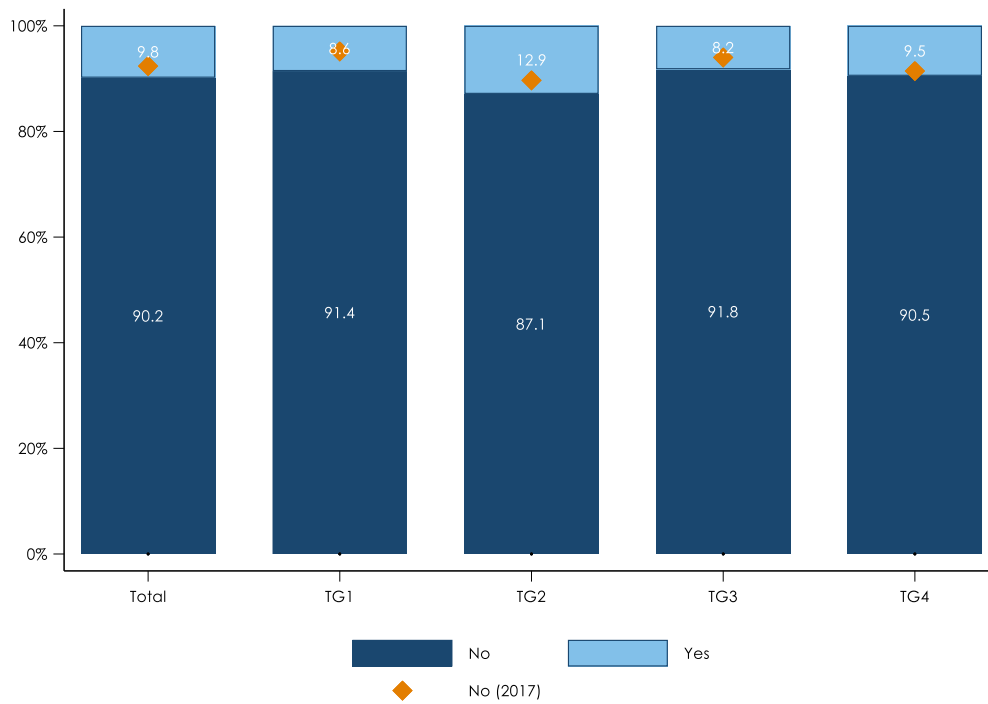
- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 11: “Did you obtain a PhD degree?” and question 20 “Country of current employment”

Analogous to MORE3, the MORE4 Global Survey also included a question on whether the PhD obtained or enrolled in is a joint degree, as defined by a degree issued by two institutions, whether in the same country or in two different countries. Overall, less than 10% of researchers did or do a joint PhD (Figure 14).

Target groups: Across target groups, Figure 14 indicates that joint degrees are a rare phenomenon, ranging from 8% among non-EU researchers who have worked abroad but not in the EU (TG3) to 13% among non-EU researchers who have been mobile to the EU (TG2).

Country of graduation: The distribution of joint degrees among researchers by country of graduation (Figure 15) seems to indicate that joint degrees are more common in emerging countries, as joint degrees in the BRICS and in other countries make up 11-16% of all joint degrees. While the questionnaire did not include specific questions on the motivations for enrolling in joint degrees, it can be speculated that it might be more attractive to combine the PhD in these countries with a degree in more developed countries usually offering more attractive higher education systems. Compared to MORE3, however, the shares of researchers who did or do a joint PhD in the EU or associate countries has increased slightly from 9 to 13%.

Figure 14: Prevalence of joint degrees across the four target groups.

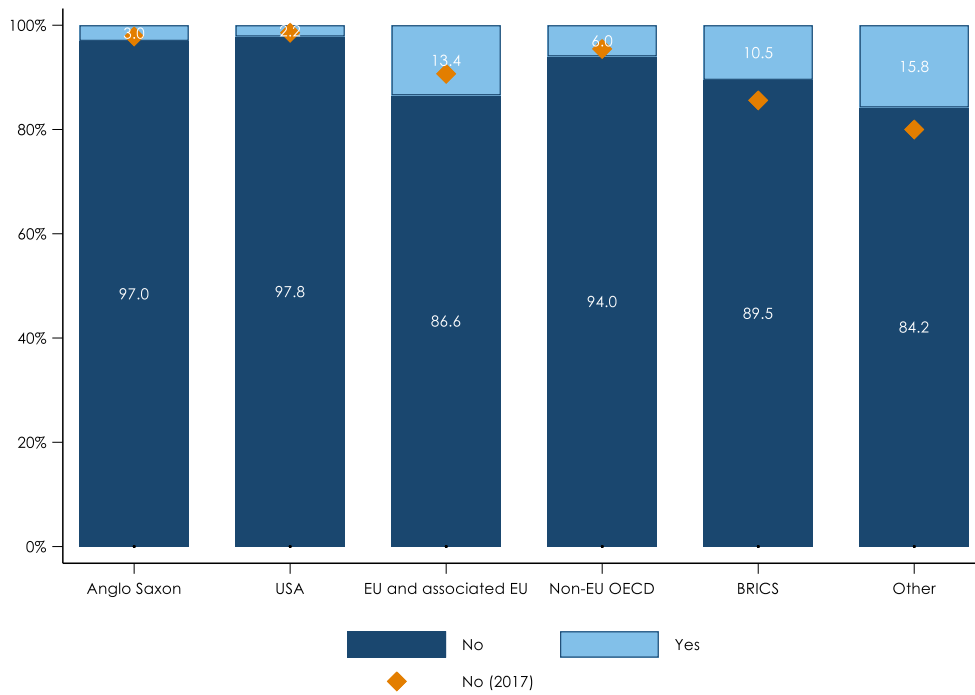


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,095, 2017: n=1,615)
- TG1: EU researchers currently working outside the EU (n=315)
- TG2: Non-EU researchers who have worked in the EU in the past (n=383)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=231)
- TG4: Non-EU researchers who have never worked abroad (n=1166)
- Based on question 12: “Is/will your PhD degree (be) a joint doctorate?”

Figure 15: Joint degrees by country of PhD graduation.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

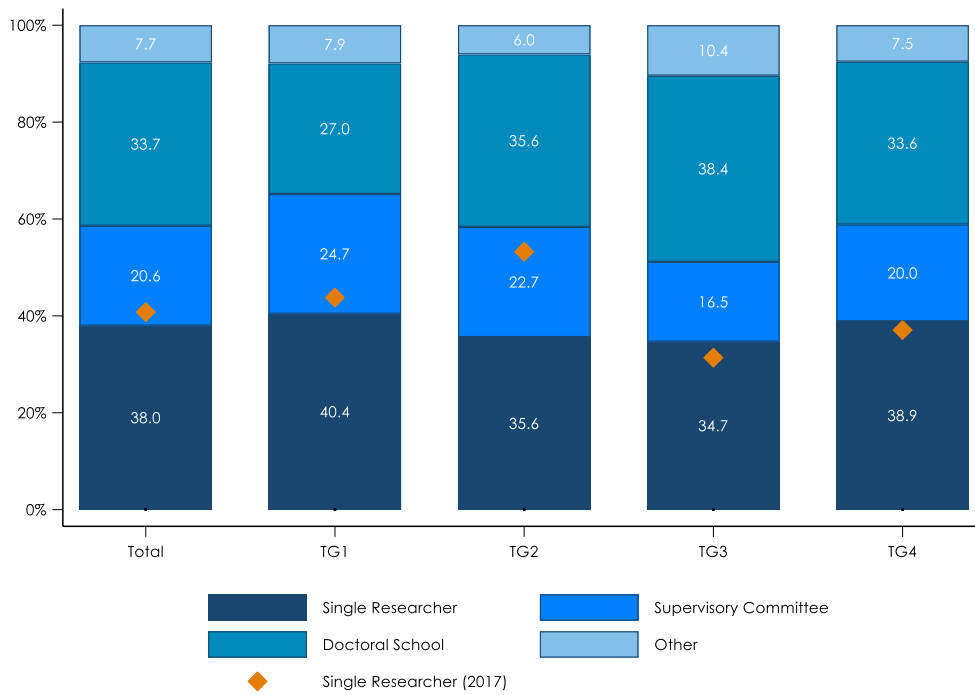
- Total: Researchers currently working outside the EU (2020: n=2,095, 2017: n=1,615)
- TG1: EU researchers currently working outside the EU (n=315)
- TG2: Non-EU researchers who have worked in the EU in the past (n=383)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=231)
- TG4: Non-EU researchers who have never worked abroad (n=1,166)
- Based on question 12: “Is/will your PhD degree (be) a joint doctorate?” and question 13: “What is/will be the country of graduation (of your PhD degree)?”

4.2.2. PhD supervision structure

PhD supervision structures are an important characteristic of the professionalisation of PhD studies, with more traditional master-apprentice studies (“PhD supervision by just one senior researcher”) struggling to impart broader skills sets to PhD graduates. A high share of researchers (38%) report that the supervision structure of their PhD has consisted or consists of a single researcher (Figure 16). The shares of this more traditional type of PhD study have decreased since 2017 though. 34% of researchers have attended or attend a doctoral school and 21% have had or have a supervisory committee.

Target groups: Figure 16 shows that more traditional PhD studies are quite frequent, ranging from just above one third (35%) in the group of non-EU researchers who were mobile, but not towards the EU (TG3), to 40% in the group of EU researchers currently working outside the EU (TG1). Broader and more structured PhD supervision structures, such as supervisory committees and doctoral schools, make up for 52% (EU researchers currently working outside the EU) to 58% of all PhD degrees or enrolments (Non-EU researchers who have worked in the EU in the past).

Figure 16: PhD supervision structures across target groups.



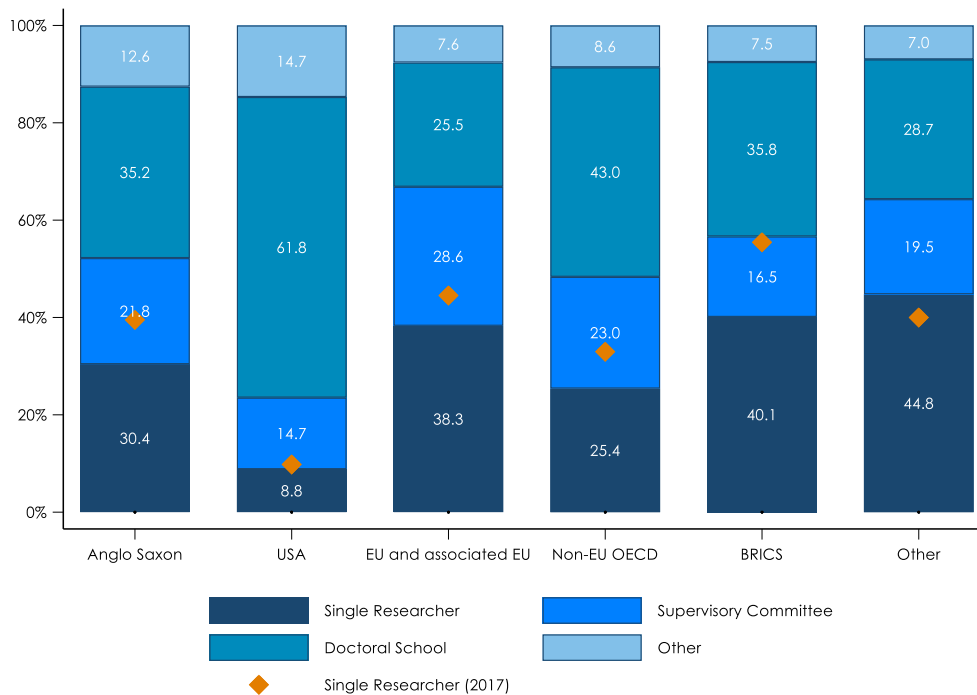
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: 675, 2017: n=564)
- TG1: EU researchers currently working outside the EU (n=89)
- TG2: Non-EU researchers who have worked in the EU in the past (n=116)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=86)
- TG4: Non-EU researchers who have never worked abroad (n=383)
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 14: "How would you describe your PhD in terms of supervision structure?"

Country of graduation: Investigating PhD supervision structures by country of graduation yields several interesting insights: 62% (MORE3: 61%) of all PhDs obtained or being undertaken in the US are embedded in doctoral schools, and a further 15% (MORE3: 22%) have taken place or take place under the umbrella of a supervisory committee, while only 9% (MORE3: 10%) correspond to the more traditional Single Researcher-PhD-model. By contrast, 45% of PhD studies in countries in the group 'other', 40% of PhD studies in BRICS countries and 38% of PhDs in the EU or associated countries correspond to the latter model. This points to the differences in the way PhD studies are organised and structured in the US and the EU, although the EU is of course very heterogeneous (see the report on the MORE4 EU HE Survey). Compared to the MORE3 Global Survey, the share of Single Researcher-PhD model has decreased by 7 percentage points.

Figure 17: PhD supervision structures by country of graduation.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

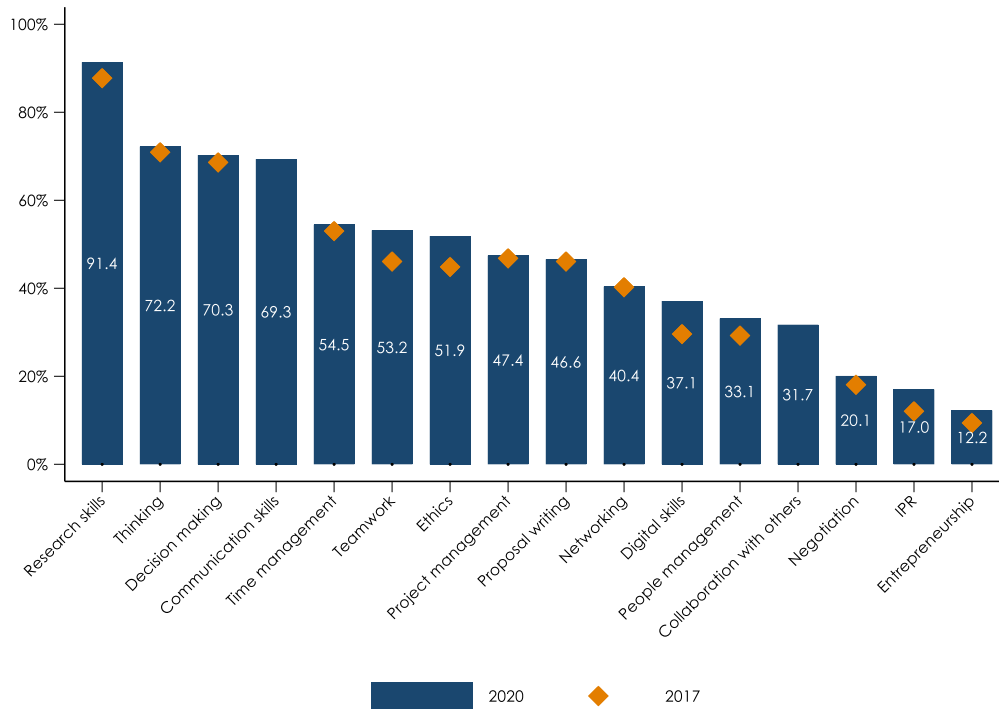
Notes:

- Total: Researchers currently working outside the EU (2020: 675, 2017: n=564)
- TG1: EU researchers currently working outside the EU (n=89)
- TG2: Non-EU researchers who have worked in the EU in the past (n=116)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=86)
- TG4: Non-EU researchers who have never worked abroad (n=383)
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 14: “How would you describe your PhD in terms of supervision structure?” and on question 13: “What is/will be the country of graduation (of your PhD degree)?”

4.2.3. PhD training – transferable skills

An important aspect of PhD studies is their ability to provide training for young scientists in transferable skills such as research skills, people and project management. This broadens the labour market options for researchers. On average, 96% (MORE3: 93%) of researchers respond that they have received some form of training in transferable skills during their doctorate. The transferable skills researchers received during PhD studies are predominantly related to skills necessary for research activities themselves, such as research skills (91%, MORE3: 88%) or skills related to creative thinking, decision making and communication (69-72%). More general work management-related skills, such as time management and the ability to work in teams, but also ethics come somewhat behind (between 52% to 54%). Skills related to engaging with other areas of society and business, such as collaboration with citizens, entrepreneurship or intellectual property rights, are least frequently received by the researchers in our sample. This pattern is in line with the MORE3 Global Survey, but also in line with the MORE4 EU HE Survey.

Figure 18: Prevalence of training in transferable skills by type of transferable skills, across all target groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: 675, 2017: n=564)
- TG1: EU researchers currently working outside the EU (n=89)
- TG2: Non-EU researchers who have worked in the EU in the past (n=116)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=86)
- TG4: Non-EU researchers who have never worked abroad (n=383)
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 15: “Please indicate below the training modules in transferable skills that you have received during your doctorate”

Country of graduation: There are interesting variations across the country groups examined. The largest difference between country groups (33 percentage points) can be found in terms of grant and proposal writing: in the US, the majority of researchers (65%) have gathered transferable skills in proposal writing during their PhD, while only 32% of researchers who graduated or will graduate in the EU or an associated country agree. Similarly, communication and presentation skills are near omnipresent in US PhDs (85%), while they reach only 59% among researchers having graduated in the EU (and currently working outside Europe). A similar gap between the US and the EU (incl. associated countries) can be seen for project and people management (difference of 23 and 19 percentage points) and critical thinking (difference of 19 percentage points). Again, the structural differences between doctoral training in the US and in the EU must be pointed out. In the US, structured PhD training in the form of doctoral schools can more easily address transferable skills than PhD training in the form of master-apprentice relationships which is more prevalent in the EU. The results should hence not be taken as a sign that these skills are valued less in the EU, but that their teaching in addition to progress in the PhD topic itself is more difficult in such contexts.

Respondents who have graduated in the US are also more likely to have received training in research skills (US: 100%) than researchers who now work abroad but have graduated in the EU (85%). The same holds true of digital skills (US: 41%, EU: 30%), while, interestingly, negotiation and collaboration with other researchers are skills mostly taught in PhD studies of other Anglo-Saxon and BRICS countries. Respondents are less likely to have received training in ethics in the EU (41%) than in BRICS countries (62%).

Table 14: Transferable skills received by country group of graduation.

	ANGLO-SAXON	US	EU AND ASSOC. EU	NON-EU OECD	BRICS	OTHER
Research skills	93.1%	100.0%	84.6%	93.5%	94.0%	90.3%
Digital skills	38.6%	41.2%	30.3%	33.3%	39.6%	40.8%
Thinking	77.2%	88.2%	69.0%	75.2%	76.9%	66.8%
Decision making	70.4%	61.8%	62.3%	71.2%	78.9%	66.2%
Proposal writing	53.7%	64.7%	32.2%	51.1%	56.1%	42.1%
Entrepreneurship	10.9%	11.8%	10.9%	11.5%	12.7%	12.6%
Teamwork	59.5%	58.8%	45.1%	56.2%	61.8%	47.2%
Time management	64.6%	58.8%	53.1%	59.7%	53.4%	50.4%
People management	44.4%	41.2%	22.3%	37.9%	40.1%	28.0%
Project management	57.0%	61.8%	38.3%	55.7%	54.6%	38.7%
Networking	54.5%	52.9%	38.3%	44.8%	45.6%	31.9%
Negotiation	25.2%	14.7%	14.9%	20.7%	24.2%	19.6%
IPR	10.9%	2.9%	9.1%	12.1%	20.2%	22.7%
Communication skills	79.7%	85.3%	59.2%	75.2%	74.9%	63.3%
Collaboration with others	34.6%	23.5%	23.2%	28.8%	38.2%	33.4%
Ethics	53.7%	50.0%	40.8%	54.5%	62.4%	46.5%

Source: MORE4 Global Survey (2020).

Notes:

- Only R1 PhD candidates and R2 PhD holders.
- Based on question 15: "Please indicate below the training modules in transferable skills that you have received during your doctorate" and on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- (n=675)

4.3. Recruitment

Recruitment policies are an important tool to shape universities' and other research institutions' current and future research orientation and, of course, they directly affect researchers' career perspectives and perceptions of the attractiveness of research jobs. The MORE4 Global Survey included similar questions on recruitment as the MORE4 EU HE Survey. Questions were asked on how recruitment is perceived, for instance with respect to minority groups, administrative burdens or language barriers. Compared to the MORE3 Global Survey, the answer categories have been expanded to provide a more differentiated picture of the recruitment process in MORE4. Thus, a direct comparison of these question with researchers' answers in 2017 is not possible. Moreover, researchers were asked which factors are perceived to have positive or negative impacts for recruitment in the researchers' home institutions.

4.3.1. Researchers' perception of the recruitment process

Overall, the majority of researchers who participated in the MORE4 Global Survey agreed that the levels of qualifications and competencies required are in line with the needs of the position (76%), that job advertisements include clear and detailed information on the required competencies, duties, and working and career development conditions (69%), and that there is a specific procedure to deal with complaints made by applicants who believe that they have been treated in a negligent way, unfairly or incorrectly (58%) (Figure 19). In addition, more than 50% of researchers agree that there are measures to foster the representation of underrepresented groups (57%), that the administrative burden for candidates is kept to a minimum (54%), and that the selection process includes feedback to all candidates about their strengths and weaknesses (53%). However, less than 50% of researchers agree that a lack of knowledge of national language is not a barrier for candidates (49%) and that the whole selection process is clear and transparent (40%).

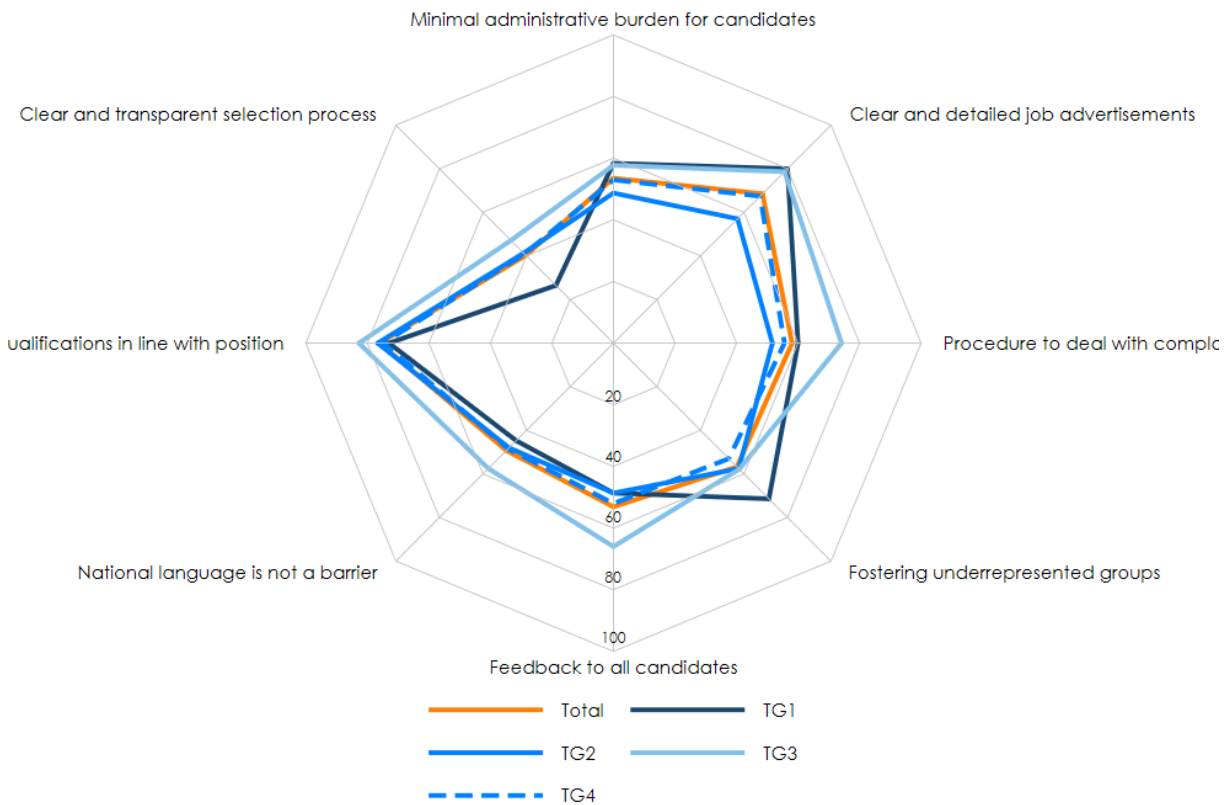
Target groups: With the exception of measures to foster representation of underrepresented groups, the highest shares of researchers satisfied with the recruitment process are among mobile non-EU researchers who have not worked in the EU, but in other non-EU countries (TG3). However, some variation across different target groups can be observed (see Figure 19).

The largest differences between target groups can be found regarding researchers' views on the existence of clear and detailed job advertisements, the procedures on how to deal with complaints and on whether selection processes are clear and transparent. While the share of EU researchers currently working outside the EU agreeing that job advertisements include clear and detailed information on the required competencies, duties, and working and career development conditions is rather high (80% of TG1), only 57% of non-EU researchers who have worked in the EU in the past (TG2) agree. 74% of the mobile non-EU researchers who have not worked in the EU, but in other non-EU countries (TG3) agree that there are specific procedures to deal with complaints made by applicants who believe that they have been treated negligently, unfairly or incorrectly, compared to only one out of two (52%) TG2 researchers. Interestingly, the lowest share of researchers agreeing that clear and transparent information on the whole selection process is available is found in the group of EU researchers currently working outside the EU: only one in four (26%) researchers in TG1 think that selection processes are transparent.

While two thirds of researchers in the group of mobile non-EU researchers who have not worked in the EU (66% of TG3 researchers) think that the selection process includes feedback to all candidates about their strengths and weaknesses, only roughly one out of two researchers in the other target groups (49%-53%) agree. Similarly, when looking into researchers' perceptions on the extent to which recruitment processes foster underrepresented groups, the group of EU researchers currently working

outside the EU deviates from the other groups: 71% of TG1 researchers agree that there are measures to foster representation of underrepresented groups. In the other target groups, the respective shares are considerably lower and range between 53% and 58%.

Figure 19: Researchers' perception of recruitment processes in their home institution, by target groups.



Source: MORE4 Global Survey (2020).

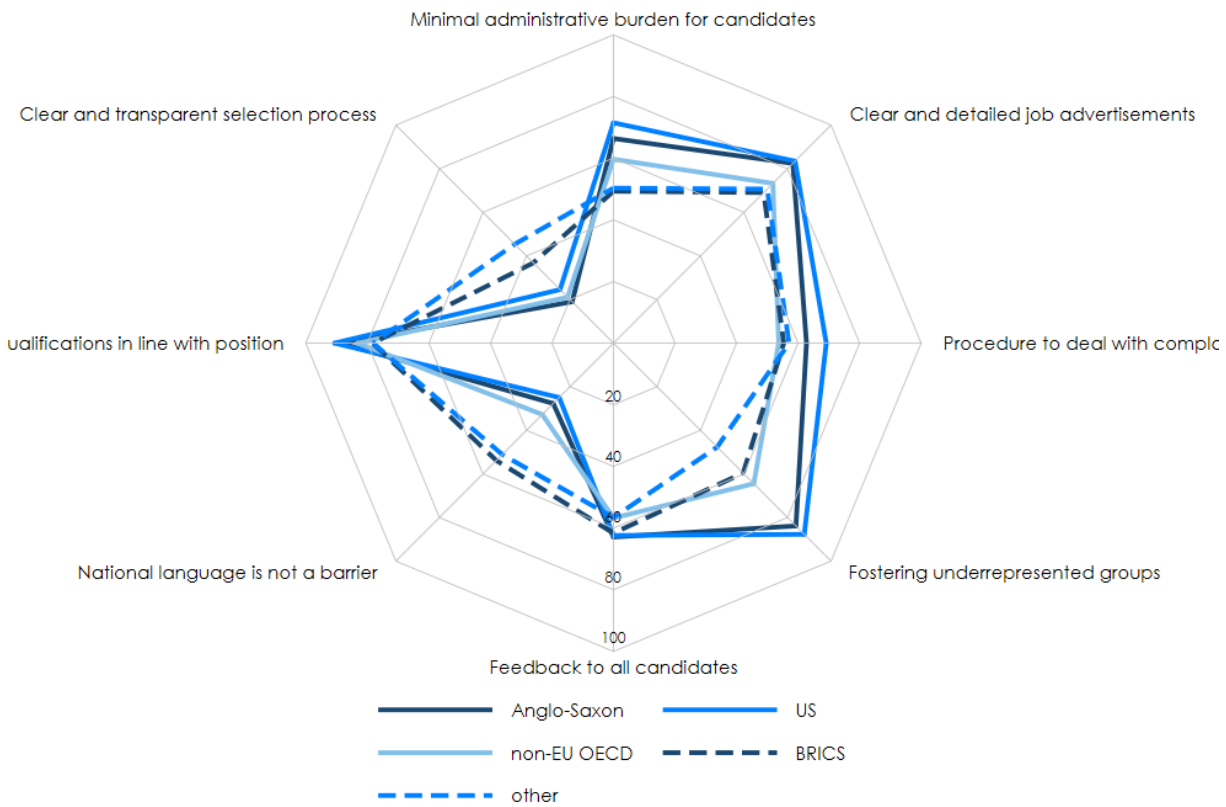
Notes:

- Total: Researchers currently working outside the EU
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries
- TG4: Non-EU researchers who have never worked abroad
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to recruitment in their home institution.
- Based on question 29: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=1,383-1,664)

Country of employment: Overall, the shares of researchers satisfied with the different factors of recruitment are the highest among researchers employed in the US. Two exceptions are noteworthy: the share of researchers employed in the US is at the lower end in case of language barriers and clear and transparent selection processes. The biggest difference between country groups of employment appears in terms of measures to foster representation of underrepresented groups (gap of 40 percentage points). The vast majority of researchers employed in the US (88%) but also in the Anglo-Saxon country group (84%) agree that there are measures to foster the representation of

underrepresented groups (Figure 20). In contrast, only 48% of researchers employed in the group of 'other' countries agree. Vice versa, while more than half of the researchers (54%) employed in the BRICS countries think that the lack of knowledge of a national language is not a barrier, the share of researchers employed in the US that do agree is not even half as large (25%).

Figure 20: Researchers' perception of recruitment processes in their home institution, by country groups.



Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to recruitment in their home institution.
- Based on question 29: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=1,383-1,664)

Contract type: Researchers' perceptions of recruitment processes in their home institution can also depend on the type of contract they have. Perceptions of researchers with permanent contracts deviate from those of researchers that are still struggling with fixed-term contracts regarding the level of transparency and merit-based recruitment. For instance, the biggest differences between contract types in researchers' perceptions of recruitment appear in terms of competencies: While 82% of researchers with permanent or open-ended contracts think that the levels of qualifications and competencies required are in line with the needs of the position, only about 74% of researchers with no contract or who are self-employed agree. In contrast, 54% of researchers with no contract or who are self-employed think that the lack of knowing the national language is not a barrier. For those with permanent contracts only 42% agree. However, in terms of clear and transparent selection processes, the share of researchers with fixed term contracts is highest (38%) and lowest for those with

permanent or open-ended contract (30%). Fostering underrepresented groups and procedures to deal with complaints are most often perceived as in place at their home institution within the group of permanently or open-ended employed researchers (60% and 57% respectively).

Table 15: Researchers’ perception of recruitment processes in their home institution by types of contract.

	PERMANENT/OPEN-ENDED CONTRACT	FIXED TERM CONTRACT	NO CONTRACT OR SELF-EMPLOYED
Clear and detailed job advertisements	72.7%	67.8%	68.7%
Qualifications in line with position	82.0%	77.7%	73.9%
Lack of Knowledge of national language is no barrier	41.6%	46.3%	53.8%
Fostering underrepresented groups	60.0%	53.0%	64.1%
Feedback to all candidates	59.5%	52.8%	55.2%
Minimal administrative burden for candidates	53.4%	55.2%	56.0%
Clear and transparent selection process	29.7%	38.2%	34.0%
Procedure to deal with complaints	57.0%	50.2%	48.8%

Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to recruitment in their home institution.
- Based on question 29 “What is your opinion on the recruitment process in your home institution?” and question 21 “Type of contract”.
- (n=1,329-1,594)

4.3.2. Factors for recruitment

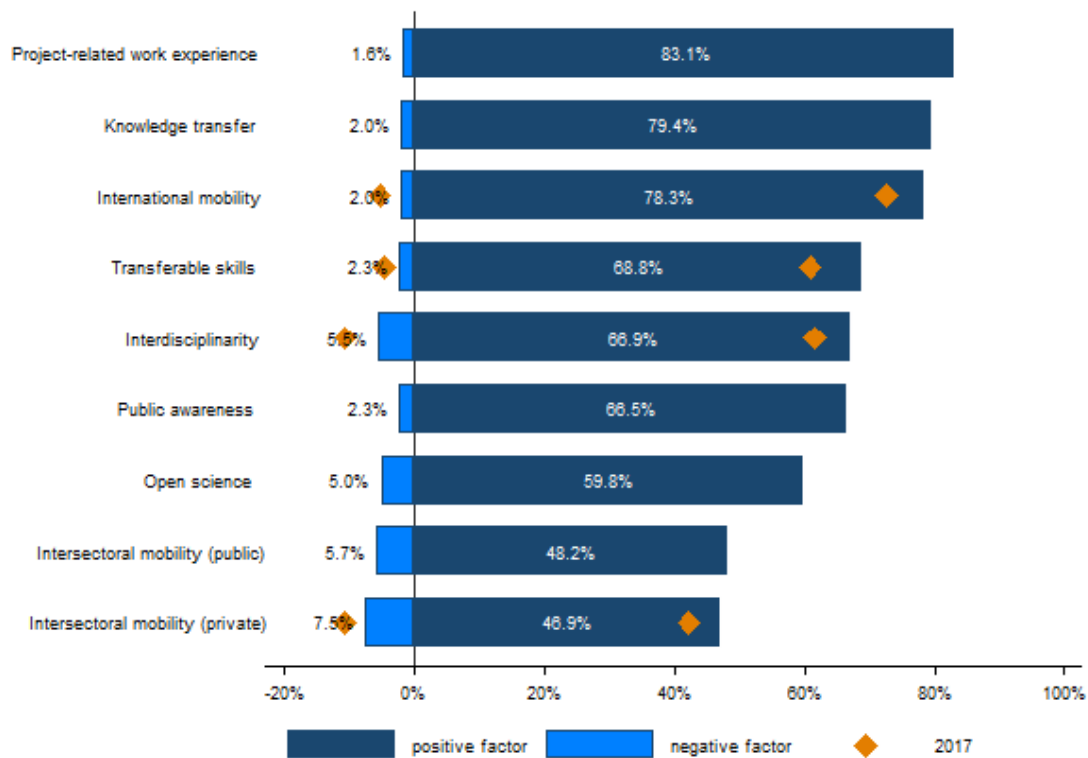
Similar to the MORE4 EU HE Survey, the MORE4 Global Survey included questions on how open access publications, public awareness activities, project-work experience, knowledge transfer, transferable skills and mobility experiences affect recruitment in their home institution. Overall, three different types of mobility experiences are considered as factors that could have an impact on recruitment: international, intersectoral (to the private industry or to the not-for-profit, public or government sector) and interdisciplinary mobility experiences (or interdisciplinary research approaches). In contrast to the MORE3 Global Survey, the MORE4 Global Survey questionnaire considered more factors that might affect recruitment. Thus, a direct comparison with results from MORE3 is not always possible.

Interestingly, intersectoral mobility is not considered as an important factor for recruitment, with two other forms of mobility (international and interdisciplinary mobility) being perceived as much more important for recruitment for the majority of researchers in the MORE4 Global Survey. As shown in Figure 21, 78% (MORE3: 73%) of researchers perceive international mobility as a positive factor for recruitment and 67% (MORE3: 62%) associate positive effects on recruitment with interdisciplinary mobility experiences. In contrast, only 47% (MORE3: 43%) of all researchers and 48% of researchers

with intersectoral mobility experiences to the not-for-profit, public or government sector perceive intersectoral mobility experiences to the private sector to be a positive factor for recruitment. Moreover, negative effects for recruitment are most often associated with intersectoral mobility experiences into the private sector: 7% and the non-profit sector: 6%. In comparison with the MORE4 EU HE Survey, the ranking of the shares of researchers that perceive these three types of mobility to be positively related to recruitment is the same. However, each of the three types of mobility is associated with lower positive effects on recruitment in the MORE4 Global Survey.

The factor that is most often perceived to be positive for recruitment is project-related work experience, e.g. teamwork, writing grant applications or project reports (83% of researchers). Also, engagement in knowledge transfer, management of research or innovation, contribution to patents or development of inventions (79%), and transferable skills, such as project management, data cleaning, or networking, (69%) are frequently perceived as a positive factor for recruitment. Engagement in public awareness activities (science outreach, citizen science projects, etc.) and publishing in open access journals or sharing research data in open platforms are positive factors for recruitment for 66% and 60% of researchers respectively.

Figure 21: Researchers’ perception of recruitment processes in their home institution, all university and HEI researchers.



Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to recruitment in their home institution.
- Based on question 29: “What is your opinion on the following issues with respect to recruitment in your home institution?”.
- Categories were added and modified in MORE4 in comparison to MORE3. Therefore only 3 categories are directly comparable with MORE3, while intersectoral mobility included moves from both the public and the private sector.
- (n=1,536-1,671)

Target groups: Differentiating between target groups reveals little variation with respect to project-related work experience, engagement in knowledge transfer, international and interdisciplinary mobility experience, and transferable skills (see Table 58 in annex 5). However, regarding positive effects of publishing in open access journals, the range between the minimum share of researchers perceiving it as a positive factor for recruitment and the maximum share is about 18 percentage points. While 64% of researchers in group TG4 (non-EU researchers who have never worked abroad) agree that publishing in open access journals positively affects recruitment, only a share of 46% in the group TG1 (EU researchers who currently work abroad) agrees. The variation between different target groups with respect to an intersectoral mobility experience to the not-for-profit, public or government sector (TG1: 39%, TG2: 52%), to an intersectoral mobility experience to the private industry (TG1: 38%, TG2: 49%) and to engagement in public awareness activities (TG1: 57%, TG4: 69%) also ranges between 12 and 13 percentage points. In all these cases, the shares of TG1 researchers who consider these factors to be positive are smaller than in the other groups.

Country of current employment: Overall, some variation between country groups can be observed (see Table 16). The largest gap between country groups can be found with respect to international mobility experience (27 percentage points) and publishing in open access journals (21 percentage points). In both cases, the minimum share is found among researchers employed in the US: only 58% and 49% of researchers in the US perceive international mobility and publishing in open access journals to be positive for recruitment. In contrast, 85% of researchers employed in BRICS countries think international mobility is a positive factor for recruitment and 70% of researchers employed in 'other' countries perceive publishing in open access journals to be positive. In part, these findings are similar to the pattern found in the MORE3 Global Survey: with respect to international mobility, the US represents an exception compared to other country groups of employment. This could reflect a generally lower importance of international experiences for US research careers as a consequence of the high quality of the US research system in comparison to other national research systems. On the contrary, researchers employed in the US perceive engagement in public awareness activities, interdisciplinary mobility, project-related work experience and engagement in knowledge transfer to be positive for recruitment; however, the differences with other country groups are not that large (2 - 13 percentage points).

Table 16: Perception of positive factors for recruitment by country groups.

	POSITIVE FACTOR					NEGATIVE FACTOR				
	ANGLO SAXON	US	NON-EU OECD	BRICS	OTHER	ANGLO SAXON	US	NON-EU OECD	BRICS	OTHER
Interdisciplinarity	65.9%	71.8%	65.5%	67.8%	68.3%	5.8%	2.9%	5.6%	6.2%	4.7%
International mobility	65.2%	58.0%	71.3%	84.9%	82.3%	1.8%	3.6%	2.1%	2.0%	1.9%
Intersectoral mobility (public)	43.3%	46.0%	41.9%	47.9%	57.7%	6.4%	8.1%	6.3%	5.8%	4.7%
Open science	51.2%	49.4%	52.8%	59.7%	70.1%	6.3%	6.6%	5.2%	6.7%	3.2%
Intersectoral mobility (private)	39.2%	42.0%	40.7%	45.8%	56.8%	7.2%	10.1%	8.4%	7.2%	6.4%
Project-related work experience	85.2%	89.4%	83.5%	85.6%	80.2%	1.1%	0.7%	1.1%	1.6%	2.4%
Public awareness	74.3%	76.0%	68.3%	62.6%	67.3%	0.9%	1.5%	2.1%	2.4%	2.4%
Transferable skills	65.5%	70.3%	66.0%	68.8%	72.8%	1.4%	0.0%	2.0%	2.1%	3.0%
Knowledge transfer	80.1%	79.9%	78.5%	79.5%	80.4%	0.7%	0.7%	1.6%	2.2%	2.3%

Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing that the factors are regarded as positive or negative for recruitment in their home institution. Devoid of the share of researchers indicating that the factor is not relevant.
- Based on question 31: “In your experience would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?”
- (n=1,536-1,665)

Career stage: Differences between carer stages are more pronounced than between country groups. The largest variations are found with respect to intersectoral mobility experience to the private and the not-for-profit, public or government sector. Interestingly, a higher share of (young) early stage researchers perceive intersectoral mobility experience as a positive factor than do (older) established researchers. Only 42% of R4 leading researchers perceive intersectoral mobility to the not-for-profit, public or government sector to be positive for recruitment, while 61% of R1 researchers think it is a positive factor. Similarly, the share of researchers perceiving intersectoral mobility experience to the private sector as positive for recruitment in career stage R4 (41%) is considerably lower than the respective share among early stage (R1) researchers (58%). This is in line with the results of the MORE3 Global Survey. The same divergence between leading R4 researchers (56%) and early-stage R1 researchers (73%) also appears with regard to the role of publications in open access journals for recruitment. In contrast, with regard to international mobility or transferable skills, no high levels of heterogeneity can be observed across career stages (see Table 17). The spreads range from 75% and 65% of R4 researchers that regard international mobility experience as a positive factor for recruitment to 81% and 76% of R1 researchers.

Table 17: Perception of positive factors for recruitment by career stages.

	Positive factor				Negative factor			
	R1	R2	R3	R4	R1	R2	R3	R4
Interdisciplinarity	72,3%	67,9%	66,3%	65,2%	4,5%	4,6%	5,8%	6,0%
International mobility	80,5%	76,5%	80,3%	75,5%	1,9%	3,4%	1,3%	2,2%
Intersectoral mobility (public)	60,7%	49,4%	49,0%	42,2%	4,9%	6,2%	5,8%	5,4%
Open science	72,8%	62,1%	58,4%	55,6%	5,8%	3,6%	4,9%	6,0%
Intersectoral mobility (private)	57,7%	47,5%	48,4%	40,6%	6,0%	5,9%	9,0%	6,8%
Project-related work experience	79,0%	85,3%	84,6%	80,9%	3,0%	0,8%	1,3%	2,1%
Public awareness	77,1%	65,5%	65,1%	65,3%	1,9%	1,5%	1,9%	3,4%
Transferable skills	75,9%	74,5%	66,8%	65,4%	3,3%	1,2%	2,4%	2,6%
Knowledge transfer	79,9%	78,7%	79,6%	79,3%	4,4%	1,6%	1,6%	1,8%

Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing that the factors are regarded as positive for recruitment in their home institution. Devoid of the share of researchers indicating that the factor is not relevant.
- Based on question 31: “In your experience would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?” and question 10 “In which career stage would you currently situate yourself?”
- (n=1,536-1,665)

4.4. Career progression

In line with the MORE4 EU HE Survey, the MORE4 Global Survey asked respondents several questions on how career paths, which regulate career progression, are perceived across countries and which skills influence progression along career paths. The next section looks at the determinants of progression in terms of whether researchers perceive career progression to be merit-based and transparent. Then, factors that co-determine career progression in research careers are identified. Finally, the confidence researchers have about their future career is analysed.

4.4.1. *Open, transparent, and merit-based career progression*

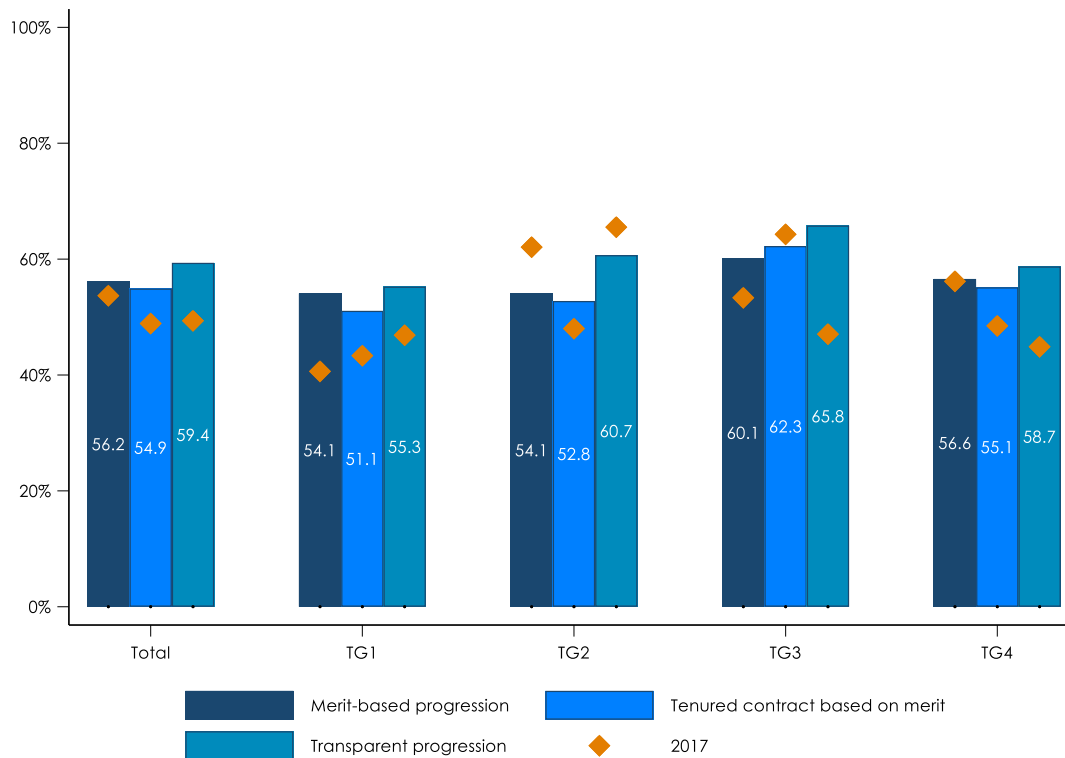
On average, the share of researchers agreeing that the different types of career paths are clear and transparent at their home institutions is 59% (MORE3: 49%). The shares of researchers perceiving the career progression as being sufficiently merit-based and agreeing that obtaining a tenured contract is based on merit only are slightly lower: 56% and 55% (MORE3: 54% and 49%) of all researchers respectively. Results on career progression show a pattern similar to the results of the MORE4 EU HE Survey. However, the shares of researchers perceiving career paths as transparent, career progression as sufficiently merit-based and tenured contracts to be based on merit only have been larger in the MORE4 EU HE Survey (76%, 73% and 73% respectively) than in the MORE4 Global Survey.

Target groups: There is little variation between target groups in the perception of whether career paths are clear and transparent for researchers (see Figure 22). While 55% (MORE3: 47%) of European researchers currently working outside Europe (TG1) agree that career paths are clear and transparent in their home institutions, the largest share of researchers agreeing with that statement is higher by 11 percentage points (66%, MORE3: 47%) and located in target group TG3, i.e. non-EU researchers who have been mobile but not towards the EU.

Limited differences exist between target groups with regard to the issue of whether obtaining a tenured contract based on merit only is perceived as common practice. The lower bound is in TG1, European researchers currently working abroad (51%, MORE3: 43%), while the higher bound is located in TG3 (62%, MORE3: 64%), mobile non-EU researchers who have worked abroad, but not in the EU.

The shares of researchers perceiving career progression as sufficiently merit-based range from 54%, considerably up from MORE3 (41%) in the groups of European researchers currently working outside Europe (TG1) to 60% (MORE3: 53%) in the groups of non-EU researchers who have worked abroad but not in the EU (TG3).

Figure 22: Perception of transparent and merit-based career progression in the home institution, by target groups.



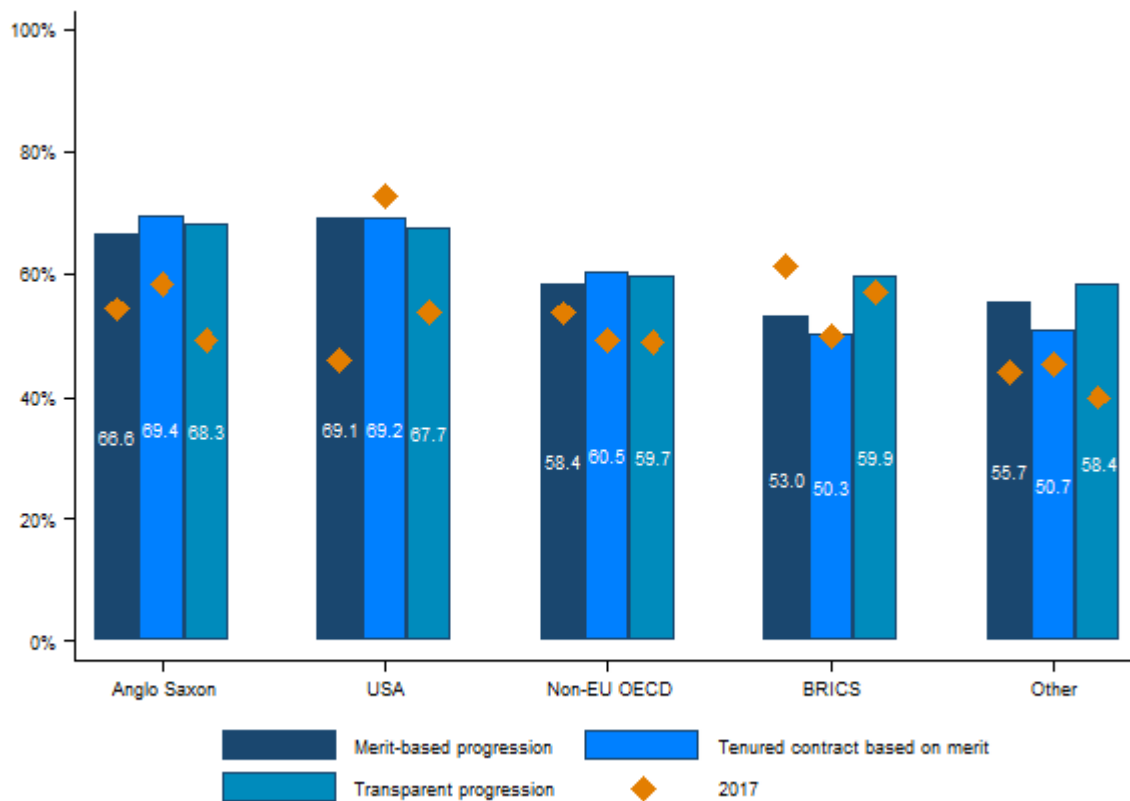
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=1,501-1,641, 2017: n=1,308-1,434)
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries
- TG4: Non-EU researchers who have never worked abroad
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to career progression in their home institution.
- Based on question 30: "What is your opinion on the following issues with respect to career progression in your home institution?"

Country of current employment: In line with the results on recruitment, differentiating between groups of researchers' countries of employment reveals that researchers working in the US and Anglo-Saxon countries show the highest shares of perceived transparent and merit-based career progression in their home institution (see Figure 23). In comparison to other country groups, the share of researchers agreeing that obtaining a tenured contract based on merit only is common practice is particularly high in the US (69%; MORE3: 73%), while in BRICS countries only 50% (MORE3: 50%) of researchers agree. Again, the share of US researchers is also higher in the group of Anglo-Saxon countries, including not only the US but Australia, Canada, United Kingdom, New Zealand, South Africa and Ireland as well.

Figure 23: Perception of transparent and merit-based career progression in the home institution by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to career progression in their home institution.
- Based on question 30: “What is your opinion on the following issues with respect to career progression in your home institution?”
- (2020: n=1,501-1,641, 2017: n=1,308-1,434)

Contract type: The share of researchers considering career progression as sufficiently merit-based and transparent in their home institution is the highest in the group of researchers having permanent (open-ended) contracts. Researchers on a permanent contract are potentially more likely to perceive career progression as merit based in their home institution because their own merits have obviously been recognised by the institution. Among those researchers, 62% (MORE3: 66%) perceive career paths as sufficiently clear and transparent; 58% (MORE3: 63%) think that obtaining a tenured contract is based on merit only; and again 58% (MORE3: 61%) agree that career progression is sufficiently merit-based.

In contrast, among the groups of researchers having fixed-term contracts, only 50% (MORE3: 45%) of researchers agree that obtaining a tenured contract is based on merit only. The share of researchers with fixed-term contracts perceiving career progression to be sufficiently merit-based and career paths transparent and clear is at 53% and 55% respectively; in MORE3 both shares reached 52%). In contrast to the group of researchers with permanent (open-ended) contracts, the comparative values for MORE3 are therefore lower in the case of researchers with fixed term contracts. For the group of researchers who are self-employed or employed without contract, a decline in the proportion of those

who consider career progression to be transparent and clear (52%, MORE3: 58%), or obtaining a tenure contract (38%, MORE3: 47%) or progressing in career (48%, MORE3: 61%) to be based on merit is observable compared to the MORE3 survey.

Table 18: Perception of transparent and merit-based career progression in the home institution, by types of contract.

	PERMANENT/OPEN-ENDED CONTRACT	FIXED TERM CONTRACT	NO CONTRACT OR SELF-EMPLOYED
Transparent progression	61.5%	54.9%	51.9%
Merit-based progression	57.6%	53.0%	47.7%
Tenured contract based on merit	57.8%	49.8%	38.2%

Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing on the issues with respect to career progression in their home institution.
- Based on question 30: “What is your opinion on the following issues with respect to career progression in your home institution?” and question 21 “Type of contract”.
- (n=1,440-1,573)

4.4.2. Factors for career progression

Analogous to recruitment, the MORE4 Global Survey includes questions on how open access publications, public awareness activities, project-work experience, knowledge transfer, transferable skills and mobility experiences affect career progression. Looking at the total shares of researchers, the ordering of the approval rates changes slightly in comparison to the MORE4 EU HE Survey (see section 5.4.3.2 EU HE Survey report). While in the MORE4 EU HE Survey the two highest shares of positives views are found with respect to project-related work experience and knowledge transfer (91% and 88% respectively), in the MORE4 Global Survey 84% of researchers perceive project-related work experience and 75% perceive that both public awareness and international mobility are positive for career progression. Another 70% (MORE3: 62%) of researchers perceive that transferable skills are positive for career progression, with similar percentages found regarding interdisciplinarity mobility experience (70%) and open science approaches (67%) as positive factors. Only around 50% of researchers indicate the same with respect to intersectoral mobility experiences. The shares of researchers perceiving those factors to positively affect career progression are generally lower in the MORE4 Global Survey than in the MORE4 EU HE Survey. A similar observation was made for the analysis of factors influencing recruitment.

Target groups: Differentiating between target groups reveals some differences (see Table 19). In particular, the variance between target groups is rather large in the case of publishing in open access journals (22 percentage points). In comparison to the 72% of the researchers in target group TG4 that perceive publishing in open access journals as a positive factor for career progression, only one in two European researchers currently working abroad (TG1) agrees (50%). A similar pattern is seen with respect to intersectoral mobility to the not-for-profit, public or government sector: 55% of TG4 researchers think of it as a positive factor for career progression, compared to only 40% of TG1 researchers. Moreover, mobility to the private sector is only perceived by 39% of TG1 researchers as positive, while 52% of TG3 researchers agree. In contrast, in terms of knowledge transfer, project-

related work experience, public awareness activities, international mobility and transferable skills no considerable differences between target groups are observed.

Table 19: Perception of positive factors for career progression by target groups.

	POSITIVE FACTOR					NEGATIVE FACTOR				
	TOTAL	TG1	TG2	TG3	TG4	TOTAL	TG1	TG2	TG3	TG4
Interdisciplinarity	69.8%	62.7%	69.6%	67.4%	72.2%	4.5%	4.5%	4.6%	2.8%	4.8%
International mobility	75.4%	69.2%	78.3%	74.3%	76.4%	2.7%	1.6%	3.3%	2.2%	2.8%
Intersectoral mobility (public)	52.0%	39.7%	54.2%	51.5%	54.7%	4.9%	6.8%	2.9%	4.3%	5.2%
Open science	67.1%	50.2%	66.7%	66.1%	72.0%	5.3%	6.4%	4.8%	7.5%	4.6%
Intersectoral mobility (private)	48.2%	38.8%	47.9%	52.3%	50.1%	7.1%	6.9%	6.0%	5.7%	7.8%
Project-related work experience	84.4%	87.0%	84.7%	81.3%	84.3%	1.7%	0.4%	2.4%	1.7%	1.8%
Public awareness	75.5%	73.4%	76.1%	72.0%	76.5%	1.9%	1.6%	0.5%	1.9%	2.5%
Transferable skills	70.2%	63.1%	71.6%	71.4%	71.4%	1.9%	0.4%	2.4%	1.3%	2.3%
Knowledge transfer	85.2%	84.4%	85.3%	83.2%	85.7%	1.5%	0.4%	1.8%	1.9%	1.7%

Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries
- TG4: Non-EU researchers who have never worked abroad
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing that these factors are regarded as positive or negative for career progression in their home institution. Devoid of the share of researchers indicating that the factor is not relevant.
- Based on question 32: “In your experience would you say that the following factors are regarded as positive or negative factors for career progression in your home institution?”
- (n=1,548-1,669)

Country of current employment: Similar to the findings in MORE3, international mobility is one of the factors that is associated with large heterogeneity across countries: there is a 20 percentage points difference between the highest and the lowest shares of researchers perceiving it as positive for career progression across country groups. While 82% of researchers employed in ‘other’ countries think international mobility is positive, only 62% of researchers employed in the Anglo-Saxon countries agree (see Table 20). This may be linked to the fact that the US and the UK are considered as leading research environments, such that international mobility may be less beneficial for researchers based in Anglo-Saxon countries. Another factor with large heterogeneity across country groups (22 percentage points) is publishing in open access journals. In this case, 78% of researchers employed in ‘other’ countries perceive publishing in open access journals as positive for career progression, compared to only 56% in Anglo-Saxon countries. The third factor displaying large disparities (19 percentage points) between country groups is having an intersectoral mobility experience to the private sector. The largest share of researchers perceiving it as positive for career progression is employed in the group of ‘other’ countries (58%), while the smallest is employed in Anglo-Saxon

countries (39%). A similar pattern can be found with respect to intersectoral mobility to the public or non-profit sector, transferable skills, and interdisciplinary mobility.

Table 20: Perception of positive factors for career progression by country groups.

	POSITIVE FACTOR					NEGATIVE FACTOR				
	ANGLO-SAXON	US	NON-EU OECD	BRICS	OTHER	ANGLO-SAXON	US	NON-EU OECD	BRICS	OTHER
Interdisciplinarity	64.9%	72.6%	66.3%	70.1%	74.6%	5.9%	4.4%	5.4%	4.4%	3.2%
International mobility	61.9%	64.0%	68.2%	80.2%	81.6%	3.4%	5.1%	3.4%	1.8%	2.4%
Intersectoral mobility (public)	45.5%	49.3%	45.1%	54.4%	60.0%	5.6%	7.6%	5.2%	5.3%	4.0%
Open science	56.3%	57.9%	58.6%	68.5%	78.2%	7.7%	6.7%	6.2%	4.9%	4.2%
Intersectoral mobility (private)	38.6%	42.7%	43.2%	45.6%	57.9%	6.3%	9.3%	6.5%	7.8%	7.3%
Project-related work experience	86.9%	91.3%	85.0%	86.0%	82.2%	0.9%	1.4%	1.5%	1.1%	2.5%
Public awareness	82.9%	86.2%	77.9%	72.0%	75.1%	1.8%	2.9%	1.5%	2.5%	2.0%
Transferable skills	64.0%	69.4%	65.4%	72.4%	75.2%	1.4%	0.7%	1.9%	1.2%	2.6%
Knowledge transfer	87.7%	91.0%	86.0%	84.1%	85.0%	0.9%	0.8%	1.3%	1.4%	2.1%

Source: MORE4 Global Survey (2020).

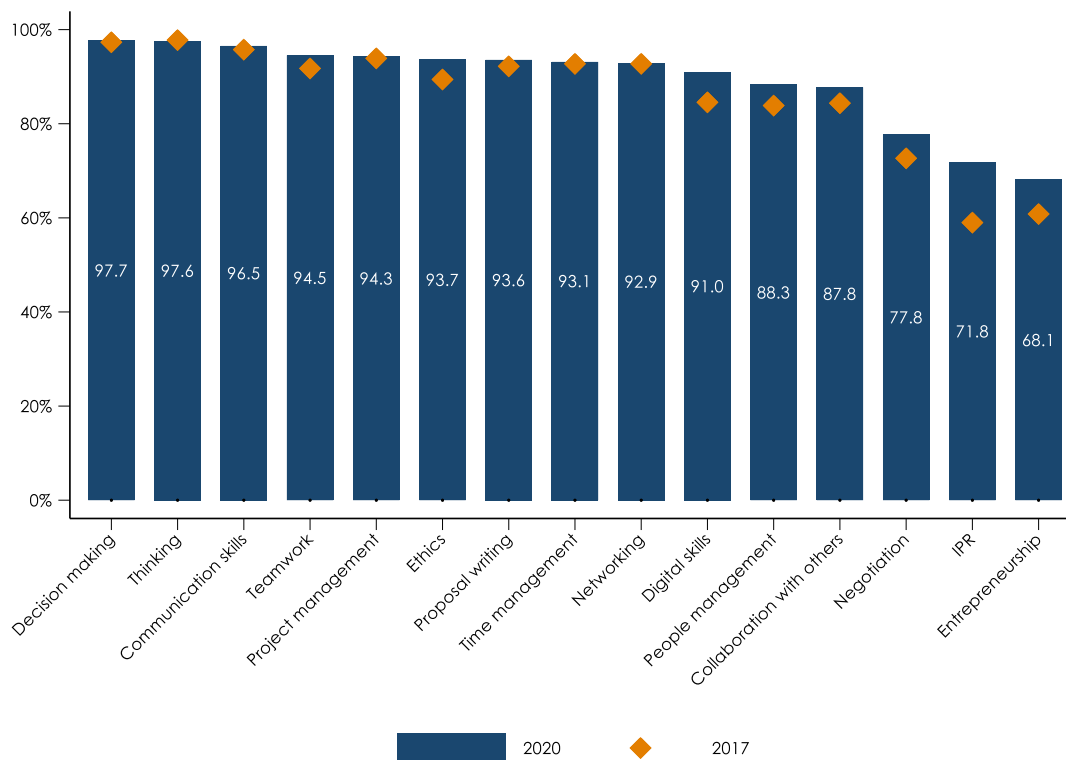
Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing that these factors are regarded as positive or negative for career progression in their home institution. Devoid of the share of researchers indicating that the factor is not relevant.
- Based on question 32: “In your experience would you say that the following factors are regarded as positive or negative factors for career progression in your home institution?”
- (n=1,548-1,669)

4.4.3. Skills for future career progression

Regarding their future careers (in and outside academia), the vast majority of researchers in the MORE4 Global Survey agree that skills for critical and autonomous thinking (98%, MORE3: 98%), decision making and problem solving (98%, MORE3: 97%), communication and presentation (97%, MORE3: 96%), teamwork (95%), project management, ethics and proposal writing (94%), time management, networking and digital skills (around 90%) are essential for a prosperous future career (see Figure 24). In comparison to MORE3, the results have remained stable.

Figure 24: Perception of important skills for future research career.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

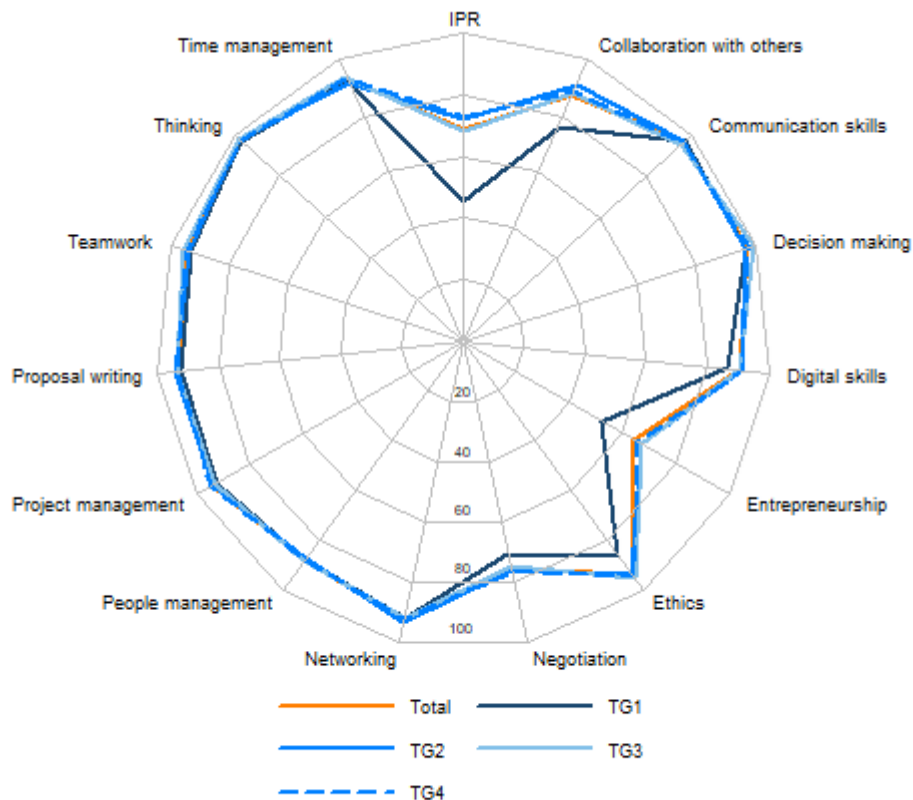
Notes:

- Based on question 33: “Which skills do you consider important for your future research career (in or outside academia)?”
- (2020: n=1,512-1,709, 2017: n=1,727)

Target groups: The perceptions of the importance of skills for future research careers are rather homogeneous across target groups (see Figure 25). There are only three exceptions. First, skills related to intellectual property rights (e.g. applying for patents) are considered important by 73% of TG4 researchers, compared to 46% of TG1 researchers. Second, 67% of TG3 researchers consider entrepreneurial skills as important in contrast to 52% of TG1 researchers. Third, the range between TG2 researchers (91%) and TG1 researchers (76%) is rather large in terms of collaboration with citizens, government and broader society. This may be due to the different current countries of employment feeding into the target groups (Table 8 in section 3.3.3). Target Group 4 and also Target Group 3 contain a lower share of researchers working in advanced countries such as the US, Japan or other OECD countries, while in the shares of countries such as India and Ukraine are higher. In less advanced countries, focusing on excellence in research may be less important than in emerging countries; from the MORE4 EU HEI Survey, we know that Eastern European countries generally value

exchanges or cooperation with industry more highly than e.g. Western European countries. With respect to skills in people management, critical and autonomous thinking, communication and presentation, networking, project management, grant and proposal writing, time management, decision making and problem solving, teamwork, innovative digital skills, negotiation, and ethics the differences across target groups are only small. Compared with the MORE3 Global Survey, results remained rather stable.

Figure 25: Perception of important skills for future research career by target groups.



Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries
- TG4: Non-EU researchers who have never worked abroad
- Based on question 33: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=1,512-1,709)

Country of current employment: The largest difference between country groups can be found in terms of skills in intellectual property rights (40 percentage points). Not even four out of ten researchers (39%) employed in Anglo-Saxon countries consider IPR skills to be important for their future research career in or outside academia. In contrast, 80% of researchers employed in the group of 'other' countries (including countries such as Ukraine, Argentina, Malaysia or Thailand), think that IPR skills are important. Similarly, 72% of researchers in the group of 'other' countries consider entrepreneurial skills to be important for their future career, while only one in two researchers (47%)

employed in Anglo-Saxon countries agree. The difference between the maximum share ('other' countries: 95%) and the minimum share (US: 80%) of researchers perceiving digital skills to be important is about 16 percentage points (Table 21). The lowest differences between groups of countries of current employment are found in term of communication and presentation skills and decision making and problem-solving skills and time management (each 2 percentage points).

Table 21: Perception of important skills for future research career by country of employment.

	ANGLO-SAXON	US	NON-EU OECD	BRICS	OTHER
Thinking	99.0%	100.0%	98.2%	98.4%	96.0%
Decision making	97.6%	96.5%	97.6%	98.7%	96.9%
Communication skills	97.1%	95.9%	95.8%	97.4%	96.5%
Time management	94.3%	92.9%	93.5%	93.5%	91.8%
Networking	93.0%	94.7%	92.0%	93.6%	92.6%
Teamwork	91.8%	94.1%	93.0%	94.9%	95.7%
Project management	91.8%	91.1%	93.3%	94.8%	94.5%
Proposal writing	91.7%	89.8%	92.0%	94.7%	93.9%
Ethics	90.3%	91.4%	91.9%	94.1%	94.7%
People management	84.7%	82.6%	85.8%	89.1%	88.9%
Digital skills	81.0%	79.8%	85.5%	92.3%	95.3%
Collaboration with others	80.1%	76.5%	82.6%	90.2%	89.9%
Negotiation	68.4%	70.7%	70.8%	78.3%	79.0%
Entrepreneurship	46.9%	48.8%	55.4%	67.7%	71.9%
IPR	39.3%	40.7%	53.2%	75.7%	79.7%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 33: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=2,369)

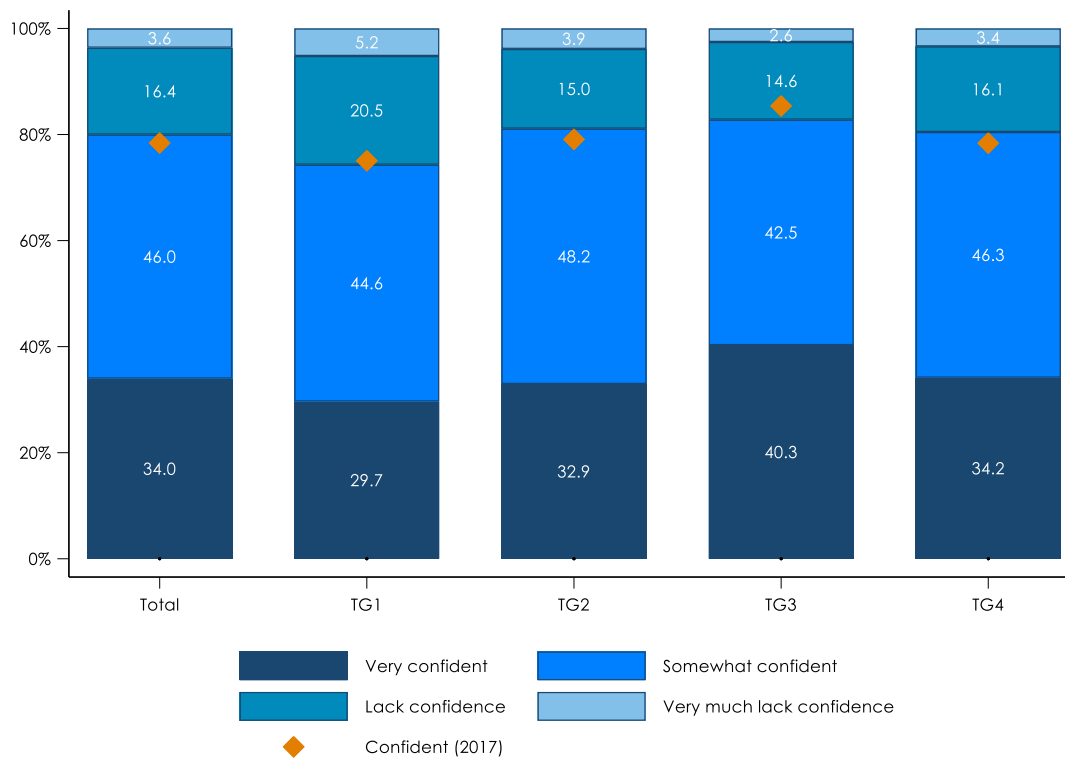
4.4.4. Confidence in future career prospects

Researchers were asked how confident they feel about the future prospects for their research career. In the MORE4 Global Survey, about 34% (MORE3: 27%) of all researchers feel very confident and 46% (MORE3: 52%) feel somewhat confident about their future prospects (see Figure 26). Only 4% (MORE3: 4%) of the respondents' report that they very much lack confidence about the prospects for their future research career, and another 16% (MORE3: 17%) of researchers say that they lack confidence. Thus, no large changes with respect to the perceived future career prospects have occurred since 2017 on the aggregate level.

Target groups: There are hardly any differences across target groups regarding researchers' levels of confidence in their future prospects. The largest difference (11 percentage points) is observed in the group of researchers who are very confident about their future prospects for their research career.

While 40% of non-EU researchers who have never worked abroad (TG4) feel very confident about their future prospects, only about 30% of EU researchers currently working outside the EU (TG1) agree (see Figure 26). In total, 83% (MORE3: 85%) of TG3 researchers are (very) confident about future career prospects, while only 74% (MORE3: 75%) of European researchers currently working abroad (TG1) agree. In contrast, 26% (MORE3: 21%) of European researchers currently working abroad (TG1) lack confidence about their future career, while the percentage of researchers that agree is 10 percentage points lower (17%, MORE3: 11%) in the group of TG3 researchers. These results are hence very similar to those of MORE3 in 2017.

Figure 26: Confidence in future career prospects by target groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

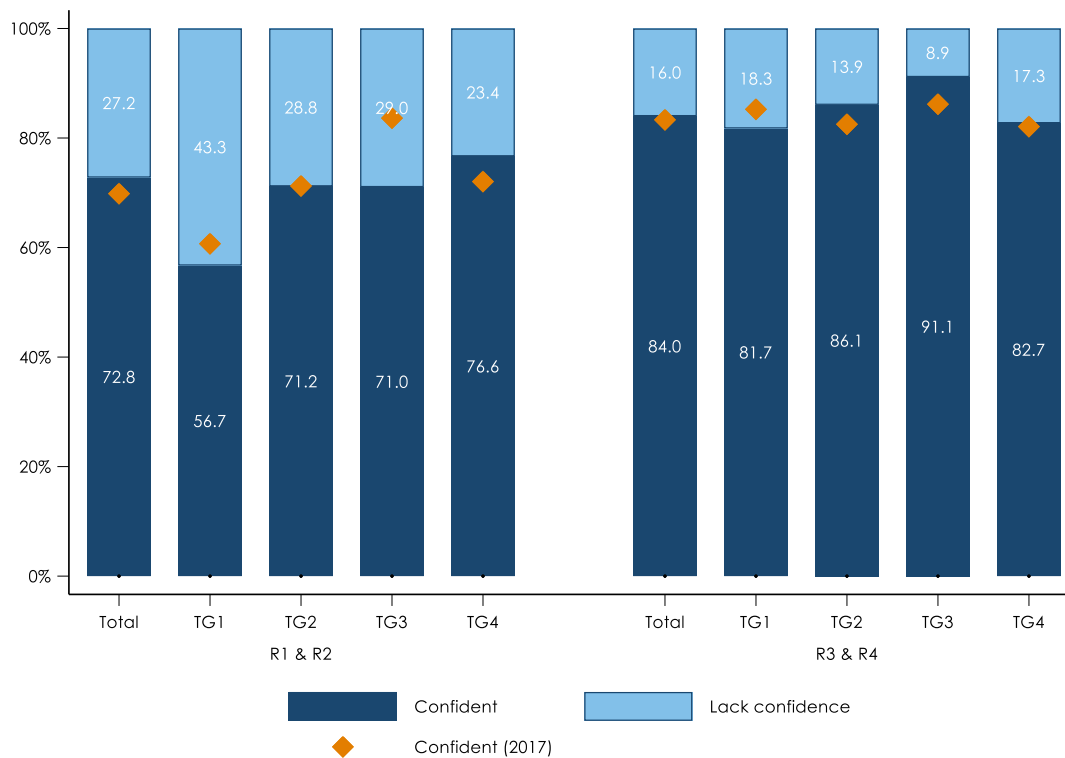
Notes:

- Total: Researchers currently working outside the EU (n=2,369)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 35: "Overall, how confident do you feel about the future prospects for your research career?"

Career stages: The results of the MORE2, MORE3 and MORE4 EU HE Surveys suggest that the level of confidence in future research careers is also related to researchers' uncertainty levels due to their career stage. Therefore, the data of the MORE4 Global have also been analysed by differentiating between different career stages. Since the number of first-stage researchers (R1) in the target group TG1 is rather low (25), the two early career stages (R1 and R2) are aggregated. For simplicity, we compare groups of researchers in these earlier stages (R1 and R2) with the groups of researchers who are already more established in their field of research (R3 and R4). In line with previous results, the share of researchers who lack confidence is highest in the group of early-stage researchers (R1 and

R2), while leading or established researchers (R4 and R3) show higher levels of optimism about their future (see Figure 27). While in advanced career stages (R3 and R4) no large differences between target groups can be observed, the variation between target groups is higher in early career stages (R1 and R2). Similar to the share of early-stage researchers that are confident in their future career perspectives is particularly low among EU researchers currently working abroad (57%, MORE3: 61%). In contrast, the share of early-stage researchers feeling confident about their future career is high among non-EU researchers (TG2 & TG3: 71%, TG4: 77%, MORE3: TG2 71%; TG4 72%; TG3 84%). Compared to MORE3, no large differences can be observed regarding the shares of confident researchers in different target groups and career stages. One exception, however, is the group of early stage non-EU researchers who have worked abroad but not in the EU (R1 and R2 in target group TG3). Since 2017, the share of confident researchers in this group has dropped by 13 percentage points. This is likely due to sampling effects and also the always more volatile response patterns of early stage researchers.

Figure 27: Confidence of researchers in future career prospects by career stage and target group.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have worked abroad but not in the EU
- TG4: Non-EU researchers who have never worked abroad
- Based on question 35: "Overall, how confident do you feel about the future prospects for your research career?" and question 10 "In which career stage would you currently situate yourself?"

Country of current employment: With respect to different country groups, limited variation has been observed (see Figure 112 in annex 5). While the share of researchers feeling (very) confident about their future career prospects is highest in the group of Anglo-Saxon countries (85%) and in the US

(82%), it is slightly lower in non-EU OECD countries (81%) and BRICS countries (80%). The lowest share of confident researchers is employed in the group of 'other' countries like Ukraine, Argentina, Malaysia and Thailand (78%). Even if a slight tendency can be detected, the differences are not large enough to confirm the general assumption that researchers are feeling less confident in less developed countries.

5. Working conditions in the current position

Researchers, particularly academic researchers, experience a highly competitive working environment, although they are generally quite confident about their career (section 4.4.4). Nevertheless, the “up-or-out” nature of academic research may result in a considerable proportion of researchers dropping out of research careers. While the specific “winner-takes-it-all” aspect of (academic) research might lead to undesired dropouts of highly talented researchers, competition among researchers can enhance scientific productivity and lead to new pioneering insights. However, this only holds true if the selection criteria are largely merit-based and if researchers are not leaving the academic labour market due to bad working conditions or other individual characteristics like gender or ethnic minority⁴³.

Research careers are terminated not only because of low levels of productivity. Studies⁴⁴ show that, despite high labour demand, the number of young American physician-scientists is stagnating due to more attractive working conditions and secure career paths outside academia. Moreover, especially when looking at high-tech industries, university spin-offs can be an attractive alternative to academic careers⁴⁵. The structure of academic career paths analysed in the preceding section is hence only one determinant of the attractiveness of a research system; working conditions are also very important.

In the MORE4 Global Survey, as in the MORE3 survey, researchers were asked about the characteristics of their current employment and their satisfaction with different conditions in their current employment. As there are many working conditions potentially relevant for working as a researcher, it is difficult to single out the main ones. MORE2 used a stated choice approach to identify the most relevant working conditions.⁴⁶ Based on the analysis of these data, the main working conditions are conceptualised and grouped in three categories in MORE4, namely:

- Working conditions not directly affecting scientific knowledge production, such as conditions relevant for extrinsic pecuniary motivations to engage in a research career (e.g. salary and pension entitlements), and working conditions affecting social and content-specific motivations of a research career.
- Working conditions affecting scientific knowledge production, such as research funding, working with stimulating peers or career-path determined time horizons available for implementing one’s research agenda.
- Working conditions relevant for both knowledge production and pecuniary motivations, such as career and mobility perspectives.

⁴³ Geuna, A., Shibayama, S., (2015) "Moving Out Of Academic Research: Why Scientists Stop Doing Research?", in Geuna, A. (Ed.), *Glob. Mobil. Res. Sci. Econ. Who Goes Why*, Elsevier, pp. 271–303.

⁴⁴ Donowitz, M., Germino, G., Cominelli, F., Anderson, J. M., (2007) "The attrition of young physician-scientists: problems and potential solutions", *Gastroenterology*, 132(2), pp. 477–480.

⁴⁵ Landry, Rejean, Nabil Amara, and Imad Rherrad, (2006) "Why are some university researchers more likely to create spin-offs than others? Evidence from Canadian universities.", *Research Policy*, 35(10), pp. 1599-1615.

⁴⁶ IDEA Consult et al, 2013. MORE2 - Support for continued data collection and analysis concerning mobility patterns and career paths of researchers, Final Report. European Commission, DG Research and Innovation; And Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

In this section, we only describe in detail characteristics of the contractual, employment and remuneration situation of researchers. The details on perception of satisfaction with other non-science related working conditions, science-related working conditions and cross-cutting conditions will be presented in section 7.1.

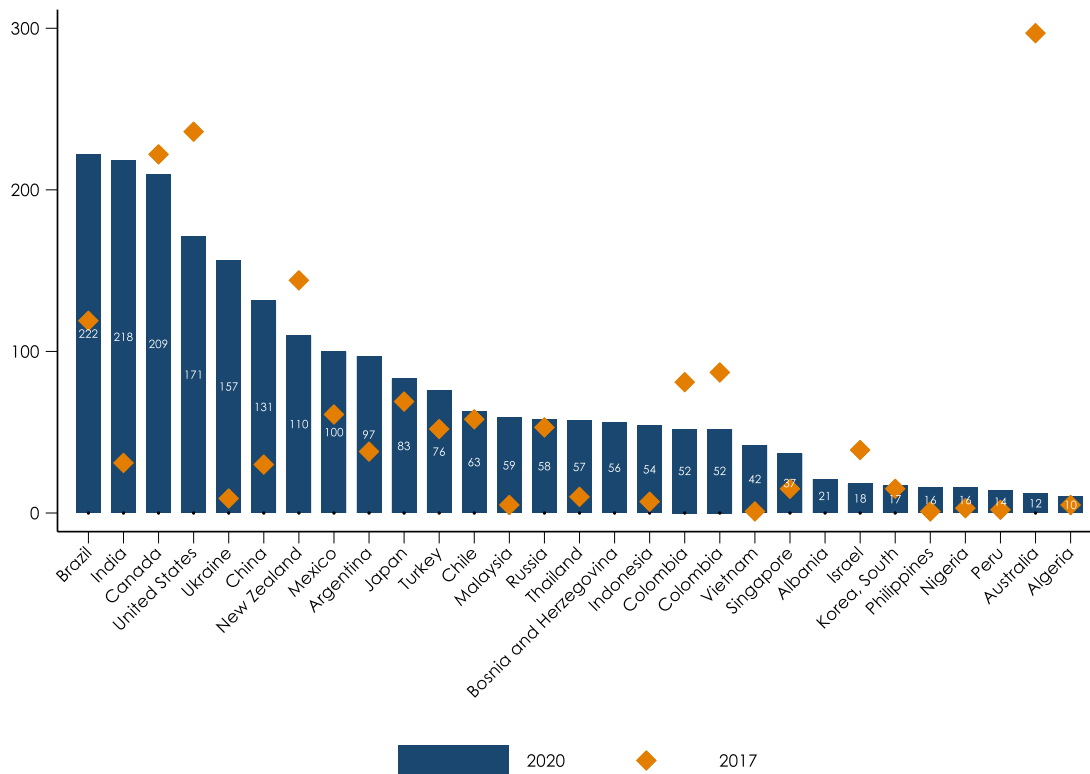
Box 3: Main research questions on working conditions.

- What are the main characteristics of employment of researchers (e.g. contractual situation)?
- How do researchers perceive their income level?
- Are there any differences between researchers working inside and outside academia with respect to their perception of their remuneration packages?

5.1. Characteristics of employment and contractual situation

The results of the analyses are influenced by the working conditions of the respondents to the survey: the highest number of respondents are currently working in Brazil, India, and Canada, and a considerable share also work in the US, Ukraine and China (see Figure 28). Moreover, in comparison with MORE3 some significant data differences in terms of countries of employment prevail. Most researchers who answered the MORE3 Global Survey questionnaire in 2017 were employed in Australia, the US, Canada, New Zealand and Brazil. In contrast, the Global Survey of MORE4 includes only a low share of researchers employed in Australia, but large shares of researchers employed in India or the Ukraine. Thus, the direct comparison with MORE3 data is limited. Of course, this non-uniform distribution of researchers across different employment countries and the difference with the MORE3 survey data have to be considered in the whole report; however, the following analyses rely on country of employment (rather than, for instance, country of citizenship) and thus, it is worth mentioning here the potential country bias of the results. Sometimes a distinction between certain groups of countries of employment is made in order to analyse results in the context of specific (national) research systems of country groups, like the (non-EU) Anglo-Saxon countries. The assignment of countries to different groups is presented in Table 53 in Annex 4.

Figure 28: Researchers' countries of employment.



Source: MORE4 Global Survey (2020), MORE 3 Global Survey (2017)

Notes:

- Only countries where at least 10 researchers who participated in the MORE4 Global Survey are employed
- Based on question 20: "Country of employment"
- (2020: n=2,369; 2017: n=1727)

Analogous to the MORE4 EU HE Survey, the MORE4 Global Survey includes questions referring to researchers' current employment position, where 'employment position' does not only apply to researchers working as employees, but also to civil servants, students etc. If researchers have more than one paid post, the main or primary one is considered.

5.1.1. Length of employment

On average, researchers that participated in the MORE4 Global Survey have been employed for 12 years (MORE3: 11 years) (see Table 22).

Target groups: Differences between target groups are most evident between European researchers currently working abroad (TG1) and non-EU researchers who have never worked abroad (TG4). While, on average, TG1 researchers have been employed for 10 years in their current position, TG4 researchers have been employed for 15 years. Compared to the results of both groups in MORE3 the length of employment has increased, more in target group TG1 though (TG1: +3 years; TG4: +1 year). Thus, the gap between target groups has shrunk since 2017. One reason for this development could be based on the differences in the age structure of researchers of different target groups in MORE3. However, the MORE4 survey data do not show any significant age differences in the target groups TG1 and TG4 (see section 3).

Table 22: Average length of employment at current position (in years).

	EMPLOYMENT LENGTH (IN YEARS)	
	2017	2020
TG1	7,4	9,9
TG2	13,0	12,6
TG3	11,4	11,7
TG4	13,8	14,9
Total	11,4	12,2

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369; 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (2020: n=327; 2017: n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (2020: n=407; 2017: n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (2020: n=254; 2017: n=178)
- TG4: Non-EU researchers who have never worked abroad (2020: n=1,380; 2017: n=869)
- Based on question 19: "Employed since"

5.1.2. Contractual situation

Differences in the length of employment might also be based on differences with respect to the contractual situation of researchers. 58% (MORE3: 63%) of the respondents have a permanent or open-ended contract, 28% (MORE3: 30%) a fixed term contract and 9% (MORE3: 7%) have no contract or are self-employed.

Target groups: There are some differences between target groups: The share of researchers with permanent or open-ended contracts is the lowest within the groups of EU researchers currently working outside the EU and non-EU researchers who have worked abroad but not in the EU (54% of researchers in TG1 and TG3). The highest share of researchers with permanent contracts are in the group of non-EU researchers who have worked in the EU in the past (61% of TG2 researchers). The shares of researchers having fixed-term contracts ranges from 26% in TG4 to 33% in TG1. Compared to MORE3, the differences between target groups have diminished (MORE3: 45% of TG1 and only 22% of TG3 researchers had fixed-term contracts).

Country of current employment: There are also differences regarding the contractual situation of researchers between different country groups (see Figure 115 in annex 6). With 38%, the highest share of researchers having fixed-term contracts is the group of 'other' countries (e.g. Ukraine, Argentina, Malaysia). In all other country groups, shares between 18% and 26% have been observed. To some extent, this might be driven by the differences in age structure between country groups. With 19% (<35 years) and 37% (35 - 44 years), the shares of young researchers are, on average, higher in the group of 'other' countries than in Anglo-Saxon or non-EU OECD countries. However, the age structure in BRICS countries is, on average, comparable to those in 'other' countries. In spite of this, the share of researchers with fixed-term contracts employed in 'other' countries is larger by 13 percentage points than the respective share of researchers employed in BRICS countries. Among the richer country groups, the US might be a small exception, as, in comparison to the average of Anglo-Saxon countries and non-EU OECD countries, a higher share of researchers employed in the US have fixed-term contracts. On average, 26% (MORE3: 40%) of researchers employed in the US have fixed-

term contracts in contrast to 18% of researchers in Anglo-Saxon countries. This could reflect the diminishing availability of tenure track positions in the US over the last ten years.⁴⁷

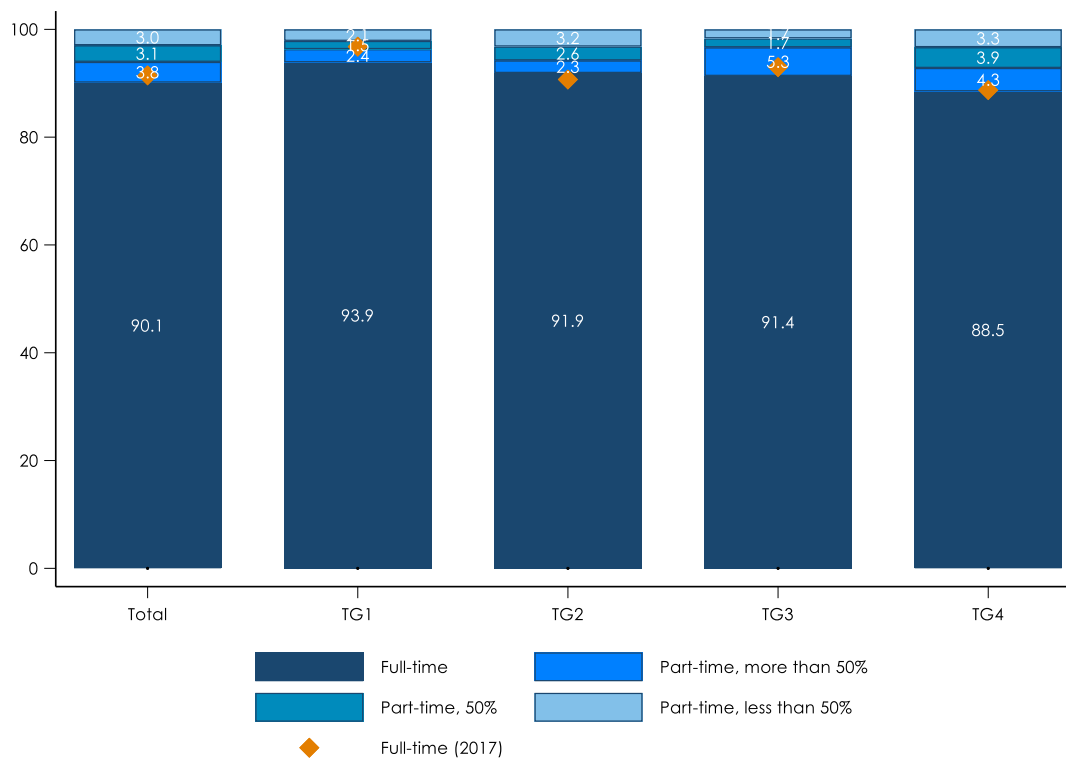
Gender: While more than 6 out of 10 male researchers (61%, MORE3: 75%) have a permanent or open-ended contract, the share of female researchers with permanent contracts is slightly lower, at 54%. Vice versa, among researchers working outside the EU, more women than men have fixed-term contracts (31% vs. 27%, MORE3: 30% vs. 23%). This pattern is also apparent in terms of researchers working in the EU. In the MORE4 EU HE Survey, the share of male researchers with a permanent or open-ended contract is also higher than that of female researchers with the same type of contract (81% vs. 73%), while more women have fixed-term contracts (25% vs. 17%).

Type of position: The vast majority of researchers (90%; MORE3: 91%) questioned in the MORE4 Global Survey hold full-time positions (see Figure 29).

Target groups: The largest differences between target groups can be observed between European researchers currently working outside the EU (TG1) and non-EU researchers who have never worked abroad (TG4) (see Figure 29). The highest share of researchers working full-time is that in target group TG1 (94% of European researchers working abroad), while the lowest share of researchers that are full-time employed is in the group of TG4 researchers (89% of non-EU researchers who have never worked abroad). Comparing the results from MORE3 with these numbers reveals no significant differences.

⁴⁷ See this report by the American Association of University Professors
<https://www.aaup.org/sites/default/files/10112018%20Data%20Snapshot%20Tenure.pdf>.

Figure 29: Distribution of researchers by type of position and target groups.



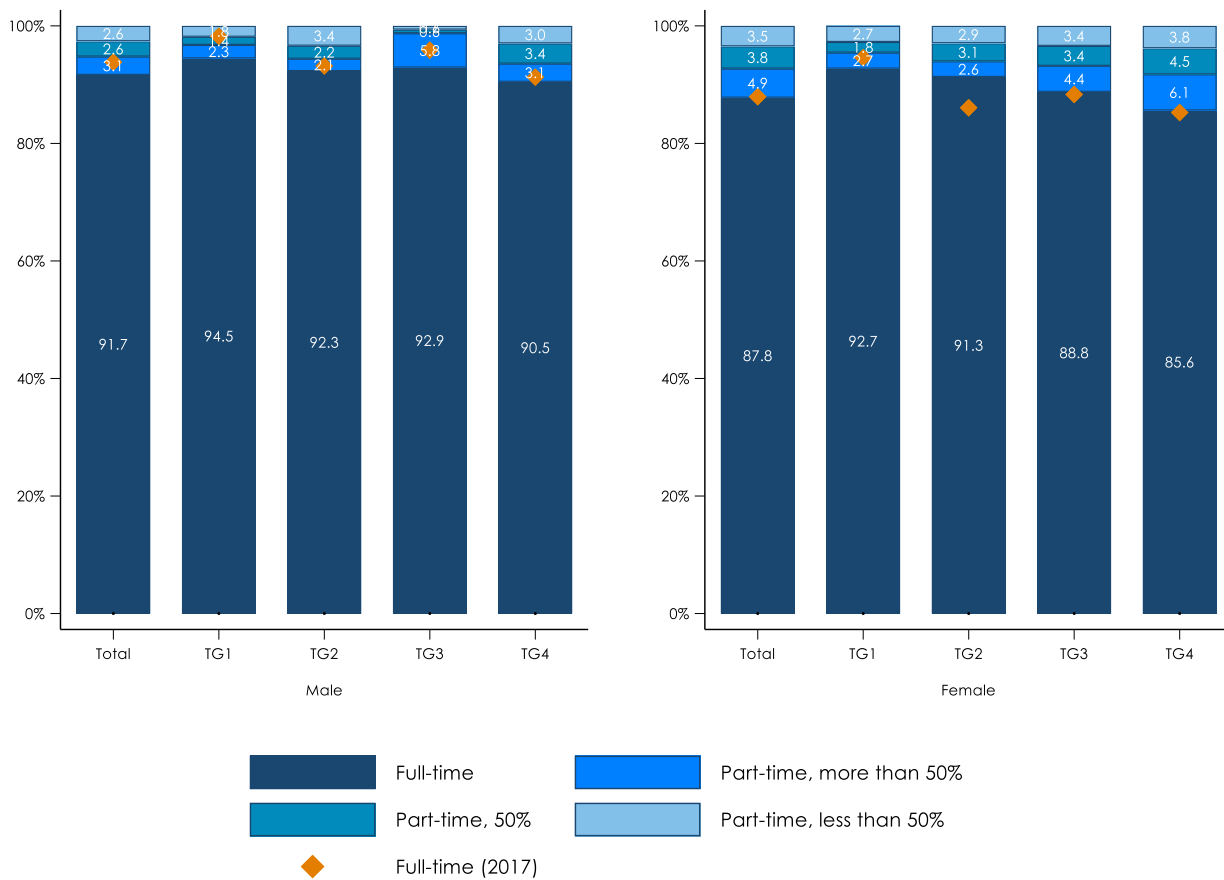
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369; 2017: n=1,513)
- TG1: EU researchers currently working outside the EU (2020: n=327; 2017: n=375)
- TG2: Non-EU researchers who have worked in the EU in the past (2020: n=407; 2017: 226)
- TG3: Non-EU researchers who have worked abroad but not in the EU (2020: n=254; 2017: 157)
- TG4: Non-EU researchers who have never worked abroad (2020: n=1,380; 2017: 755)
- Based on question 22: "Type of position"

Gender and target groups: Similar to the MORE4 EU HE Survey, and consistent with the results from MORE3, the share of female researchers working part-time (12%) is higher than the share of male researchers (8%); this is also true across all target groups. Compared to MORE3, the differences have slightly diminished (see Figure 30). The share of non-mobile non-EU female researchers working full-time ranges from 86% (in TG4) to 91% (TG2) and is thus a little bit lower than the respective share of European female researchers currently working outside the EU (93%).

Figure 30: Distribution of researchers by type of position, target groups and gender.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- For males in TG3 shares for the categories “Part-time, 50% and “Part-time, less than 50%” are below 1% of total.
- Based on question 22: “Type of position” and question 2 “What is your gender?”
- (2020: n=2,369; 2017: n=1,513)

5.1.3. Dual positions

Knowledge spillovers within and between higher education institutions, as well as university-industry knowledge transfer, contribute to economic well-being and knowledge gains according to the literature.⁴⁸ This section presents results about the situation of researchers currently in a dual position, which may facilitate such knowledge spillovers.⁴⁹ Analogous to MORE3, a dual position is defined as employment in more than one institution or organisation at the same time (either combined positions in more than one HEI or combined positions in a HEI and in another sector). One out of five (20%) respondents to the Global Survey (researchers currently working outside the EU) has a dual position, either inside or outside the higher education sector. Compared to MORE3, this is an increase of 8 percentage points since 2017 (MORE3: 12%).

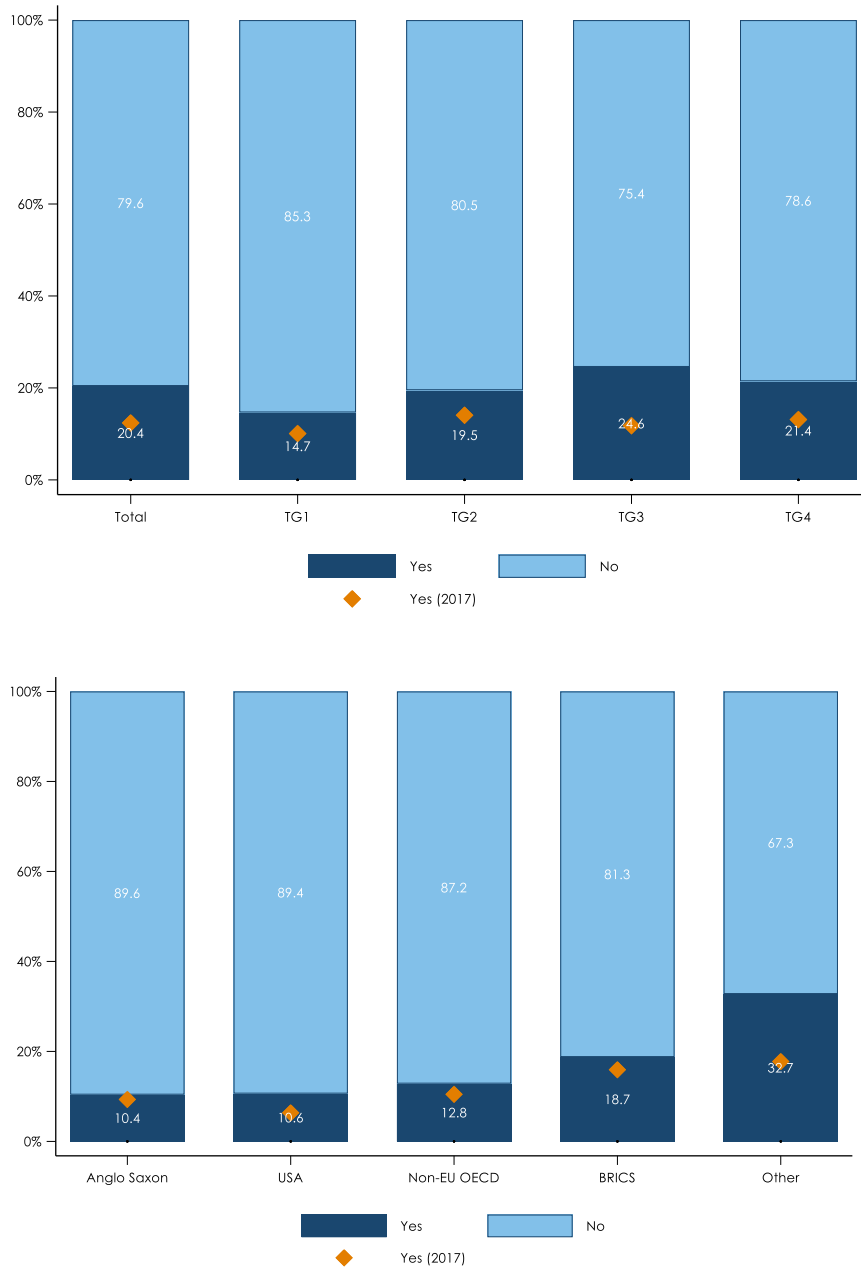
⁴⁸ Cañibano - Otamendi - Andújar, 2008; O’Shea – Chugh - Allen, 2008; Perkmann et al., 2013; "Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D’Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., (2013) "Academic engagement and commercialisation: A review of the literature on university–industry relations", Res. Policy, 42(2), pp. 423–442."

⁴⁹ Although dual positions are only one way to achieve knowledge spillovers.

Target groups: Figure 31 shows that there are small differences across the four main target groups in this area: the largest difference (10 percentage points) is found between EU researchers currently working outside the EU (TG1: 15% holds a dual position) and non-EU researchers who have worked abroad but not in the EU (TG3: 25%). Since 2017, the share of researchers having a dual position has increased in all target groups, with the change in TG3 (plus 12 percentage points) being the largest.

Country of current employment: The differences between country groups of current employment are even more prominent (see second graph of Figure 31; and Table 53 in annex 4 for the definition of these country groups of employment). Among researchers currently employed in the Anglo-Saxon country group, just 10% state that they are in a dual position, whereas in the group of 'other' countries the share of researchers employed in a dual position is clearly higher (33%). This might be due to lower satisfaction with working conditions in less economically developed countries. For instance, the satisfaction with researchers' remuneration packages is the lowest in the group of 'other' countries (see section 5.2). Only 9% of researchers working in the group of 'other' countries think that they are well-paid. However, having a dual position might not correspond with better or worse working conditions. Dual positions might be seen more commonly at the level of directors – chairing a non-academic organisation may go hand in hand with being a professor or professors for applied sciences may keep their position in industry, particularly to maintain their close links to industry. Therefore, a double position might not be a matter of employment conditions, it could also be a matter of choice related to motivations to combine theory and practice.

Figure 31: Share of researchers currently in a dual position by target groups and by current employment country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=1,722, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=266)
- TG2: Non-EU researchers who have worked in the EU in the past (n=309)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=198)
- TG4: Non-EU researchers who have never worked abroad (n=948)
- Based on question 17: “Are you currently in a so-called “dual position”, whereby you are employed in more than one institution/organisation at the same time?”
- In the MORE4 Global Survey, interviewees were only asked about dual positions if they indicated a university or HEI as their primary employment. The sample therefore deviates from the MORE3 Global Survey where all researchers were considered irrespective of their primary employment.

Career stage: Questions on dual positions were asked to all four career stages in the MORE4 Global Survey.⁵⁰ Across career stages, researchers are not equally likely to engage in a dual position (R1: 25%, R2: 25%, R3: 16%, R4: 22%). The shares of researchers with dual positions hint at an inverse u-shape. One explanation would be that, in early career stages, a dual position is more likely to be economically necessary, while recognised R3 researchers are already less restricted by financial constraints and thus more focused on pursuing their research agenda. Leading researchers being in leadership positions, however, might find a dual position more attractive in order to combine theory and practice or co-chairing institutions. Compared to MORE3, the shares of researchers having dual positions have increased in all career stages. Within the group of men, the share of those employed in a dual position is similar (22%, MORE3: 13%) to that among female researchers (18%, MORE3: 12%, Table 56 in annex 5).

Current sector of employment (main position): The survey questioned researchers on the sectors where they work as researchers and, in case they work at a university or higher education institution (HEI), on whether they have a dual position. In the latter case, researchers were asked to also state the sector of their second position.

Table 23 shows the results of both researcher groups with and without a dual position, however in the latter case just the main position is used. The large majority of the respondents is employed at a university or other HEI: on average 82% of all researchers in the sample mentioned the university or HEI as their main sector of current employment. The university or HEI sector reaches the highest share in the group of non-EU researchers who were mobile but not towards the EU (TG3: 86%) and the lowest share among non-EU researchers who have worked in the EU in the past (TG2: 81%). However, the differences between the four main target groups are quite small. The second most frequent sector named is the public or government sector in all four target groups (ranging from 8% in TG3 to 13% in TG2). The private sector is of little importance, even when summing up the shares of employment in large firms, SMEs, start-ups or NGOs, the share varies just from 2% (TG1) to 4% (TG3).

⁵⁰ In the MORE3 EU HE Survey only R2-R4 researchers answered the question on dual positions.

Table 23: Distribution of researchers across sectors of current employment by target group.

	TOTAL	TG1	TG2	TG3	TG4
University/HEI	82.2%	84.4%	80.5%	86.0%	81.4%
Public or government sector	12.0%	10.8%	13.0%	8.3%	12.7%
Private not for profit sector	1.6%	1.0%	1.8%	2.2%	1.6%
Private industry (large firm)	0.8%	1.0%	0.8%	1.3%	0.7%
Private industry (SME or startup)	1.0%	0.6%	2.1%	1.7%	0.7%
Other	2.4%	2.2%	1.8%	0.4%	3.0%

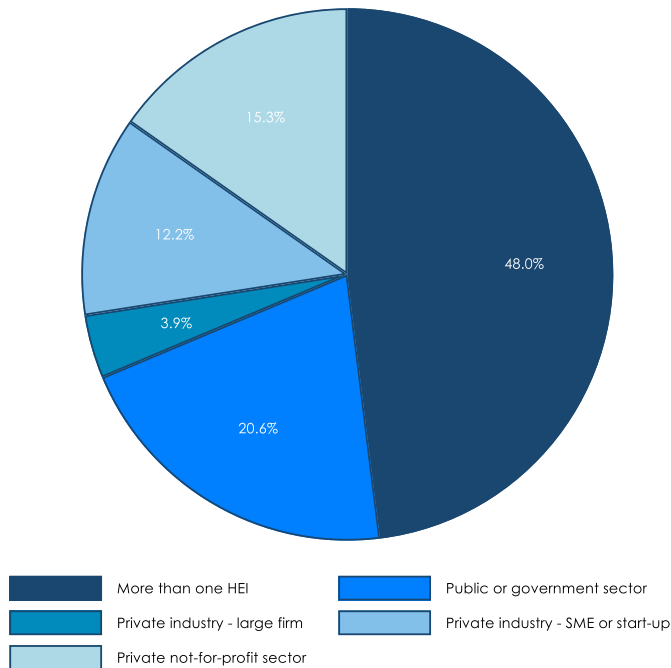
Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU (n=2,095)
- TG1: EU researchers currently working outside the EU (n=315)
- TG2: Non-EU researchers who have worked in the EU in the past (n=383)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=231)
- TG4: Non-EU researchers who have never worked abroad (n=1,166)
- Based on question 16: "What is your current sector of employment as a researcher?"

Sector of dual position: 48% (MORE3: 57%) of researchers that hold a dual position combine their position in the university or HEI with a position in another university or HEI (see Figure 32). More than one-fifth (21%, MORE3: 22%) combine their position in an HEI with employment in the public or government sector and 31% (MORE3: 18%) with employment in the private sector (non-profit: 15%, SME or start-up: 12%, large firm: 4%). Compared to MORE3, the largest increase in shares have been observed in terms of dual positions combining HEI positions with positions in the public or government sector, but also combinations with the private sector, especially in SMEs or start-ups, have apparently become more attractive for researchers with dual positions currently working outside the EU. In contrast, the shares of researchers with dual positions working in more than one university or HEI has dropped by 9 percentage points compared to the MORE3 Global Survey.

Figure 32: Distribution of second position of current employment in a dual position if main position is at a university/HEI.



Source: MORE4 Global Survey (2020).

Notes:

- Just researchers in dual positions where the main position is a university or HEI.
- Based on question 17: “Are you currently in a so-called “dual position”, whereby you are employed in more than one institution/organisation at the same time?”
- (n=351)

5.2. Remuneration packages

Researchers’ working conditions are shaped, among other factors, by the terms of financial security and remuneration⁵¹. Therefore, similar to the MORE4 EU HE Survey, some questions that address explicitly remuneration are included in the MORE4 Global Survey.

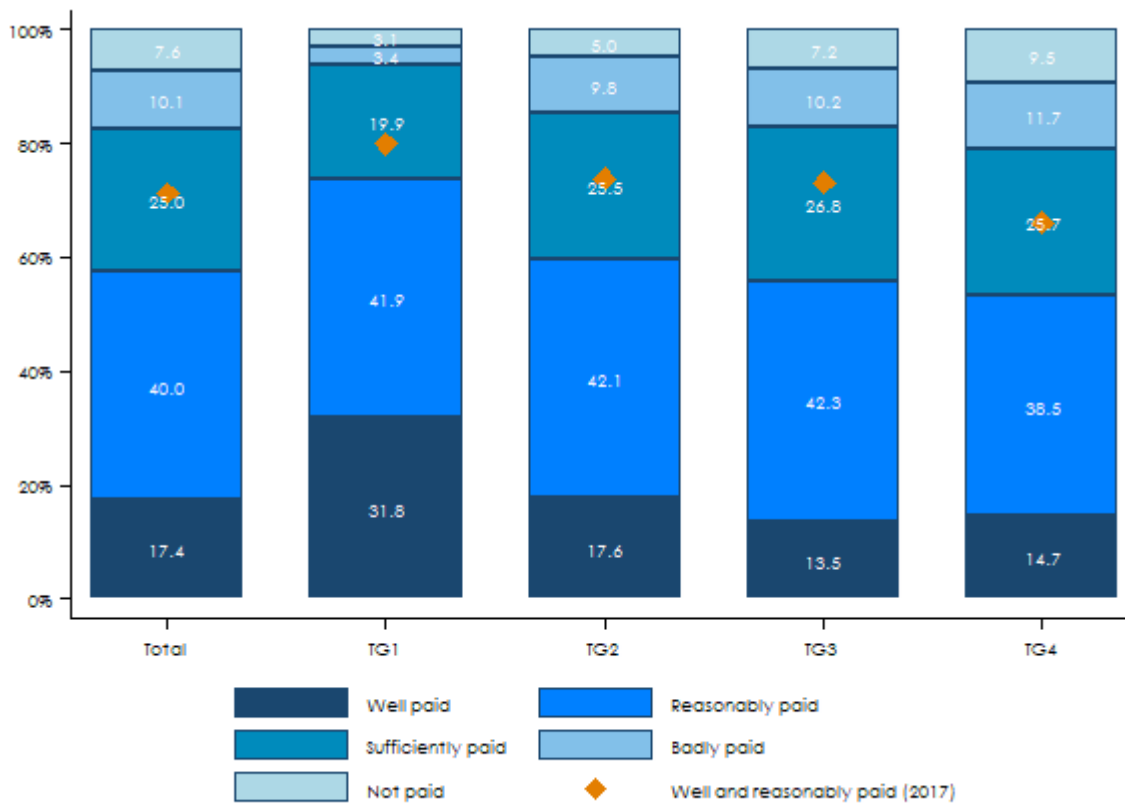
In total, one in six researchers participating in the MORE4 Global Survey feels well paid (17% of researchers), and more than one in three researchers thinks that he or she is paid a reasonable salary (40% of researchers) (see Figure 33). This means that the share of researchers perceiving themselves as well or reasonably paid is lower than the respective share in the MORE4 EU HE Survey (difference of 13 percentage points). Compared to the Global Survey in MORE3, there is a drop in the shares of researchers perceiving their remuneration package as reasonable or well-paid. However, in MORE4, the additional answer category ‘I am not paid for my work as a researcher’ was added. On average, 8% of researchers working outside the EU are not paid for their research. Thus, the results cannot be compared directly to the results in MORE3.

Target groups: Figure 33 shows some differences between the target groups. While the share of researchers feeling well or reasonably paid is the highest among EU researchers currently working abroad (74% of TG1 researchers), it drops remarkably when looking at non-EU researchers who have

⁵¹ Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

never worked abroad (53% of TG4 researchers feel well or reasonably paid). This pattern is consistent with the results in MORE3. In contrast, the share of researchers thinking that they are badly paid and are struggling to make ends meet is almost four times larger in the group of non-mobile non-EU researchers than in the group of EU researchers working abroad (12% of TG4 researchers in contrast to 3% of TG1 researchers). Similarly, between target groups, the shares of researchers who are not paid at all for their work as a researcher range from 10% in TG4 to 3% in TG1. TG4 researchers are more likely to work in emerging countries such as India, Ukraine or Brazil, rather than economically developed OECD countries (see Table 8 in section 3.3.3).

Figure 33: Researchers' perception of remuneration by target group.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

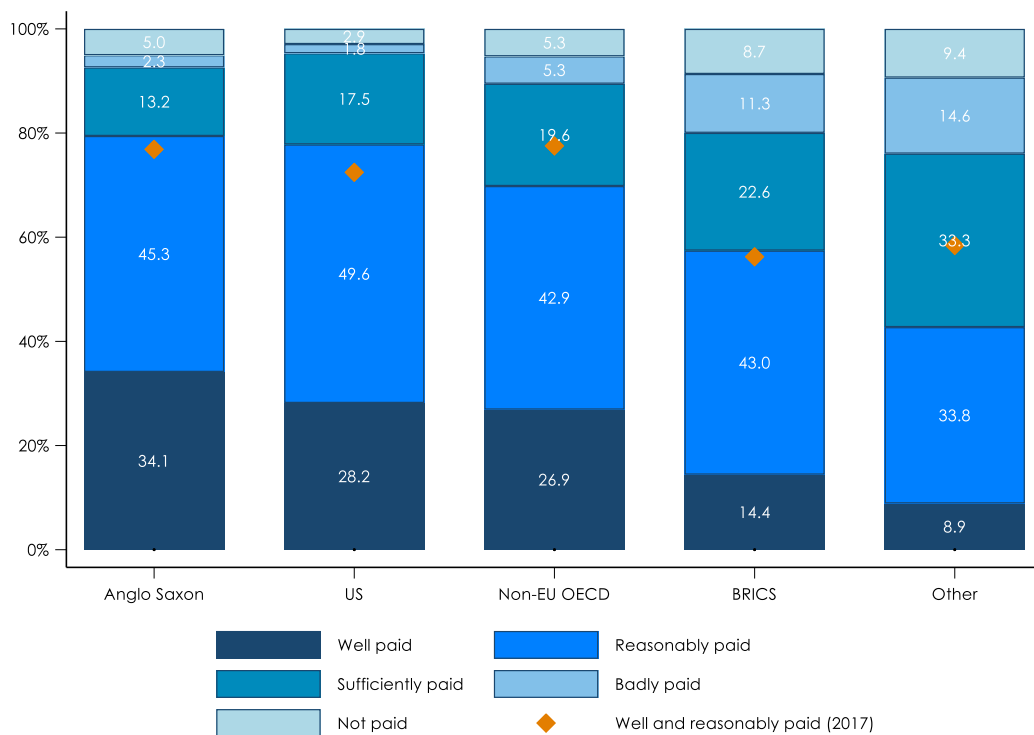
- Total: Researchers currently working outside the EU (2020: n=2,369; 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (2020: n=327; 2017: n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (2020: n=407; 2017: n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (2020: n=254; 2017: n=178)
- TG4: Non-EU researchers who have never worked abroad (2020: n=1,380; 2017: n=869)
- Based on question 25: "How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be..."

Country of current employment: In terms of different country groups, Figure 34 indicates some variations in researchers' perceptions of remuneration. In Anglo-Saxon countries (79%) and non-EU OECD countries (70%), the shares of researchers who feel well paid or paid a reasonable salary are particularly high. Simultaneously, in those countries the shares of researchers who say that they are

badly paid and are struggling to make ends meet are especially low at 2% (Anglo- Saxon) and 5% (Non-EU OECD).

In contrast, the shares of researchers perceiving their remuneration as bad are rather high in BRICS nations (11%) and ‘other’ countries, including countries like the Ukraine, Argentina, Malaysia, Thailand, Indonesia and Bosnia and Herzegovina (15%). Moreover, the share of researchers being employed in ‘other’ countries and feeling well-paid is the lowest among those country groups. Only 9% of researchers working in ‘other’ countries think that they are well-paid. Despite the inclusion of an additional answer category in MORE4 (‘I am not paid for my work as a researcher’), the results are rather stable compared to MORE3 in terms of all Anglo-Saxon countries, especially in the US, and the BRICS countries (Anglo-Saxon: 77% in MORE3 and 79% in MORE4, BRICS: 56% in MORE3 and 57% in MORE4). In the US, the shares of researchers perceiving themselves as well paid or reasonably well paid are even slightly higher than in 2017 (US: 72% MORE3 compared to 78% in MORE4).

Figure 34: Researchers’ perception of remuneration, by country group.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

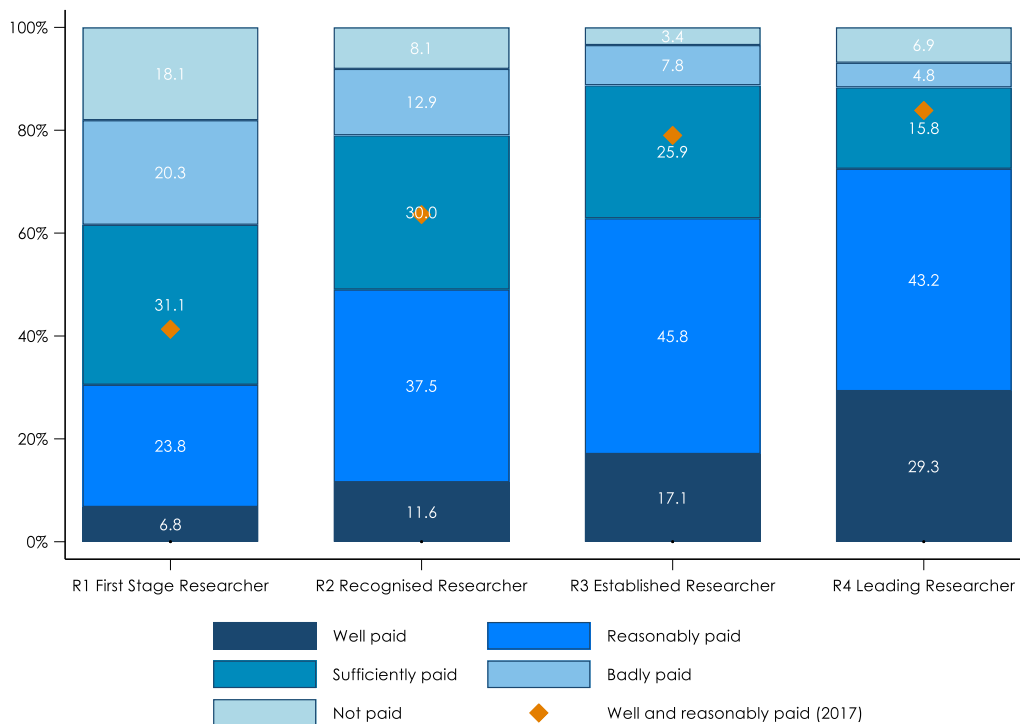
- Based on question 25: “How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be...”
- (2020: n=2,369; 2017: n=1,727)

Gender: Female and male researchers perceive their remuneration rather similarly (see Figure 116 in the annex 6). Nevertheless, the general pattern, which was also observed in MORE3, still persists. In comparison with their male colleagues, female researchers are less likely to feel well paid or paid a reasonable salary, while they are more likely to feel badly paid or are not paid at all for their work as researchers. 14% and 37% of female researchers feel well-paid or paid reasonably, while the respective shares are 19% and 42% in the group of male researchers. The shares of female researchers feeling

badly paid (12%) or who are not paid at all (9%) are larger by 3 percentage points than the respective shares in the group of male researchers. Compared to MORE3, the gaps between female and male researchers have slightly increased.

Career stages: The distribution of researchers’ perceptions of remuneration differs considerably between career stages (see Figure 35). The largest share of researchers that are not paid for their work as researchers can be found in the group of first-stage researchers (18% of R1 researchers). This share decreases over the career stages (4% of R3 researchers), but slightly increases again in the last career-stage (7% of R4 researchers). This might be due to retired leading researchers who still engage in research. Similarly, the share of researchers who feel badly paid is rather high in the group of first-stage researchers (20% of R1 researchers). Again, it is noteworthy that the share of R1 researchers perceiving themselves as badly paid is rather constant compared to MORE3 (19% of R1 researchers in MORE3). Given the addition of the new answer category ‘I am not paid for my work as a researcher’ in MORE4, this suggests that the situation of first-stage researchers has become even more precarious. In contrast, within the group of leading researchers, this share is remarkably lower than for the earlier career stages, but stable over time (less than 5% of R4 researchers; MORE3: 4% of R4 researchers). Overall, with each higher career level, beginning from R1 and ending in R4, the shares of researchers that are satisfied with their remuneration increases, while at the same time the shares of researchers dissatisfied with their salary decreases, which is likely to reflect pay schemes based on seniority.

Figure 35: Researchers’ perception of remuneration by career stages.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

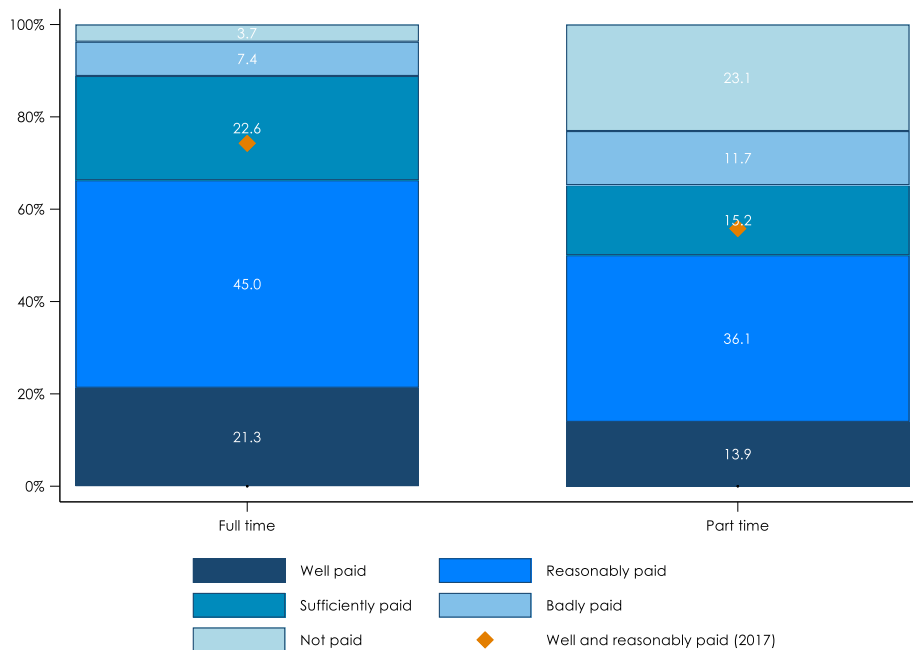
Notes:

- Based on question 25: “How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be...” and question 10 “In which career stage would you currently situate yourself?”
- (2020: n=2,369; 2017: n=1,727)

Dual position: In line with the results of the MORE3 EU HE Survey, having a dual position or working at only one position also makes some difference to researchers' perceptions of remuneration. While only 30% of researchers working at one position feel badly paid or only sufficiently paid to make ends meet, 44% of researchers having a dual position, i.e. researchers that are employed by more than one institution/organisation at the same time, would agree (see Figure 117 in Annex 6). Conversely, more than seven out of ten researchers employed in only one institution feel reasonably or well paid (73%), while in the group of researchers having dual positions only six out of ten researchers would agree (61%). However, given the available data, it is not clear whether these differences might be explained by the fact that remuneration for part-time positions is less attractive or whether a potentially less attractive remuneration in academia tends to force researchers to take up a second job (outside academia).

Type of position: Figure 36 clearly hints at differences in the perceptions of remuneration between researchers with different types of positions. 12% of part-time researchers feel badly paid and 23% of part-time researchers are not paid for their work as a researcher at all. Among the group of part-time workers, the share who think that they are badly paid is particularly high amongst those employed with 50% working time (21%). This contrasts with researchers with a full-time position, of which 7% think that they are badly paid but only 4% are not paid at all for their work in research. Vice versa, while more than 21% of researchers with full-time positions think that they are well-paid, only less than 14% of part-time researchers agree. Compared to the results in 2017, the shares of researchers feeling well-paid have decreased in the group of full-time workers (MORE3: 25%), as well as in the group of researchers having a part-time position (17%). However, direct comparison is limited due to the additional answer category ('I am not paid for my work as a researcher') in MORE4 and the difference in researchers' countries of employment.

Figure 36: Researchers' perception of remuneration by type of position.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only researcher who are not working in a dual position.
- Based on question 25: “How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be...” and question 22 “Type of position”
- (2020: n=2,369; 2017: n=1,513)

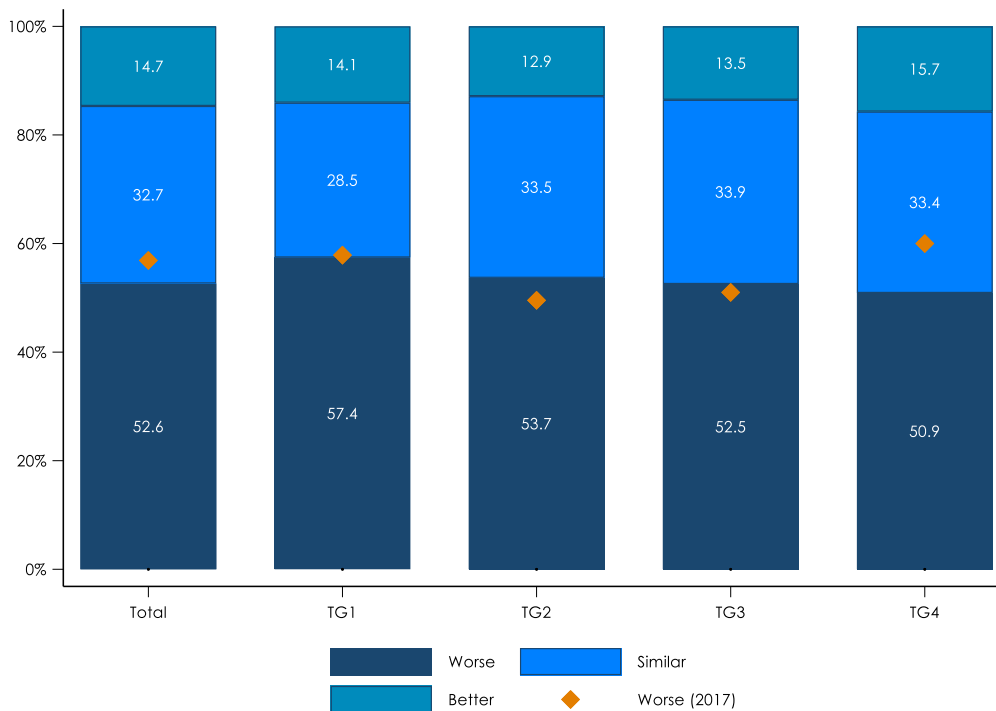
Contractual situation: In terms of researchers' contractual situation, differences with respect to their perceptions of remuneration can be observed. Figure 118 demonstrates that the group of researchers feeling well-paid is the largest among researchers with permanent contracts (22%, MORE3: 28%), followed by researchers with fixed-term contracts (12%, MORE3: 18%). Independent of their contractual status, the shares of researchers feeling well-paid have decreased since 2017.

5.2.1. Researchers working in academia

Similar to MORE3, 53% of researchers working in the higher education sector feel more badly paid compared to people with comparable skills and experience working outside academia (MORE3: 57%) (see Figure 37). 33% of researchers feel there is little difference (MORE3: 30%) and only 15% of researchers perceive themselves as better paid than their non-academic counterparts (MORE3: 14%).

Target group: Overall, only small differences can be found between the various target groups. The highest share of researchers feeling that they are paid worse than people with comparable skills and experience outside academia can be found in the group of EU researchers currently working abroad (57% of TG1 researchers, see Figure 37). The group of non-EU researchers who have never worked abroad in the past show the lowest share of respondents who feel more badly paid (51% of TG4 researchers) and the highest share of researchers that feel they are better paid than people outside academia (16% of TG4 researchers). Overall, about 33% think that remuneration packages within and outside academia are rather similar.

Figure 37: Perception of remuneration compared to outside academia by target groups.



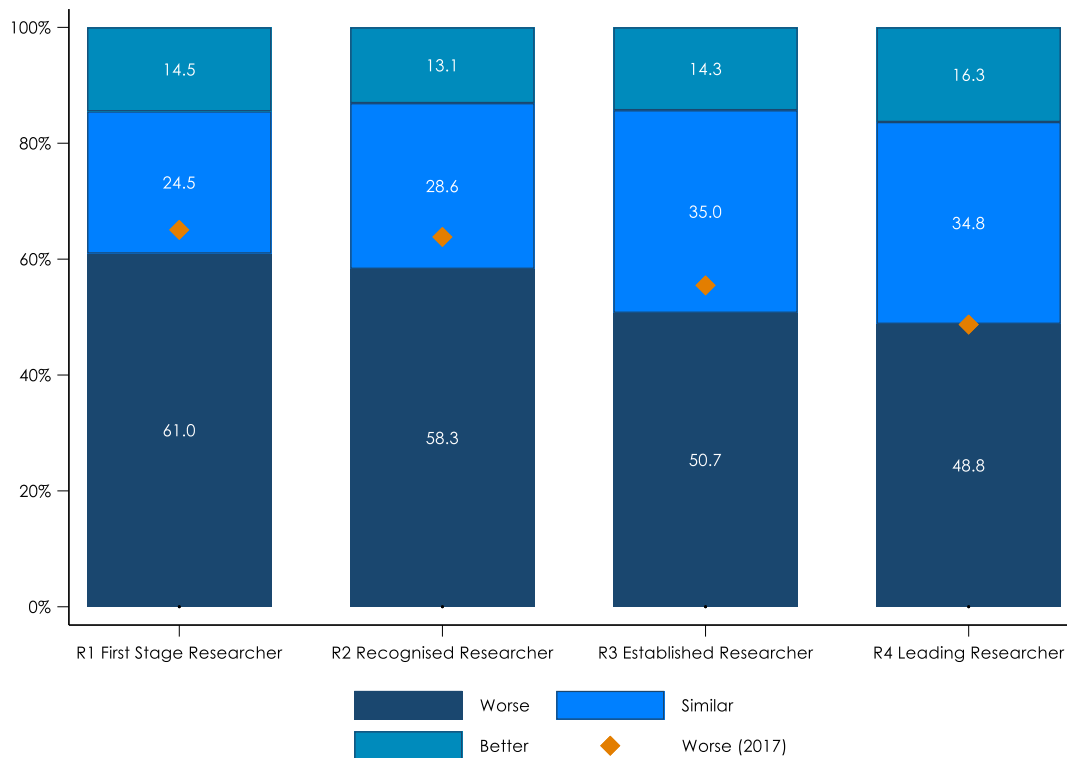
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=1,552; 2017: n=1,394)
- TG1: EU researchers currently working outside the EU (2020: n=249; 2017: n=337)
- TG2: Non-EU researchers who have worked in the EU in the past (2020: n=282; 2017: n=218)
- TG3: Non-EU researchers who have worked abroad but not in the EU (2020: n=181; 2017: n=149)
- TG4: Non-EU researchers who have never worked abroad (2020: n=840; 2017: n=690)
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 27: “How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?”

Career stage: Interestingly, researchers are less likely to feel that they are paid worse than their non-academic counterparts later in their career stage, a result that contrasts with findings of the MORE4 EU HE survey. While 49% of R4 and 51% of R3 researchers feel that they receive worse pay packages, the proportion of R1 researchers with this perception is 61% (see Figure 38). Conversely, in terms of the share of those researchers feeling that they are better paid, the average increases from 15% in R1 to 16% in R4. These results have remained rather stable compared with the results in 2017.

Figure 38: Perception of remuneration compared to outside academia by career stage.



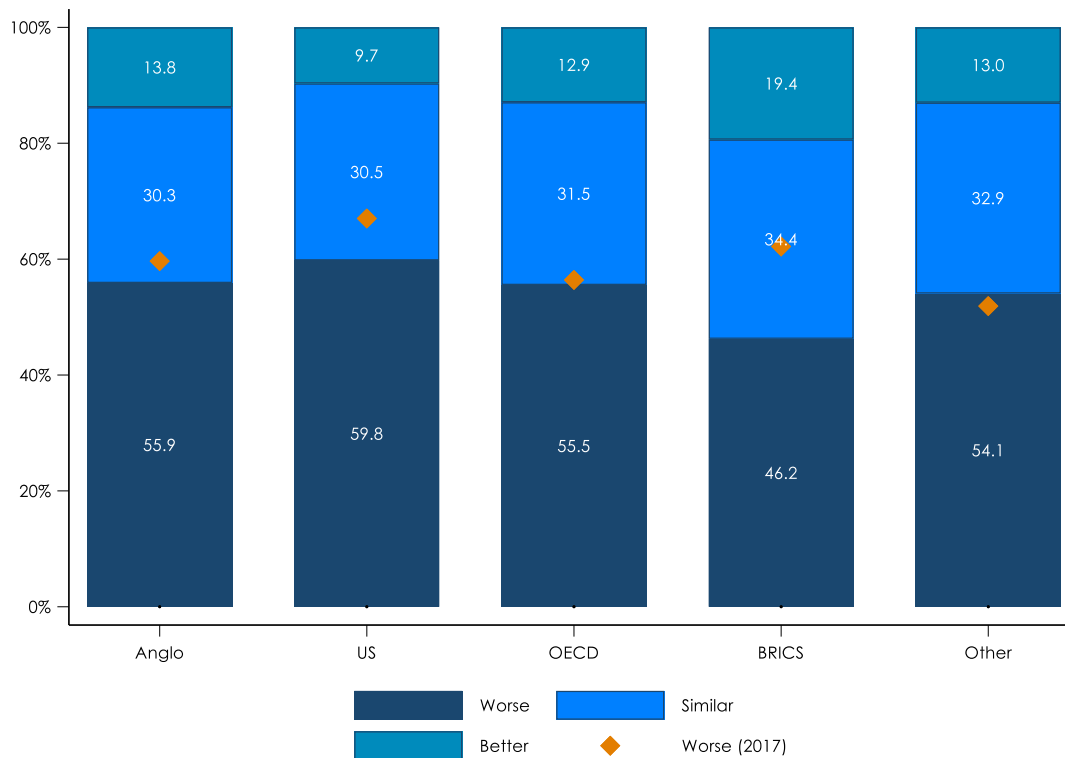
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 27: “How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?” and question 10 “In which career stage would you currently situate yourself?”
- (2020: n=1,552; 2017: n=1,394)

Country of current employment: Looking at researchers employed in different country groups gives a hint at small regional differences (see Figure 39). Similar to MORE3, the share of researchers feeling worse paid than their non-academic counterparts is highest in the US (60%, MORE3: 67%). The lowest share of researchers feeling worse paid than their colleagues outside academia is in the group of BRICS countries (46%), while the share was at 54% in the group of ‘other countries’ like the Ukraine, Argentina, Malaysia and Thailand in 2017 (MORE3: 52%). One possible explanation could be more reliable and constant salaries in government-financed institutions in comparison to the private sector in some less developed countries: job options outside academia are usually better in economically-developed countries.

Figure 39: Perception of remuneration compared to outside academia by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 27: “How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?”
- (2020: n=1,552; 2017: n=1,394)

5.2.2. Researchers working outside academia

Similar to the MORE3 Global Survey and in contrast to the MORE4 EU HE Survey, the MORE4 Global Survey also includes researchers working outside academia. As a result, it is possible to clarify whether the individual perception regarding one’s own remuneration in comparison to others is biased according to the adage ‘the grass is always greener on the other side of the fence’ or whether the perceptions of researchers in academia reflect a general impression. Therefore, in the MORE4 Global Survey, researchers working outside academia were asked how they compare their remuneration package to that of people with comparable skills and experience working in academia. Table 24 compares the answers by researchers inside academia with the answers by researchers outside academia on how they assess each other’s remuneration. Clearly, a higher percentage of academic researchers thinks that non-academic researchers are better paid, than non-academic researchers believing their academic counterparts to be better paid.

Table 24: How researchers in- and outside of academia assess each other’s remuneration.

	How would you compare your remuneration package in your position outside academia to that of people with comparable skills and experience in academia?	How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?
BETTER	25%	15%
WORSE	38%	53%

Source: MORE4 Global Survey (2020).

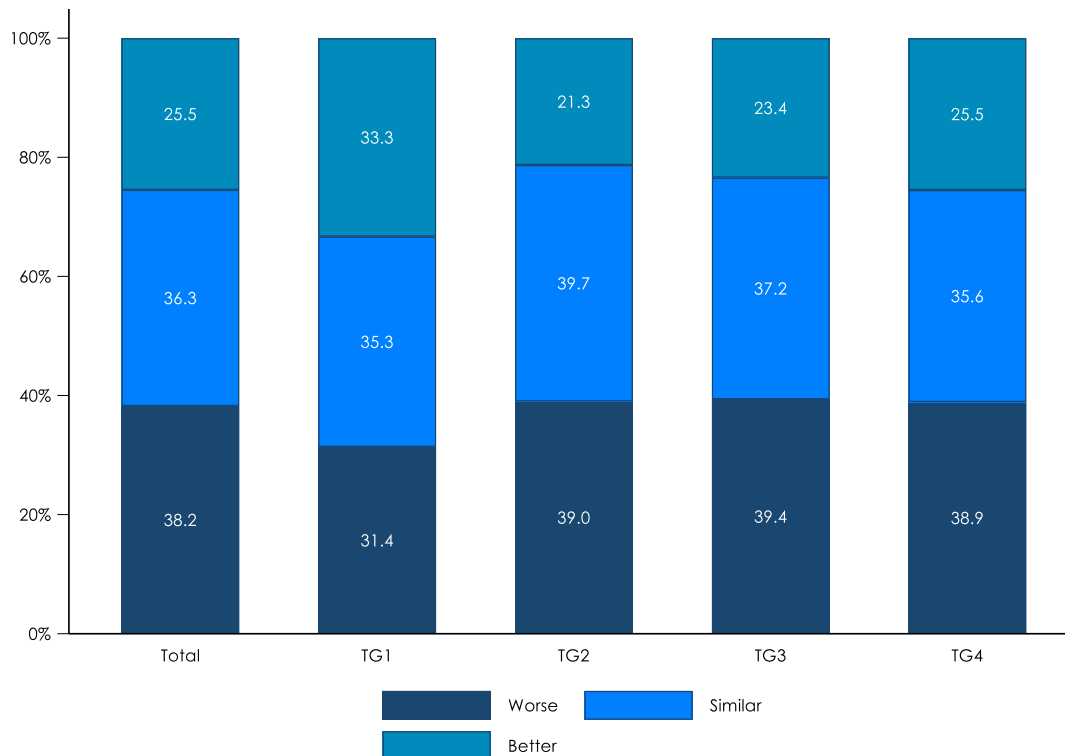
Notes:

- Based on question 28: “How would you compare your remuneration package in your position outside academia to that of people with comparable skills and experience in academia?”
- Based on question 27: “How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?”

Figure 40 reveals that the largest group of researchers working outside academia feels that they are paid worse than their colleagues in academia (38%). 36% perceive their remuneration to be similar to academia and another 26% think that they are better paid than their colleagues in academia.

Target groups: Overall, with respect to the perception of being paid worse than people in academia, only small differences between the groups of EU researchers currently working outside the EU (TG1) and non-EU researchers (TG2, TG3 and TG4) have been observed (see Figure 40). While 31% of EU researchers currently working outside the EU perceive their remuneration as worse than that of their colleagues inside academia, 39% of non-EU researchers agree. The share of researchers thinking that they are paid rather similar salaries to their academic counterparts is the largest in the group of non-EU researchers who have worked in the EU in the past (40%). In contrast, the shares of researchers thinking that they are better paid than researchers with similar skills inside academia is higher in the group of EU researchers currently working abroad (33%) than in the group of non-EU researchers (21% to 26%). A direct comparison of differences between single target groups with MORE3 results is not possible, as the sample size was too small in 2017, particularly for target groups TG2 and TG3.

Figure 40: Perception of remuneration by researchers outside academia compared to researchers in academia by target groups.



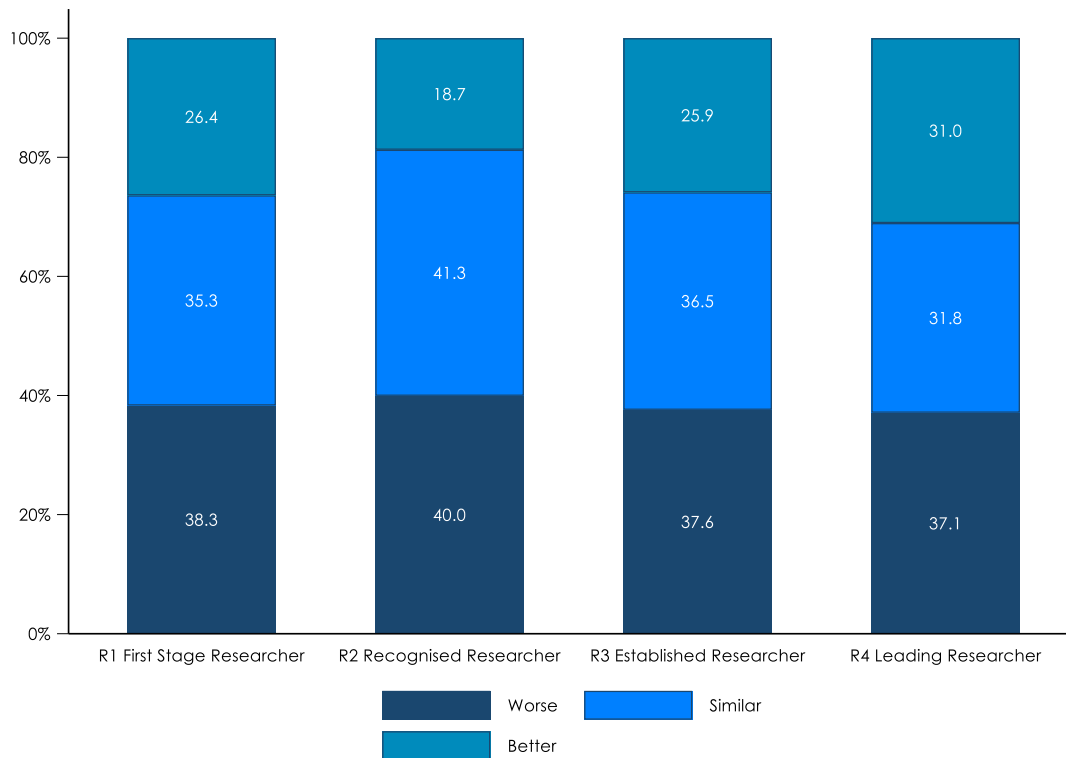
Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU (n=525)
- TG1: EU researchers currently working outside the EU (n=51)
- TG2: Non-EU researchers who have worked in the EU in the past (n=76)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=47)
- TG4: Non-EU researchers who have never worked abroad (n=351)
- Only researchers whose main (or only) position is not at a university or in the HEI sector.
- Based on question 28: "How would you compare your remuneration package in your position outside academia to that of people with comparable skills and experience in academia?"

Career stages: Figure 41 shows only very small differences between single career stages. 38% of R1 and R3 researchers and 37% of R4 researchers and 40% of R2 researchers feel that they are not as well paid as their academic counterparts. The smallest share of researchers who perceive that their remuneration is better than that of researchers with similar skills inside academia can be found in the group of recognised researchers (19% of R2 researchers), while in the group of leading researchers 31% agree. Due to the small sample size of non-academic researchers in the MORE3 Global Survey, it was not possible to distinguish between single career stages when analysing researchers' perceptions of remuneration compared to researchers inside academia. Thus, a direct comparison with MORE3 is not possible.

Figure 41: Perception of remuneration by researchers outside of academia compared to researchers in academia by career stages.



Source: MORE4 Global Survey (2020).

Notes:

- Only researchers whose main (or only) position is not at a university or in the HEI sector.
- Based on question 28: “How would you compare your remuneration package in your position outside academia to that of people with comparable skills and experience in academia?” and question 10 “In which career stage would you currently situate yourself?”
- (n=525)

6. Mobility, collaboration and networking

The MORE4 Global Survey asked researchers about their mobility patterns including international, intersectoral and interdisciplinary mobility. This section presents the findings regarding mobility and collaboration of EU and non-EU researchers currently working outside Europe. The results obtained in the MORE3 Global Survey are also provided when comparison is possible. It is important to note, however, that the survey is not based on a representative sample and therefore the results and the evolution over time of the indicators need to be interpreted with care. This section is divided into four main sections:

- International mobility (section 6.1)
- Intersectoral mobility (section 6.2)
- Interdisciplinary mobility (section 6.3)
- International collaboration (section 6.4)

Box 4: Main research questions on international, intersectoral, interdisciplinary mobility and collaboration.

International mobility
<ul style="list-style-type: none">• To which countries do they go and for how long do they stay? What is the pattern of mobility to Europe? How long do they stay in Europe?• When they leave Europe after a stay there, to which countries do they go?• Which types of short-term work-related travel are more frequent among researchers?• What contacts do they maintain with the European research community when working outside Europe and what contacts do they have with the non-European research community when they return to Europe? What links do researchers maintain with Europe after they leave?
Intersectoral mobility
<ul style="list-style-type: none">• In which sectors do researchers work?• To what extent have they worked in a different sector before?• Is intersectoral mobility considered by researchers as a positive factor for recruitment and career progression? Does having a previous intersectoral mobility experience affect this perception?
Interdisciplinary mobility
<ul style="list-style-type: none">• In which fields of knowledge do researchers work?• To what extent do they have experience in another field of knowledge/discipline?• In which fields of knowledge is interdisciplinary mobility more frequent?• Is interdisciplinary mobility considered by researchers as a positive factor for recruitment and career progression? Does having a previous interdisciplinary mobility experience affect this perception?
Collaboration
<ul style="list-style-type: none">• To what extent do researchers collaborate in their research with researchers from other fields of knowledge?• To what extent do researchers collaborate in their research with researchers working in organisations located in another country?• To what extent do researchers collaborate in their research with researchers working in a different sector?• Are these collaborations the result of a previous mobility experience?

6.1. International mobility

Global mobility patterns are interesting to map as they reflect the relative attractiveness of global regions and countries as research areas. It is difficult though to obtain a picture of the migration patterns of researchers per country⁵², mainly because it is difficult to track individuals moving across borders. Several methods are found in the literature to overcome this difficulty, with surveys and bibliometric analyses being the most common methods to analyse the global mobility patterns of researchers and the consequences of mobility. While bibliometric analyses⁵³ tend to be constrained by limits in the number of countries and field of science, the MORE3 and MORE4 Global Surveys are characterised by applying a comprehensive approach that includes all fields of science and all countries outside Europe.

This section discusses international mobility and the analysis is structured according to the types of international mobility and collaboration:

- International long-term (> 3 months) mobility (section 6.1.1)
- International short-term (< 3 months) mobility (section 6.1.2)
- Short travel for conferences, meetings and visits (section 6.1.3)
- Networking (section 6.1.4)

6.1.1. International long-term mobility of > 3 months

Mobility patterns

The table below provides an overview of the respondents and their mobility patterns. The sample consists of 492 EU researchers and 2,041 non-EU researchers. The levels of international mobility have decreased since 2017. While in MORE3, the share of researchers that had been > 3 months internationally mobile in the last ten years reached 50%, in 2020 this type of mobility is only indicated by 39% of researchers. Mirroring this evolution, the share of non-mobile researchers has increased by 5 percentage points and the share of researchers that have been mobile more than years ago has witnessed a similar increase.

Table 25: Number of respondents with > 3 month international mobility experience.

	YEAR	LESS THAN TEN YEARS AGO	MORE THAN TEN YEARS AGO	NEVER	TOTAL
EU researchers (TG1)	2017	417	(54)	(55)	417

⁵² C. Franzoni, G. Scellato and P. Stephan 2012. Foreign-born scientists: mobility patterns for 16 countries. *Nature biotechnology*, 30(12): 1250-1253

⁵³ See, for instance: Robinson-Garcia, N., Sugimoto, C. R., Murray, D., Yegros-Yegros, A., Larivière, V., & Costas, R. (2019). The many faces of mobility: Using bibliometric data to measure the movement of scientists. *Journal of Informetrics*, 13(1), 50-63. Another example is the GlobSci survey, which collected information of research scientists in 16 countries and performed a cross-country analysis in 2012.

⁵⁴ In 2017, 81 responses were obtained by EU researchers who were mobile more than 10 years ago.

⁵⁵ In 2017 132 respondents were obtained by researchers with EU citizenship who were never mobile (but are currently working outside the EU). A large share of them indicated to have a double citizenship (EU and non-EU).

	YEAR	LESS THAN TEN YEARS AGO	MORE THAN TEN YEARS AGO	NEVER	TOTAL
	2020	327	⁽⁵⁶⁾	⁽⁵⁷⁾	492
Mobile non-EU researchers that have moved to the EU in the past (TG2)	2017	263	/	/	263
	2020	407	/	/	407
Mobile non-EU researchers that have NOT moved to the EU in the past (TG3)	2017	178	/	/	178
	2020	254	/	/	254
Non-mobile researchers (TG4)	2017	/	211	658	869
	2020	/	359	1,021	1,380
Total	2017	858 (49,7%)	211 (12,2%)	658 (38,1%)	1,727 (100%)
	2020	989 (39%)	446 (17,6%)	1,099 (43,4%)	2,534 (100%)

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

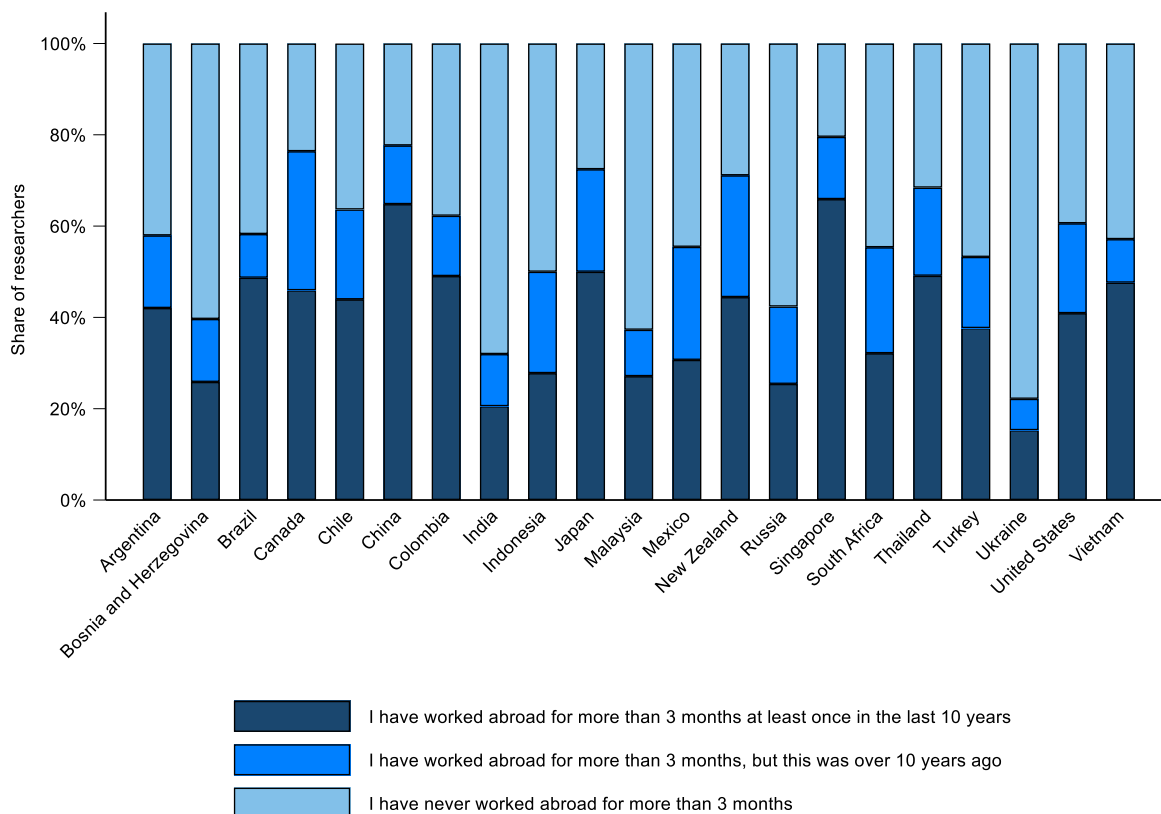
- Based on question 36 “After gaining your highest education qualification (PhD or other), how would you typify your international mobility experience?”
- (2020: n=2,534; 2017: n =1,727)

When looking into the mobility patterns across countries, important differences can be found. Figure 42 shows the distribution of the mobility patterns in a series of countries. The figure refers to the researchers’ current country of employment. Although this figure needs to be interpreted with caution, because the sample is not representative at country level, it provides a good indication of the profiles of the respondents to the survey. In some countries, e.g. China, Singapore, Japan or Vietnam, the shares of internationally mobile researchers (among those currently working there) are relatively high, while other countries like Ukraine, Malaysia and India show lower levels of international mobility.

⁵⁶ In 2020, 87 responses were obtained by EU researchers who were mobile more than 10 years ago.

⁵⁷ In 2020, 78 responses were obtained by researchers with EU citizenship who were never mobile (but are currently working outside the EU). A large share of them indicated to have a double citizenship (EU and non-EU).

Figure 42: Mobility patterns by country of employment.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 36 “After gaining your highest education qualification (PhD or other), how would you typify your international mobility experience?”
- Only those countries having more than 30 respondents in the sample are shown in the figure.
- (2020: n=2,534; 2017: n =1,727)

International mobility with change of employer

In line with the findings for international mobility, the share of mobile researchers that have moved to another country due to a change of employer has decreased over the last years. While in 2017, 45% of the mobile researchers indicated that they had changed employer in one of their long-term international moves in the past ten years, this employer mobility share dropped to 35% in 2020.⁵⁸

Target groups: This decrease has been observed in all the target groups. The highest level of employer mobility is found among EU researchers who are currently working outside the EU (TG1): 50% in 2020 (58% in 2017).

Country of citizenship: This finding is confirmed when looking at the mobility profiles per country of citizenship. Figure 43 shows the level of employer mobility by country of citizenship. The figure only includes those countries for which there are more than 30 respondents in the sample. It includes data for 2017 for those countries with comparable data (>30 respondents) in the previous MORE Global Survey. Germany, France, United Kingdom and Italy are the four nationalities with the most

⁵⁸ A change of employer is sometimes also referred to as job-to-job mobility in the literature.

prominent levels of employer mobility in both 2017 and 2020, compared in particular to citizens from non-EU countries.

Table 26: International mobility with change of employer.

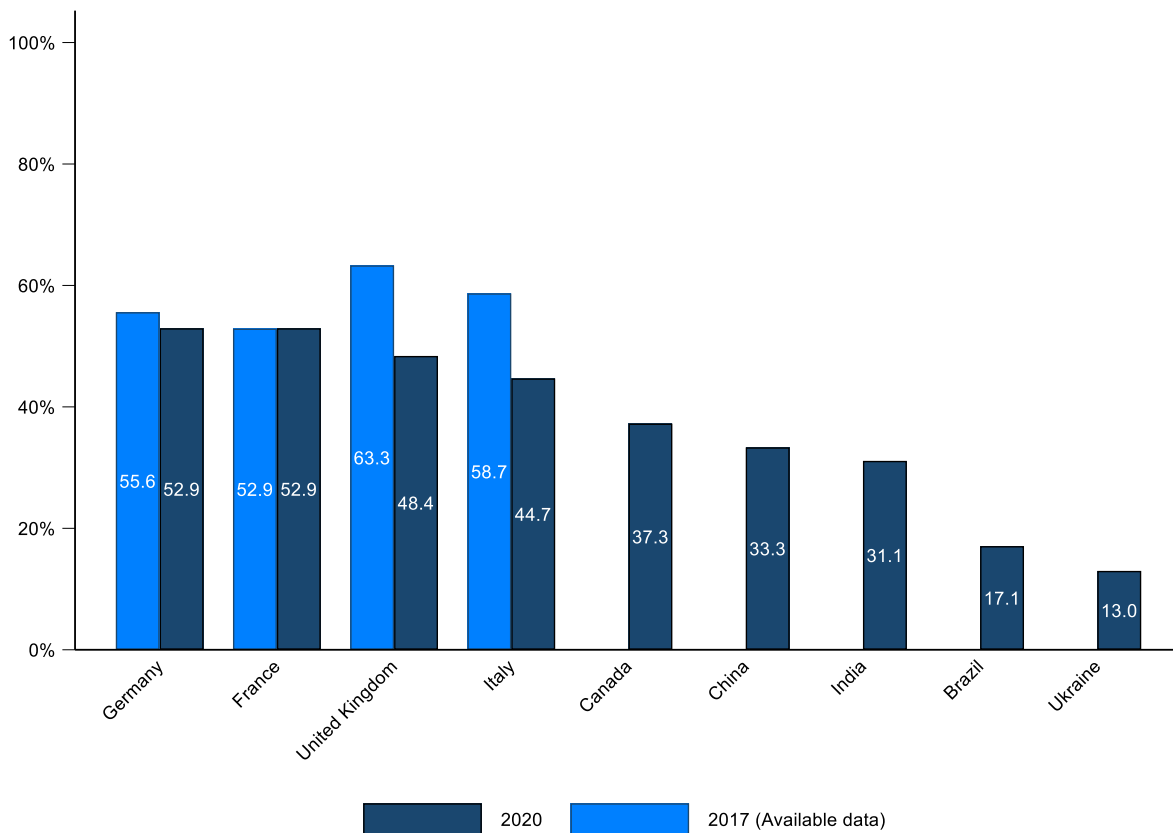
	SHARE OF MOVES WITH EMPLOYER MOBILITY	
	2017	2020
Total: Researchers currently working outside the EU	44.7%	34.8%
TG1: EU researchers currently working outside the EU	58.4%	50%
TG2: Non-EU researchers who have worked in the EU in the past	31.7%	25.8%
TG3: Non-EU researchers who have worked abroad but not in the EU	37.3%	28.4%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 44 “Did you change employer on this step?”
- (2020: n=871; 2017: n =696)

Figure 43: International mobility with change of employer as share of > 3 month international mobility, in the past ten years, by country of citizenship.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 36 “After gaining your highest education qualification (PhD or other), how would you typify your international mobility experience?” question 44 “Did you change employer in this step?” and question 5 “What is your country of citizenship?”
- (2020: n=477; 2017: n=382)
- Only includes countries (by citizenship) with 30 or more researchers in the 2020 and 2017 samples.

Mobility flows and moves

In the MORE3 and MORE4 surveys, researchers were asked to indicate some characteristics of their three most recent international moves of more than 3 months. The figures shown in the following paragraphs are carried out at the level of the moves. In total, 1,714 moves were registered by the respondents in the survey: 981 were EU moves (i.e. move to an EU country) and 733 were non-EU moves (Table 27). A total of 1,532 moves entailed a change towards countries different than the country of citizenship (1,080 in 2017).

Table 27 shows the number of EU and non-EU moves indicated by respondents. This figure shows the total number of moves (including those to the country of citizenship of the researcher).

Table 27: Overview of mobility flows.

	EU MOVES		NON-EU MOVES		TOTAL	
	2017	2020	2017	2020	2017	2020
TG1: EU researchers currently working outside the EU	273	280	297	236	570	516
TG2: Non-EU researchers who have worked in the EU in the past	372	701	103	180	457	881
TG3: Non-EU researchers who have worked abroad but not in the EU	/	/	200	317	200	317
Total	645	981	600	733	1,245	1,714

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 38 “Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career.
- (2020: n=1,714; 2017: n = 1,245)
- This analysis refers to the level of the moves, no weighting has been applied.

Employer change: Table 28 shows the number of moves with and without employer change. This figure only reflects those moves to a country different from the researchers’ country of citizenship. 27% of these moves accompany a change of employer. As observed in the analysis of current mobility patterns (cf. section 0), there is a decrease in employer change moves compared to the MORE3 Global Survey (36%).

Consistent with the previous Global Survey, the results show that EU researchers currently working outside the EU (TG1) have most frequently engaged in mobility with a change of employer (49%), followed by non-EU researchers who have worked abroad but not in the EU (TG3: 28%), and by non-EU researchers who have worked in the EU in the past (TG2: 17%). This suggests that EU researchers who currently work abroad leave the EU more frequently for a new job, whereas non-EU researchers are more likely to leave their countries for academic visits abroad.

Table 28: Overview of mobility flows with employer change.

	NO EMPLOYER CHANGE		EMPLOYER CHANGE		TOTAL	
	2017	2020	2017	2020	2017	2020
TG1: EU researchers currently working outside the EU	239 (52.3%)	209 (51.5%)	218 (47.7%)	197 (48.5%)	457	406
TG2: Non-EU researchers who have worked in the EU in the past	334 (73.9%)	711 (83.1%)	118 (26.1%)	145 (16.9%)	452	856
TG3: Non-EU researchers who have worked abroad but not in the EU	116 (67.8%)	195 (72.2%)	55 (32.2%)	75 (27.8%)	171	270

	NO EMPLOYER CHANGE		EMPLOYER CHANGE		TOTAL	
	2017	2020	2017	2020	2017	2020
Total	689 (63.8%)	1,115 (72.8%)	391 (36.2%)	417 (27.2%)	1,080	1,532

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 44 “Did you change employer in this step”?
- (2020: n=1,532; 2017: n = 1,080)
- This analysis refers to the level of the moves, no weighting has been applied.

Following the same trend observed in MORE3, for TG1 – EU researchers – the largest share of moves with an employer change relate to moves towards non-EU countries (“non-EU moves”): four out of ten moves are made towards non-EU countries. For non-EU researchers (TG2), seven out of ten moves with employer change concern a move towards the EU. It is thus more common to change employer if you move outside the EU for EU researchers and if you move towards the EU for non-EU researchers.

Table 29: Overview of mobility flows with employer change: EU versus non-EU moves.

	EU MOVES		NON-EU MOVES		TOTAL	
	2017	2020	2017	2020	2017	2020
TG1: EU researchers currently working outside the EU	83 (38.1%)	72 (36.6%)	135 (61.9%)	125 (63.4%)	218	197
TG2: Non-EU researchers who have worked in the EU in the past	88 (74.5%)	113 (77.9%)	30 (25.4%)	32 (22.1%)	118	145
TG3: Non-EU researchers who have worked abroad but not in the EU	/	/	55 (100%)	75 (100%)	55	75
Total	171 (43.7%)	185 (44.4%)	220 (56.3%)	232 (55.6%)	391	417

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 44 “Did you change employer in this step”?
- (2020: n=1,532; 2017: n = 1,080)
- This analysis refers to the moves, no weighting has been applied.

Destination countries

The US is the most frequent destination country for the sample of researchers currently working outside the EU (14%). This figure is stable with respect to the results of the MORE3 Global Survey (2017): 16%. When looking only into the moves to EU countries, the larger countries like Germany

(18%), the United Kingdom (14%), and France (12%) continue to be the most popular destinations.⁵⁹ This is in line with the destination countries for researchers currently working in the EU according to the results of the MORE4 EU HEI survey, and related to country size. Below, a more detailed analysis of the destination countries of the different target groups is provided.

Mobility flows of EU researchers towards non-EU and EU destinations (TG1)

The mobility flows of EU researchers can be analysed from two perspectives: first, looking at the countries where they are currently working, and second, analysing mobility from the perspective of the moves that respondents have indicated in the survey.

From the first perspective, it has been observed that the highest number of EU researchers are found in the US (17%), Canada (14%) and China (12%). Table 30 shows the main inflows (by country of citizenship) to the countries with a higher number of respondents. As in 2017, the main inflows in the US originate from Germany, France and Italy. The main inflows in Canada come from France, Germany and The Netherlands.

Table 30: Current location of EU researchers in non-EU countries.

Current country of employment		SHARE	ORIGIN (CITIZENSHIP)		
Current country of employment	United States	17%	Germany	France	Italy
	Canada	14%	France	Germany	Netherlands
	China	12%	Germany	Latvia	France
	Brazil	8%	Italy	(*)	(*)
	Argentina	7%	Italy	(*)	(*)
	Japan	7%	(*)	(*)	(*)

Notes:

- Based on question 22: "Country of current employment?"
- With "moves" defined as moves of three months or more during the last ten years to another country than the country of citizenship of the researcher.
- The symbol (*) indicates that fewer than 10 moves were registered by respondents.
- (n = 406).

When looking at the individual moves reported by the respondents (EU researchers working outside Europe), we observe that 54% of moves have been towards non-EU countries and 46% towards EU countries. The EU countries that have been more frequent destinations among EU researchers working outside Europe are the United Kingdom (10%), Germany (6%) and France (6%). This ranking is similar to the one found in 2017, although we observe that the distribution across countries is more homogeneous in 2020. In 2017, the share of researchers having already been mobile to these countries was much higher, reaching 25% in the case of the United Kingdom, and 13% for both Germany and France.

The most frequent non-EU destinations for TG1 in the analysis of all individual moves are the United States (15%), China (6%), Canada (6%) and Japan (4%). In this case, the distribution across countries is also more homogeneous than in 2017, where the share of moves to these countries was also higher

⁵⁹ In 2017 the results of the MORE3 Global Survey indicated that 10% of the moves were done to the United Kingdom, 9% to Germany and 8% to France.

(as well as to other destinations that seem to have more recently attracted fewer researchers according to 2020 data, such as Australia or Singapore).

Mobility flows of non-EU researchers towards EU destinations (TG2)

Table 31 provides an overview of the moves from non-EU researchers towards the EU. The more frequent destinations are the larger European countries:

- Germany: 20% of the EU moves (15% in 2017)
- United Kingdom: 13% (13% in 2017)
- France: 12% (14% in 2017)
- Spain: 9% (10% in 2017)

In addition to the moves to the EU, this group of researchers also shows a certain degree of mobility towards non-EU countries. Overall, respondents to the survey indicated to have moved to 38 different countries, with the US and Japan the most frequent destinations (6% and 2%, respectively). Table 31 shows the EU countries that are more frequently mentioned by researchers across different regions of origin (defined by citizenship).

Table 31: Mobility flows of non-EU researchers towards the EU.

REGION OF ORIGIN (CITIZENSHIP)	DESTINATION COUNTRY	SHARE OF TOTAL NUMBER OF MOVES OF NON-EU RESEARCHERS
Africa	France	1.0%
	Germany	0.7%
	Spain	0.6%
	Belgium	0.4%
Asia	Germany	7.1%
	United Kingdom	5.0%
	Austria	2.6%
	France	2.4%
Central and Southern America	France	5.4%
	Spain	5.3%
	Germany	4.9%
	United Kingdom	3.0%
Middle East	Germany	1.1%
	United Kingdom	1.0%
	Spain	0.4%
	Slovenia	0,1%
North America	France	1.7%
	United Kingdom	1.4%
	Germany	1.3%
	Switzerland	1.0%
Oceania	Germany	1.1%
	United Kingdom	1.0%

REGION OF ORIGIN (CITIZENSHIP)	DESTINATION COUNTRY	SHARE OF TOTAL NUMBER OF MOVES OF NON-EU RESEARCHERS
Other European countries	France	0.6%
	Finland	0.3%
	Poland	7.1%
	Germany	3.3%
	Austria	2.1%
	Slovakia	1.4%

Source: MORE4 Global Survey (2020).

Notes:

- Count of moves from non-EU countries to the EU by non-EU researchers who have worked in the EU in the past.
- Based on question 38 “Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career.
- With “moves” defined as moves of three months or more during the last ten years to another country than the country of citizenship of the researcher.
- The following regions outside the EU are applied (the countries included in each category reflect the countries of citizenship of the respondents to the survey): Africa (Algeria, Egypt, Nigeria, South Africa, Tunisia); Asia (Bangladesh, British Indian Ocean Territory, India, Indonesia, Japan, South Korea, Laos, Malaysia, Mongolia, Mozambique, Myanmar, Philippines, Singapore, Thailand, Vietnam and China); . Central and Southern America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Guatemala, Mexico, Peru, Uruguay, Cuba); Middle East (Iran, Israel, Turkey); North America (Canada and United States); Oceania (American Samoa, Australia, New Zealand); Other European countries (Albania, Bosnia Herzegovina, Moldova, Republic of North Macedonia, Russia, Serbia and Montenegro and Ukraine)
- (n = 701)
- Only flows towards the four countries with a higher number of moves or more are presented in the table.

Mobility flows of non-EU researchers who have been mobile but not towards the EU (TG3)

For this group, the United States is also an important destination country: 37% of the moves made by non-EU researchers, who have been mobile but not towards the EU, were directed towards the US (30% in 2017). The main regions of origin of the researchers that moved to the US were Central and Southern America (43%), Asia (25%) and European countries outside the EU (12%).⁶⁰ Japan also stands out as an important destination country (11% of the moves); most of the researchers moving to this country originate from Asia.

⁶⁰ Iceland, Switzerland and Norway are not included in this figure.

Table 32: Mobility flows of non-EU researchers towards the non-EU countries.

		Area of origin (by country of citizenship)							Share of responses by country of destination
		Africa	Asia	Central and Southern America	Middle East	North America	Oceania	Other European countries	
Destination	United States	2%	9%	16%	3%	3%	0%	4%	37%
	Japan	1%	7%	1%	0%	1%	0%	0%	11%
	Korea, South	0%	3%	0%	0%	0%	1%	1%	6%
	Australia	0%	1%	0%	0%	2%	0%	0%	4%
	Brazil	0%	2%	1%	0%	0%	0%	0%	4%
	China	0%	1%	0%	0%	1%	0%	1%	4%
Share of responses by area of origin		7%	7%	38%	27%	6%	10%	3%	100%

Source: MORE4 Global Survey (2020).

Notes:

- Only flows towards the four countries with a higher number of moves or more are presented in the table.
- Count of moves from non-EU countries to non-EU countries by mobile non-EU researchers who have never worked in the EU in the past (TG 3).
- Cells in green indicate the share of moves in each couple “destination-area of origin” over the total number of moves made to non-EU countries by mobile non-EU researchers who have never worked in the EU in the past (TG 3).
- Cells in grey indicate the share of moves in each area of origin (over the total number of moves made to non-EU countries by mobile non-EU researchers who have never worked in the EU in the past (TG).
- Cells in yellow indicate the share of moves to each destination (over the total number of moves made to non-EU countries by mobile non-EU researchers who have never worked in the EU in the past (TG).
- Based on question 38 “Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career.
- With “moves” defined as moves of three months or more during the last ten years to another country than the country of citizenship of the researcher.
- The following regions outside the EU are applied (the countries included in each category reflect the countries of citizenship of the respondents to the survey): Africa (Algeria, Botswana, Egypt, Kenya, Nigeria, South Africa, Tunisia); Asia (Bangladesh, British Indian Ocean Territory, India, Indonesia, Japan, South Korea, Laos, Malaysia, Mongolia, Mozambique, Myanmar, Nepal, Pakistan, Philippines, Singapore, Thailand, Vietnam and China); . Central and Southern America (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Guatemala, Mexico, Nicaragua, Peru, Uruguay, Venezuela); Middle East (Gaza Strip, Iran, Iraq, Israel, Turkey); North America (Canada and United States); Oceania (American Samoa, Australia, New Zealand); Other European countries (Albania, Bosnia Herzegovina, Moldova, Republic of North Macedonia, Russia, Serbia and Montenegro and Ukraine).
- (n = 207).

Duration of long-term mobility of more than three months

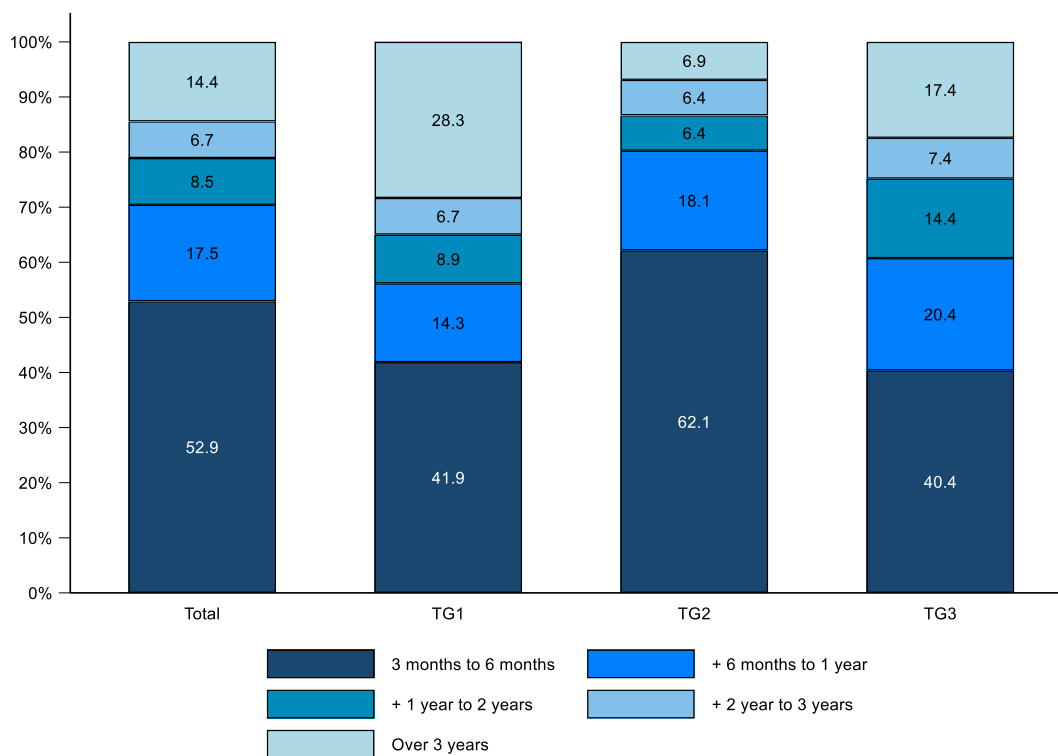
Figure 44 provides an overview of the duration of the moves of three months or more made by researchers who currently work outside Europe. 53% of the moves lasted less than six months (47% in 2017).

Target groups: The share of researchers that moved for shorter periods of time (i.e. from 3 months to 6 months) has increased since 2017. This increase is visible for all target groups. For the non-EU

researchers who have worked in the EU in the past ten years (TG2), this share has grown from 58% in 2017 to 62% in 2020. 36% of the EU researchers who were working outside Europe (TG1) in 2017 had moved for a period between 3 and 6 months. This share reaches 42% in 2020.

Consistently with the findings of the MORE3 Global Survey, this last group of researchers (TG1) has the highest share of moves with a duration of over three years: 28% in 2020 and 26% in 2017. This is consistent with the higher share of employer mobility in this group (see section 7.1.1.1.2), which might indicate that a substantial share of EU researchers currently working abroad moves with the intention of pursuing an academic career abroad and does not just move for academic exchange programmes.

Figure 44: Duration of moves.



Source: MORE4 Global Survey (2020).

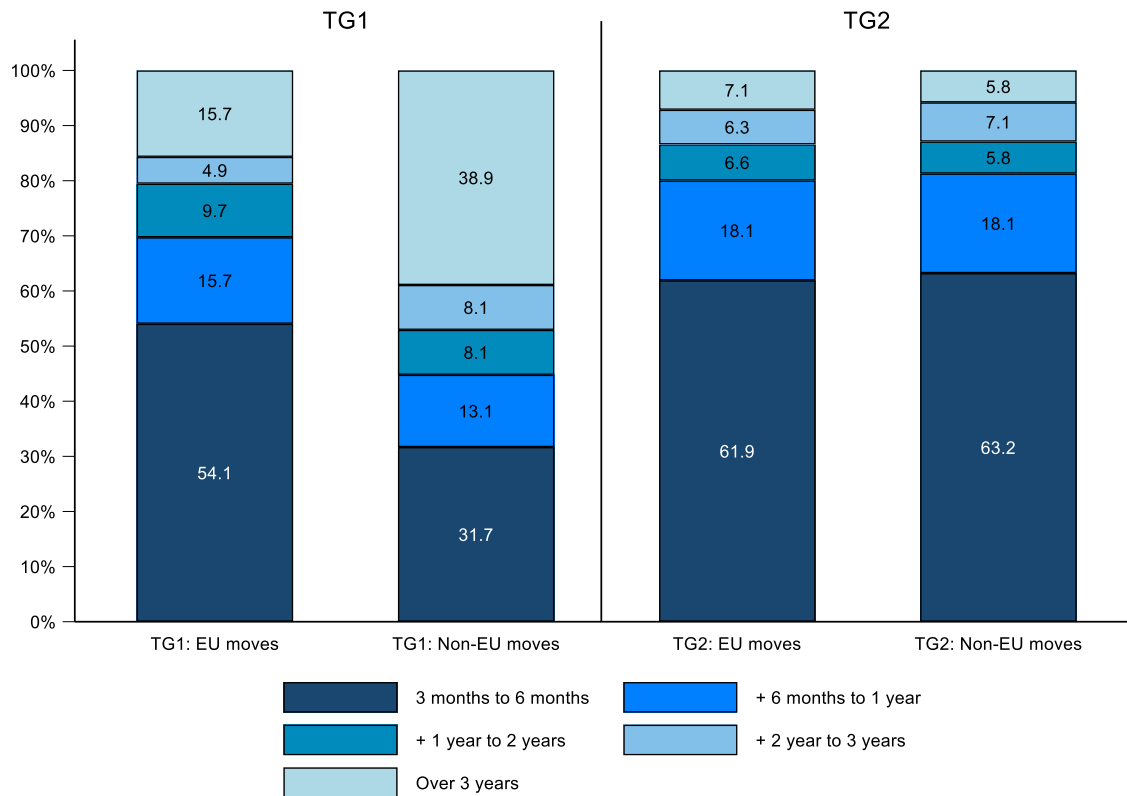
Notes:

- Total: Researchers currently working outside the EU (n=1,532)
- TG1: EU researchers currently working outside the EU (n=406)
- TG2: Non-EU researchers who have worked in the EU in the past (n=856)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=270)
- Based on question 43 “What was the duration of each step”?
- Distribution of moves by target groups
- “Moves” are defined as moves of three months or more in the last ten years to a country different from the researcher’s country of citizenship
- (n=1,532)

Duration of EU and non-EU moves: Moves outside the EU tend to be longer in duration than those inside the EU for EU researchers working outside Europe (TG1): 55% of the moves outside Europe have a duration of over a year compared to 39% of the moves inside Europe (50% and 39% in 2017 respectively).

Among non-European researchers that have worked in Europe in the past (TG2) the patterns are very similar between EU and non-EU moves: six out of ten moves tend to have a short duration (between 3 and 6 months). On the opposite side, less than one move out of ten has a duration of more than three years.

Figure 45: Duration of EU and non-EU moves.



Source: MORE4 Global Survey (2020).

Notes:

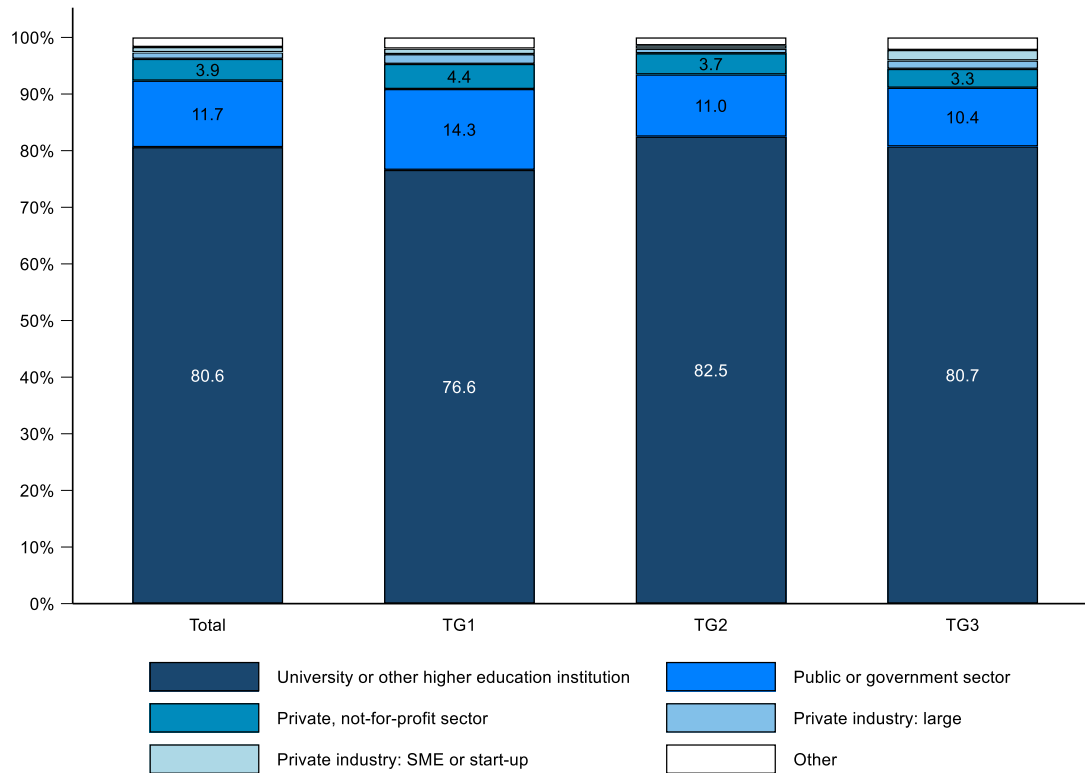
- Total: Researchers currently working outside the EU (n=1,532)
- TG1: EU researchers currently working outside the EU (n=406)
- TG2: Non-EU researchers who have worked in the EU in the past (n=856)
- Based on question 43 “What was the duration of each step”?
- Distribution of moves
- “Moves” are defined as moves of three months or more in the last ten years to a country different from the researcher’s country of citizenship
- (n=1,532)

Destination sector of long-term mobility of more than three months

As in 2017, most of the moves indicated by researchers are made towards another university or higher education institute (81% of the moves in both 2020 and 2017). This is also the case across the different target groups, with shares above 75% in each of them. 11% of the international moves in 2017 were related to moves towards a public or government sector, a share that remains stable in 2020 (12%).

Target groups: The patterns are very similar across target groups. The only exception to this observation relates to moves towards the public or government sector, which are slightly higher among EU researchers currently working outside Europe (TG1): 14% of moves compared to 11% of the total population.

Figure 46: Destination sector of moves.



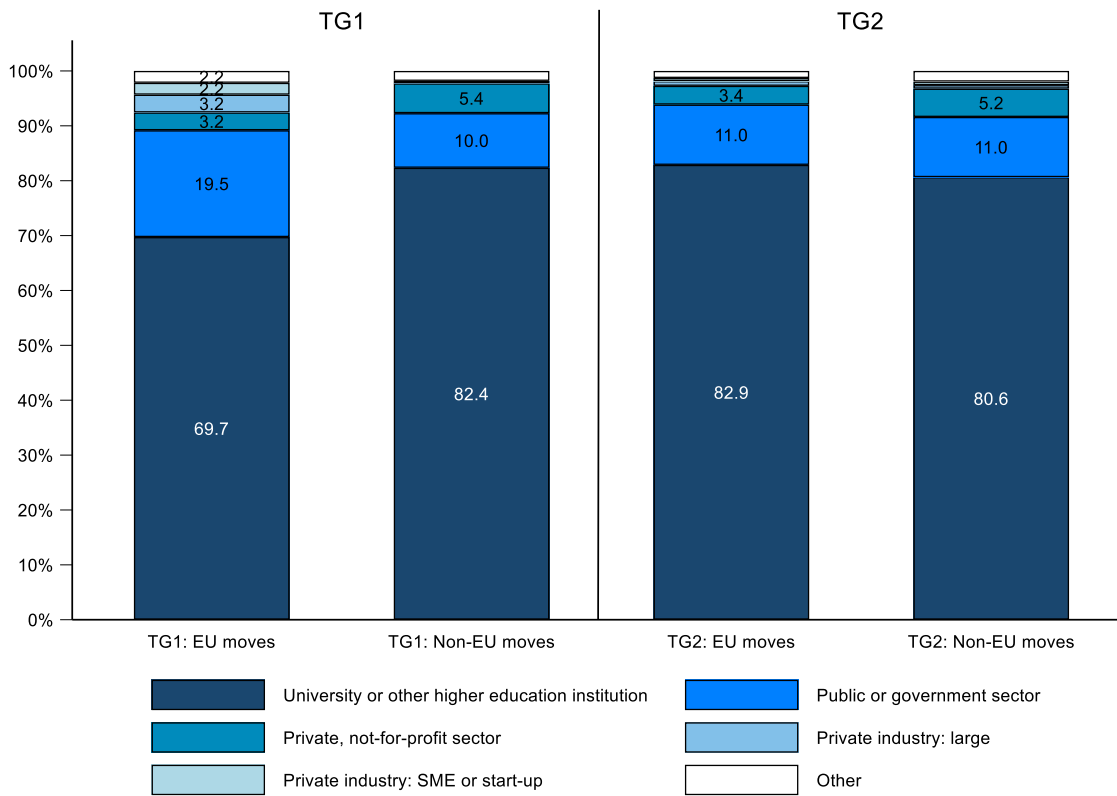
Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU (n=1,532)
- TG1: EU researchers currently working outside the EU (n=406)
- TG2: Non-EU researchers who have worked in the EU in the past (n=856)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=270)
- Based on question 45 “What was the destination sector?”
- Distribution of moves by target groups (n=1,532)
- “Moves” are defined as moves of three months or more in the last ten years to a country different from the researcher’s country of citizenship

Destination of EU and non-EU moves: For both TG1 and TG2, moves inside or towards the EU more frequently concern moves towards the public or government sectors than moves outside the EU. Moving towards the public or government sector is more frequent when moving towards EU countries for both EU and non-EU researchers (TG1 and TG2). This was also observed in 2017, although the shares have increased since then, especially for EU researchers (TG1), which experienced a rise of 6 percentage points from 14% in 2017 to 20% in 2020.

Figure 47: Destination of EU and non-EU moves.



Source: MORE4 Global Survey (2020).

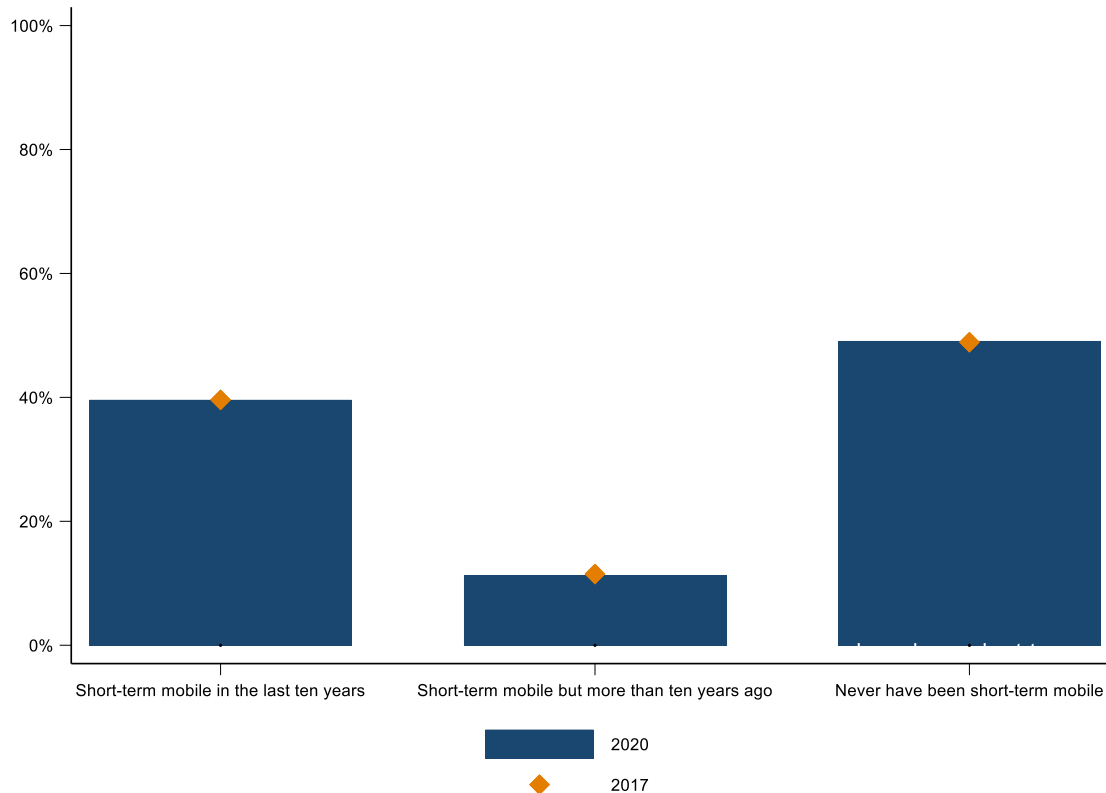
Notes:

- Total: Researchers currently working outside the EU (n=1,532)
- TG1: EU researchers currently working outside the EU (n=406)
- TG2: Non-EU researchers who have worked in the EU in the past (n=856)
- Based on question 45 “What was the destination sector?”
- Distribution of moves
- “Moves” are defined as moves of three months or more in the last ten years to a country different from the researcher’s country of citizenship

6.1.2. Short-term international mobility

The MORE4 Global Survey also included questions on shorter-term moves (i.e. of less than three months). This section presents the main findings in terms of short-term mobility; a distinction is made between ‘recent’ short-term mobility (less than ten years ago) and short-term mobility more than ten years ago.

Figure 48: Short-term mobility (stock).



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 77 “How would you typify your experience with short term mobility (of less than 3 months at a time)?”
- (2020: n=2,369; 2017: n= 1,727)

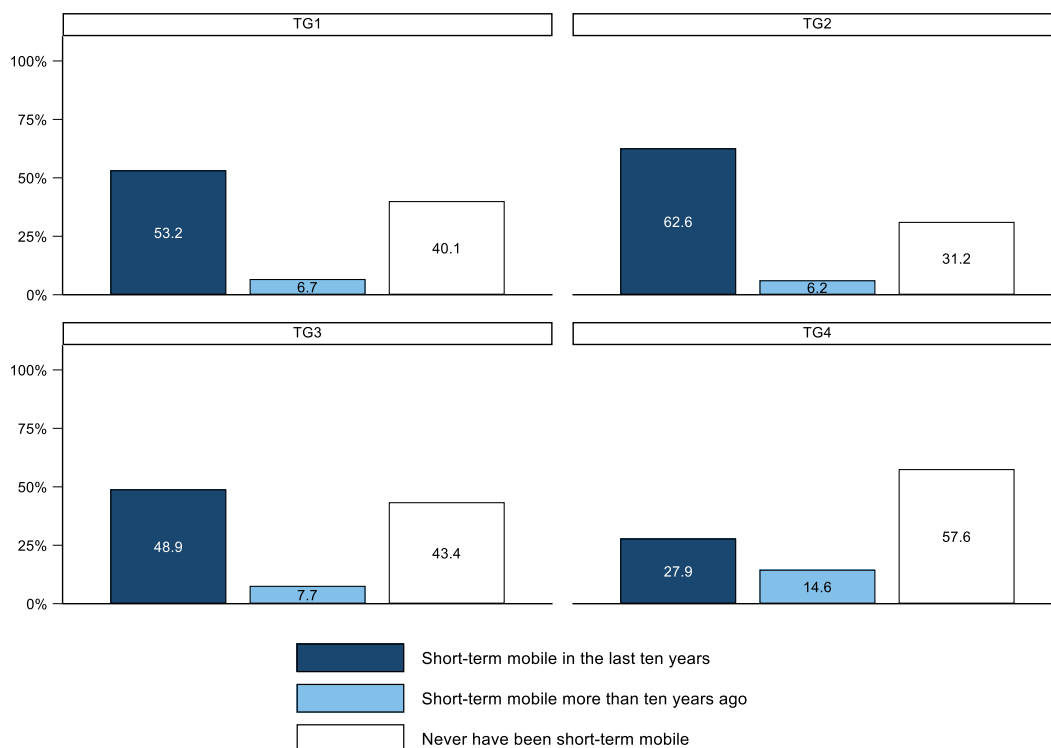
Figure 48 shows the stable evolution of this indicator since 2017: 40% of the researchers who currently work outside the EU have worked abroad for less than 3 months at least once in the last ten years. This stability contrasts with the findings obtained in the MORE4 EU HEI survey, where it was found that short-term mobility seemed to be slowly declining over time. The overall levels of mobility are, however, in line with the MORE4 EU HE Survey (49% of respondents in both surveys indicated that they have never been mobile). Similar to the results obtained in 2017, 12% of researchers working outside Europe indicated that they were mobile for less than 3 months, but that this was more than 10 years ago (11% in 2017).

Gender: The MORE EU HE surveys have showed that the levels of short-term mobility among female and male researchers working in Europe have converged over time, reaching a very similar level in 2020. In the MORE4 Global Survey, it has been observed that, also outside Europe, the gap between

men and women is decreasing. Women tend to be less short-term mobile (in the last ten years) than men: 38% versus 40% respectively. These figures were 37% and 41% in 2017.

Career stage: With respect to career stages, it can be observed that short-term mobility (in the last ten years) is more frequent in higher career stages: 27% among R1; 35% among R2; 41% among R3 and 50% among R4. These results are in line with those obtained in 2017, where the shares for the respective career stage were the following: 29%, 35%, 40% and 49% (R1, R2, R3 and R4).

Figure 49: Short-term mobility per target group.



Source: MORE4 Global Survey (2020).

Notes:

- TG1: EU researchers currently working outside the EU (n= 327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1380)
- Based on question 77 “How would you typify your experience with short-term mobility (of less than 3 months at a time)?”
- (n= 2,369)

Target groups: As in 2017, there are important differences across target groups (see Figure 49). Short-term mobility is less likely among non-EU researchers that have not worked for more than 3 months in another country (TG4): 58%. The same percentage was observed in 2017. Conversely, non-EU researchers having been to Europe in the past (TG2) are those that display a higher level of short-term mobility in the last ten years: 63% (60% in 2017).

This confirms a trend observed in 2017: EU researchers working abroad are less likely to move for short-term periods compared to mobile non-EU researchers: 53% of EU researchers (TG1) have done so compared to 63% of non-EU researchers having worked in EU countries (TG2). However, the share

is still higher than the 49% of non-EU researchers that have worked in third countries but never in the EU (TG3).

Country of current employment: Figure 119 presents the share of researchers that have been short-term mobile in the last ten years in 2017 and 2020 by country of current employment. Interestingly, neither geographical patterns nor variation over time suggest significant conclusions. Some countries seem to have much higher levels of short-term mobility, like Thailand or Vietnam, than others, like Ukraine or India. In terms of evolution over time, there is little variation in some countries (see Japan), while others present strong increases (South Africa) or decreases (China). These results need to be read with caution due to the fact that the survey has not been designed to provide representative data at country level and the fact that the figure presents only those countries for which there are more than 30 respondents in the 2020 sample (or the 2017 sample for the countries for which data for this year is displayed).

6.1.3. *Short travel for conferences, meetings and visits*

In the MORE4 Global Survey (similar to the MORE4 EU HE Survey), researchers were asked about the type of work-related international travel they have undertaken during their research career, covering: conferences, study visits and/or meetings with supervisors/partners/collaborators. An overview is provided below. More detailed information and figures are included in Annex 8.

The most frequent type of short-term international travel among researchers working outside Europe relates to attending conferences (87%), followed by travel to meet with supervisors, colleagues or partners (77%) and study visits (75%).⁶¹ These figures are stable with respect to 2017 (93%, 76% and 78% respectively).

Target groups: When looking at the differences across target groups, the survey results indicate the following results:

- No large differences are found across the target groups reflecting mobile researchers (TG1, TG2, and TG3) with respect to the types of short-term international travel. The patterns are similar to those seen in 2017.
- When looking at the frequency of the moves, EU researchers working abroad (TG1) continue to be those with higher shares of frequent short-term travel, in particular to attend conferences, and to meet with supervisors, partners, and/or collaborators. This indicates that EU researchers are in a comparatively good position when considering international exposure and links.
- Consistent with MORE3 findings, non-EU researchers that have never been mobile (TG4) are less likely to undertake this type of short-term international travel than the other target groups.

6.1.4. *Networking and remaining connected with Europe*

Previous studies⁶² have shown that mobile scientists are more likely to establish connections with researchers located in other countries. The MORE Global Surveys aim to obtain insights into the types of networking activities and international links that mobile researchers have and the extent to which they engage in them. In order to do so, the MORE Global Surveys included questions on the types of

⁶¹ These shares reflect those researchers doing these types of moves rarely, often or sometimes.

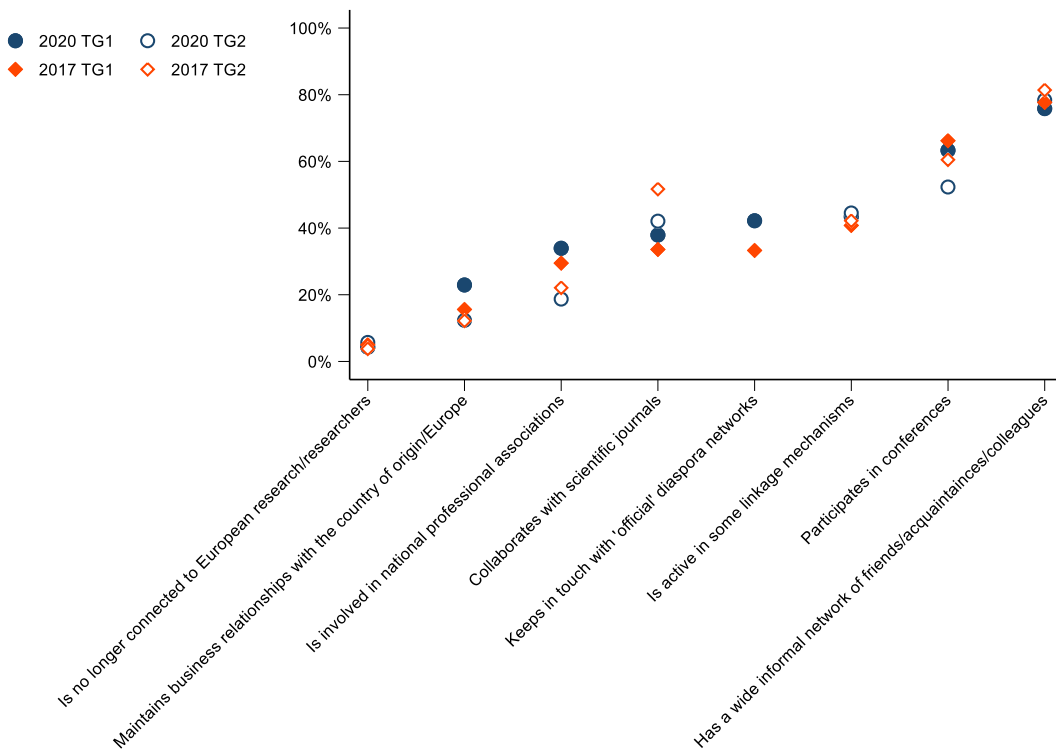
⁶² G. Scellato, C. Franzoni, and P. Stephan. Scientists and International Networks, NBER Working paper No. [18613](#), December 2012.

connections that researchers with an EU mobility experience maintained with Europe and European researchers - i.e. among EU researchers working abroad (TG1) and among non-EU researchers that have previously worked in Europe (TG2).

In 2017, the results of the MORE3 Global Survey indicated that the most frequent connections maintained with Europe were: 1) having a wide informal network of friends/acquaintances/colleagues; and 2) participation in conferences. These findings are confirmed in 2020.

Target groups: Figure 50 shows the share of researchers within each target group that aim to maintain each type of connection with Europe. The pattern of connections is very similar for both target groups and is quite stable over time. The most notable differences relate to the collaboration with scientific journals in Europe, where the share is higher among the group of non-EU researchers compared to their EU counterparts. EU researchers are more likely to participate in conferences, be involved in national professional associations and to maintain business relationships with Europe.

Figure 50: Network with Europe.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- (*) Note: the item on “official” diaspora networks was only asked to EU researchers currently working abroad.
- Based on questions 50 “Please indicate below the type of connections you still maintain with Europe”, and question 63 “Please indicate below the type of connections you still maintain with European research/researchers”
- (2020: TG1: EU researchers currently working outside the EU (n=417))
- (2020: TG2: Non-EU researchers who have worked in the EU in the past (n=263))
- (2017: TG1: EU researchers currently working outside the EU (n=327))
- (2017: TG2: Non-EU researchers who have worked in the EU in the past (n=407))

6.2. Intersectoral mobility

This section discusses the levels of intersectoral mobility found among researchers working outside Europe and who have obtained (or are working on) a PhD. Mobility between different research sectors, such as between academia and the industrial sector – or others, such as not-for-profit – is crucial for the exchange of ideas, exploiting knowledge and more generally for innovative capability. Intersectoral mobility is even more important when the business sector becomes more R&D-intensive and demands more researchers, which tend to work primarily in higher education and government.

This section discusses intersectoral mobility and the analysis is structured according to the following topics:

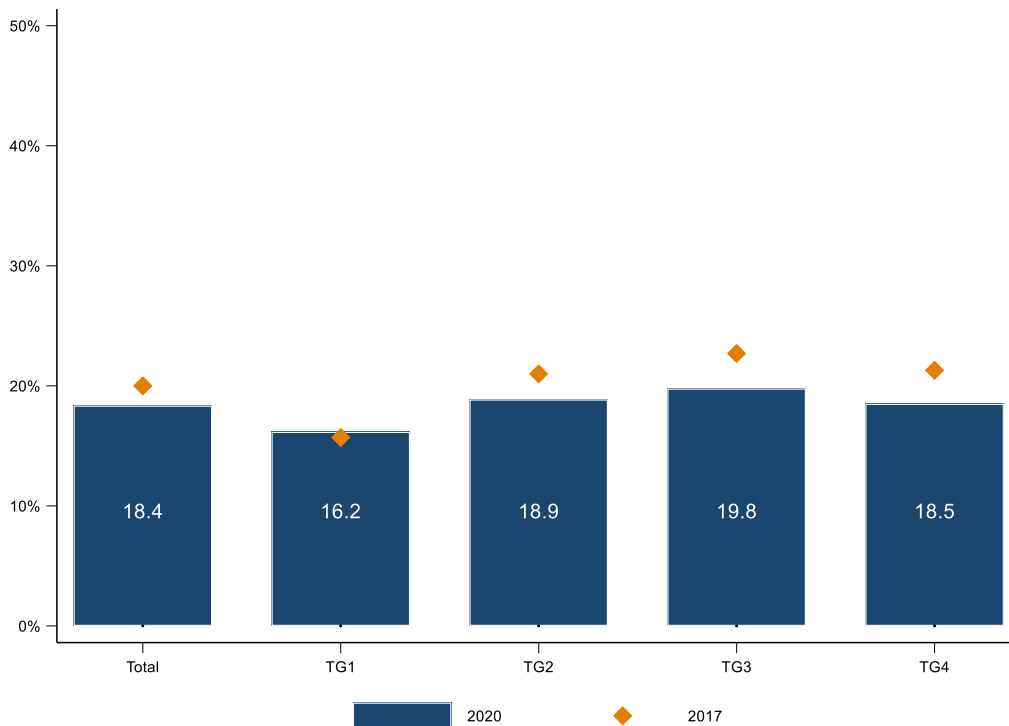
- Level of intersectoral mobility among researchers (section 6.2.1)
- Flows and moves (section 6.2.2)
- Effects (section 6.2.3)

6.2.1. *Level of intersectoral mobility among researchers*

The survey questioned researchers about the sectors in which they currently work (as researchers), whether they are currently in a dual-position (whereby they are employed in more than one institution/organisation at the same time) and whether they have worked in a different sector in the last ten years. 20.5% of the sample of researchers currently working outside the EU indicate that they have been intersectorally-mobile (regardless of the sector they work in). There are no large differences across the four main groups on this dimension but researchers currently working outside the EU and non-EU researchers who have never worked abroad tend to be less intersectorally-mobile (see Figure 123 in annex 7).

Target groups: Figure 51 sets out the level of intersectoral mobility among researchers currently working in Higher Education Institutions (HEIs across target groups. Overall, in 2020, on average, roughly one out of five (the same share as in 2017) researchers working outside the EU has some type of intersectoral mobility experience, but EU researchers have a lower share of participation in intersectoral mobility compared with the rest of the target groups. Compared to 2017, the figures are stable for the group of EU researchers currently working outside Europe (16% in both studies). In the other target groups, the level of intersectoral mobility amongst researchers has slightly decreased over time between one and five percentage points.

Figure 51: Intersectoral mobility in the last ten years: researchers currently working in higher education institutions.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

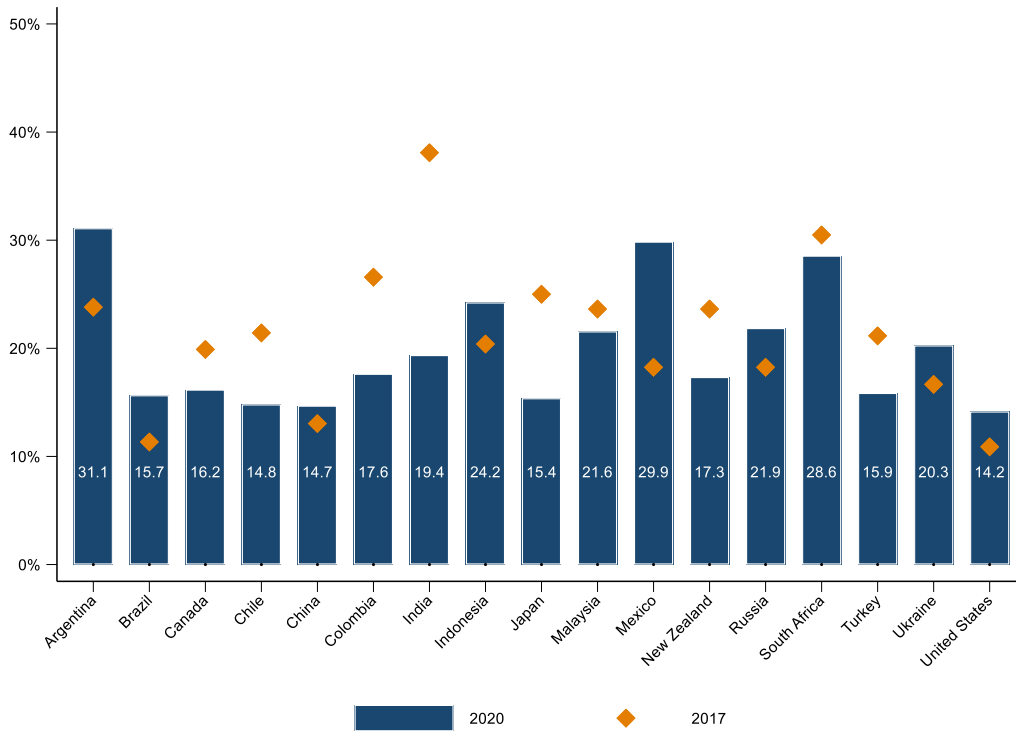
- Total: Researchers currently working outside the EU (2020: n=1,722, 2017: n=1,274)
- TG1: EU researchers currently working outside the EU (n=266)
- TG2: Non-EU researchers who have worked in the EU in the past (n=309)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=199)
- TG4: Non-EU researchers who have never worked abroad (n=949)
- Based on Question 16 “What is your current sector of employment as a researcher?”, and Question 18 “Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2010-2020)?”

Gender: The survey results indicate that there are no differences as to the extent to which women and men currently working in HEIs have an intersectoral mobility experience: 18% of the researchers in both groups.

Country of current employment: The survey sheds light on the extent to which intersectoral mobility is more or less frequent across countries. Figure 52 shows researchers that have been intersectorally-mobile in the last ten years and who are currently working in HEIs . The shares range between 31% in Argentina to 14% in the US. Regarding the latter, US-based researchers working in Engineering and Technology and in Agricultural Science show higher-than-average shares of intersectoral mobility (29% vs 20% in the overall sample and 33% vs 25% in the overall sample respectively). However, in other scientific fields, US-based researchers show lower levels of intersectoral mobility than those found in the total sample of researchers working outside Europe. This is notably the case among researchers working in the Natural Sciences: US-based researchers working in this discipline have a much lower percentage share of participation in intersectoral mobility than the general population of researchers working outside Europe: 5% vs 15% respectively. Overall, the trends in intersectoral mobility across different fields of research have not changed significantly between 2017 and 2020 in the US.

It is interesting to note however, that the analysis in Figure 52 should be taken with caution since the sample is not designed to be representative at country level and that only those countries with more than 30 respondents in MORE4 have been taken into account.

Figure 52: Intersectoral mobility in the last ten years: across countries.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- The country of reference is the country of current employment.
- The figure does not report intersectoral mobility in Thailand and Bosnia and Herzegovina in 2017 due to a lack of data.
- Based on Question 16 “What is your current sector of employment as a researcher?”, and Question 18 “Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2010-2020)?” and question 20 “Country of current employment”
- Only considers countries where 30 or more researchers are currently employed.
- (2020: n=1,722, 2017: n=1,363)

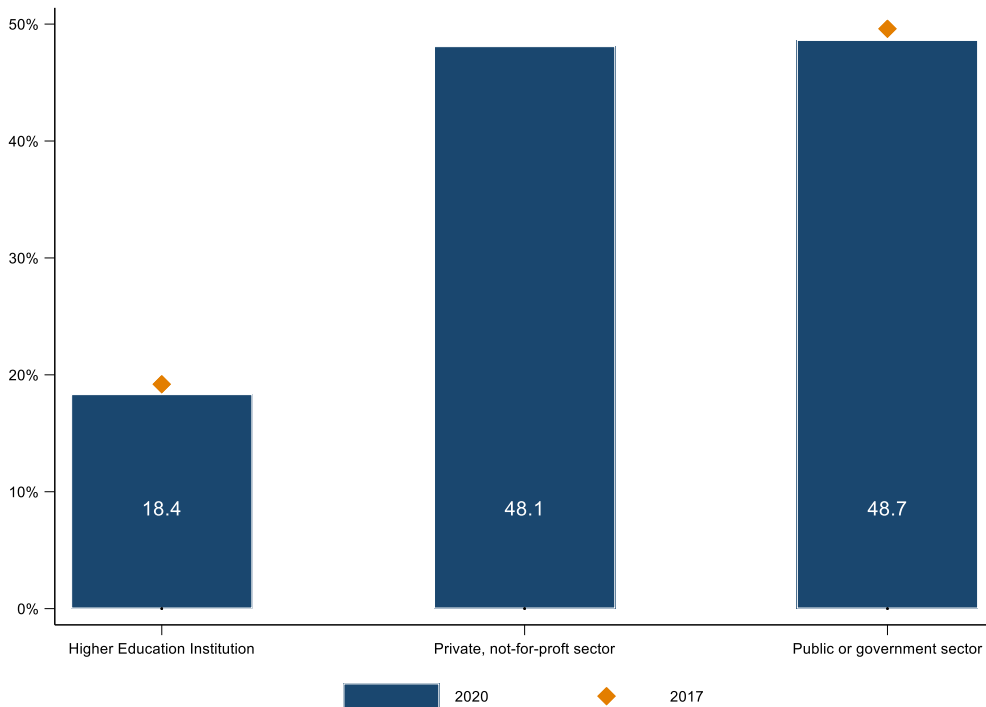
6.2.2. Flows and moves

Type of sector: The survey also provides information on the levels of intersectoral mobility across different sectors. Figure 53 shows the sectors in which intersectorally-mobile researchers currently working in HEIs have previously worked in ⁶³. This figure shows that there are very large differences between researchers working in HEIs and other types of researchers. Whereas nearly half of the researchers working in the public sector have previously worked in a different sector, only 18% of the researchers in the HEIs has had a previous intersectoral mobility experience. This difference can be explained by the fact that in the public sector, a large number of researchers has previously worked in a HEI (56%). This is specially the case when considering the early stages of researchers’ careers,

⁶³ Intersectoral mobility in other sectors – not-for-profit organisations, large companies, and SMEs and start-ups – is not reported due to the low number of respondents in these categories (n<30).

where universities are more likely to propose short-term contracts than government institutions, for instance, in the form of contracts to develop a PhD thesis or for short-term postdoctoral positions. Moreover, only very small differences in intersectoral mobility levels between 2017 and 2020 across sectors can be observed. No comparison with MORE3 can be made regarding the moves in the private, not-for-profit sector since the number of survey responses in 2017 was too small.

Figure 53: Previous intersectoral mobility by type of sector.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- The figure for the intersectoral mobility of researchers working in Private industry: SMEs or start-ups, Private industry: both large firms, and the private, not-for-profit sector are not reported for 2017 because the number of available survey responses is below 30.
- Based on Question 16 “What is your current sector of employment as a researcher?”, and Question 18 “Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2010-2020)?”
- (2020: n=2,045; 2017: n=1,635)

6.2.3. Effects

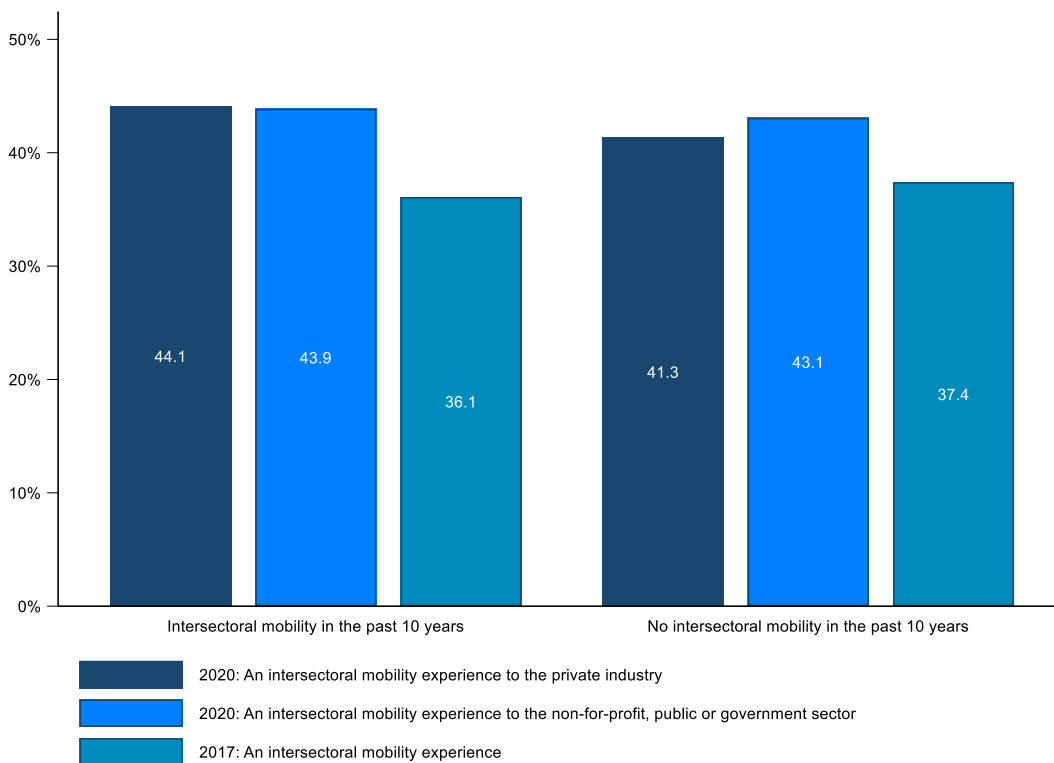
The survey included questions on the perception of intersectoral mobility as a positive or negative factor for recruitment among those researchers currently employed in HEIs. A detailed analysis in this regard is provided in section 4.3.2. It is interesting to note that having an intersectoral mobility experience (or not) is related to the perception of it being a positive or negative factor for recruitment (see Figure 54).

There were similar findings when analysing perceptions about the consequences of intersectoral mobility on career progression (also see section 4.4.2): there are no major differences between researchers that have been mobile and those that have not (see Figure 55). Future research should investigate whether these perceptions change across sectors: the limited number of responses from

researchers having had a previous mobility experience in the private sector prevents us from shedding light on this question.

Figure 54 and Figure 55 show that in 2020, intersectorally-mobile as well as non-intersectorally mobile researchers perceived intersectoral mobility to have a more positive effect on both career progression and recruitment in their home institution than in 2017. Overall, having an intersectoral mobility experience to the not-for-profit, public or government sector is considered to have a better effect on recruitment and career progression than experience in private industry.

Figure 54: Perception of the positive effect of intersectoral mobility on recruitment in home institution.

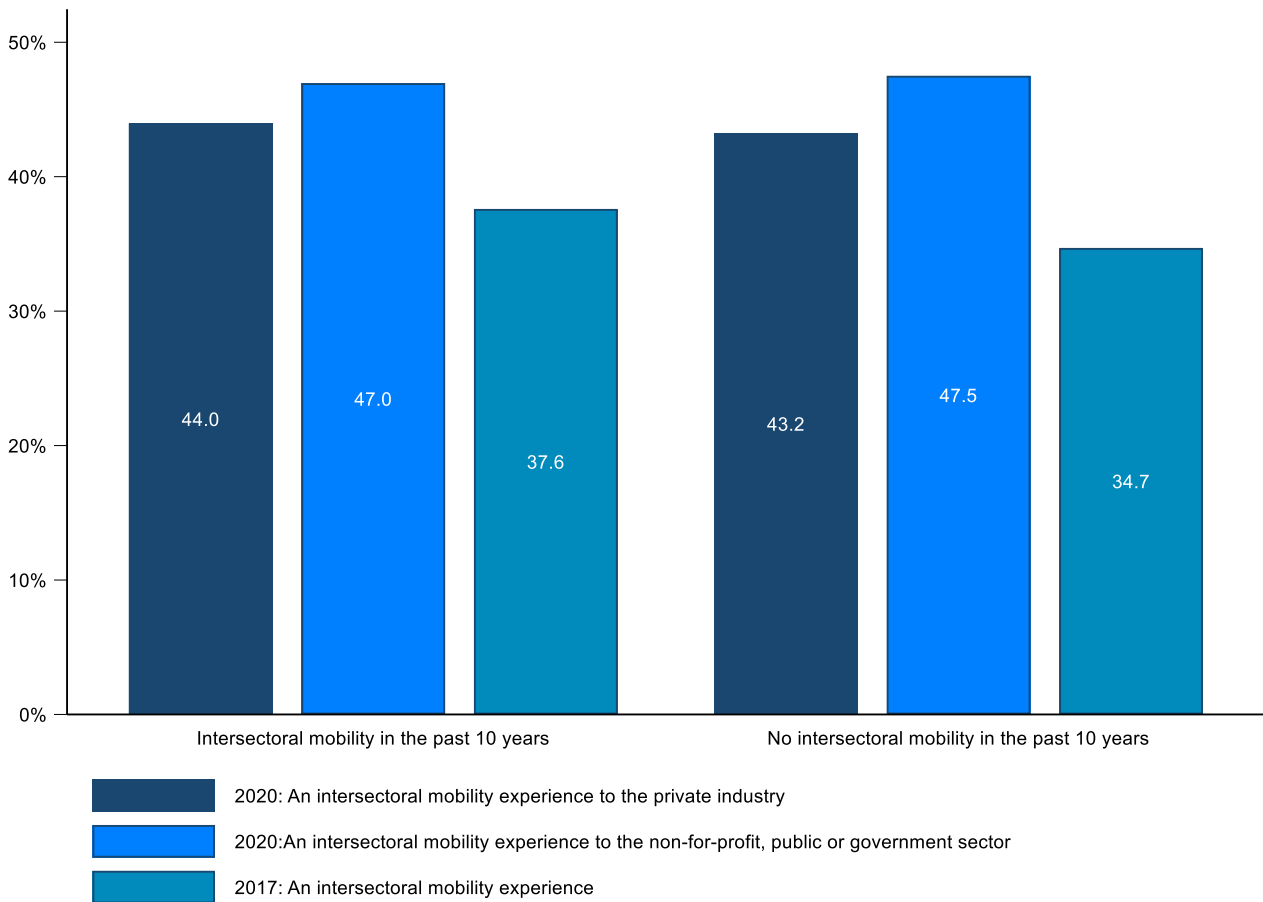


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on Question 16 “What is your current sector of employment as a researcher?”, Question 18 “You are currently in dual position whereby you are employed in more than one institution/ organisation at the same time. Can you indicate the sector of your 2 main research positions?” (only the main position is considered in the Figure), and Question 31 “In your experience, would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?”
- (2020: n=1,722; 2017: n=1,512)

Figure 55: Perception of the positive effect of intersectoral mobility on career progression in home institution.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on Question 16 “What is your current sector of employment as a researcher?”, Question 18 “You are currently in dual position whereby you are employed in more than one institution/organisation at the same time. Can you indicate the sector of your 2 main research positions?” (only the main position is considered in the Figure), and Question 32 “In your experience, would you say that the following factors are regarded as positive or negative factors for career progression in your home institution?”
- (2020: n=1,722; 2017: n=1,521)

6.3. Interdisciplinary mobility

This section discusses the levels of interdisciplinary mobility of researchers working outside Europe. Interdisciplinarity is often seen as a key driver of research breakthroughs⁶⁴ and a means of fostering innovative approaches to developing solutions to societal challenges as part of mission-driven research.

⁶⁴ See, e.g., Schilling, M. A., Green, E., "Recombinant search and breakthrough idea generation: An analysis of high impact papers in the social sciences", *Research Policy*, 2011, 40(10), pp. 1321–1331.

The growing importance of knowledge economies today is related to an increase in interactions between disciplines. Although there are various definitions of interdisciplinarity,⁶⁵ interdisciplinary mobility - understood as mobility across research fields - can contribute to the interaction across disciplines, and it can lead to the emergence of new research questions and new approaches to problems.

Interdisciplinary mobility is, together with international and intersectoral mobility, one of the cornerstones of European research and innovation policies and programmes (e.g. the Marie Skłodowska-Curie actions⁶⁶ and the European Research Council grant schemes⁶⁷), although it tends to receive less attention than the other two main types of mobility (intersectoral and international mobility). Despite this, as shown below, researchers continue in 2020 to consider this type of mobility as being a more positive factor in the recruitment and/ or career progression of researchers than intersectoral mobility.

This section discusses the findings related to interdisciplinary mobility in the MORE4 Global Survey. The analysis is structured according to the following topics:

- Level of intersectoral mobility among researchers (section 1296.3.1)
- Flows and moves (section 6.3.2)
- Effects (section 6.3.3)

6.3.1. Level of interdisciplinary mobility among researchers

Approximately a third of survey respondents stated that they had switched to another (sub)field of research during their career. This indicator shows stability with respect to 2017 (see Figure 56).

Target groups: When looking into the overall figures per target group, it can be observed that the four target groups had similar levels of interdisciplinary mobility, the largest difference being the one between EU researchers (TG1) and non-EU researchers having worked previously in the EU (TG2) (31% and 36% respectively). Overall, interdisciplinary mobility is stable across both target groups and time.

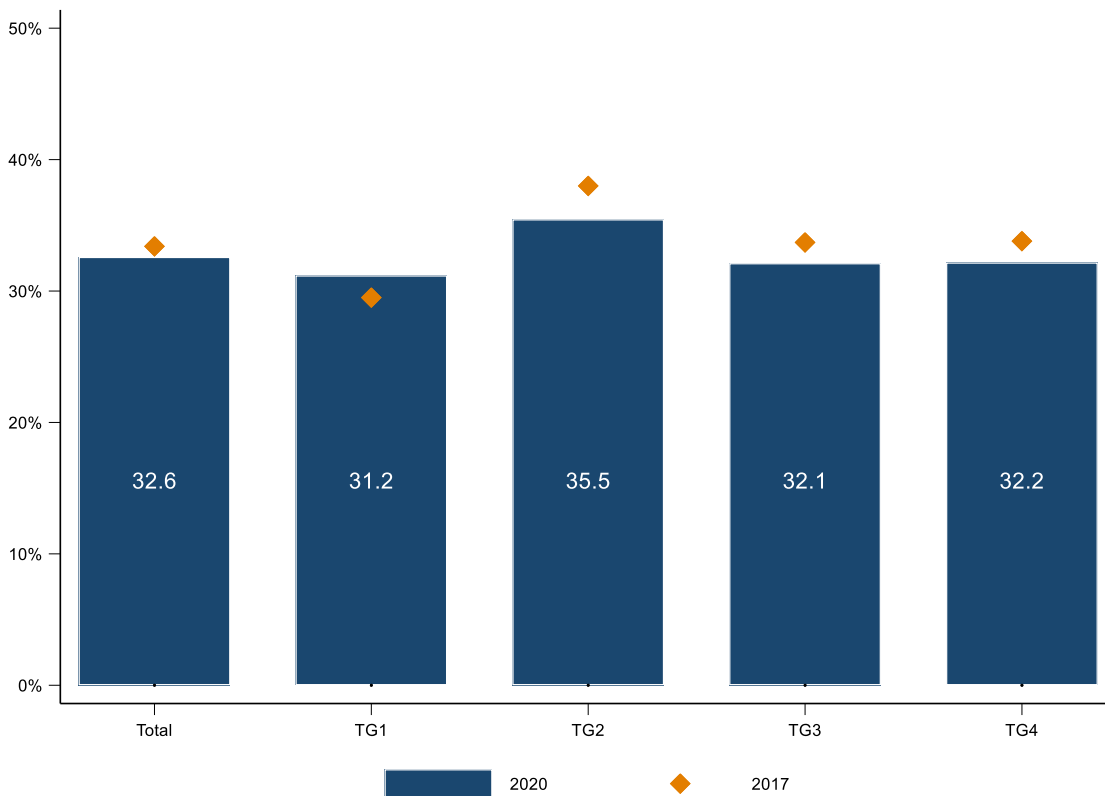
Gender: The MORE3 Global Survey revealed the existence of minor gender differences between researchers of different sexes in this regard. The results of the MORE4 Global Survey indicate that the level of interdisciplinary mobility by gender is converging over time: in 2020 32% of men and 33% of women have been interdisciplinarily-mobile.

⁶⁵ Qin, J, Lancaster, F. W., Allen, B. "Types and levels of collaboration in interdisciplinary research in the sciences." JASIS 48.10, 1997, pp. 893-916.

⁶⁶ COMMISSION (DG RTD). 2012. Marie Curie Actions- Where Innovation Science becomes success. Available: http://ec.europa.eu/research/mariecurieactions/documents/documentation/publications/eu-marie-curie-actions-fellowships-innovative-science-becomes-success-publication_en.pdf

⁶⁷ ERC (2009). Towards a world class Frontier Research. Organisation Review of the European Research Council's Structures and Mechanisms. https://erc.europa.eu/sites/default/files/content/pages/pdf/final_report_230709.pdf

Figure 56: Interdisciplinary mobility.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,381)
- Based on question 9 “Did you switch to another (sub)field of research during your career?”

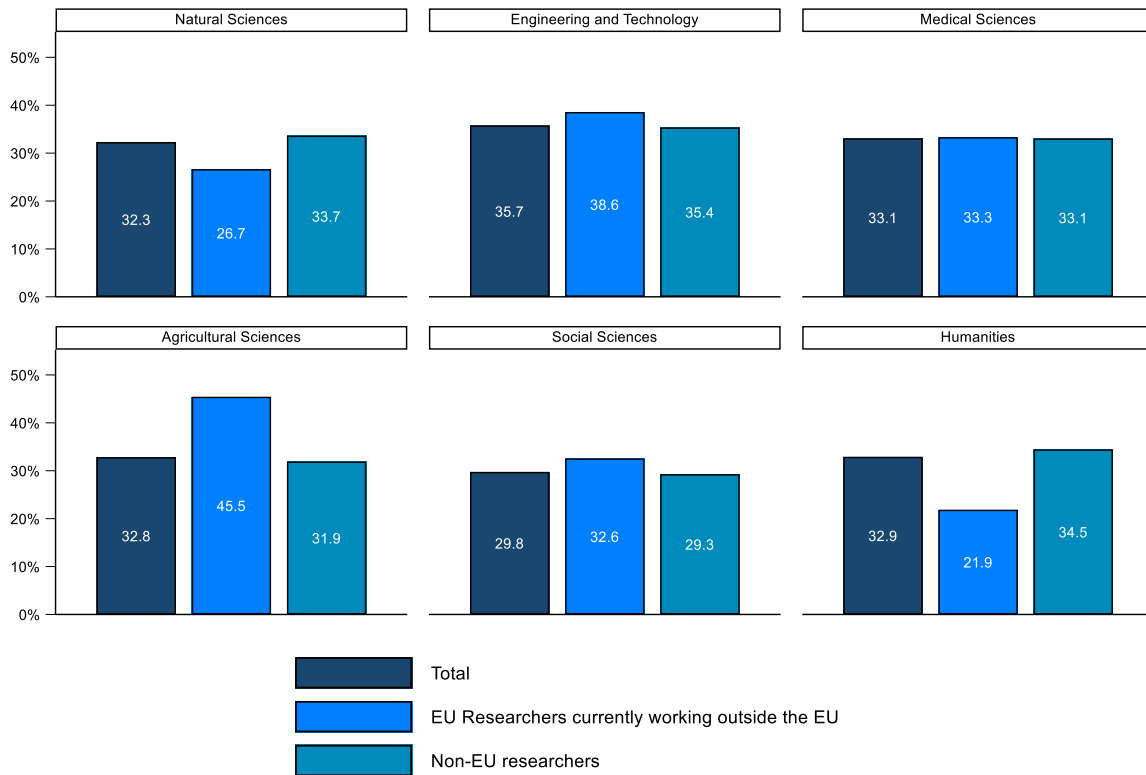
6.3.2. *Flows and moves*

In spite of the homogeneity displayed across target groups with respect to their levels of interdisciplinary mobility, larger differences emerge when looking at the question from the perspective of disciplines and countries. With respect to the former, Figure 57 shows the differences between EU and non-EU researchers across disciplines. Like in 2017, in 2020, researchers employed in Engineering and Technology tend to be more interdisciplinarily mobile (36%) than researchers working in other disciplines, followed by researchers in the Medical Science (33%). One of the reasons for the higher level of interdisciplinarity among researchers working in Engineering and Technology might be related to the increasing embeddedness of IT disciplines within these (sub)disciplines.

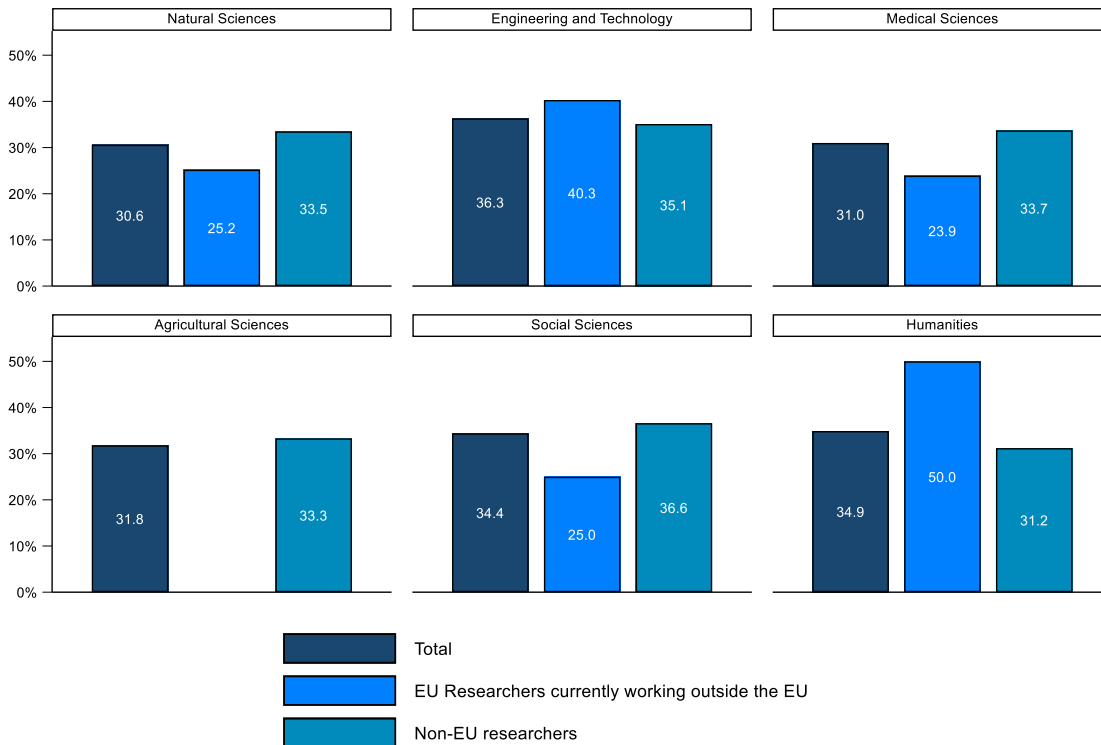
Regarding the evolution between 2017 and 2020, some differences in the levels of interdisciplinary mobility across disciplines can be observed. Levels of interdisciplinary mobility across disciplines have remained stable over time.

Figure 57: Interdisciplinary mobility across disciplines and origins.

In 2020:



In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- The figure for the interdisciplinary mobility of EU researchers working in Agricultural Sciences is not reported because the n value is lower than 30.
- Based on question 8 “What is your main field of research in your current position?” and question 9 “Did you switch to another (sub)field of research during your career?”
- (2020: n=2,369; 2017: n=1,727)

EU versus non-EU researchers: Figure 57 shows that in 2020 EU researchers are more likely to be interdisciplinarily-mobile than non-EU researchers in Agricultural Sciences (46% and 32% respectively). In 2017, EU researchers are more likely to be interdisciplinarily-mobile than non-EU researchers in two disciplines: Engineering and Technology (40% and 35%) and Humanities (50% and 31%). However, these trends have converged or were inverted over time.

Conversely, non-EU researchers display larger shares of interdisciplinary mobility than EU researchers in the Natural Sciences (27% and 34%), and in Humanities (22% and 35%). However, in 2017, non-EU researchers were less interdisciplinarily-mobile than EU researchers in Humanities (31% and 50% respectively).

6.3.3. *Effects*

When asked whether interdisciplinary mobility is perceived as a positive or a negative factor for recruitment, it is interesting to note that there are very small differences between those that have an interdisciplinary mobility experience and those that do not. The same trend was observed in the MORE3 Global Survey. In general, interdisciplinary mobility is seen as a positive factor for recruitment in the researchers’ home institution (63%) (Figure 58). In comparison with the results of the MORE4 EU HEI survey (75%), this factor seems to be more positively perceived among researchers working in Europe.

Figure 58 shows that those researchers that have been interdisciplinarily-mobile and those that have not yet done so both have a positive opinion about the impact of participating in such mobility: 63% of researchers in both groups think that such mobility is a positive factor in enhancing their recruitment prospects in their home institution. In 2017, around 57% of researchers in both groups perceived interdisciplinary mobility as a positive factor. Hence, interdisciplinary mobility is perceived as having a positive effect on recruitment by a higher percentage of researchers than in 2020.

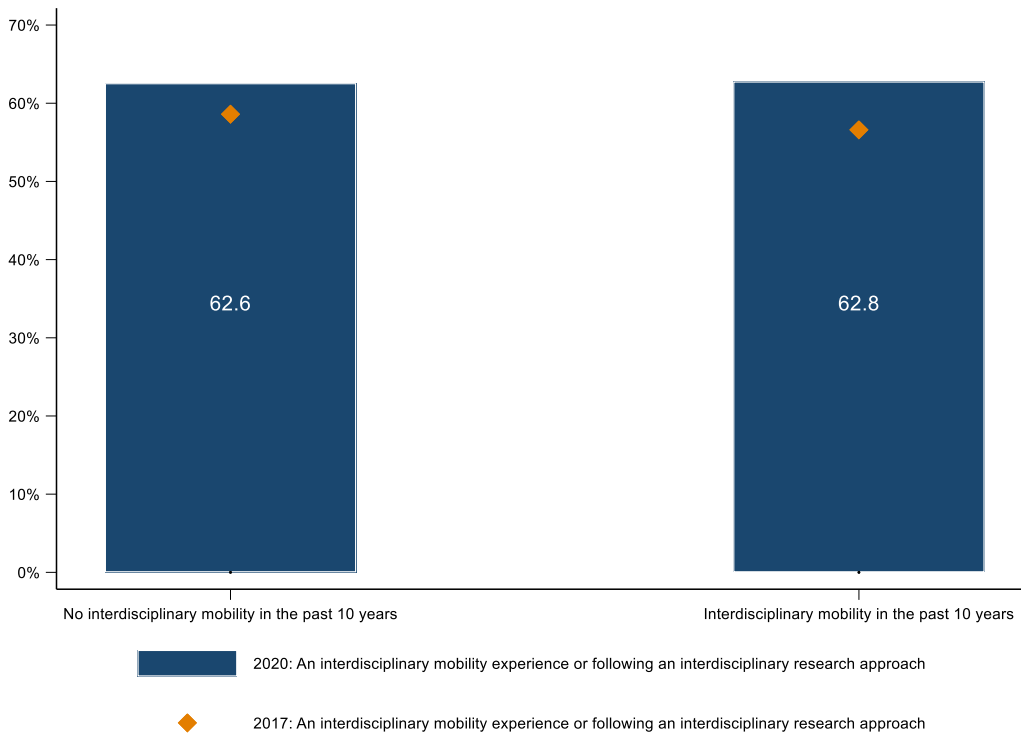
A similar picture arises when considering researchers’ perceptions with respect to the impact of interdisciplinary mobility on career progression (see Figure 59). Researchers that have an interdisciplinary mobility experience and those that do not had similar views on the impact it can have on career progression: around 65% in 2020 and around 55% in 2017. In 2017, researchers tended to perceive interdisciplinary mobility as having had a less positive effect on career progression than in 2020.

Overall, in 2020, interdisciplinary mobility is perceived to have a more positive effect on both career progression and recruitment compared to 2017. This perception is confirmed by both groups of researchers: those who have worked in a different discipline before and those who have not. Trends across groups are very similar, however. On average, non-interdisciplinarily mobile researchers have a more positive perception of the impact of mobility on career progression and recruitment as shown by both Figure 58 and Figure 59.

Further research should be carried out to investigate the extent to which this positive perception is held by researchers across different career stages, and which are the disciplines where

interdisciplinary mobility is being perceived as a more negative or positive factor for career progression and recruitment. The limitations of this survey prevent the extraction of meaningful conclusions to these questions, but the findings suggest that these are research avenues worth investigating in future.

Figure 58: Perception of the positive effect of interdisciplinary mobility on recruitment in home institution.

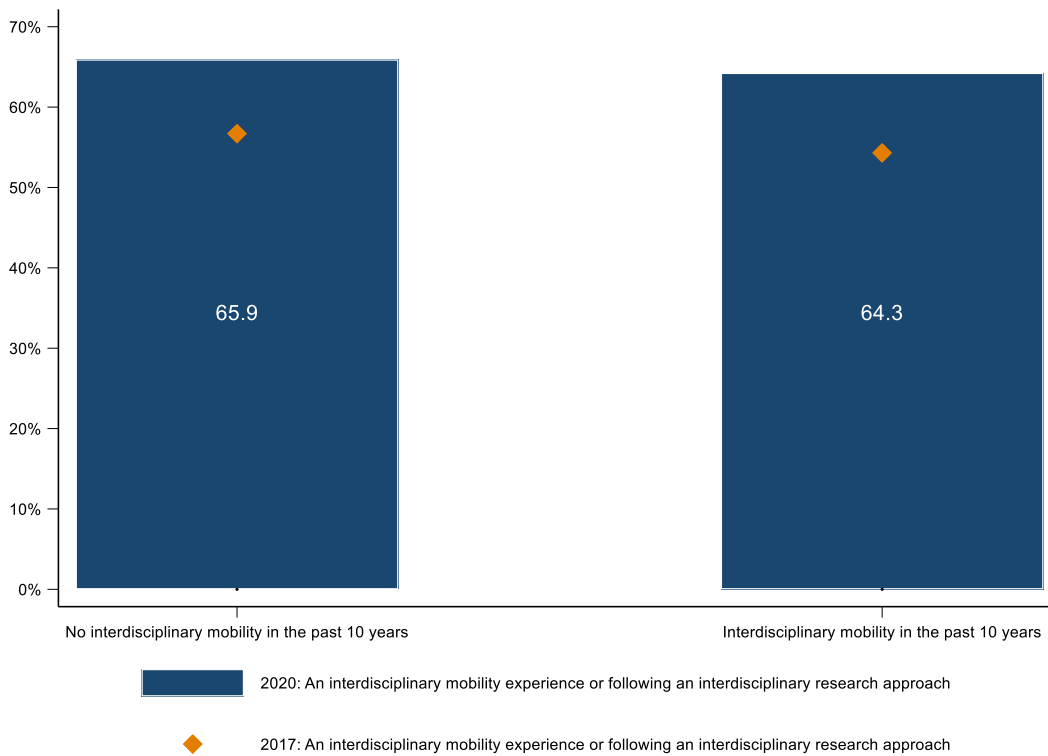


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 8 “What is your main field of research in your current position?”, question 9 “Did you switch to another (sub)field of research during your career?” and Question 31 “In your experience, would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?”
- (2020: n=2,369; 2017: n=1,512)

Figure 59: Perception of the positive effect of interdisciplinary mobility on career progression in home institution.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 8 “What is your main field of research in your current position?”, question 9 “Did you switch to another (sub)field of research during your career?” and Question 32 “In your experience, would you say that the following factors are regarded as positive or negative factors for career progression in your home institution?”
- (2020: n=2,369; 2017: n=1,512)

6.4. Collaboration

The survey included questions on the types of collaborations in which researchers engage. The extent to which researchers collaborate with others working in different disciplines, sectors or countries, enhances countries’ human capital and can have a positive effect on the quality of the research produced and the levels of innovation. Previous research⁶⁸ has highlighted some of the most oft-cited reasons to collaborate: having access to expertise and new research techniques⁶⁹; access to research equipment; better opportunities to access grants; increase productivity or even for fun⁷⁰. In spite of these incentives to engage in collaboration, there are important differences across the types of collaboration that researchers are more inclined to engage with.

Figure 60 shows the most frequent types of collaborations among EU researchers working abroad (TG1) and among non-EU researchers having had previous work experience in Europe (TG2):

⁶⁸ Beaver, D., 2001. Reflections on scientific collaboration (and its study): past, present and future. *Scientometrics* 52, 365–377.
⁶⁹ Bozeman, B., Corley, E. "Scientists' collaboration strategies: implications for scientific and technical human capital." *Research policy* 33.4 (2004): 599-616.

⁶⁹ Katz, J.S., Martin, B.R., 1997. What is research collaboration? *Research Policy* 26, 1–18.

⁷⁰ Thorsteinsdottir, O., 2000. External research collaboration in two small science systems. *Scientometrics* 49, 145–160.

- Intersectoral collaboration: 63% of researchers collaborate with researchers in another field or discipline, and slightly more than one out of three does so with organisations from another sector.
- International collaboration: The difference between the two target groups appears to be slightly larger when referring to collaborations with organisations in another country: 73% of non-EU researchers having worked in the EU before have done this type of collaboration versus 78% of EU researchers.

Similar figures can be observed in 2017 and 2020. The two main differences that have arisen over time are that EU researchers used to collaborate less with researchers in another discipline than in 2020 (63% in 2020 vs 59% in 2017). The second main difference is that, for both groups, collaboration with researchers in other sectors has increased by 5 to 6 pp (from 31% to 36% TG1 respectively and from 29% to 35% for TG2).

Gender: According to the results of the MORE4 Global Survey, women tend to undertake these types of collaborations less frequently than men. The differences are larger among non-EU researchers that have worked in Europe (TG2) than among EU researchers working outside Europe (TG1). In the former, men collaborate more with researchers in other disciplines (64%) and from other countries (74%) than women (respectively 56% and 67%).

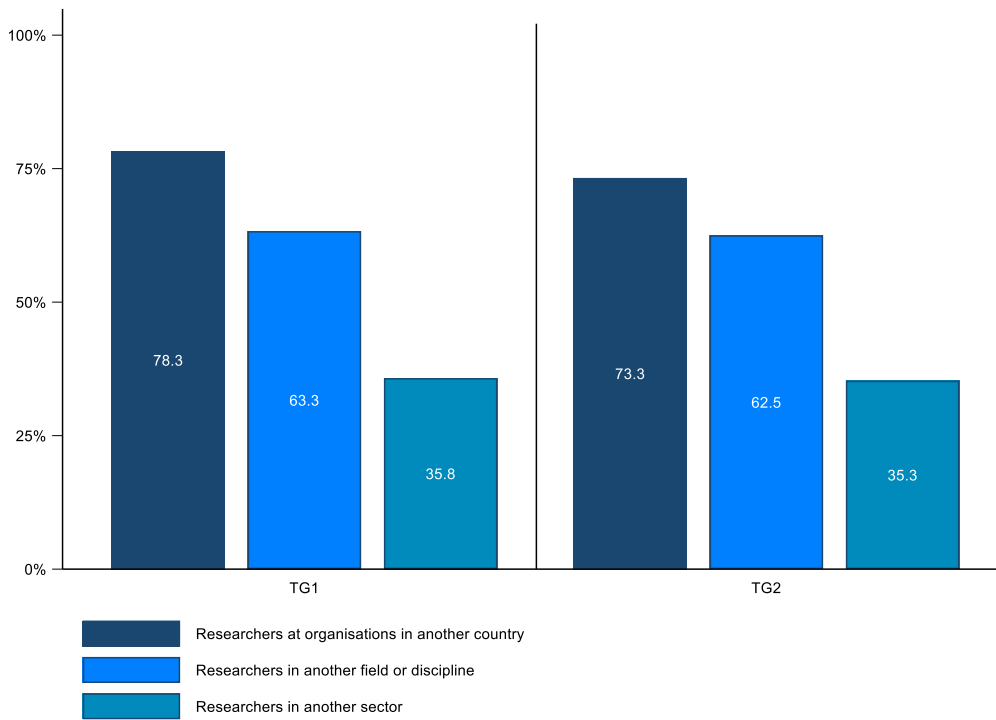
Country of current employment: When analysing the patterns of collaboration across countries (see Figure 124 in annex 7), BRICS countries tend to display lower levels of interdisciplinary, international and intersectoral collaboration than other countries in both years 2017 and 2020.

- Interdisciplinary collaboration in the BRICS (7%) is much less common than in Anglo-Saxon countries or non-EU OECD countries (19% and 14% respectively). There are similar differences with respect to international collaboration, where 8% of researchers working in BRICS claim to undertake this type of collaboration compared to 21% among Anglo-Saxon countries, or 17% in non-EU OECD countries. These collaboration trends across countries have not evolved over time, as shown in Figure 124.
- Intersectoral collaboration is the least frequent type of cooperation in most BRICS countries, with on average 4% engagement in such collaboration in 2020 compared with 3% in 2017. Researchers having engaged in intersectoral collaboration constitute between 7% and 14% of the researchers in Anglo-Saxon countries, in the US and in non-EU OECD countries. A similar trend is also visible in the 2017 survey.
- International collaboration is the most recurrent type of collaboration. This type of collaboration is mainly found in the USA, and among Anglo-Saxon and non-EU OECD countries with levels of 27%, 23% and 23% respectively. The Figures in 2017 are similar, however, for non-EU OECD countries, international collaboration has increased from 17% to 23% (6% pp).

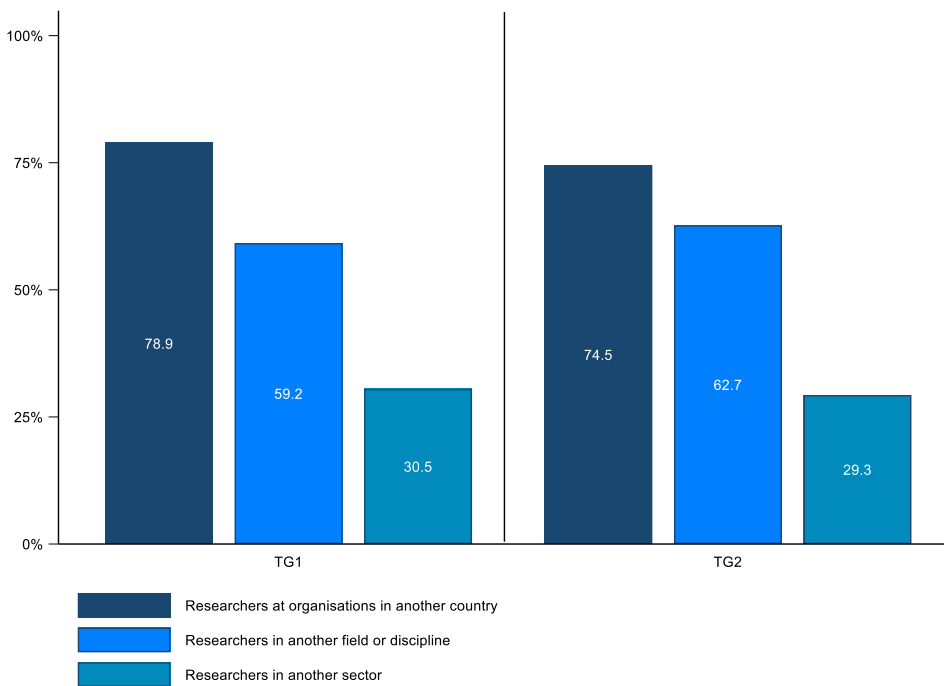
The figures for all country groups have remained stable over time.

Figure 60: Types of collaboration.

In 2020:



In 2017:



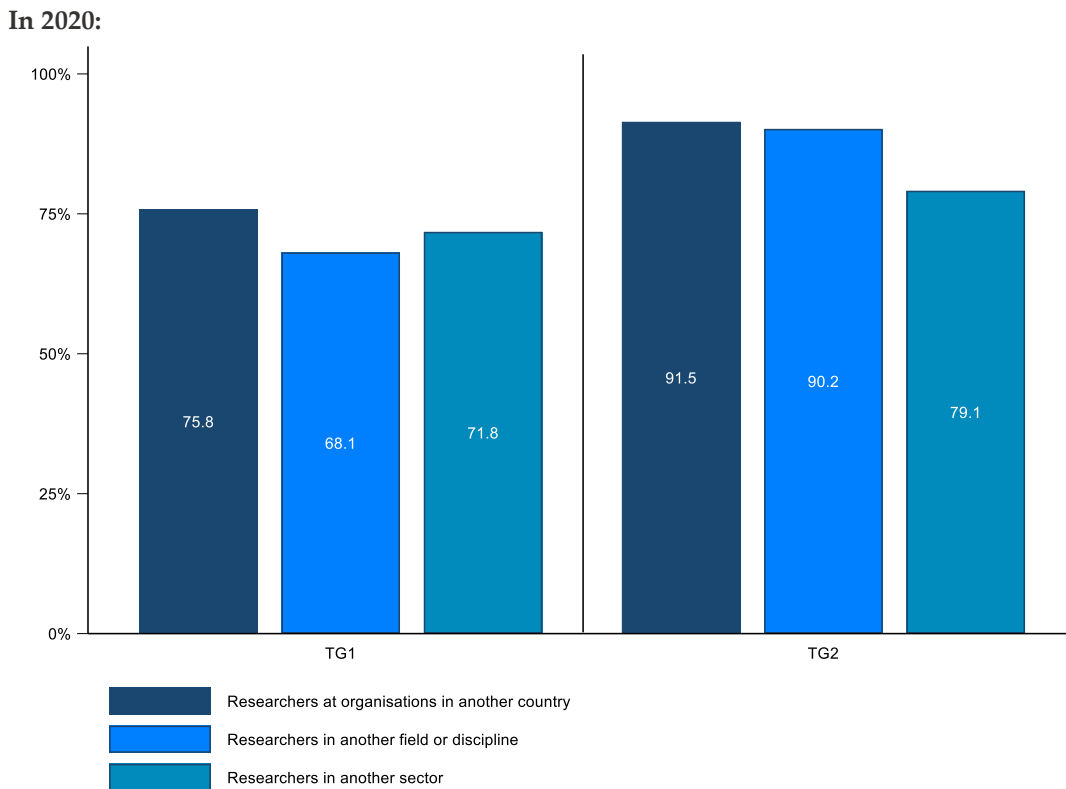
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- Based on question 55 and question 66 “Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?”
- (2020: n=734: 327 in TG1, 407 in TG2)(2017: n=680: 417 in TG1, 263 in TG2)

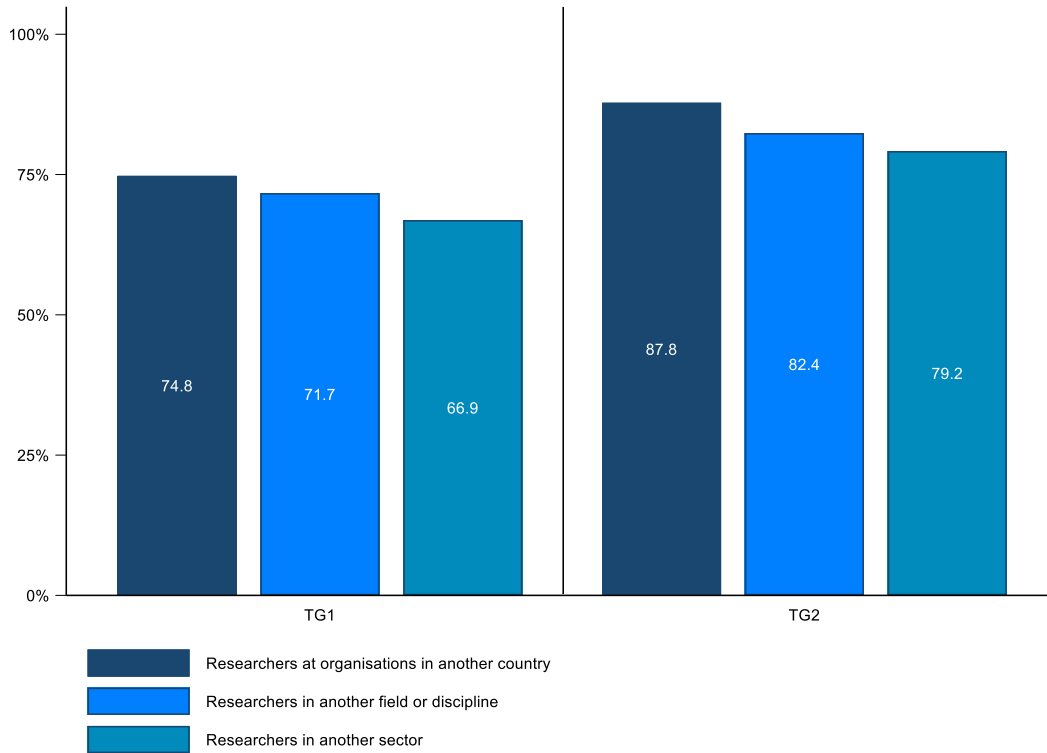
Collaboration as result of previous mobility experiences: Figure 61 shows the extent to which respondents indicate whether each type of collaboration was the result of a previous mobility experience. Figure 61 indicates that there are larger differences in this area than those related to the intensity of collaboration between EU researchers (TG1) and non-EU researchers with a previous work experience in Europe (TG2). International, intersectoral and interdisciplinary collaboration are related to a previous mobility experience to a larger extent among non-EU researchers having worked in the EU (TG2) than among EU researchers (TG1)⁷¹.

Figure 61: Collaborations as a result of a mobility experience.



⁷¹ This might be related to TG2 researchers that have been mobile at least twice, while TG1 researchers have been mobile at least once.

In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- (The number of responses for each item depends on the number of respondents having indicated that they have done each type of collaboration)
- Based on question 55 and question 66 “Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?”
- (2020: n=734: 327 in TG1, 407 in TG2)(2017: n=680: 417 in TG1, 263 in TG2)

7. Attractiveness of the European Research Area

When knowledge is one of the principal factors underlying competitive advantage and when there is increasing competition for the best research talents, the attractiveness of the European Research Area is crucial for sustainable and dynamic knowledge economies. The analysis performed in the MORE2 study and related research projects provides a clear picture of what drives attractiveness among researchers in academia⁷². Attractiveness is influenced by research job characteristics related to remuneration, pensions and job security (“financial” working conditions) and other non-science related conditions, but driven by those influencing a researcher’s scientific productivity, such as research autonomy, career paths and working with high quality peers.

- “Financial and social” working conditions:
 - Salary, pension and health characteristics;
 - Job security;
 - Quality of life;
 - Satisfaction with job content and challenge.
- Working conditions relevant to scientific productivity:
 - Research organisation at work unit level (research and financial autonomy);
 - Balance between teaching, administrative tasks, and research;
 - Availability of funding (including the funding of research infrastructures);
 - Quality of peers.

Career perspectives are cross-cutting working conditions, as they influence both financial conditions and the production of scientific knowledge. Career perspectives are particularly important to early-stage researchers, for whom a performance-based model (“tenure-track” versus a seniority-based model) can make a substantial difference to their careers.

Attractiveness is hence a result of the structure of career paths and the quality of working conditions (analysed in sections 4 and 5). International, intersectoral or interdisciplinary mobility may be driven by perceptions of varying levels of attractiveness. In turn, mobility indicators (see section 6) are also a proxy for attractiveness in terms of which countries researchers choose for their international mobility experience. Based on the MORE4 Global Survey analysed in this report, we can thus provide evidence as to how researchers perceive the relative attractiveness of the ERA in a global setting. The corresponding research questions are listed in the box below.

⁷² Janger, J., Campbell, D., Strauss, A., (2019) Attractiveness of jobs in academia: a cross-country perspective, Higher Education 78 (6): 991-1010. Doi:10.1007/s10734-019-00383-7 Janger, J., Nowotny, K., “Job choice in academia”. Research Policy 45, Nr. 8 (October 2016): 1672–83. doi:10.1016/j.respol.2016.05.001.

Box 5: Main research question on ERA attractiveness.

- How are the research environment and working conditions in other countries perceived in comparison with those in the EU?
- How are the research systems in the EU and outside the EU compared?
- Why do EU researchers decide to work outside the EU?
- Why do non-EU researchers decide to come (or not to come) to the EU?
- What factors influence their decision to remain or return to the EU?
- What factors influence their decision to stay or leave the EU?
- What are the factors hindering researchers to return to the EU?
- What problems do non-EU researchers experience in coming to the EU and in working as researchers in Europe?
- How do the research environment and working conditions in Europe compare with those in other countries?
- Are they considering moving (back) to the EU (again)?
- Are they interested in working in Europe?
- Are different types of EU research funding known outside the EU? Are researchers working outside the EU interested in EU research funding types? Have they obtained them?

The following information from the survey results has been used to provide evidence for these research questions:

- Perception of attractiveness of current research position (section 6);
- Direct comparison of research systems (section 7.3);
- Comparison of barriers, motives and the effects on mobility (section 7.4).
- Degree of interest in working in the EU (section 7.5)
- Analysis of the role of EU-level policy instruments, the role of the Euraxess network and of EU research funding programmes in enhancing attractiveness (section 7.6).

Two dimensions are important for the analysis: the target groups and country of current employment. For the latter, the survey responses are clustered into 5 country groups by country of current employment of the researchers: 1) non-EU OECD (including the US), 2) Anglo-Saxon countries (including the US), 3) the US separately, 4) the BRICS countries (Brazil, Russia, India, China and South Africa), and 5) other non-EU and non-OECD countries (cf. section 3.3.3 for more detail). A more precise comparison (i.e. by countries) is not possible for most countries given that the number of observations per country is too low. The US was singled out because of its excellent research universities which manage to attract talented researchers from all over the world.⁷³

What becomes apparent with respect to almost all aspects of perceived attractiveness throughout the whole section is that researchers working in the US and non-EU OECD countries are the most satisfied irrespective of whether they have been mobile or not. Rather, many differences between researchers are driven by their current country of employment than by their mobility experiences or their country of origin. In most cases, the differentiation between target groups shows less variation than the differentiation between country groups. Moreover, the variation between target groups observed is – at least to a certain extent - based on the distribution of researchers' country of employment. This particularly applies in case of the US. For instance, 17% of EU researchers currently working abroad (TG1) are working in the US, which has one of the best research systems worldwide. Other large groups in TG1 are working in Canada (16%) and China (13%). With these shares, TG1 is more represented in these countries than other target groups. While TG1 makes up 14% (MORE3: 24%) of the total number of respondents, 32% of the respondents who are currently employed in the US are

⁷³ Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

TG1. In the groups of researchers working in the non-EU OECD and Anglo-Saxon countries, 21% and 27% respectively are TG1 researchers.

Thus, when interpreting differences between target groups' perception of satisfaction in their current research positions, one needs to bear in mind that those results may be somewhat biased due to the non-uniform distribution of EU researchers who participated in the survey across different countries of employment.

7.1. Attractiveness based on the perception of satisfaction in the current research position

Section 5.2 focused on researchers' perceptions of their level of satisfaction with the remuneration package in their current position. However, aside from remuneration, there are several other factors directly influencing the attractiveness of research careers and the decision between competing job offers for research positions. Researchers decide between jobs in research not only based on remuneration and other material well-being related issues such as social security, but also – and actually most importantly - on job characteristics which influence the scientific productivity of researchers. Researchers are even willing to trade off salary against other job characteristics they perceive as being attractive working conditions, or which are likely to enhance their research excellence and productivity, such as the degree of research autonomy given to researchers, the opportunity to work with leading scientists and the scope for longer-term career development. This will enable the implementation of a research agenda over a longer time horizon, facilitating risk-taking.

In order to disentangle these various factors, the different aspects of researchers' satisfaction with their current job has been grouped in terms of:

- Non-science related working conditions that affect the attractiveness of researcher careers or decision-making when between different research jobs:
 - Job and social security;
 - Social environment and recognition;
 - Individual satisfaction at work;
- Working conditions that directly affect scientific knowledge production:
 - Research funding;
 - Intellectual support;
 - Time balance and degree of research autonomy;
- Career progression and mobility perspectives, especially over the medium-longer term.

Note that by design, none of the researchers currently work in the EU, so that their view on job satisfaction cannot be interpreted as a direct measure of the attractiveness of jobs in the EU. However, the pattern of satisfaction with job characteristics can be compared between non-EU countries. This section is therefore firstly useful in determining which regions globally offer more or less attractive jobs compared with the EU within the ERA. Secondly, the results can also be compared with the MORE4 EU HE Survey and the MORE3 Global Survey, but as the data are not representative, we will pay more attention to whether the patterns and relationships of satisfaction are similar or dissimilar.

In the following assessment, each aspect is discussed in more detail according to the structure outlined below. Figure 62 provided later below gives an overview of the averages for working conditions based on the following structure:

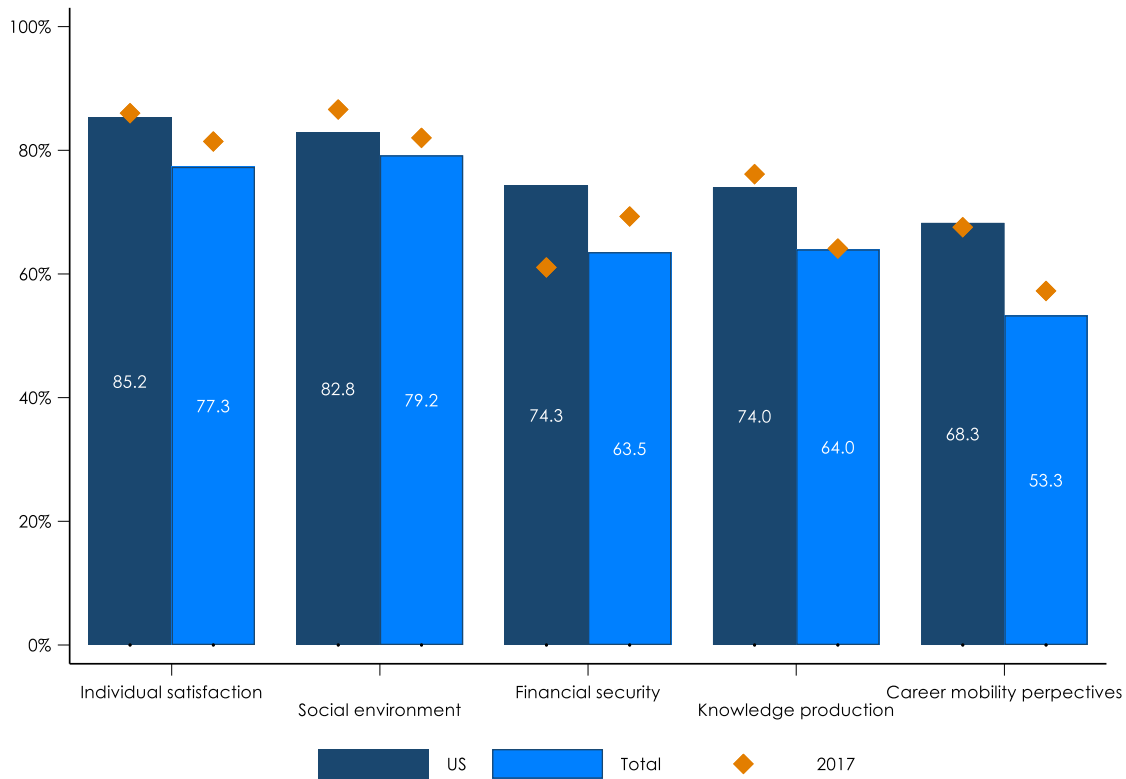
- Non-science related working conditions that affect the attractiveness of researcher careers and/ or decision-making when researchers are between jobs:
 - Perceived working conditions affecting extrinsic pecuniary motivations is shown by **financial security** (average score for job security, pension plan and social security);
 - Social working conditions are shown by the indicator **social environment and recognition** (social status, reputation of employer, contribution to society);
 - Content-specific working conditions are shown by the indicator **individual satisfaction at work** (average of intellectual challenge, dynamic work environment, level of responsibility and quality of life).

- Working conditions that directly affect scientific knowledge production, as the average of:
 - Satisfaction with the level of research funding and access to high-quality research facilities (**financial support** for research);
 - Satisfaction with working with leading scientists and the perceived quality of education and training (**intellectual support**);
 - Satisfaction in terms of the **balance** between research and teaching, as well as in the degree of **research autonomy**.

- Career development and mobility perspectives affect both knowledge production and financial security, so are shown as a separate bar in the figure.

While the share of researchers satisfied with their social environment (79%, MORE3: 82%) and perceiving satisfaction in their current job (77%, MORE3: 81%) is rated highly, the share of researchers that are satisfied with career and mobility perspectives (driven by career development perspectives) are at the lower end (53%, MORE3: 57%). This is in line with the results of the MORE4 HE EU and the MORE3 Global Survey. These results illustrate the conundrum of embarking on a career in research – a very high level of intellectual challenge and satisfaction with job-specific content runs up against uncertain career perspectives or the opportunities for continually engaging in a satisfactory job. In other words, the results suggest that researchers' individual satisfaction with their research jobs is generally high, but their satisfaction with working conditions for performing that research is much lower (in particular, for funding). Moreover, researchers employed in the US had particularly high levels of satisfaction. The shares of satisfied researchers currently working in the US is above average by between 4 (social environment) to 15 (career mobility perspectives) percentage points.

Figure 62: Satisfaction with working conditions in current position.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (n=2,051-2,307)

The various target groups are rather homogeneous with respect to their level of satisfaction with working conditions (Table 33). Except for financial security, mobile EU researchers (TG1) are the most satisfied with their current position, but there are no large differences between target groups. TG1 researchers are especially satisfied in terms of their social environment and individual satisfaction with their research jobs. As most TG1 researchers are currently working in the US, Canada and China, the quality of research systems in those countries, particularly in the US, are reflected in the respondent patterns.

Table 33: Satisfaction with working conditions in current positions by target group.

	TG1	TG2	TG3	TG4
Career mobility perspectives	57.7%	53.0%	56.0%	54.1%
Financial security	58.2%	63.9%	61.7%	62.4%
Individual satisfaction	79.1%	75.6%	77.3%	77.4%
Knowledge production	66.0%	63.4%	63.4%	64.0%
Social environment	82.0%	77.7%	78.7%	79.0%

Source: MORE4 Global Survey (2020).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (n=2,051-2,307)

7.2. Non-science related working conditions

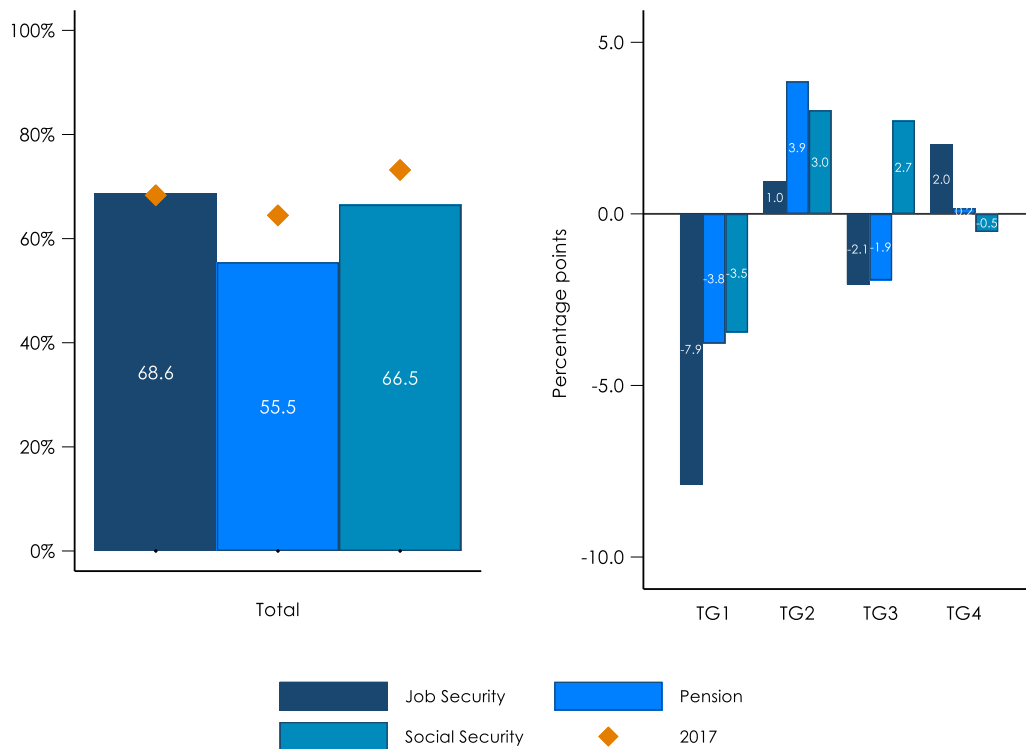
Non-science related working conditions might not directly affect the quality and quantity of research output, but they certainly affect the attractiveness of researcher careers. Analogous to the MORE3 Global Survey questionnaire, non-science related working conditions include aspects regarding financial security (job security, pension plan and social security), the social environment and recognition (social status, reputation of employer, contribution to society), and researchers’ satisfaction at work (intellectual challenge, dynamic work environment, level of responsibility and quality of life). Each of these aspects is analysed in detail in the sections below.

7.2.1. Job and social security

Overall, 69% of researchers (MORE3: 68%) are satisfied with job security at their institution and 67% of researchers (MORE3: 73%) are satisfied with social security and other benefits associated with their current position (see Figure 63, left panel). A lower share of respondents in MORE4 (56%) are satisfied with the pension plan at their current research position compared with MORE3 (65%). Compared to MORE3, the share of satisfied researchers has decreased in terms of social security and pension plans, while the share of researchers satisfied with job security has remained broadly constant.

Target groups: Differentiating between the different survey target groups by category of researcher reveals only small differences in the level of satisfaction. In terms of pension plans, the share of researchers that were satisfied ranges between 52% of EU researchers currently working abroad (TG1) and 59% among non-EU researchers, who have worked in the EU in the past (TG2). The range between the highest (70% of TG2 researchers) and the lowest (63% of TG1 researchers) share of researchers that were satisfied with their social security is similar (see Figure 63, right panel). The difference between the highest share of researchers satisfied with job security at their current position (71% of TG4 researchers) and the lowest share (61% of TG1 researchers) is 10 percentage points. In total, the share of satisfied researchers in terms of the job and social security dimensions is smallest among the group of EU researchers currently working abroad (TG1).

Figure 63: Individual satisfaction with job and social security attributes: total (left panel) and differences between target groups (right panel).



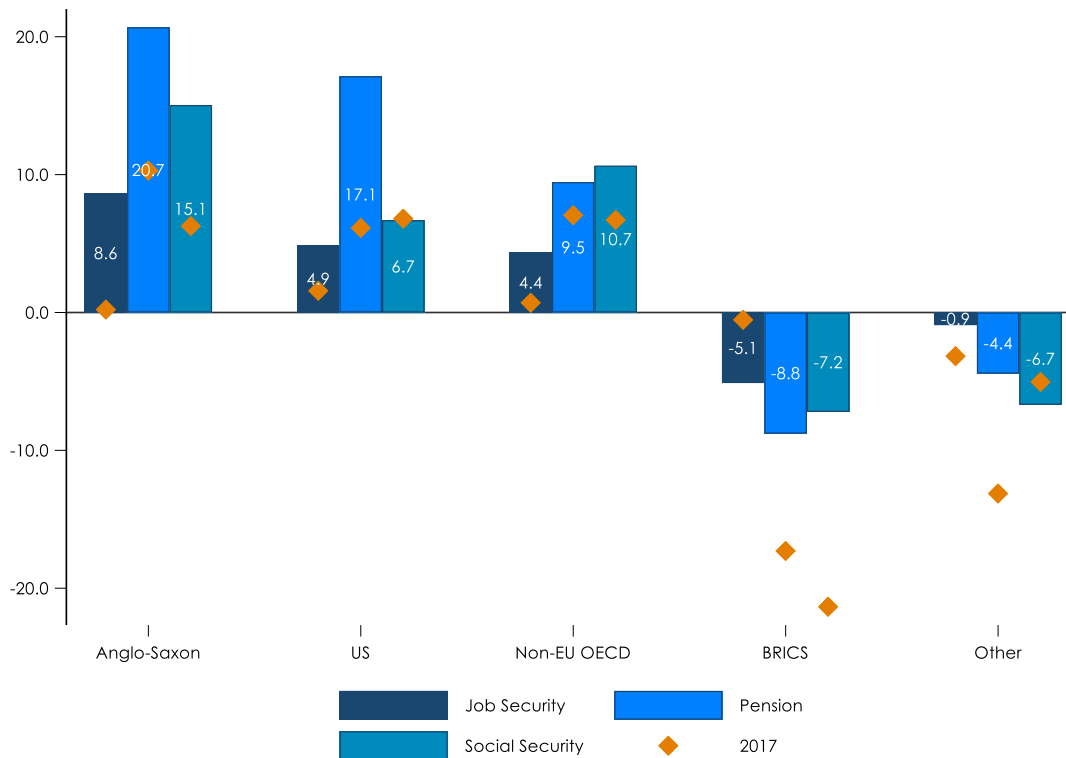
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,051/2,173/2200; 2017: n=1,614/1,509/1,593)
- TG1: EU researchers currently working outside the EU (n=298/308/314)
- TG2: Non-EU researchers who have worked in the EU in the past (n=352/374/377)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=220/228/231)
- TG4: Non-EU researchers who have never worked abroad (n=1,181/1,260/1,281)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: In terms of job security, a low variance between different country groups can be observed (see Figure 64). The highest share of researchers feeling satisfied with job security is employed in Anglo-Saxon countries (including the US), while the lowest share is located in the BRICS countries. In contrast, the variation between countries with respect to researchers' satisfaction with pension plans and social security is considerable. The range between the highest and the lowest shares of researchers satisfied with their pension plan is particularly significant, with only 47% of researchers being satisfied in BRICS nations compared with 76% of researchers in Anglo-Saxon countries. Similarly, only 59% of researchers employed in BRICS countries are satisfied with social security, while 82% of researchers in Anglo-Saxon countries were content. In general, researchers working in BRICS nations are considerably less satisfied with their pension rights and social security conditions than other country groups, while the differences between the Anglo-Saxon and the OECD countries is less obvious. This mirrors the patterns identified from the MORE3 Global Survey, and may reflect differences in the level of economic development, reflected in the funding of higher education and research, and in turn funding provision for researchers' pensions and social security in those countries.

Figure 64: Differences in individual satisfaction with job and social security attributes between country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,051/2,173/2,200; 2017: n=1,614/1,509/1,593)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

7.2.2. Social environment and recognition

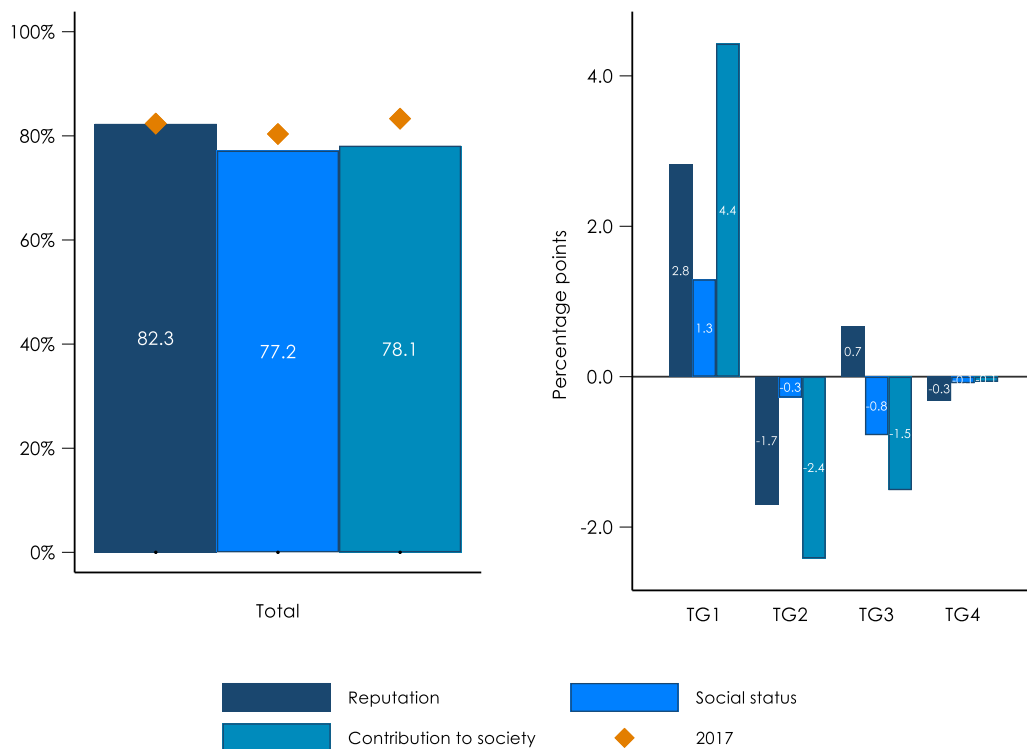
In this section, we look into the level of satisfaction with aspects of the social environment and career recognition, as part of the non-science related working conditions. Analogous to the MORE3 Global Survey report, these include contributions to society, social status and the reputation of researchers' current employer.

Overall, 82% of researchers (MORE3: 82%) who participated in the MORE4 Global Survey are satisfied with the reputation of their employer, 77% of researchers (MORE3: 80%) are satisfied with the social status associated with their position as researchers and 78% (MORE3: 83%) are content with their contribution to society (see Figure 65, left panel). These shares have remained rather constant since 2017. In comparison with the MORE4 EU HE Survey, those shares are noticeably lower (9 to 14 percentage points) than the shares of satisfied researchers working in the EU.

Target groups: Differentiating between target groups reveals that with respect to all three aspects of the social environment and recognition, EU researchers currently working abroad (TG1) show the highest shares of satisfied researchers (see Figure 65, right panel). However, overall, the differences between target groups are rather low. The difference between European researchers working abroad and other groups is the largest when looking at the shares of researchers satisfied with their contribution to society (6 percentage points). However, these results are partly driven by the

composition of the sample in terms of country of current employment (see section 3.3.3): the highest shares of TG1 researchers are found in the US and non-EU OECD countries.

Figure 65: Individual satisfaction with social environment: total (left panel) and differences between target groups (right panel).



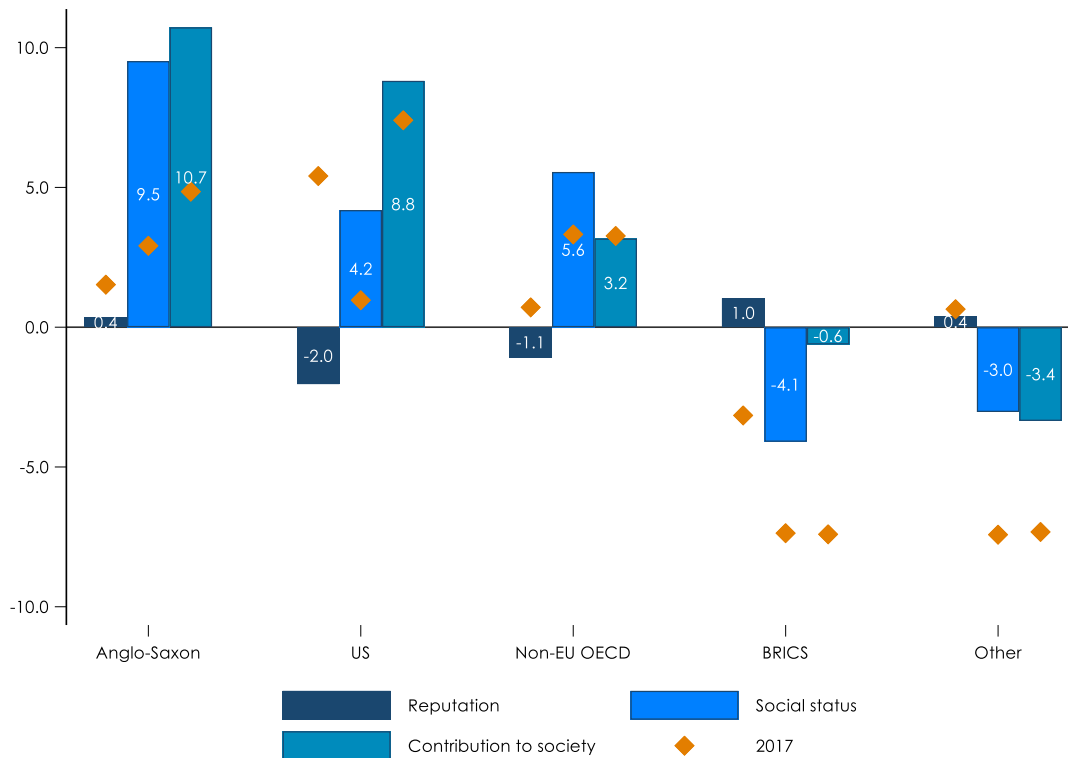
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,215/2,219/2,241, 2017: n=1,667/1,635/1,665)
- TG1: EU researchers currently working outside the EU (n=311/315/316)
- TG2: Non-EU researchers who have worked in the EU in the past (n=380/380/389)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=235/242/244)
- TG4: Non-EU researchers who have never worked abroad (n=1,275/1,292/1,295)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: Figure 66 shows the deviation of country group averages from the total average in percentage points. The results indicate that in Anglo-Saxon countries, the share of researchers satisfied with their contribution to society and social status is greater than average by 11 pp and 10 pp respectively. Overall, in terms of satisfaction with social status and contribution to society, the average for researchers employed in Anglo-Saxon countries, as well as the non-EU OECD average (both of which the US is a part of) is higher than in the other country groups. Regarding reputation, no major differences could be observed between countries based on the country of current employment of the researcher. The non-EU OECD average, as well as the average of researchers employed in the Anglo-Saxon countries (both of which the US is part of) is higher. Again, the data show a similar cross-country pattern as in the MORE3 Global Survey, with researchers in the BRICS countries having improved most in terms of satisfaction.

Figure 66: Differences in individual satisfaction with social environment between country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,215/2,219/2,241, 2017: n=1,667/1,635/1,665)
- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”

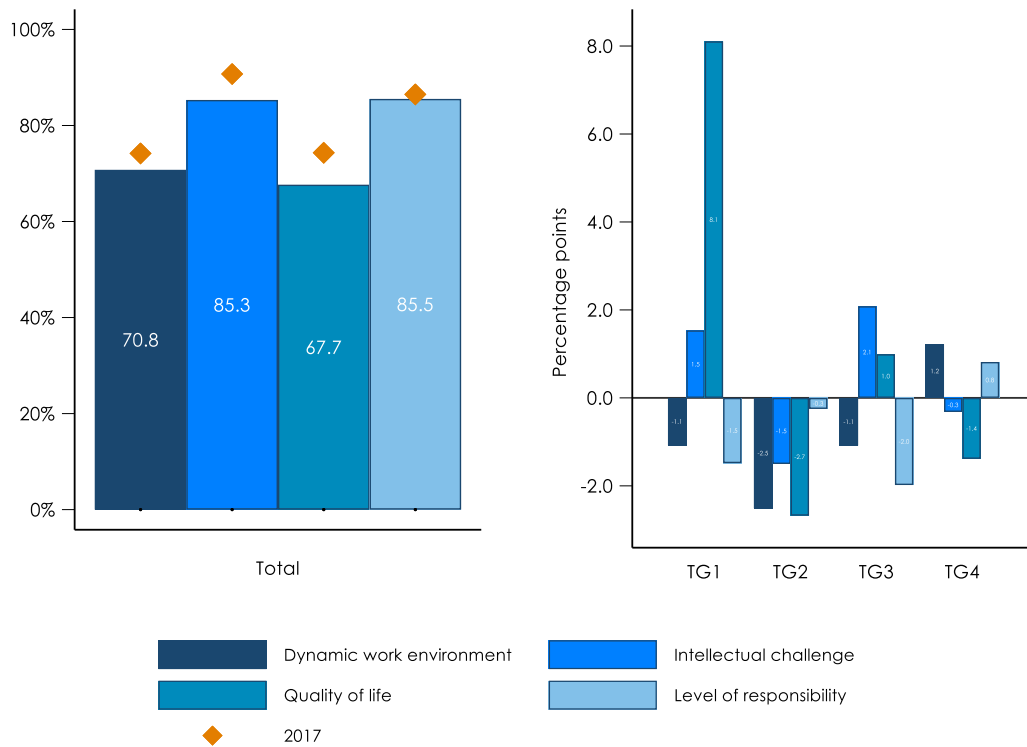
7.2.3. Individual satisfaction at work

In both the MORE3 and the MORE4 EU HE Surveys, the degree of satisfaction at work, taking into account the extent of intellectual challenge, whether there is a dynamic work environment, the level of responsibility and quality of life were analysed as part of an analysis of ‘individual satisfaction at work’. This forms part of the assessment of non-science working conditions.

Overall, a vast majority of 86% (MORE3: 87%) of respondents are satisfied with the level of responsibility; 85% (MORE3: 91%) with intellectual challenges at work; 71% (MORE3: 74%) with having a dynamic work environment; and 68% (MORE3: 74%) with the quality of life (see Figure 67, left panel). The percentage shares in the MORE4 EU HE Survey are somewhat lower than the corresponding shares of researchers who were satisfied with the same aspects of individual satisfaction at work in the MORE3 EU HE Survey. The general pattern, however, has remained broadly the same in that the satisfaction rates are the highest for intellectual challenge and the level of responsibility in researchers’ job positions, and are a little lower in terms of the quality of life and whether the work environment is dynamic. The gaps between the percentage share of satisfied researchers in the MORE4 Global Survey and the MORE4 EU HE Survey are especially great with respect to quality of life (21%) and a dynamic work environment (16%). The proportion of satisfied researchers in the MORE4 Global Survey are comparable to the MORE3 Global Survey results in 2017.

Target groups: The largest discrepancy between target groups is observed in terms of the quality of life. While 76% of EU researchers currently working abroad are satisfied with their quality of life, only 65% of non-EU researchers who have worked in the EU in the past agree. (see Figure 67, right panel). Regarding the other dimensions of individual satisfaction at work, the ranges between the highest and the lowest shares of satisfied respondents are marginal between target groups.

Figure 67: Individual satisfaction at work: total (left panel) and differences between target groups (right panel).



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

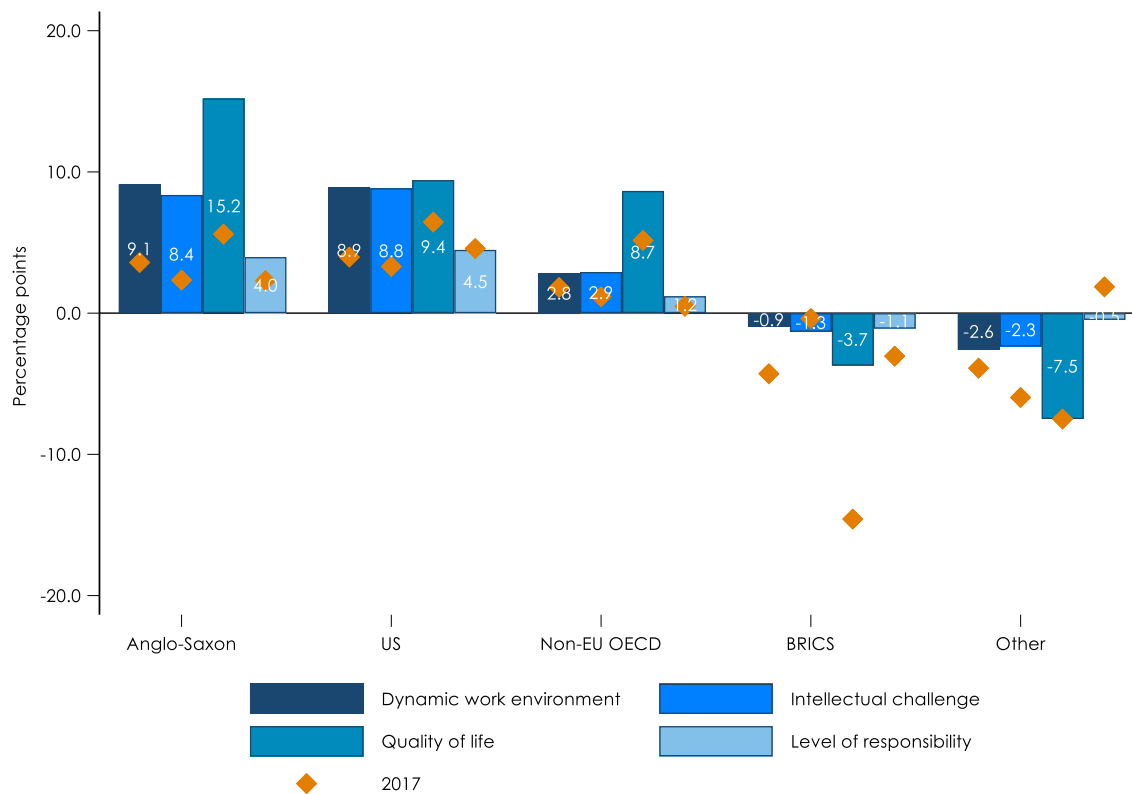
Notes:

- Total: Researchers currently working outside the EU (2020: n=2,257/2,281/2,282/2,307; 2017: n=1,670/1,705/1,690/1,687)
- TG1: EU researchers currently working outside the EU (n=320/322/326/327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=385/391/393/398)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=242/249/250/251)
- TG4: Non-EU researchers who have never worked abroad (n=1302/1,309/1,320/1,332)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: Figure 68 indicates a number of differences between groups of countries, similar to the differences identified above. Whilst highly developed countries such as Anglo-Saxon countries, especially the US in particular, and the OECD countries show above-average shares of satisfied researchers across all of the categories used to assess the level of satisfaction at work, the BRICS and other nations are especially below-average with respect to satisfaction with the quality of life, having a dynamic work environment and intellectual challenge. This may suggest some degree of correlation with the level of economic development (and links to research funding availability, as wealthier countries are able to invest more in R&D&I, on average) in the countries surveyed.

The shares of satisfied researchers employed in countries of the category 'Other', which includes e.g. Ukraine, Argentina, Malaysia and Thailand, is rather low with respect to all aspects of satisfaction at work. This group in particular has the lowest share of respondents satisfied with the quality of life. Again, the data shows the same pattern as in the MORE3 Global Survey, albeit with higher, but still below-average satisfaction levels in the BRICS countries.

Figure 68: Differences in individual satisfaction at work between country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,257/2,281/2,282/2,307; 2017: n=1,670/1,705/1,690/1,687)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

7.2.4. Working conditions for scientific knowledge production

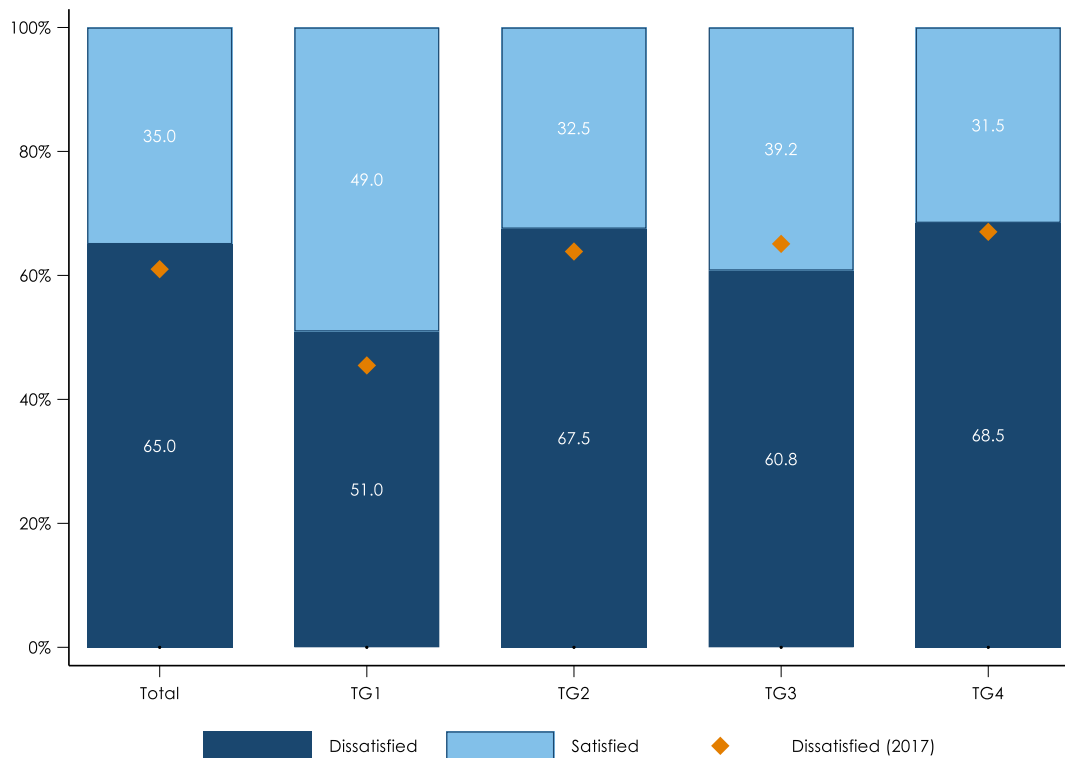
The most talented researchers and their capabilities considerably affect technological progress and shape the worldwide scientific frontier. To attract excellent foreign researchers, working conditions relevant for scientific knowledge production are pivotal: factors such as having clear career development opportunities, financial support (research funding and infrastructure) and intellectual support provided to researchers, as well as the level of time balance between teaching and research and degree of research autonomy are essential. Ensuring that as many of these criteria as possible are satisfactory is key to improving the performance of existing researchers and scientific staff, and establishing an adequate supply of promising early-stage researchers and junior scientists.

Financial support

Overall, 65% of researchers (MORE3: 61%) who participated in the MORE4 Global Survey are dissatisfied with the availability of research funding, only 35% (MORE3: 39%) of researchers feel content with their funding situation (see Figure 69). Compared to MORE3, no improvements can be observed since 2017 regarding the shares of researchers working outside the EU who are satisfied with research funding.

Target groups: The above findings apply both overall and on a disaggregated basis across the different target groups included in the sample. The only exception is among EU researchers currently working abroad, where almost half of the researchers (49% of TG1 researchers) are satisfied with the availability of research funding, but still 51% are dissatisfied. This share has slightly decreased since 2017 (MORE3: 55%). In the other target groups, the share of researchers satisfied with their research funding ranges between 39% (TG3) and 32% (TG4).

Figure 69: Individual satisfaction with research funding, by target groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

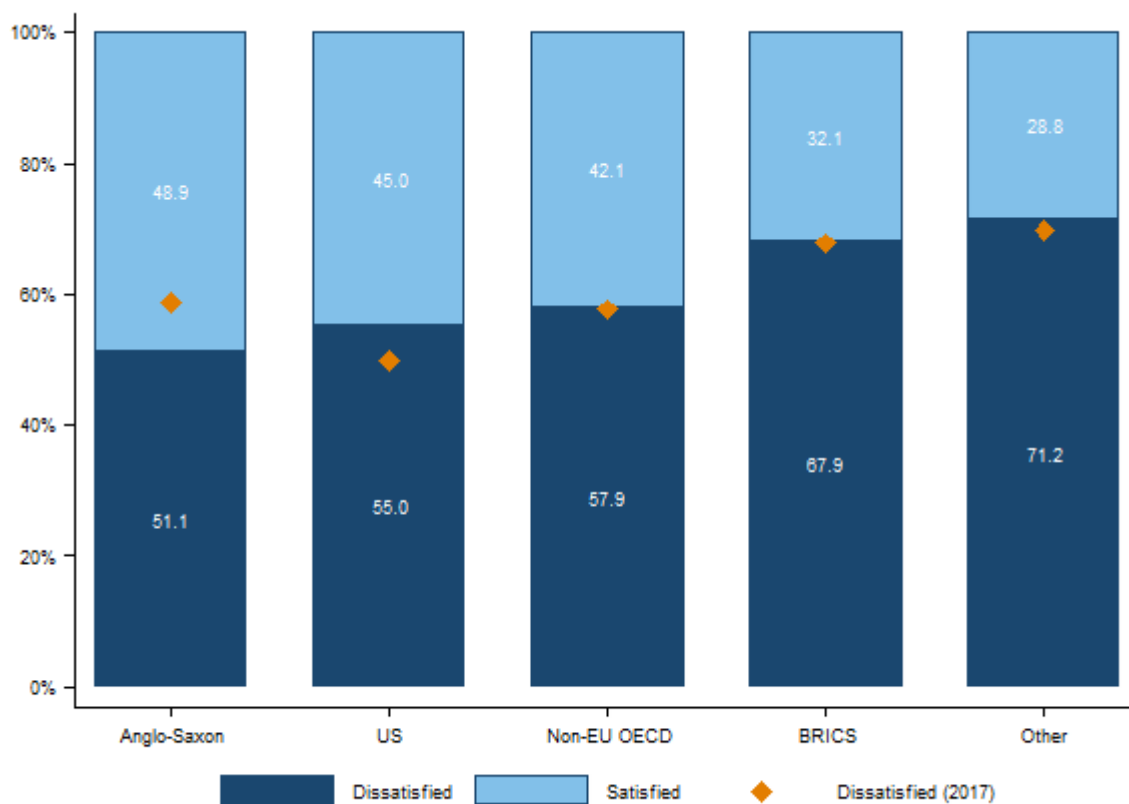
Notes:

- Total: Researchers currently working outside the EU (2020: n=2,249; 2017: n=1,649)
- TG1: EU researchers currently working outside the EU (n=314)
- TG2: Non-EU researchers who have worked in the EU in the past (n=386)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=243)
- TG4: Non-EU researchers who have never worked abroad (n=1,306)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: Figure 70 shows the differences in terms of researchers' satisfaction with research funding between country groups of current employment. In all country groups, the

majority of researchers is dissatisfied with their funding situation; the shares of dissatisfied researchers range between 51% and 71%. The largest share of researchers that feels satisfied with the availability of research funding are employed in Anglo-Saxon countries (49%). In contrast, similarly to the MORE3 survey findings, in MORE4, in BRICS nations and 'other' countries, including Ukraine, Argentina, Malaysia and Thailand, a greater share of researchers employed are dissatisfied with the availability of research funding (68% in BRICS and 71% in 'other' countries)). This is again in line with the pattern observed above of a close correlation between the level of economic development in the country and satisfaction with a job in research. These varying patterns of satisfaction can be expected to influence (among other factors) the prevalent asymmetric international mobility of researchers with countries such as the US or the UK having central positions in mobility networks of researchers.⁷⁴

Figure 70: Individual satisfaction with research funding, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

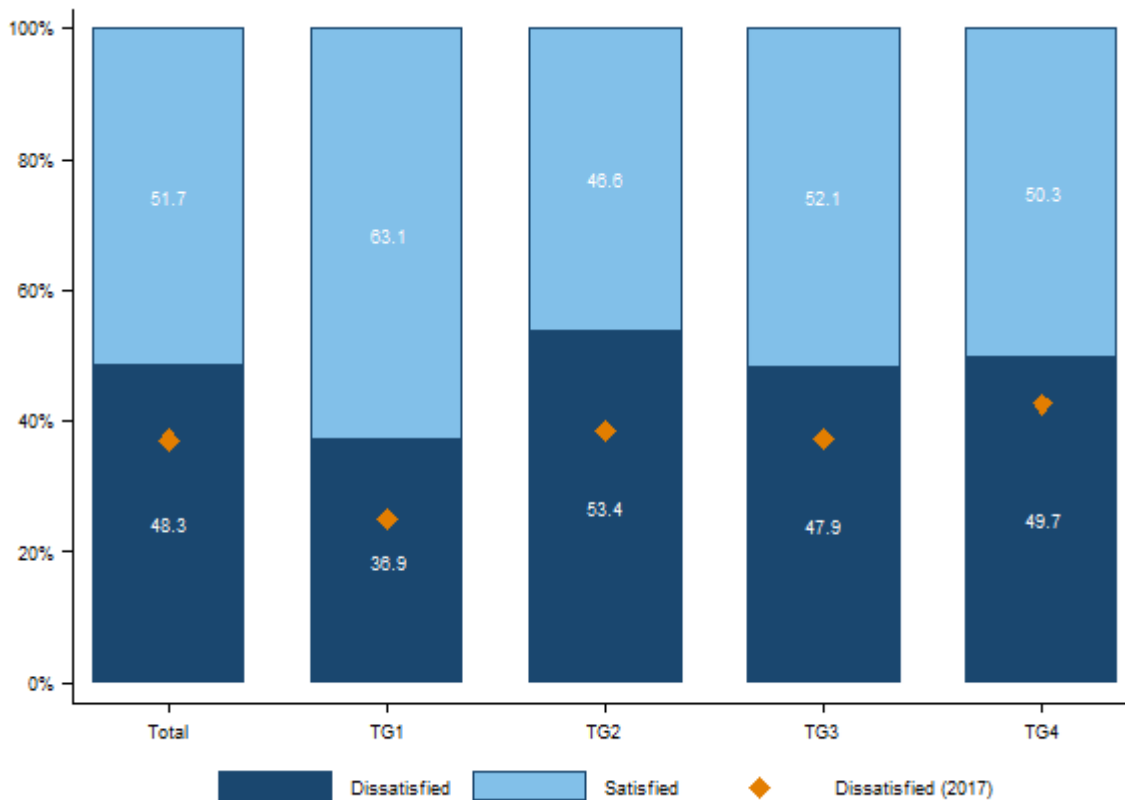
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."
- (2020: n=2,249; 2017: n=1,649)

Target groups: In common with the findings on researchers' satisfaction levels with research funding, their satisfaction levels with research infrastructures identified differences between target groups. This becomes apparent when contrasting the survey findings for EU researchers currently working outside Europe to other target groups which are more homogeneous. While a good majority of 63%

⁷⁴ Robinson-García, Nicolás, et al. 'The many faces of mobility: Using bibliometric data to measure the movement of scientists.' *Journal of Informetrics*, 13.1 (2019): 50-63. Hunter, Rosalind S., Andrew J. Oswald, and Bruce G. Charlton. 'The Elite Brain Drain'. *The Economic Journal* 119, no. 538 (2009).

of researchers in TG1 are satisfied with their research facilities and equipment, the shares of satisfied researchers in other target groups is lower by between 11pp (TG3) to 16pp (TG2), as shown in Figure 71.

Figure 71: Individual satisfaction with research facilities and equipment, by target group.



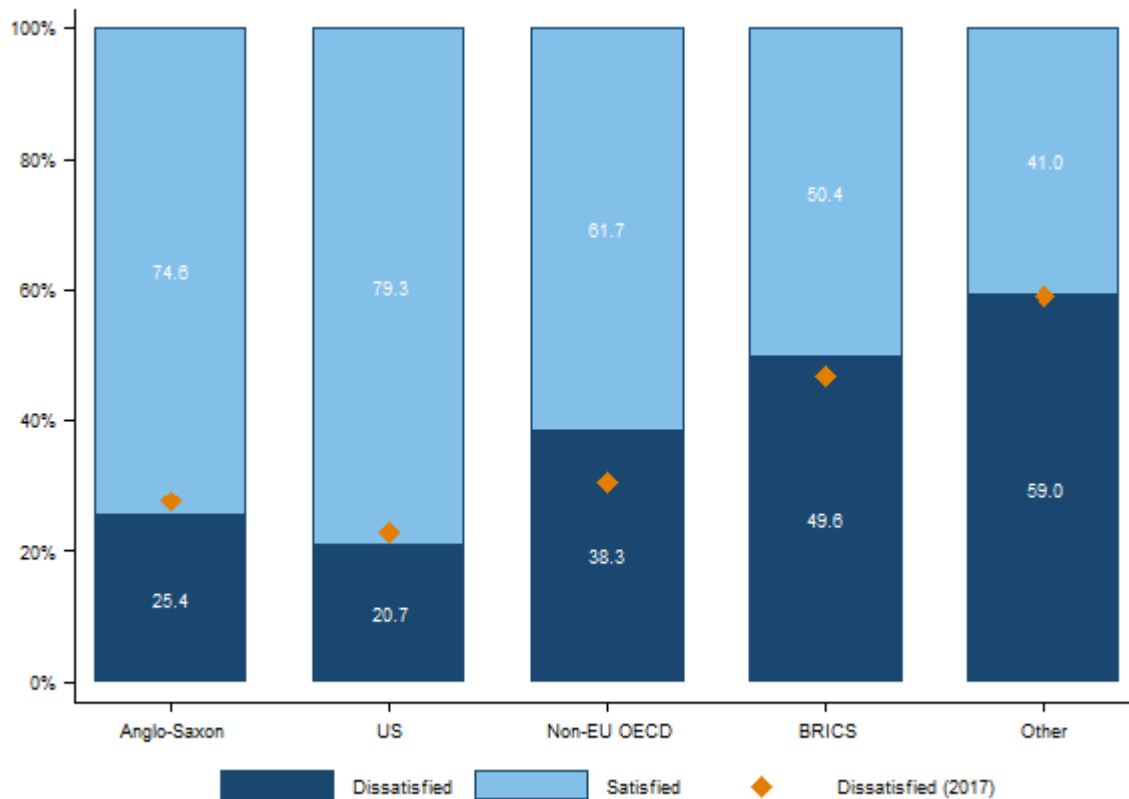
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,241; 2017: n=1,632)
- TG1: EU researchers currently working outside the EU (n=317)
- TG2: Non-EU researchers who have worked in the EU in the past (n=380)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=239)
- TG4: Non-EU researchers who have never worked abroad (n=1,305)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: In terms of the degree of satisfaction with research infrastructures, there are some differences between countries of employment. This was similar to the pattern identified relating to the degree of satisfaction with research funding. While the shares of researchers satisfied with research facilities and equipment are rather high in Anglo-Saxon countries (75% of researchers), especially in the US (79% of researchers), researchers employed in BRICS (50% of researchers) and 'other' countries (41% of researchers) are less satisfied. Since these results are in line with the results from MORE3, in the past few years, there have not been any considerable improvements in researchers' satisfaction levels with research infrastructures outside the EU.

Figure 72: Individual satisfaction with research facilities and equipment, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,241; 2017: n=1,632)

Intellectual support

This section relates to researchers’ satisfaction with their collaboration with leading scientists and with the quality of education and training. Firstly, collaboration with leading scientists can be a strong driver of scientific performance and output. Of course, to some extent the opportunity to collaborate with international scientists is also related to the researcher’s individual willingness to be mobile, which has implications for research policy, particularly in relation to the importance of appropriate support measures being in place to facilitate mobility for researchers and scientists⁷⁵.

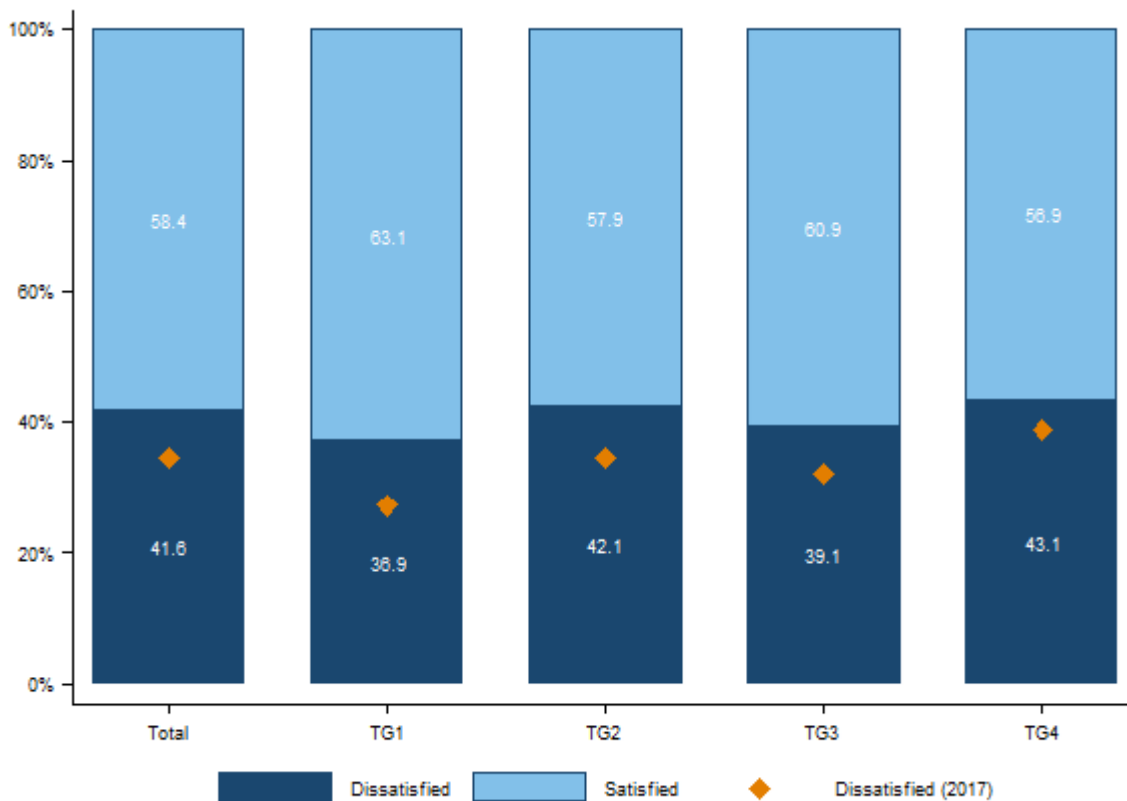
In total, 58% of researchers who participated in the MORE4 Global Survey is satisfied with their opportunities to work with leading scientists (see Figure 73). Compared to MORE3, on average, this share has slightly decreased (MORE3: 65%) over the last three years. By comparison with the satisfaction with intellectual challenge or the social environment, this percentage figure is rather low.

Target groups: As in the MORE3 Global Survey (2017), the share of researchers dissatisfied because of the lack of opportunities to cooperate with other leading scientists is the highest in the group of

⁷⁵ Kato, Maki, and Asao Ando. ‘National ties of international scientific collaboration and researcher mobility found in Nature and Science.’ *Scientometrics* 110.2 (2017): 673-694. Petersen, Alexander M. ‘Multiscale impact of researcher mobility.’ *Journal of The Royal Society Interface* 15.146 (2018): 20180580.

non-EU researchers who have never been mobile in the past (TG4), pointing to benefits of international mobility in terms of collaboration (see Figure 73). More than four out of ten TG4 researchers (43%) are dissatisfied with the opportunity to work with leading researchers. In contrast, the majority (63%) of EU researchers currently working abroad are satisfied with their opportunities to work with leading scientists.

Figure 73: Individual satisfaction with collaboration with leading scientists, by target groups.



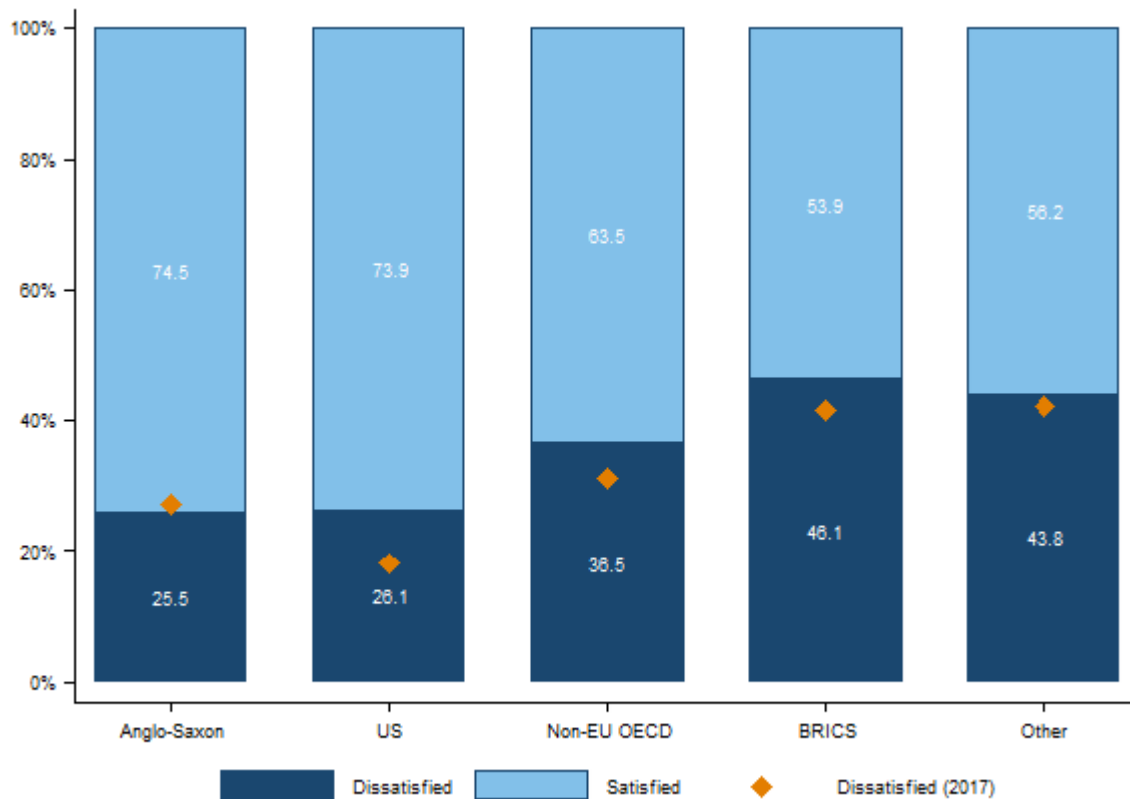
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,215; 2017: n=1,579)
- TG1: EU researchers currently working outside the EU (n=314)
- TG2: Non-EU researchers who have worked in the EU in the past (n=366)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=237)
- TG4: Non-EU researchers who have never worked abroad (n=1,208)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of employment: Again, when differentiating between country groups, the exceptional position of the Anglo-Saxon countries (incl. the US) is apparent (see Figure 74). While three out of four researchers in Anglo-Saxon countries (75%) and the US (75%) are satisfied with opportunities to work with leading researchers, only 54% employed in a BRICS country agrees. Since 2017 the relative percentage shares in different country groupings covered by the MORE3 and MORE4 surveys have remained broadly stable.

Figure 74: Individual satisfaction with collaboration with leading scientists, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,125; 2017: n=1,579)

The level of satisfaction with the quality of education and training is now considered. In total, 69% (MORE3: 74%) of researchers are satisfied with the quality of training and education at their institute (see Figure 75). Compared to MORE3, this share has remained broadly similar between 2017 and 2020. In comparison with the MORE4 EU HE Survey, however, the share of satisfied researchers is considerably lower (by 19 percentage points).

Target groups: Comparing different target groups reveals no considerable differences: 71% of non-EU researchers who have not worked in the EU, but in other non-EU countries (TG3) are satisfied with the quality of training and education and the same share (71%) of non-EU researchers who have never worked abroad (TG4) agree. In the group of EU researchers who currently work abroad (TG1) and non-EU researchers who have worked in the EU in the past (TG2), 65% are satisfied with the quality of training and education. Compared to MORE3, the shares of researchers satisfied with their training have slightly dropped across all target groups except for TG3.

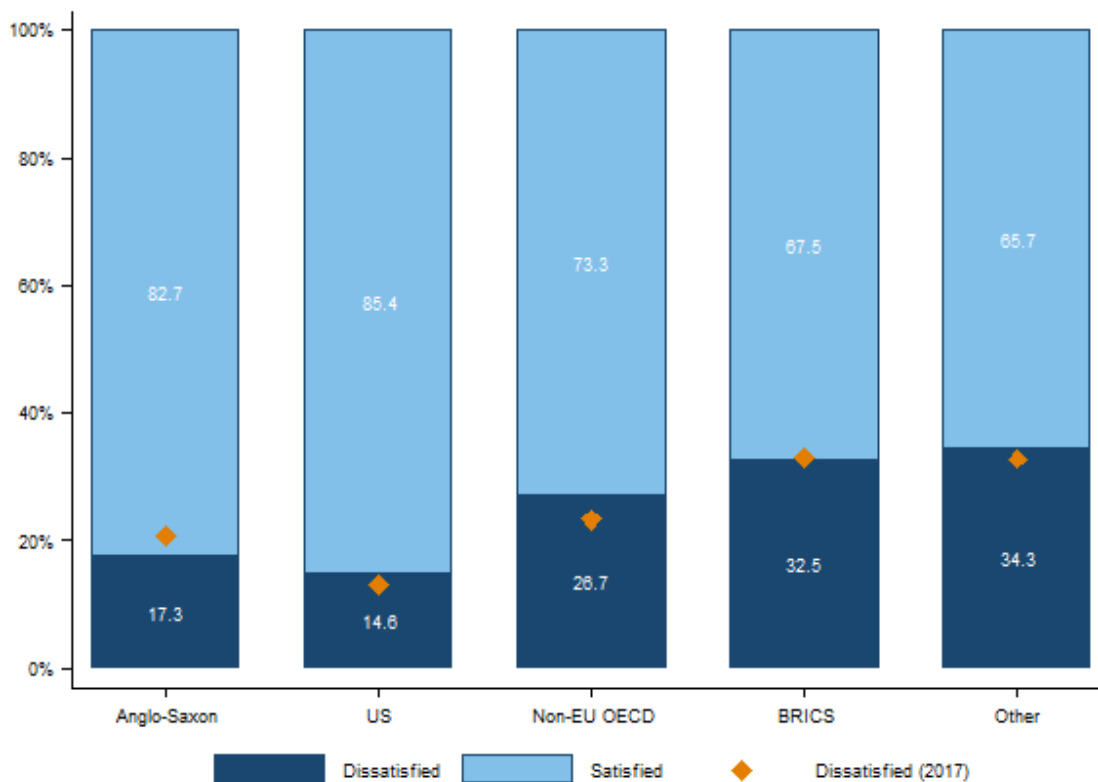
Country of current employment: In contrast, differences between country groups are more pronounced (see Figure 75). The highest shares of dissatisfied researchers are employed in the country group ‘other’ (34%; e.g. Ukraine, Argentina, Malaysia and Thailand) and in the BRICS nations (32%), while the lowest share of dissatisfied researchers is again located in the Anglo-Saxon countries (17%), especially in the US (15%). This result is in line with international rankings of research at universities

that regularly place universities in the US in the top-ranked positions (e.g., the purely bibliometric CWTS Leiden Ranking).

Research universities in the US are also in the vanguard according to composite rankings (including several aspects, not just research and citations but also teaching and sometimes even industry income etc.), but also when ordered according to their teaching scores only (see e.g. The *Times Higher Education World University Rankings 2016-2017*⁷⁶). Nonetheless, it can be observed that the US-American higher education system is overall very heterogeneous, with very low-quality institutions alongside top institutions. Some literature has also pointed to weaknesses in international rankings.⁷⁷

Our results seem to reflect respondents working at top or at least high-quality institutions, as international mobility of researchers to low-quality institutions is probably lower. The results are very similar to the MORE3 Global Survey.

Figure 75: Individual satisfaction with quality of training and education, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,209; 2017: n=1,612)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

⁷⁶ <https://www.timeshighereducation.com/world-university-rankings>

⁷⁷ University Rankings: Diversity, Excellence and the European Initiative, Geoffrey Boulton, League of European Research Universities (LERU), 2010 <https://www.leru.org/files/University-Rankings-Diversity-Excellence-and-the-European-Initiative-Full-paper.pdf>.

Time balance and research autonomy

The balance between research activities, administrative tasks and teaching is a crucial factor that affects scientific knowledge production. The same is true for the level of research autonomy that researchers have, as this clearly affects the extent to which a researcher can dedicate their time to the own research subject at hand. Research autonomy is also a broader principle that is important beyond the individual researcher level at an institutional level e.g. among universities and other types of HEIs. Autonomy is closely linked to the related issue of academic freedom. Research autonomy has been integrated into a number of different Declarations by groups of universities, such as the Lima Declaration on Academic Freedom and Autonomy of Institutions of Higher Education,⁷⁸ the Utrecht Declaration on Academic Freedom⁷⁹ and the Magna Charta Universitatum.⁸⁰ If universities and HEIs value research autonomy institutionally, they are more likely to embed it within their approach to employing researchers and funding their research activities. At the individual level, researcher autonomy to determine their own research agenda is highly valued by researchers.

Research and teaching are often seen as symbiotic and hard to separate. Teaching activities are essential for the production of scientific knowledge for a number of reasons: the recruitment of talented young researchers and scientists, transmission of 'taste for science' and enrichment of the current research and researchers' basic stock of knowledge (Marsh - Hattie, 2002, Roach - Sauermann, 2010)⁸¹. However, teaching also ties up resources that otherwise could be used to pursue research activities and the individual level of teaching load and quality often has less of an impact on researchers' career advancement than other metrics, such as the number of academic publications and citations. Literature indicates that a moderate teaching load is likely to be the most attractive for researchers⁸².

In total, only 58% (MORE3: 57%) of researchers who participated in the MORE4 Global Survey are satisfied with the balance between teaching and research time at their current position (see Figure 76). In comparison to the MORE4 EU HE Survey, that means that the share of satisfied global researchers is 12 percentage points lower than that of EU-based researchers. Since 2017, no improvement for researchers working outside the EU is observed in terms of a better teaching balance.

Target groups: However, looking at the survey data across the different target groups reveals that EU researchers currently working outside Europe have a slightly higher share of satisfied researchers than other groups. 65% of TG1 researchers are satisfied with the balance between teaching and research, while only 55% of non-EU researchers who have worked in the EU in the past (TG2) would agree.

⁷⁸ 68th General Assembly of World University Service. (1998). The Declaration on Academic Freedom and Autonomy of Institutions of Higher Education. Available at: <http://ace.ucv.ro/pdf/lima.pdf>

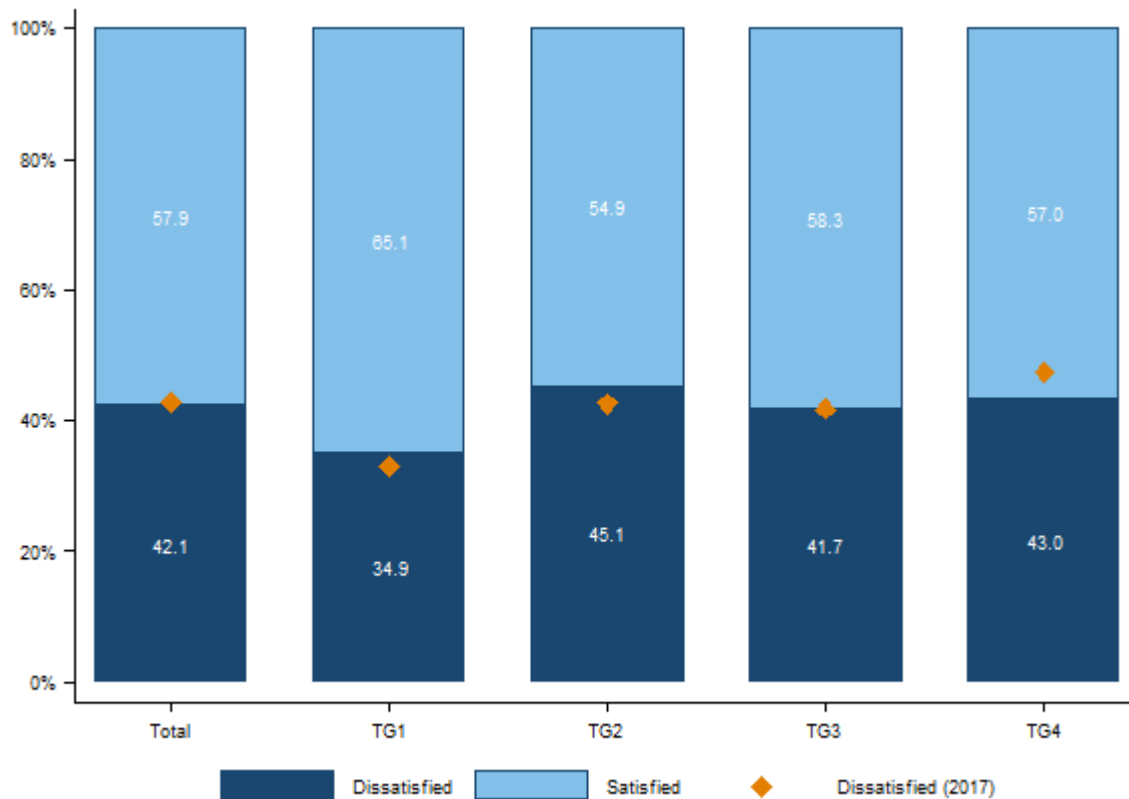
⁷⁹ AHRI. (2016). Utrecht Declaration on Academic Freedom. Utrecht. Available at: <https://www.cesaer.org/content/7-administration/legal-affairs/values/utrecht-declaration-on-academic-freedom.pdf>

⁸⁰ University of Bologna.(1986). Magna Charta Universitatum. Available at: <http://www.magna-charta.org/resources/files/the-magna-charta/english>

⁸¹ Marsh, H. W., Hattie, J., (2002) "The relation between research productivity and teaching effectiveness: Complementary, antagonistic, or independent constructs?", *J. High. Educ.*, 73(5), pp. 603–641. Roach, M., Sauermann, H., (2010) "A taste for science? PhD scientists' academic orientation and self-selection into research careers in industry", *Res. Policy*, 39(3), pp. 422–434.

⁸² Robertson, J., Bond, C. H., (2001) "Experiences of the relation between teaching and research: What do academics value?", *High. Educ. Res. Dev.*, 20(1), pp. 5–19. Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

Figure 76: Individual satisfaction with balance between teaching and research time, by target groups.



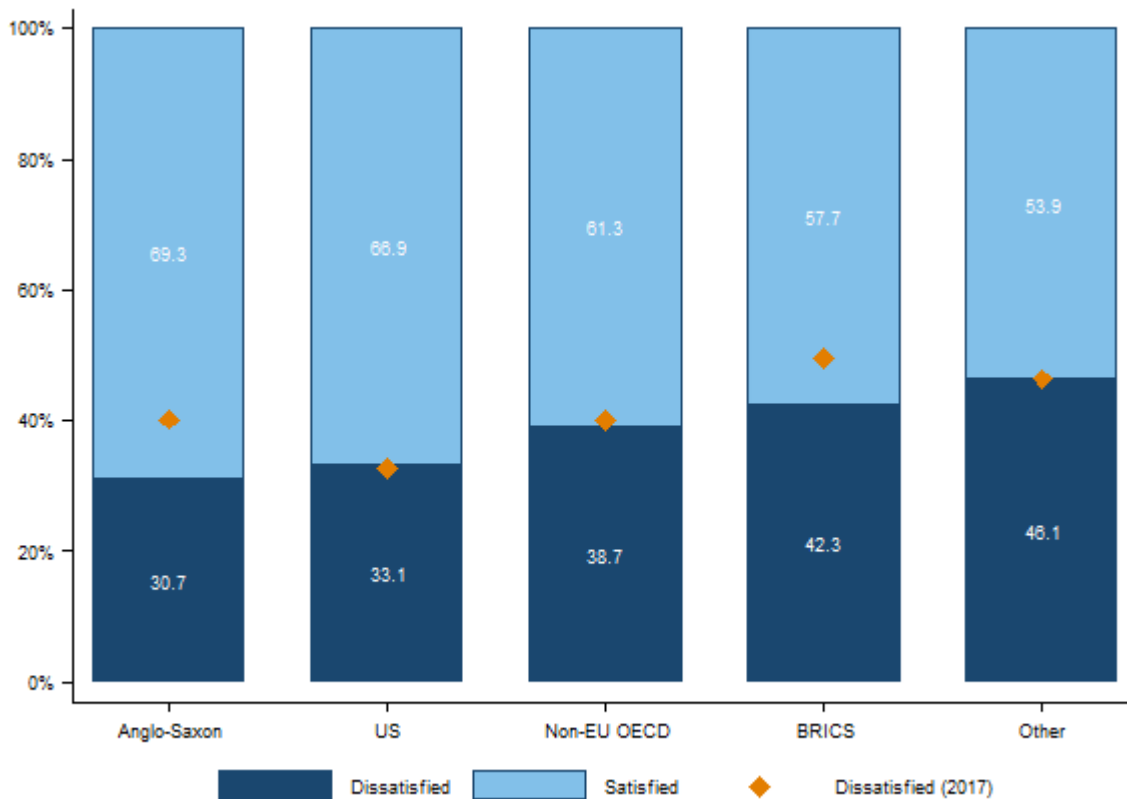
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,095; 2017: n=1,483)
- TG1: EU researchers currently working outside the EU (n=292)
- TG2: Non-EU researchers who have worked in the EU in the past (n=352)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=217)
- TG4: Non-EU researchers who have never worked abroad (n=1,234)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: Figure 77 indicates small differences between country groups of employment. In particular, the share of dissatisfied researchers employed in the groups 'other', but also in BRICS countries, is rather high at 46% and 42% respectively. Again, researchers employed in Anglo-Saxon countries, particularly in the US, are contrasting. Less than one in every three researchers (31%) in the US Anglo-Saxon countries and every third researcher (33%) employed in the US feels dissatisfied with the balance between teaching and research time at his/her current position. This points to another factor that partly explains the generally-perceived high level of attractiveness of the research system in Anglo-Saxon countries, and especially in the US. Researchers' satisfaction with the balance between teaching and research has further improved in Anglo-Saxon countries since 2017. Compared to MORE3, the share of satisfied researchers from Anglo-Saxon countries has increased by 9 percentage points.

Figure 77: Individual satisfaction with balance between teaching and research time, by country groups.



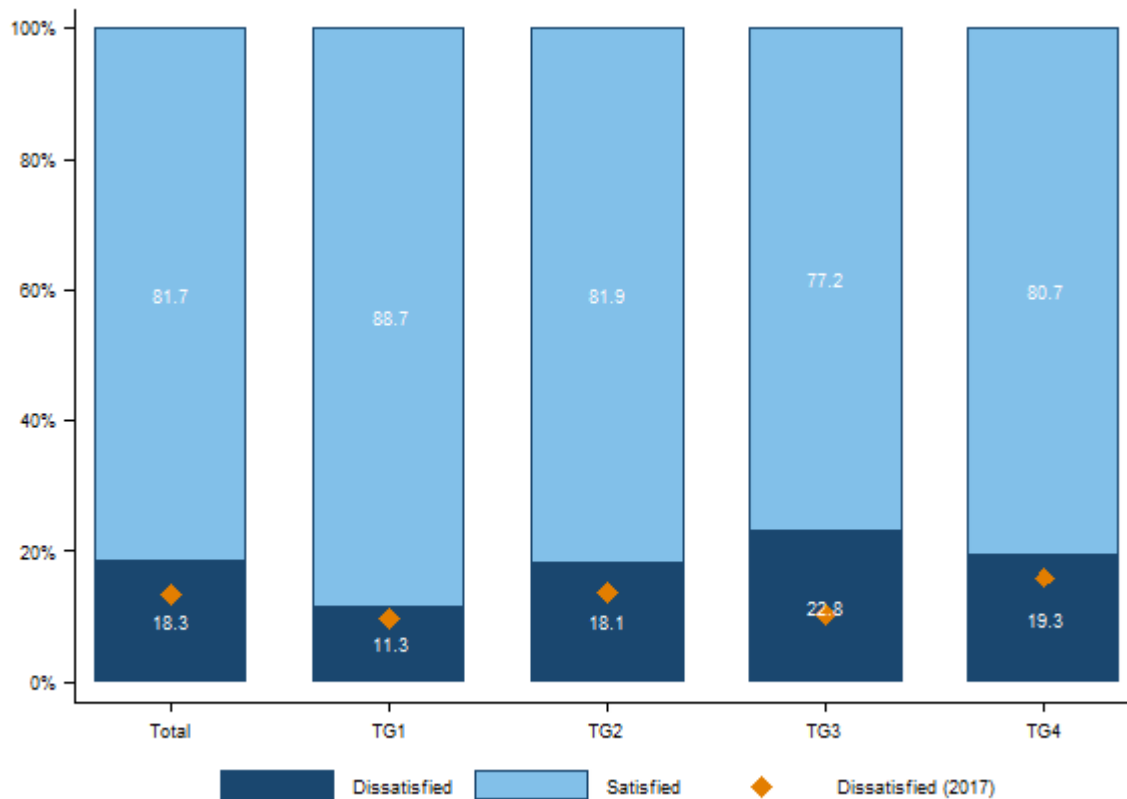
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,095; 2017: n=1,483)

Overall, the vast majority (82%) of researchers who participated in the MORE4 Global Survey are satisfied with their research autonomy (see Figure 77). Since 2017, the share of researchers working outside the EU who are satisfied with their autonomy in research has not changed significantly (MORE3: 86%). In comparison to the MORE4 EU HE Survey, that means that the share of satisfied global researchers is 9 percentage points lower than that of EU-based researchers.

Figure 78: Individual satisfaction with research autonomy, by target groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

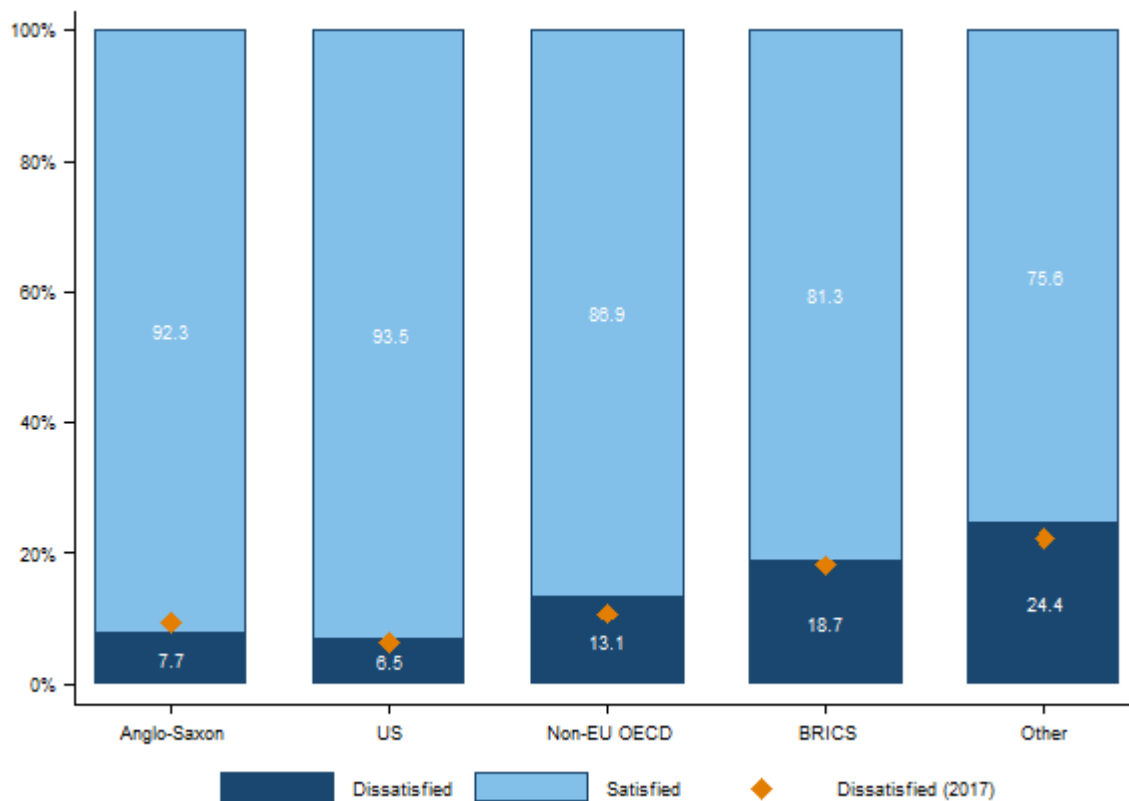
Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,095; 2017: n=1,483)

Target groups: Only minor differences can be observed between target groups. The highest share of researchers satisfied with research autonomy is found in the group of EU-researchers currently working abroad (89% of TG1 researchers), while the lowest share is in the group of non-EU researchers who have worked abroad but not in the EU (77% of TG3 researchers). Compared to MORE3, the shares of satisfied researchers have dropped only slightly (between 1 and 4 percentage points) in all target groups.

Country of current employment: The spread between the highest and the lowest share of researchers satisfied with their research autonomy is higher when comparing different country groups (see Figure 79). In line with the results above, the highest share of satisfied researchers is again employed in the US (94%) and the Anglo-Saxon country group (92%), while the lowest share of researchers satisfied with research autonomy can be found in ‘other’ (e.g. Ukraine, Argentina, Malaysia and Thailand) and BRICS countries (76% and 81% respectively). Thus, the results suggest no significant changes compared to the findings from MORE3 in 2017.

Figure 79: Individual satisfaction with research autonomy, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,284; 2017: n=1,686)

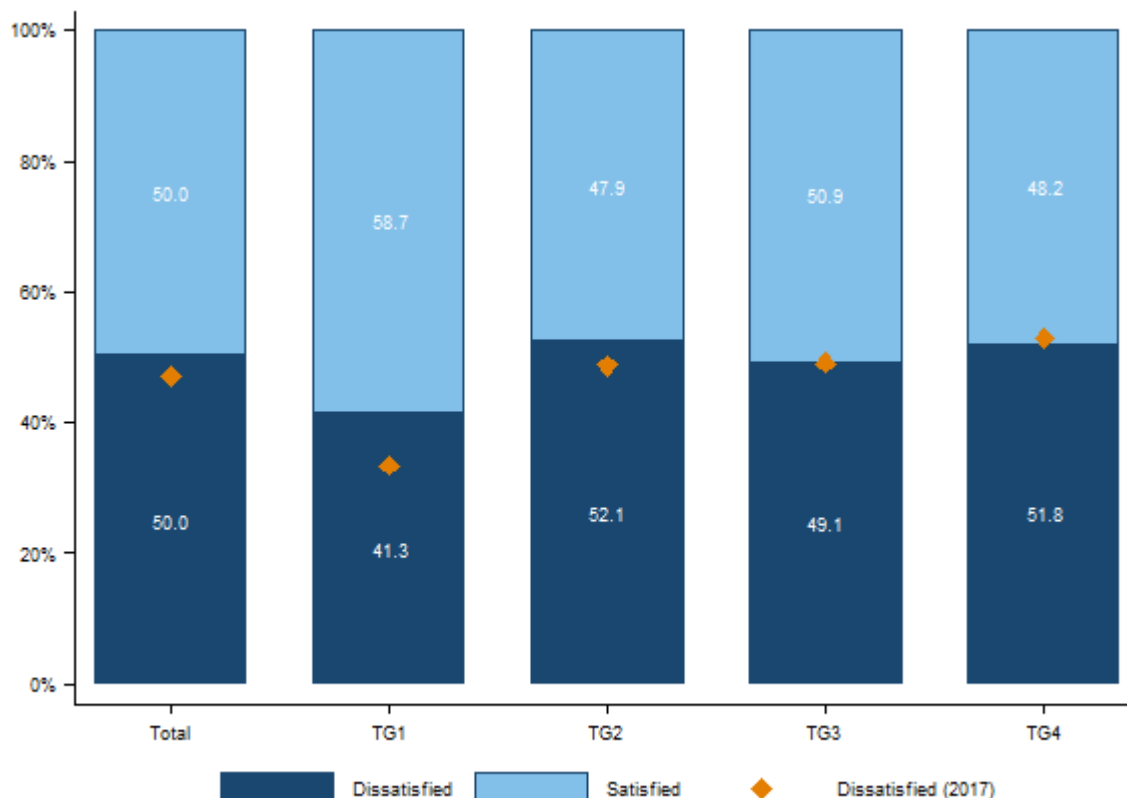
7.2.5. Career and mobility perspectives as working conditions

In both the MORE3 and the MORE4 EU HE Surveys, career perspectives are treated as a cross-cutting issue as they matter both in terms of scientific knowledge production and for researcher perspectives on job security and financial security. The analysis of the MORE4 EU HE Survey indicates that mobility perspectives and collaboration patterns are interrelated and, as a result, mobility perspectives also affect the production of scientific knowledge.

In general, the share of researchers satisfied with their mobility perspectives is only moderate. Only one out of every two researchers (50%) who participated in the MORE4 Global Survey feel satisfied with their mobility perspectives (see Figure 80). This share has been rather constant for the last three years (MORE3: 53%) and is 25 percentage points lower than the share of EU28 researchers satisfied with their mobility perspective in the MORE4 EU HE Survey (75%).

Target groups: A comparison between different target groups shows only minor differences between target groups as to their level of satisfaction. The group of EU researchers currently working outside the EU display the highest share of researchers satisfied with their mobility perspective (59% of TG1 researchers). In contrast, the shares of satisfied researchers in the other target groups are somewhat lower and rather homogeneous (TG3: 51%, TG4: 48%, TG2: 48%).

Figure 80: Individual satisfaction with mobility perspectives, by target groups.



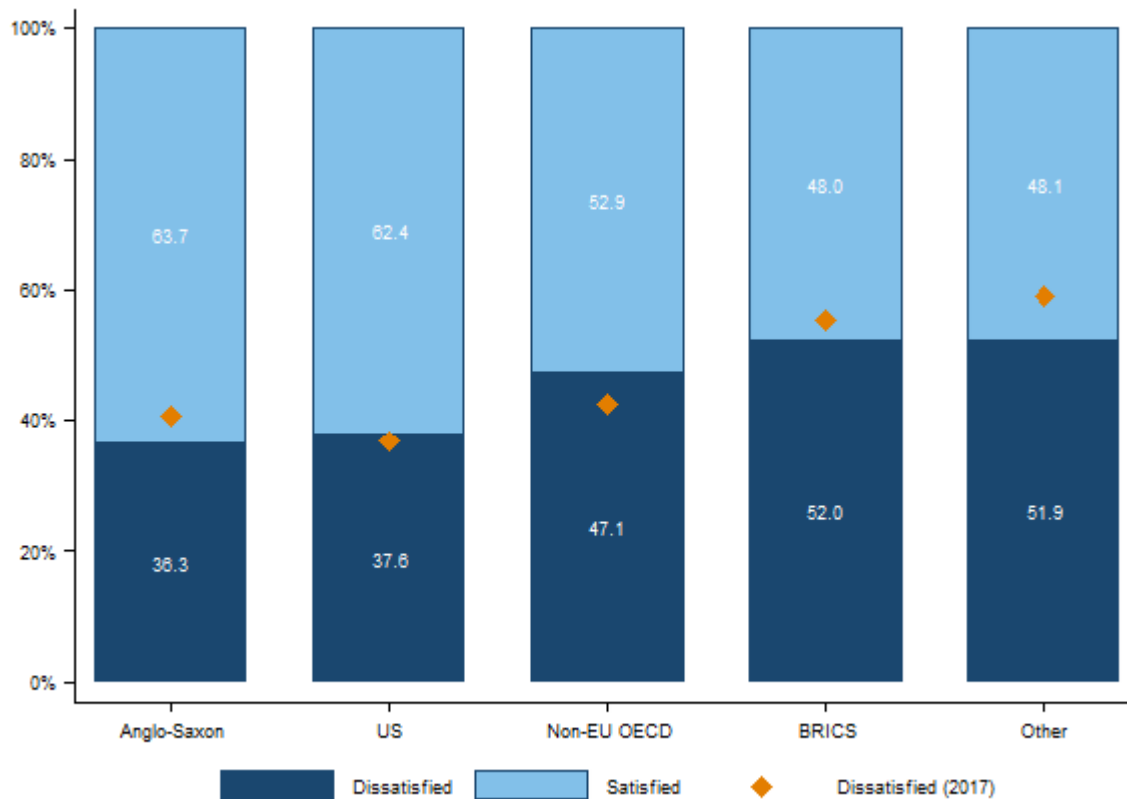
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,134; 2017: n=1,564)
- TG1: EU researchers currently working outside the EU (n=305)
- TG2: Non-EU researchers who have worked in the EU in the past (n=274)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=234)
- TG4: Non-EU researchers who have never worked abroad (n=1,221)
- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."

Country of current employment: Figure 81 indicates again some differences between country groups of employment. The spread between the highest share of researchers satisfied with their mobility perspectives (64% of researchers employed in the Anglo-Saxon country group) and the lowest share (48% of researchers in BRICS countries) is 16 percentage points. Also, the share of satisfied researchers employed in 'other' countries (48%) and non-EU OECD countries (53%) is noticeably lower. Overall, the pattern is in line with the results from MORE3, with small improvements discernible in the case of Anglo-Saxon countries, and a small deterioration in the group of 'other' countries notwithstanding. These small changes compared to MORE3 might be due to the different sample structure in terms of researchers' countries of employment (see Section 3.3.3).

Figure 81: Individual satisfaction with mobility perspectives, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

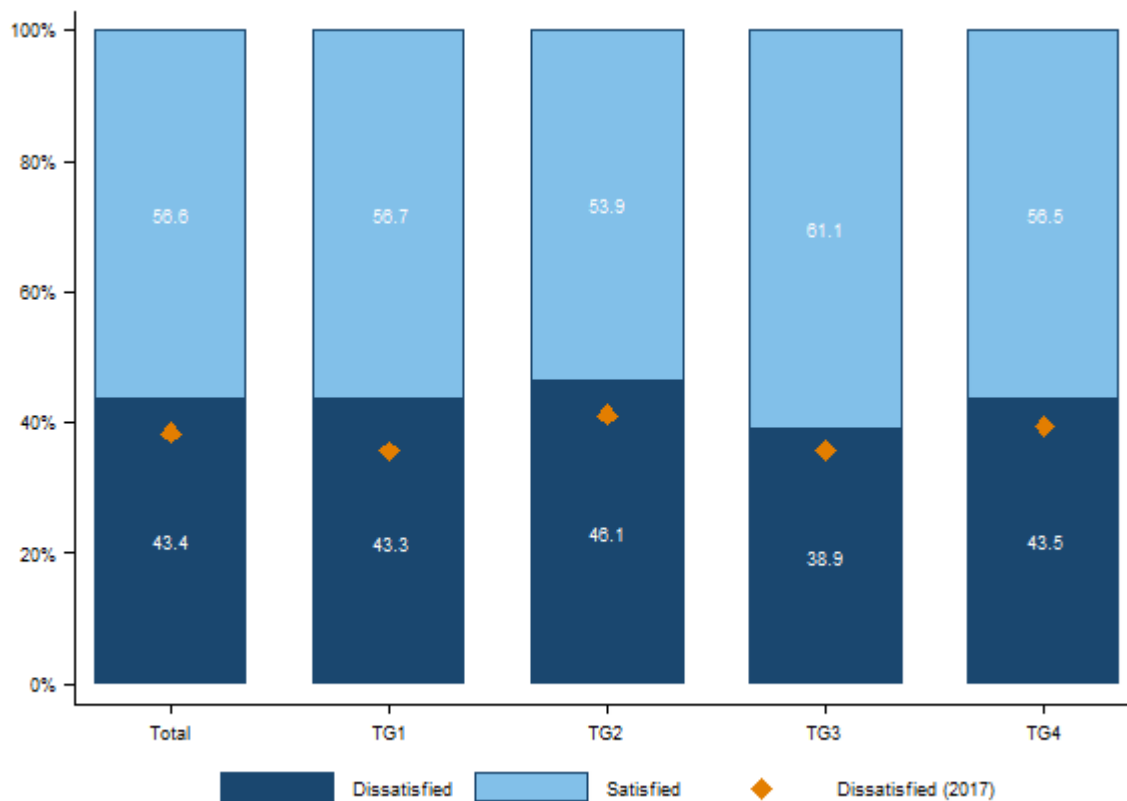
Notes:

- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,134; 2017: n=1,564)

Overall, 57% (MORE3: 62%) of researchers who participated in the MORE4 Global Survey feel satisfied with their current career perspectives (see Figure 82). In comparison to satisfaction levels regarding the researcher experiencing intellectual challenges and being satisfied with their social environment, this is also on the low side.

Target groups: In terms of satisfaction with career perspectives, there are only minor differences between the percentage satisfaction across the different target groups. The highest share of researchers satisfied with respect to career perspectives can be found in the group of non-EU researchers who have worked abroad, but not in the EU (61% of TG3 researchers), while the lowest share is the target group of non-EU researchers who have worked in the EU in the past (54% of TG2 researchers). Across target groups, the shares of satisfied researchers have slightly decreased since 2017.

Figure 82: Individual satisfaction with career perspectives, by target groups.



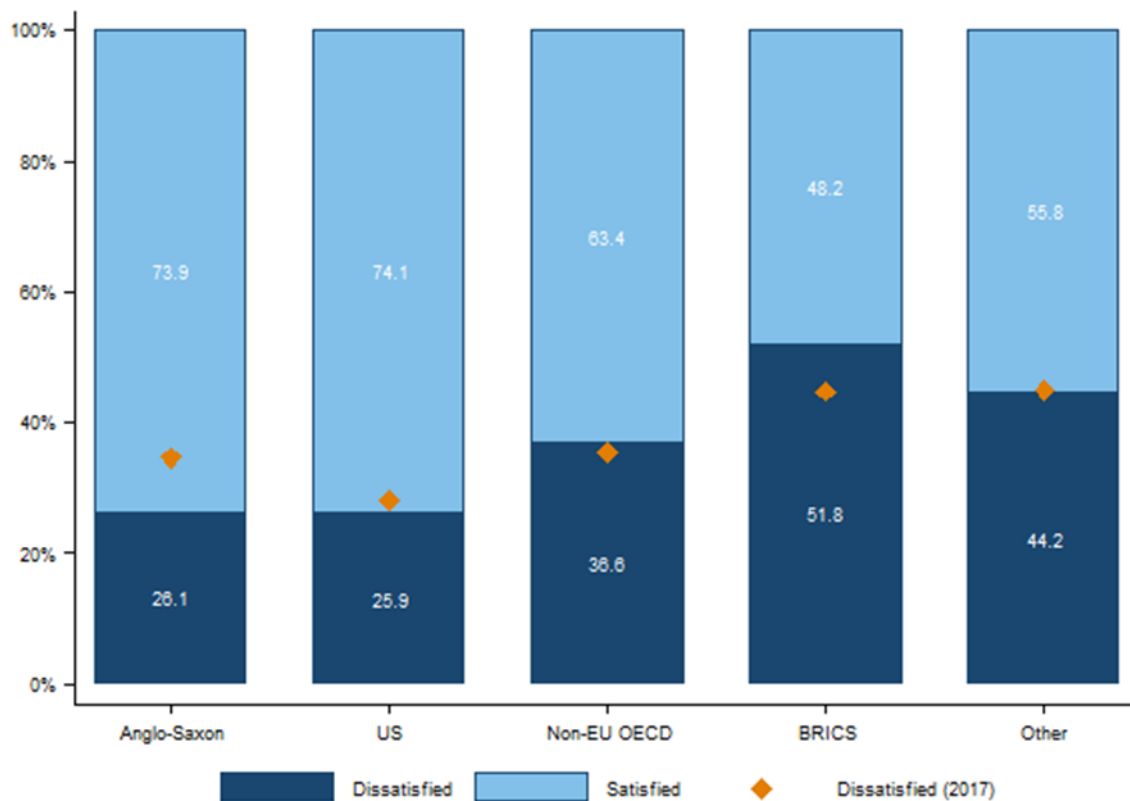
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,200; 2017: n=1,611)
- TG1: EU researchers currently working outside the EU (n=314)
- TG2: Non-EU researchers who have worked in the EU in the past (n=382)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=238)
- TG4: Non-EU researchers who have never worked abroad (n=1,266)
- Based on question 24: “Please indicate your satisfaction with each factor as it relates to your current position.”

Country of current employment: Differences between country groups of employment are more pronounced than in comparison to the satisfaction with mobility perspectives (see Figure 83). Again, researchers employed in the Anglo-Saxon country group, and especially in the US, are considerably more frequently satisfied with their career perspectives than researchers employed in the other country groups. While 74% of researchers in the US and in the Anglo-Saxon countries on average are satisfied with their career perspective, the respective share of researchers employed in BRICS nations is by 26 percentage points lower. Again, the shares of satisfied researchers in non-EU OECD countries is somewhere in the middle (63%).

Figure 83: Individual satisfaction with career perspectives, by country groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 26: “Please indicate your satisfaction with each factor as it relates to your current position.”
- (2020: n=2,200; 2017: n=1,611)

7.3. Attractiveness based on direct comparison between research systems

In this subsection, the information gained from the directly-targeted questions 48 and 58 of the MORE4 Global Survey are analysed. These compare a number of aspects of the research system outside and inside the EU. Researchers eligible to respond to these questions are those who have knowledge of at least one EU and non-EU system:

- Researchers with EU citizenship who currently work abroad (TG1) (Figure 84);
- Non-EU Researchers who have been mobile to the EU (TG2) (Figure 85).

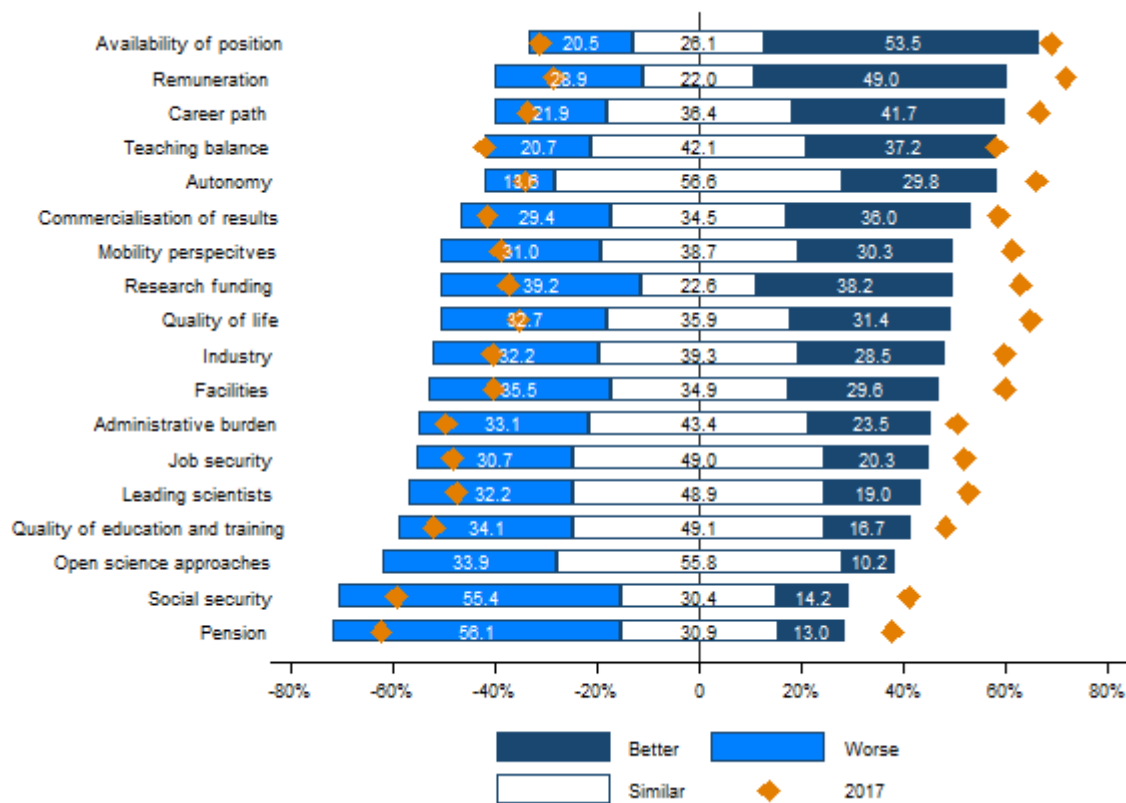
Overall, whether researchers in the target groups for direct comparisons between research systems appreciate the non-EU research system as being either better or worse than the EU system regarding various aspects depends heavily on their experience, i.e. which system they know.

Remarkably, European researchers (TG1) are overall less positive about the EU research system than the non-EU researchers who have been mobile to the EU (TG2). TG1 researchers are more positive than negative compared to their current employment outside Europe than about the following aspects in the EU:

- By a considerable margin (>15 percentage points), about their pension plan, social security as well as open science approaches, quality of education and training.
- By a less significant margin (5-15 percentage points), about working with leading scientists, job security, administrative burden and research equipment & facilities.
- Similar aspects (>-5 to <5) are working with industry, mobility perspectives, quality of life and research funding.
- The commercialisation of research results was considered to be marginally better outside the EU; but better by a considerable margin are research autonomy, balance between teaching and research, career path, remuneration and the availability of positions.

Conversely, TG2 researchers deem all aspects better in the EU than in their current position outside the EU (Figure 85).

Figure 84: Comparative perspective of working outside the EU versus working inside the EU (TG1; better refers to better outside the EU).

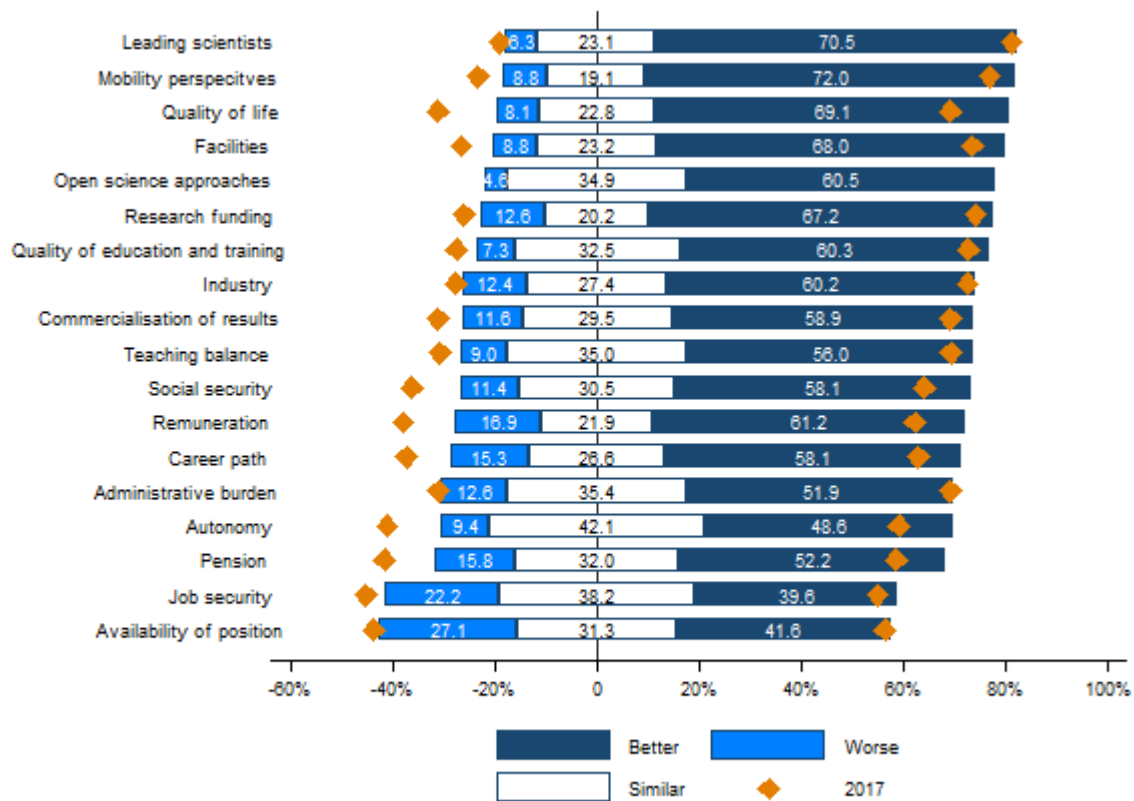


Source: MORE4 Global Survey (2020).

Notes:

- Based on question48: “How does working in ... compare to working as a researcher in Europe? Please indicate if something is worse, similar or better in ... than in Europe.”
- (2020: n=197-315)

Figure 85: Comparative perspective of working in the EU versus working outside the EU (TG2; better refers to better in the EU).



Source: MORE4 Global Survey (2020).

Notes:

- Based on question 58: “How does working as a researcher in Europe compare to your current employment in ...? Please indicate if something is worse, similar or better in Europe than in ...”
- (n=243-393).

Figure 86 contrasts the share of respondents assessing the EU research system as being more attractive compared with the proportion of researchers who assess it as less attractive based on the country of employment. The graph contains the net shares (i.e. share of “better in the EU” minus share of “worse in the EU”, in percentage points), and the line where better and worse are equally balanced, taking the value 0, is shown explicitly as the line “EU = outside EU”. This implies that lines within or below the latter line indicate “EU = worse” (taking negative values), and lines outside or above indicate “EU = better”, taking positive values. The top panel is based on responses from EU researchers currently working abroad (TG1), while the bottom panel focuses on non-EU researchers currently working outside the EU, but who had at least one mobility experience inside the EU within the last 10 years (TG2).

The panels summarise the more detailed categories:

1. “Remuneration and other material factors” includes remuneration, social security and other benefits, quality of life, job security, and pension plans;
2. “Conditions for scientific knowledge production” includes the availability of research funding, access to research facilities and equipment, working with

- leading scientists, research autonomy, administrative burdens, and the balance between teaching and research time;
3. "Engagement with industry" includes the ease of commercialisation of research results, and ease of industry collaboration.

Non-summarised categories are:

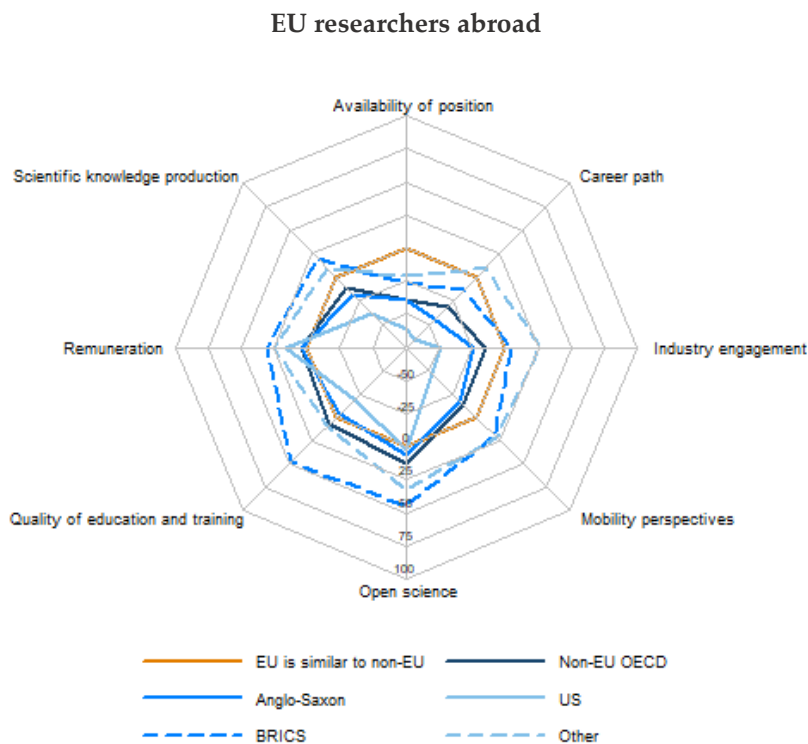
4. mobility perspectives;
5. attractive career paths;
6. the availability of suitable positions;
7. the quality of education and training;
8. open science approaches (new to MORE4 Global Survey).

In case of the non-EU researchers in TG2, an additional item was added to question 60 in terms of:

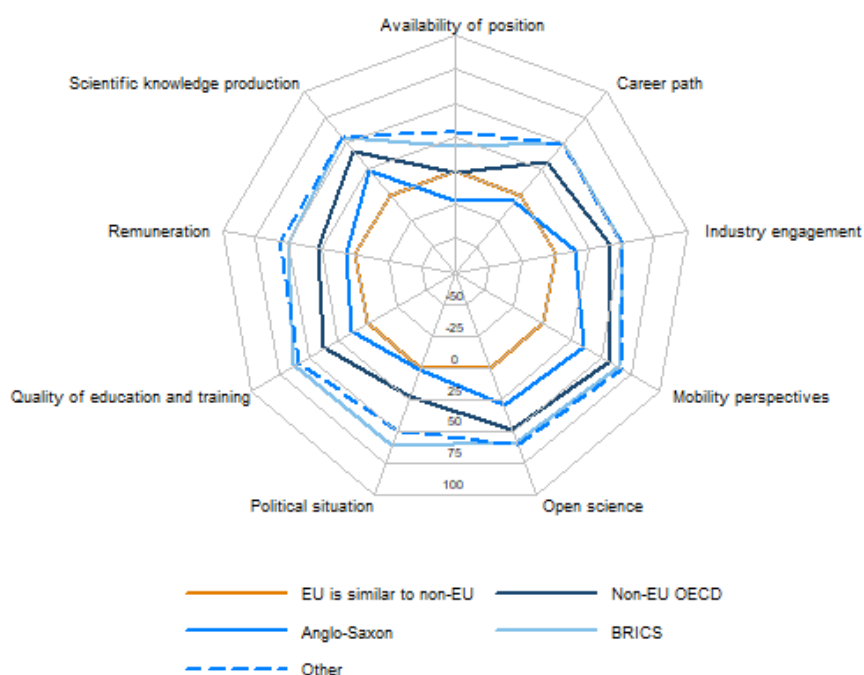
9. the political situation.

Table 34 below provides all the data for Figure 86. As in the previous analyses in this chapter, the survey responses are clustered into country groups by researchers' country of current employment. However, in the case of the bottom panel (non-EU researchers mobile to the EU; TG2), there are only 19 researchers now working in the US, so the US was dropped as a separate category from the bottom panel. Nevertheless, the results provide some first insights into the relative attractiveness of the EU as a place for carrying out research.

Figure 86: Comparison between working inside the EU and working outside the EU as a researcher (positive values – EU perceived to be better)



Non-EU researchers with EU mobility experience in the past



Source: MORE4 Global Survey (2020).

Notes:

- EU researchers who work abroad (TG1) and non-EU researchers who worked in the EU in the past (TG2) are each grouped by their current country of employment.
- Based on question 48: “How does working in ... compare to working as a researcher in Europe? Please indicate if something is worse, similar or better in ... than in Europe.” and question 58: “How does working as a researcher in Europe compare to your current employment in ...? Please indicate if something is worse, similar or better in Europe than in ...”
- Positive values indicate higher shares of researchers assessing working in the EU to be better than to be worse.
- (top graph/left half of the table: n=245-318, bottom graph/right half of the table: n=307-402)

Table 34: Comparison between working inside the EU and working outside the EU as a researcher: full set of data of the figure above (positive numbers indicate higher share of researchers who think that it is better inside the EU than outside).

	EU RESEARCHERS ABROAD					NON-EU RESEARCHERS MOBILE TO THE EU			
	Anglo-Saxon	USA	Non-EU OECD	BRICS	Others	Anglo-Saxon	Non-EU OECD	BRICS	Others
Career path	-45.1	-65.5	-30.9	-13.7	9.8	-6.8	30.6	50.0	48.5
Conditions for scientific knowledge production	-18.5	-38.1	-11.6	19.7	9.9	23.1	42.1	55.2	55.2
Administrative burden	-9.6	-22.2	1.1	26.4	14.8	28.8	42.0	44.5	31.1
Autonomy	-32.1	-40.0	-26.0	-5.5	1.8	1.5	22.9	47.7	47.2
Research Facilities	-21.4	-54.5	-10.6	29.7	27.8	16.2	45.5	62.8	69.7

	EU RESEARCHERS ABROAD					NON-EU RESEARCHERS MOBILE TO THE EU			
	Anglo-Saxon	USA	Non-EU OECD	BRICS	Others	Anglo-Saxon	Non-EU OECD	BRICS	Others
Working with leading scientist	-10.5	-45.5	-1.6	39.7	27.8	35.7	53.3	71.5	68.2
Research funding	-9.2	-43.6	-12.9	31.0	7.7	26.6	48.8	53.3	61.5
Teaching balance	-23.3	-20.0	-19.6	-2.9	-25.0	22.2	42.1	47.1	52.1
Engagement with industry	-24.6	-48.8	-14.6	5.0	26.5	16.0	41.2	50.9	50.6
Commercialisation of results	-33.3	-63.2	-21.5	4.3	18.6	14.3	44.3	49.4	47.5
Collaboration with industry	-16.2	-38.1	-8.3	6.9	31.4	15.9	39.1	52.3	51.2
Mobility perspectives	-17.8	-47.2	-13.9	19.4	21.8	34.9	57.1	64.7	68.0
Availability of position	-39.7	-61.8	-39.1	-26.4	-21.2	-21.8	-1.7	18.1	29.0
Remuneration	4.1	15.3	3.6	30.5	25.1	7.2	28.0	50.2	55.9
Remuneration	-34.3	-62.3	-34.1	-1.4	1.8	-24.5	17.9	56.3	58.9
Social security	36.4	58.2	34.8	54.9	44.4	34.9	44.4	40.6	54.2
Pension	26.5	33.3	30.6	61.9	63.3	13.2	32.6	27.2	50.3
Job security	7.1	21.8	3.4	24.6	15.4	-13.0	11.1	5.2	36.1
Quality of life	-11.8	21.4	-9.1	19.7	12.3	20.6	39.8	77.2	66.9
Open science	6.3	2.1	13.0	45.0	32.7	30.0	48.2	58.1	60.9
Quality of education and training	-3.8	-19.6	7.7	47.8	9.1	12.9	37.1	63.0	58.5
Political situation	-	-	-	-	-	1.6	22.1	61.2	50.0

Source: MORE4 Global Survey (2020).

EU researchers currently working abroad: comparing working outside the EU with working inside the EU

In the top panel, EU researchers who currently work in economically developed, non-EU OECD countries rate the EU as worse than their current country of employment with respect to most broad categories, with the exception of remuneration, education and training, as well as open science approaches. The positive value for the EU with regard to the broad category remuneration comes from positive values on social security and pensions, while remuneration in a narrow sense (salaries) has a very negative perception. At a detailed level (table above) there are also slightly positive shares for the degree of administrative burdens.

The results for the US in the top panel (based on 56 respondents) are particularly striking, as all shares with the exception of “remuneration and other material factors” as well as “open science approaches” are negative, indicating that EU researchers working in the US right now perceive the US to be far better across the different categories, including the quality of education and training. The positive value for the EU with regard to the broad category remuneration, as more generally in the group of non-EU OECD countries comes from positive values on social security, the pension plan, job security and quality of life, while remuneration in a narrow sense (salaries) is considerably negative. Among the conditions required for the production of scientific knowledge, a detailed look at the responses across all the categories of researchers (cf. Table 34) reveals that there are very few researchers who

think that working with leading scientists, research funding and career paths are better in the EU than in the US.

This confirms the picture from the MORE4 EU HE Survey, the MORE3 Global Survey and is also in line with other existing research: This literature contains more anecdotal evidence from interviews with mobile researchers who are generally positive about the quality of undergraduate training and higher education in EU countries (albeit any generalisations need to consider the considerable heterogeneity in universities and HEI systems across the EU-27), often find there to be better working conditions to establish their research career in science in the US, e.g. due to earlier independence (autonomy), collaboration with leading scientists and attractive career paths (tenure track models which link a tenured position to a researcher's output only).⁸³ It is also in line with both bibliometric university rankings (as e.g. the CWTS Leiden ranking) and with several bibliometric studies on mobility and scientific performance.⁸⁴ Both these data and documentation sources have found evidence of asymmetric mobility of talented scientists to the US and a better scientific performance at the aggregate level in nearly all scientific fields, even if there are of course excellent researcher groups in the EU. The ease of commercialising research results or of collaborating with industry is also perceived to be much better in the US than in the EU, similar to the availability of research positions more generally.⁸⁵

Again, this confirms the picture from the MORE4 EU HE survey, with the EU seen to be better concerning quality of life and social security, while key career-related job characteristics are perceived to be better in the US. International evidence and the MORE surveys show that researchers move away from their home country for career-related reasons such as independence, working with leading scientists and attractive career paths, while they move back for personal or family reasons⁸⁶. This means that the current advantages of the EU in terms of quality of life and job characteristics related to social and job security work less as drivers of attractiveness, or as attractors of researchers, than conditions which influence the scientific productivity of researchers (see also section 7.4).

Turning asymmetric international mobility in particular towards the US into symmetric mobility among researchers will hence require an improvement of factors across the board, both those which influence scientific productivity, such as attractive career paths, research funding and research autonomy, as well as those pertinent to material factors, bearing in mind that researchers – in particular early stage ones – are willing to trade salary off against more promising conditions for their scientific productivity⁸⁷, in addition to ensuring more generally the availability of suitable positions.

⁸³ See on this discussion Janger, J., Pechar, H., "Organisatorische Rahmenbedingungen für die Entstehung und Nachhaltigkeit wissenschaftlicher Qualität an Österreichs Universitäten", WIFO, Vienna, 2010 as well as Janger, J., and Nowotny, K. Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

⁸⁴ See, e.g., Rodríguez-Navarro, Alonso, and Francis Narin. 'European Paradox or Delusion—Are European Science and Economy Outdated?' *Science and Public Policy*. Accessed 22 May 2017. doi:10.1093/scipol/scx021.; Albarrán, Pedro, Juan A. Crespo, Ignacio Ortuño, and Javier Ruiz-Castillo. 'A Comparison of the Scientific Performance of the U.S. and the European Union at the Turn of the 21st Century'. *Scientometrics* 85, no. 1 (20 April 2010): 329–44. doi:10.1007/s11192-010-0223-7; Bonaccorsi, Andrea, Tindaro Cicero, Peter Haddawy, and Saeed-UL Hassan. 'Explaining the Transatlantic Gap in Research Excellence'. *Scientometrics*, 11 November 2016, 1–25. doi:10.1007/s11192-016-2180-2; Hunter, Rosalind S., Andrew J. Oswald, and Bruce G. Charlton. 'The Elite Brain Drain*'. *The Economic Journal* 119, no. 538 (2009): F231–F251. doi:10.1111/j.1468-0297.2009.02274.x.

⁸⁵ As the EU survey has shown, the results need to be interpreted against the background of substantial heterogeneity between EU Member States.

⁸⁶ See Stephan, P., Franzoni, C., & Scellato, G. (2013). *Choice of Country by the Foreign Born for PhD and Postdoctoral Study: A Sixteen-Country Perspective* (No. w18809). National Bureau of Economic Research, Janger, J., and Nowotny, K. Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

⁸⁷ Janger, J., Nowotny, K., (2016) "Job choice in academia", *Research Policy*, 45(8), pp. 1672–1683.

Even if these factors could be improved quickly, it would however take time before any effects would be felt, as the top leading scientists in the US attract more leading scientists, creating persistence.

Moreover, interest in return mobility (in the next year) is low among later stage researchers as shown in section 7.3.2. This means that national programmes to attract senior researchers back to Europe may be limited in their effectiveness (cf. for example the FiDiPro Finland distinguished Professor Programme in Finland or the Odysseus programme in Flanders, Belgium). As it may be difficult to encourage leading scientists who are established at top research institutions internationally to come back to the EU, it will be important to try and attract the young and talented, e.g. through attractive career paths such as the tenure track model. Mobility among researchers should not be seen as a zero sum game, however – what is important is brain circulation rather than brain drain, or turning asymmetric mobility into symmetric mobility.

With respect to emerging countries (e.g. the BRICS and other countries) in the top panel, the assessment of the EU is generally better with regard to all the categories with the exception of the attractiveness of career paths (BRICS only) and the availability of research positions (BRICS and other countries). Researchers who are currently working in the BRICS see conditions for scientific knowledge production as better in the EU. A higher share of researchers from both country groups, however, sees working with leading scientists in the EU as better than in the countries where they work now.

Non-EU researchers who worked in the EU in the past: comparing working in the EU with working outside the EU

The bottom panel on the non-EU researchers who worked in the EU in the past gives a different picture, in that the EU is perceived to be better than the other country groups, with the exception of the availability of suitable positions in non-EU OECD countries, where shares of “better” and “worse” are in the balance. The share of researchers who see something as better in the EU is particularly high for working with leading scientists and mobility perspectives. The number of researchers who are currently working in the US is too small for consideration as a separate group.

Contrasting the two target groups by country of employment hence leads to a mixed picture for the perception of the EU’s attractiveness. If the EU wants to become a leading player globally in excellent science, then it will need to strengthen its attractiveness to European and global talented researchers. The survey findings highlight a major difference in the perception as to the relative attractiveness between the US and the EU, which points clearly to the need for further efforts to increase the EU’s attractiveness as a place to conduct research and develop research careers. Improving the current situation, however, is complex, given the diverse number of factors that influence relative attractiveness.

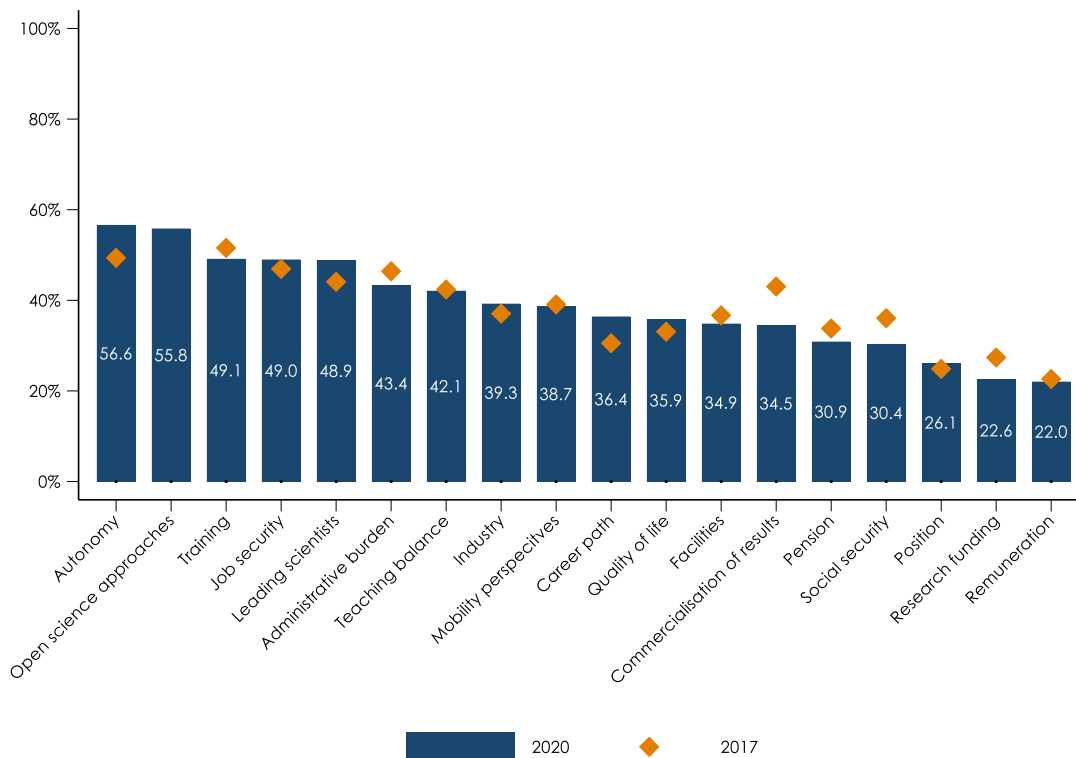
However, by comparison with researchers from non-EU OECD countries in total, the picture is more mixed, with EU researchers being more critical of the EU than non-EU researchers who have been mobile to the EU. This result is partly driven by researchers working in the US, amounting to a higher share among EU researchers abroad than among non-EU researchers who have been mobile to the US. Among researchers in the BRICS or in other, mostly emerging or developing countries, the assessment of the EU is much more positive.

The figures above do not show the share of researchers who responded that there were similarities in the working conditions and level of attractiveness both inside and outside the EU. For reference, the next two figures (Figure 87 and Figure 88) provide these shares across all countries of current employment for EU researchers working abroad (TG1) and for non-EU researchers who worked in

the EU in the past (TG2). The picture is similar as above though, in that there is perceived to be a low degree of similarity. In other words, the majority of respondents among EU researchers perceive conditions to be either better or worse for issues such as remuneration, the availability of research positions, research funding, the attractiveness of career paths (categories where the EU was perceived on balance to be less favourable than in other countries globally, especially the US). For the quality of training and education, research autonomy, job security, working with leading scientists and open science approaches, around half of respondents indicate that their perceptions of the conditions are similar between the EU and their current country of employment.

The perception of non-EU researchers having worked in the EU in the past (TG2) is more diverse (lower level of ‘similar’). A relatively high share of respondents viewed research autonomy and job security levels as being similar.

Figure 87: Comparison between working outside the EU and working inside the EU as an EU researcher abroad, factors which were perceived as similar.

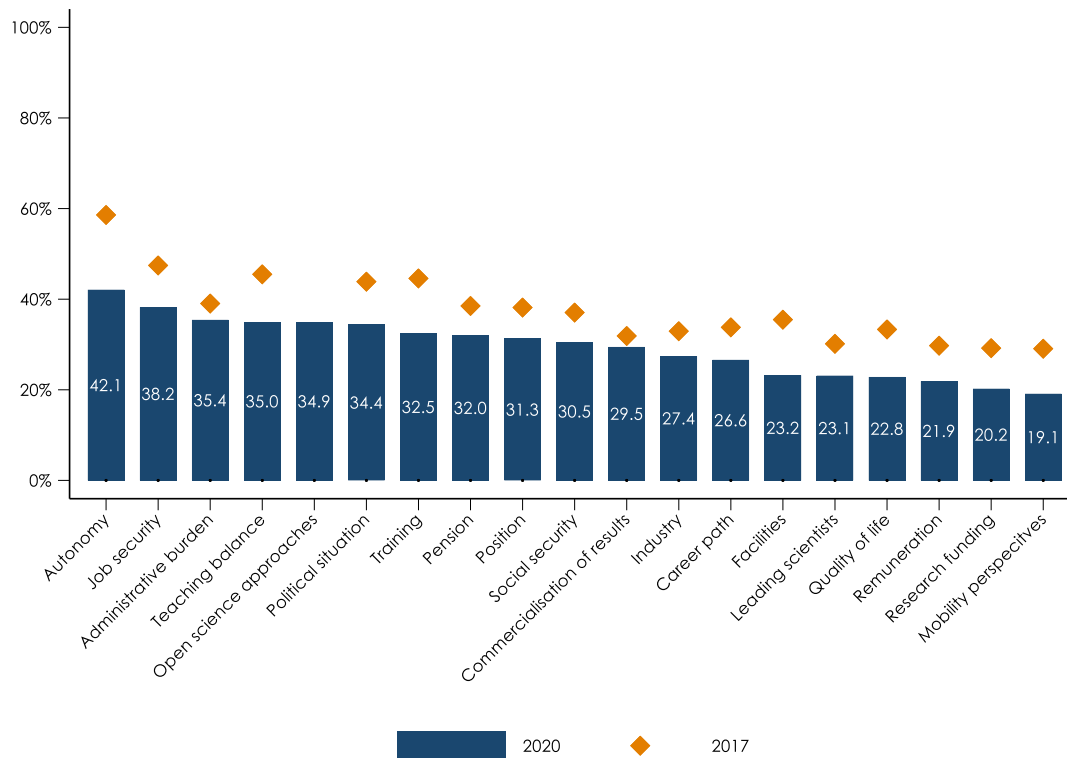


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only EU researchers who work outside the EU (TG1).
- Based on question 48: “How does working in ... compare to working as a researcher in Europe? Please indicate if something is worse, similar or better in ... than in Europe.”
- (2020: n=197-315; 2017: n= 230-408)

Figure 88: Comparison between working outside the EU and working inside the EU as a non-EU researcher who worked in the EU in the past, factors which were perceived as similar.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only non-EU researchers who have been mobile to the EU (TG2).
- Based on question 58: “How does working as a researcher in Europe compare to your current employment in ...? Please indicate if something is worse, similar or better in Europe than in ...”
- (2020: n=243-392; 2017: n= 138-256)

7.4. Motives, barriers and effects

The MORE Global Surveys investigate the motives and barriers for, and the effects of mobility. These are key aspects to developing an understanding of mobility flows across different countries.

The **motives** underlying researchers undertaking a mobility period indirectly shed light on the relative attractiveness of a country or a region from a comparative perspective. The **effects** of mobility, on the other hand, can be seen as a reality check for the expectations associated with mobility, e.g. whether expectations are met by the actual conditions for knowledge production in the country of destination. Finally, it is also important to shed light on the expected **barriers** for mobility as these perceptions are indicative of the difficulties for researchers when moving to another country. There is also wider literature available on this topic, which suggests that there remain outstanding legal obstacles to researcher mobility, such as a lack of reform of national career systems which do not recognise or reward intersectoral researcher mobility and nationality restrictions, such that

researchers from other countries may be ineligible to apply. There are also outstanding difficulties relating to the portability of pensions and social security in some instances.⁸⁸

It is especially relevant to know which are the expected difficulties for non-EU researchers who would be interested to move to Europe because they think that it is an attractive location for a research career, but decide not to do so. This provides additional insights for policy-relevant analysis in terms of how to make it easier for non-EU researchers to come and work in Europe.

7.4.1. Motives

Both the MORE4 EU HE Survey and the MORE4 Global Survey include questions regarding the reasons why researchers decided to undertake mobility (i.e. types of mobility: escape, expected and exchange mobility), their motives for mobility in general and the main motive for mobility per move (with or without changing employer). The results are discussed in more detail below.

Escape, expected and exchange mobility

Similar to the MORE4 EU HE Survey, the Global Survey directly asked mobile researchers about the degree of freedom they had in their decision to become mobile. We distinguish between escape, expected and exchange mobility (for an overview of the definitions linked to the question in the MORE4 Global Survey, see Table 35 below).

Table 35: Escape, expected and exchange mobility.

DEFINITION	QUESTION
	47. Which of the following situations would you say is most applicable to your decisions to move/work outside Europe?
Escape mobility: occurs when a researcher is ‘pushed’ away from his or her environment because of a lack of funding, positions etc. Escape mobility entails that researchers are mobile because they need to be so if they want to pursue a career as a researcher.	<ul style="list-style-type: none"> • I felt forced to move because there were no options for a research career in home country; • I felt forced to move because international mobility is a requirement for career progression.
Expected mobility: is used for those researchers for whom mobility is perceived as a ‘natural’ step in a research career but do not feel obliged to move.	<ul style="list-style-type: none"> • I chose to move to improve working conditions; • I chose to move because international mobility – though not required – will be appreciated in their career and working conditions.
Exchange mobility: refers to those situation in which a researcher chooses to move (positive motivation, self-chosen) with the aim of exchanging knowledge and work in an international network or with the aim to use international experience as a way to boost his or her career.	<ul style="list-style-type: none"> • I chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange.

⁸⁸ Guthrie, S., Lichten, C. A., Harte, E., Parks, S., Wooding, S., & Corbett, J. (2017). International mobility of researchers: A survey of researchers in the UK.

Nearly four out of ten researchers currently working outside the EU indicated that they chose to move for the opportunities that international mobility offers in terms of networking and knowledge exchange (exchange mobility). This type of mobility was indicated by 36% of the respondents in 2020, compared to 33% in 2017. About 23% indicated that they felt forced to move (escape mobility) compared to 28% in 2017. 27% indicated that they chose to move as a 'natural' step in their research career (expected mobility; 12% in 2017; see Table 36). About 14% of respondents indicated that 'another' situation was applicable to their decision to move. The two main other reasons specified were family and having an outstanding job offer. Most respondents (63%) indicated that they chose to move. Similar results were found in the MORE3 Global Survey.

Target group: EU researchers who currently work outside the EU (TG1) were specifically questioned about their decision to work outside Europe: 32% engaged in escape mobility, whilst 29% felt forced to move because there were no options for a research career in their home country. This suggests that brain drain is a considerable problem if almost three in ten researchers could not pursue their career in their own country.

26% of respondents stated the mobility concerned involved expected mobility and 17% chose to move due to the opportunities that international mobility offers in terms of networking and knowledge exchange (exchange mobility). The survey results suggest that researchers from EU countries tended to work abroad either in another European country or outside Europe because they felt that they had to do so in order to continue their research careers. These figures differ from the MORE4 EU HE Survey results where lower levels of escape (5%) and expected (19%) mobility were identified. On the other hand, in the MORE4 EU HE Survey, 45% of the respondents indicated exchange mobility as their main motive to move (a 28 pp difference with the MORE4 Global Survey).

Table 36: Escape, expected and exchange mobility.

	2017				2020			
	Total	Move outside the EU	Move to the EU	Move to a non-EU country	Total	Move outside the EU	Move to the EU	Move to a non-EU country
	n=777	TG1	TG2	TG3	n=1,082	TG1	TG2	TG3
Forced: no options for research career	22.4%	33.1%	6.1%	18.9%	18.0%	28.7%	10.8%	8.4%
Forced: required for career progression	5.6%	4.3%	7.6%	5.7%	5.0%	3.0%	6.5%	6.3%
Chose: improve working conditions	12.6%	12.5%	9.9%	26.4%	14.1%	18.5%	10.2%	12.6%
Chose: appreciated in career and working conditions	12.4%	9.8%	17.9%	5.7%	13.1%	7.9%	15.1%	21.5%
Chose: networking and knowledge exchange	32.6%	22.3%	50.6%	24.5%	35.7%	16.9%	52.7%	42.9%

	2017				2020			
	Total	Move outside the EU TG1	Move to the EU TG2	Move to a non-EU country TG3	Total	Move outside the EU TG1	Move to the EU TG2	Move to a non-EU country TG3
	n=777	n=461	n=263	n=53	n=1,082	n=492	n=407	n=183
Other	14.5%	18%	8.0%	18.9%	14.1%	25.0%	4.8%	8.4%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

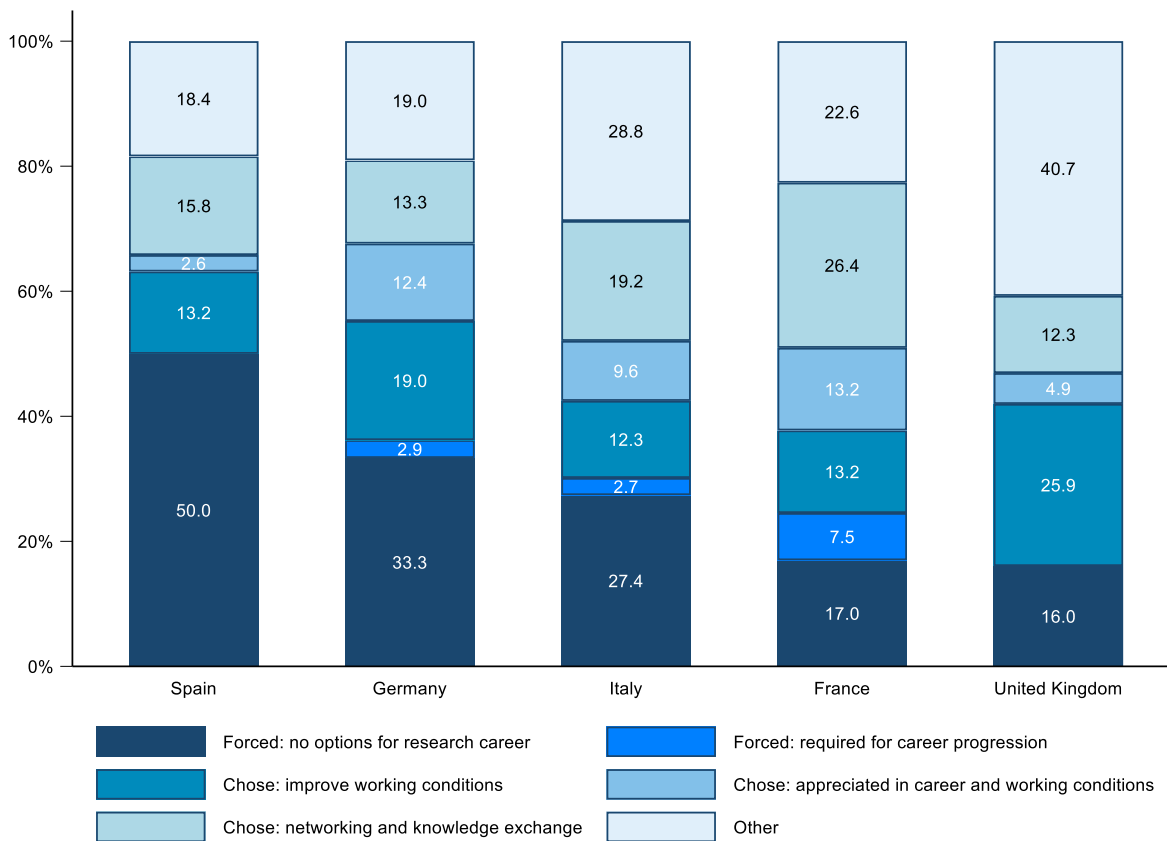
Notes:

- Based on question 47, 57 and 73: “Which of the following situation would you say is most applicable to your decision to move/work respectively outside Europe, towards Europe and to a specific third country (different than their country of citizenship).
- Escape mobility: Forced because no options for research career or because requirement for career progression
- Expected mobility: Improve working conditions or appreciated in career and working conditions
- Exchange mobility: Networking and knowledge exchange
- (2020: n=1,082, 2017: n=777)

Country of citizenship TG1: Figure 89 provides more insights on the motives for mobility by country of citizenship. For TG1, only Italy, Spain, France, Germany and the United Kingdom are considered for this analysis - other individual countries have too low response rates. The results show that, among those countries, the highest share of forced mobility can be found among Spanish and German respondents (approx. 50% and 33%). The lowest share of forced mobility (16%) was observed among UK researchers who currently work outside Europe. This is consistent with the analysis in the MORE3 Global Survey and other studies, which point to structural issues such as a lack of sufficient numbers of available research positions and funding in the Spanish research system, and the comparative attractiveness of the UK system⁸⁹.

⁸⁹ See also Janger, J., Strauss, A., Campbell, D. „Academic careers: a cross-country perspective“. WWWforEurope Working Paper Series 37 (2013).

Figure 89: Escape, expected and exchange mobility, by country of citizenship (TG1).



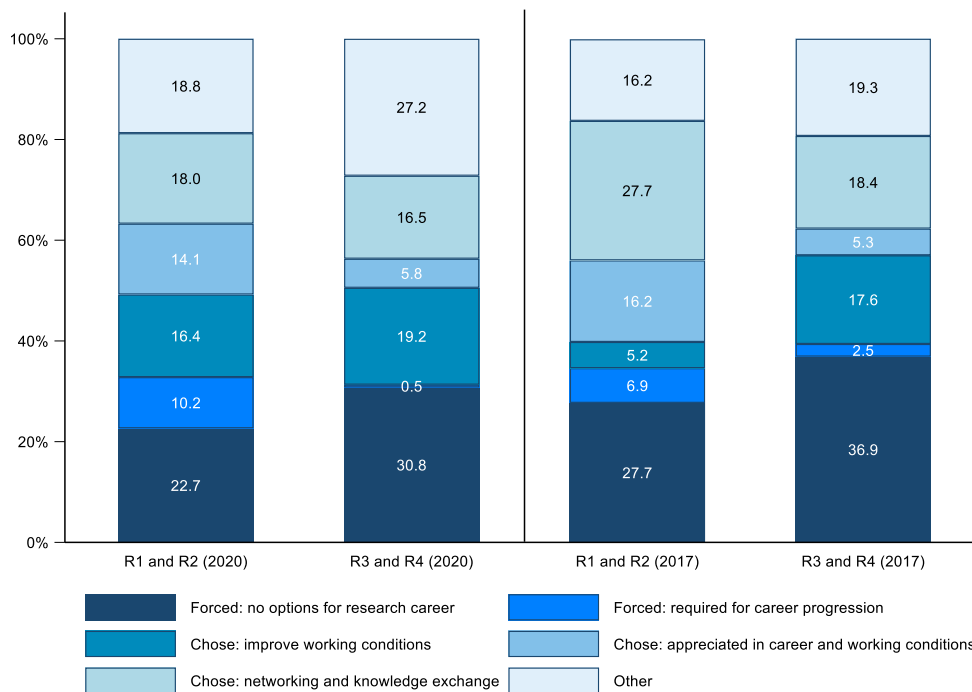
Source: MORE4 Global Survey (2020).

Notes:

- Based on question 47: “Which of the following situation would you say is most applicable to your decision to move/work outside Europe.
- Escape mobility: Forced because no options for research career or because requirement for career progression.
- Expected mobility: Improve working conditions or appreciated in career and working conditions.
- Exchange mobility: Networking and knowledge exchange.
- Countries with less than 30 respondents are excluded.
- (2020: n=350)

Career stage TG1: Figure 90 provides more insights into different types of mobility of EU researchers (e.g. escape, expected and exchange) with respect to the drivers for researchers that decided to move outside Europe. Both career stage groups R1 and R2, and R3 and R4 researchers show similar trends regarding the motives to work in another country. The main difference is that R3 and R4 researchers indicate more frequently that they feel forced to move due to a lack of research career options (31% vs 23% for R1 and R2), while R1 and R2 feel forced to move for career progression reasons and chose more frequently to move because international mobility will be appreciated in their career (10% and 14% respectively).

Figure 90: Escape, expected and exchange mobility, by career stage (TG1).



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 47: “Which of the following situation would you say is most applicable to your decision to move/work towards Europe and question 10 “In which career stage would you currently situate yourself?”
- Escape mobility: Forced because no options for research career or because requirement for career progression.
- Expected mobility: Improve working conditions or appreciated in career and working conditions.
- Exchange mobility: Networking and knowledge exchange.
- (2020: n =492, 2017: n=417)

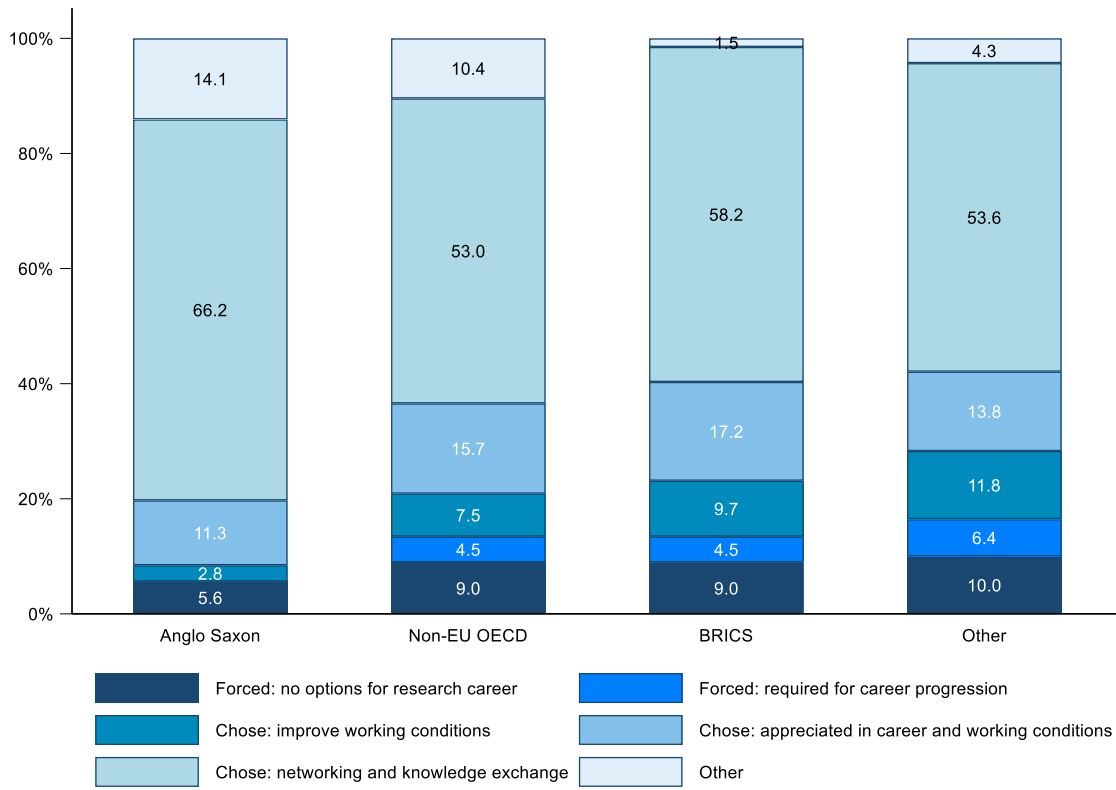
Country of citizenship TG2: The picture is different if we look at the mobility patterns of non-EU researchers who have been mobile towards the EU in the past (TG2) and their decision to move to/work in Europe.

- Forced mobility amongst researchers from Anglo-Saxon countries towards the EU is lower (less than 10%) compared to the forced mobility amongst researchers from other countries, non-EU OECD and BRICS.
- Expected mobility with respect to improving working conditions is highest amongst researchers from ‘other’ countries (12%).
- Exchange mobility for networking and knowledge exchange is highest amongst Anglo-Saxon researchers and researchers from BRICS countries (respectively 66% and 58%).

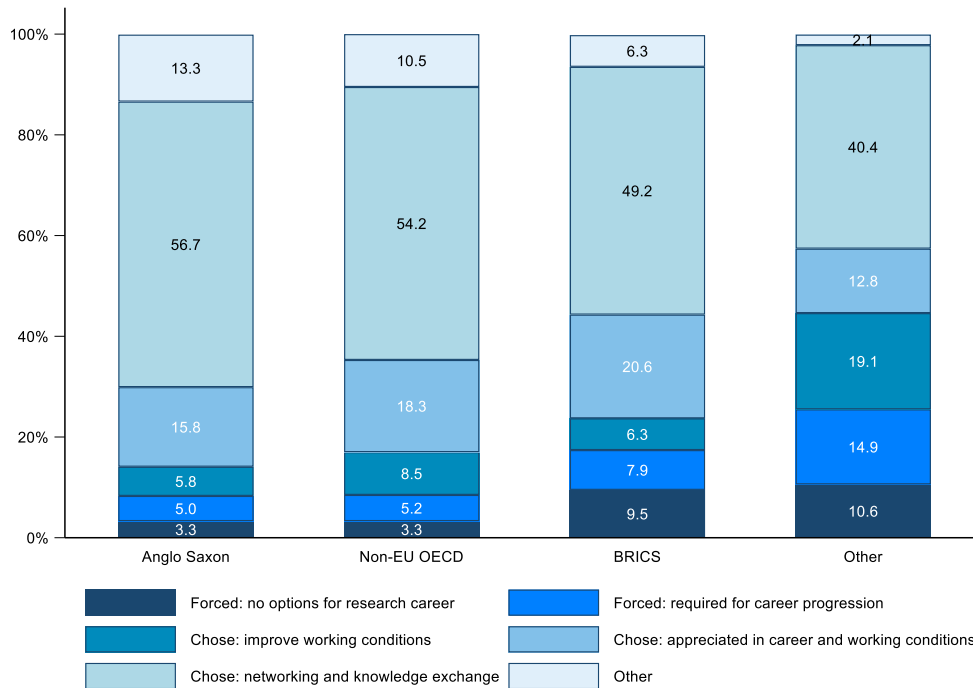
In terms of the evolution over time, the overall picture is similar between 2017 and 2020. On average, an increase in the levels of chosen mobility for networking and knowledge exchange has been observed in 2020 (56%) compared to 2017 (50%).

Figure 91: Escape, expected and exchange mobility, by country of citizenship (TG2).

In 2020:



In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 57: “Which of the following situation would you say is most applicable to your decision to move/work towards Europe.
- (2020: n=407 , 2017: n =263)
- (Anglo-Saxon n=71; Non-EU OECD n=134 ; BRICS n=134; Other n=139)

Motives for > 3 month mobility: towards Europe and outside Europe

In this section, the importance of researchers’ motives in their decision to move to/work outside Europe for TG1 and to move to/work in Europe in the past for TG2 is presented. The table under Figure 92 shows the shares of researchers who identify each of the motives as being important for their move to respectively a non-EU country, an European country, and a third country (other than their country of citizenship).

Note that the MORE4 Global Survey asked twice about researchers’ motives: firstly, the respondents were able to indicate from a comprehensive list of motives regarding whether or not these were important considerations in their mobility; secondly, they were asked to single out the main motive for each of the last three moves done in the past ten years. This subsection presents the results from the first question.

Career progression is overall perceived as the most frequent motive for mobility. This is in line with the results from the MORE3 Global Survey and MORE4 EU HE Survey. It is also in line with the MORE2 evidence that an attractive career path (a tenure-track position) is the most important factor determining job choice among early-stage researchers.⁹⁰ International networking is also a frequent motive for mobile non-Europeans moving to either European or non-European countries.

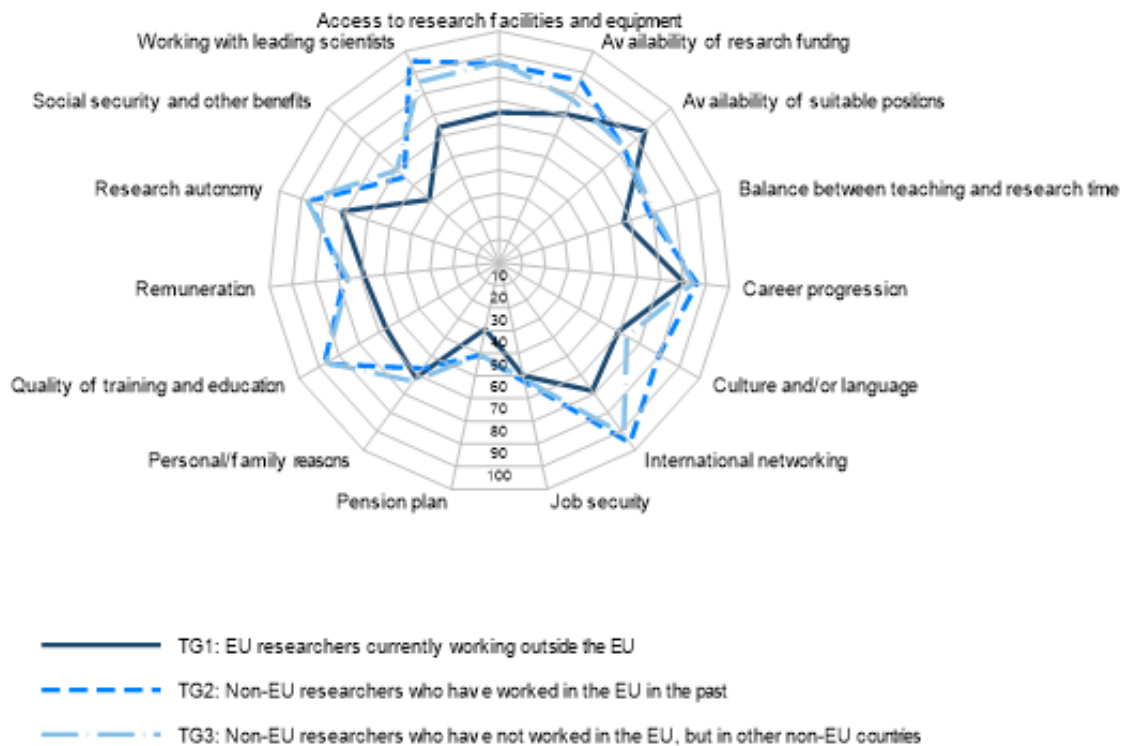
⁹⁰ Janger, J., Nowotny, K. “Job choice in academia”. Research Policy 45, Nr. 8 (Oktober 2016): 1672–83.

Target groups: The results indicate that the most frequent motives for EU researchers to move outside Europe are the availability of a suitable position (85%) and career progression (80%). The most frequent motives for non-EU researchers to move to Europe are international networking (97%) and working with leading scientists (96%). In total for both groups, the most frequent motives in 2020 are the same most frequent motives identified in the MORE3 Global Survey.

Pension plan is perceived as the least frequent factor in researchers’ decisions to move outside Europe (TG1) and to the EU (TG2). Social security and other benefits and job security are also not perceived as important factors in the decision to move among both target groups.

For researchers who have worked abroad but not in the EU (TG3), their most frequent motives to move to the “third country” were international networking (91%); research autonomy (89%) and access to research facilities and equipment (87%). Factors such as pension plan (41%), and job security (51%) were the least important factors.

Figure 92: Frequency of motives for mobility.



Source: MORE4 Global Survey (2020).

Notes:

- Based on question 46 “Were the following factors important in your decision to move/work outside Europe?”; question 56 “Were the following factors important in your decision to move/work in Europe in the past?”; question 72 “Were the following factors important in your decision to move to a third country”
- TG1: EU researchers currently working outside the EU (n=492)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=254)
- (2020: n=1,153, 2017: n =946)

Table 37: Frequency of motives for mobility.

MOTIVES	2017			2020		
	TG1: EUROPEAN WORKING ABROAD	TG2: NON-EUROPEANS MOBILE TO EUROPE	TG3: NON-EUROPEANS MOBILE, BUT NOT TO EUROPE	TG1: EUROPEAN WORKING ABROAD	TG2: NON-EUROPEANS MOBILE TO EUROPE	TG3: NON-EUROPEANS MOBILE, BUT NOT TO EUROPE
	<u>MOTIVES TO WORK OUTSIDE EUROPE</u>	<u>MOTIVES TO WORK IN EUROPE IN THE PAST</u>	<u>MOTIVES TO WORK OUTSIDE EUROPE</u>	<u>MOTIVES TO WORK OUTSIDE EUROPE</u>	<u>MOTIVES TO WORK IN EUROPE IN THE PAST</u>	<u>MOTIVES TO WORK OUTSIDE EUROPE</u>
	N=461	N=263	N=53	N=492	N=407	N=254
International networking	71.8%	95.7%	77.1%	68.4%	96.2%	91.6%
Career progression	82.5%	82.7%	89.4%	80.2%	86.0%	84.3%
Research autonomy	69.8%	82.6%	83.0%	71.6%	86.3%	87.6%
Working with leading scientists	68.7%	95.2%	61.9%	64.0%	95.3%	85.4%
Access to research facilities and equipment	66.8%	78.3%	83.7%	64.9%	85.9%	86.9%
Availability of research funding	74.1%	78.9%	82.6%	70.3%	86.1%	77.3%
Availability of suitable positions	85.9%	69.2%	98.0%	84.9%	73.0%	73.7%
Quality of training and education	58.2%	71.1%	77.8%	56.6%	87.4%	86.4%
Culture and/or language	62.2%	76.9%	71.1%	59.5%	79.8%	63.7%
Balance between teaching and research time	53.2%	63.1%	71.7%	56.6%	68.2%	70.3%
Remuneration	58.5%	47.2%	75.6%	58.6%	67.5%	65.8%
Personal/family reasons	54.5%	54.3%	68.9%	61.3%	56.5%	63.3%
Social security and other benefits	36.0%	35.3%	69.0%	40.7%	55.2%	59.7%
Job security	50.7%	33.9%	83.3%	50.0%	52.6%	51.4%
Pension plan	31.2%	26.7%	57.1%	29.3%	40.9%	40.6%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 46 “Were the following factors important in your decision to move/work outside Europe?”; question 56 “Were the following factors important in your decision to move/work in Europe in the past?”; question 72 “Were the following factors important in your decision to move to a third country”
- Green coloured cells indicate the items with the higher shares.
- Red coloured cells indicate the items that have the lowest shares.
- (2020: n=1,153, 2017: n =777)

Country of current employment (TG1): An overview of the motives for EU researchers to move/work outside Europe by country of current employment is provided in Table 38. The most frequent motives of EU researchers are the availability of suitable positions (86%) and career progression (82%). Additional motives for moving to the US are working with leading scientists (81%); availability of research funding (86%); availability of research facilities and equipment (83%). The US stands out with respect to factors influencing scientific knowledge production.

The figures in Table 38 have remained stable over time. One difference can be noted with respect to 2017: the motive of career progression has decreased from 91% to 77% (14 pp). Furthermore, international networking in 2020 is a less important motive for EU researchers to move to the US (decrease from 82% to 72%).

Table 38: Motives for moving/working outside Europe (TG1), by country of current employment.

MOTIVES	2017					2020				
	ANGLO SAXON	US	NON-EU OECD	BRICS	OTHER	ANGLO SAXON	US	NON-EU OECD	BRICS	OTHER
	n=288	n=91	n=350	n=40	n=27	n=250	n=98	n=314	n=95	n=83
Availability of suitable positions	86.3%	88.5%	86.2%	85.7%	81.0%	87.2%	89.5%	85.6%	85.5%	80.9%
Career progression	83.5%	91.1%	81.6%	84.8%	91.3%	82.1%	90.5%	80.6%	81.4%	77.1%
Availability of research funding	76%	87.2%	74.7%	74.3%	65.0%	71.6%	86.0%	71.7%	65.5%	70.6%
Research autonomy	72.0%	74.7%	69.1%	78.4%	65.2%	70.4%	73.7%	71.2%	74.4%	70.0%
International networking	71.9%	81.8%	71.5%	73.5%	73.9%	64.2%	71.6%	68.6%	67.0%	69.0%
Access to research facilities and equipment	67.8%	83.7%	68.7%	63.9%	40.0%	66.4%	83.3%	66.7%	59.3%	64.6%
Working with leading scientists	73.8%	88.8%	72.3%	47.1%	47.6%	68.3%	81.1%	67.5%	52.4%	63.8%
Quality of training and education	63.3%	78.6%	60.6%	40.6%	50.0%	57.7%	71.6%	55.7%	55.4%	61.8%
Personal/family reasons	50.0%	36.8%	53.1%	54.5%	73.9%	57.5%	48.9%	58.4%	61.0%	73.5%
Remuneration	57.6%	56.6%	58.1%	60.0%	63.2%	53.2%	59.6%	57.0%	57.8%	66.7%
Balance between teaching and research time	53.4%	43.3%	52.5%	57.6%	55.6%	56.6%	51.7%	55.3%	58.2%	59.7%
Culture and/or language	60.1%	58.8%	62.1%	69.7%	52.2%	51.6%	42.9%	56.9%	64.4%	63.8%
Job security	52.0%	50.0%	49.8%	60.6%	47.4%	48.8%	43.7%	49.8%	48.7%	52.4%
Social security and other benefits	35.9%	32.1%	36.8%	31.3%	31.6%	36.0%	30.0%	38.2%	40.5%	51.6%
Pension plan	32.1%	31.9%	32.0%	29.0%	22.2%	31.1%	31.4%	30.7%	26.3%	27.4%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 46 “Where the following factors important in your decision to move/work outside Europe?”
- Green coloured cells indicate the items with the higher shares.
- Red coloured cells indicate the items that have the lowest shares.
- (2020: n 492.;, 2017: n: 630)

Country of citizenship (TG2): An overview of the motives to move/work in Europe by country/region of citizenship is provided in Table 39. On average, for researchers from all country groups, the most frequent motives to move to Europe are international networking (97%), working with leading scientists (95%), research autonomy (87%) and career progression (86%). This picture is encouraging, as it means that non-EU researchers do come to the EU to improve their research output. For researchers from BRICS, non-EU OECD, and 'other' countries, the availability of research funding (85%, 80%, and 91% respectively), and access to research facilities and equipment (86%, 81% and 89%) are frequently indicated motives. Culture and/or language is also a motive for moving (between 80 and 84%). For researchers from BRICS and 'other' countries quality of training and education is an important motive (88%).

Figures tend to be similar to 2017 figures, with some exceptions. Table 39 shows that career progression (82% on average for the different country groups, compared to 86% in 2020), availability of research funding (79% on average compared to 83% in 2020), access to research facilities and equipment (79% on average compared to 82% in 2020), and culture and language (76% on average compared to 81% in 2020) were less frequently indicated as a motive for mobility in 2017.

Table 39: Motives for moving/working in the EU (TG2), by country of citizenship.

	2017				2020			
	ANGLO SAXON	NON-EU OECD	BRICS	OTHER	ANGLO SAXON	NON-EU OECD	BRICS	OTHER
	n=127	n=164	n=59	n=40	n=71	n=134	n=134	n=139
International networking	95.2%	95.0%	96.6%	97.4%	95.7%	97.7%	95.5%	95.7%
Working with leading scientists	91.6%	94.2%	98.3%	94.9%	93.9%	95.2%	95.4%	95.2%
Research autonomy	79.3%	82.5%	81.5%	84.6%	86.9%	86.7%	91.3%	82.5%
Career progression	76.6%	81.7%	79.2%	91.7%	81.0%	89.7%	84.8%	84.5%
Availability of research funding	71.2%	76.2%	83.0%	83.8%	77.0%	80.2%	84.9%	90.7%
Access to research facilities and equipment	68.8%	73.1%	88.7%	83.8%	68.3%	80.7%	86.2%	89.2%
Culture and/or language	73.5%	77.3%	77.4%	74.4%	83.6%	82.4%	80.2%	77.9%
Quality of training and education	57.8%	62.8%	78.6%	89.7%	63.6%	79.3%	88.7%	91.6%
Availability of suitable positions	74.3%	74.4%	53.1%	71.9%	62.3%	67.3%	71.6%	77.2%
Balance between teaching and research time	6%	66.1%	58.8%	58.1%	58.9%	66.7%	56.7%	76.4%
Remuneration	44.6%	46.7%	41.9%	55.9%	47.1%	54.6%	62.6%	78.2%
Personal/family reasons	61.7%	57.5%	50.0%	46.7%	53.7%	56.0%	61.5%	53.3%
Social security and other benefits	23.8%	25.0%	21.6%	40.7%	17.1%	36.1%	56.7%	64.5%
Job security	25.6%	32.4%	26.3%	50.0%	17.5%	38.0%	50.0%	62.0%
Pension plan	27.7%	31.9%	37.5%	45.2%	5.1%	30.3%	40.0%	47.4%
Political	9.2%	19.1%	25.0%	38.7%	12.2%	26.4%	38.3%	41.9%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 56 “Where the following factors important in your decision to move/work in Europe?”
- Green coloured cells indicate the items with the higher shares.
- Red coloured cells indicate the items that have the lowest shares.
- (2020: n=407, 2017: n=263)

Motives for > 3 months mobility: main motives per move

Next to the question to indicate all motives for mobility towards Europe and outside Europe, the MORE3 Global Survey also contained a question for researchers to indicate the main motive for each of the international > 3 months moves. This forces respondents to identify the deciding factor for their mobility experience.

The top 3 of motives for > 3 months mobility were working with leading scientists (23%), career progression (12%), and international networking (12%). These are also the most frequent motives for mobility overall but working with leading scientists stands out more when a single motive is selected. The three least common motives are job security (1%), culture and/or language (1%), and remuneration (2%). These are thus not the key drivers for mobility. No large differences are observed between EU moves and non-EU moves.

With respect to 2017, the only observable difference is the decline of the importance of working with leading scientists (from 28% in 2017 to 23% in 2020).

Table 40: Importance of motives for > 3 month international mobility, main motive per move.

	2017			2020		
	TOTAL	EU MOVES	NON-EU MOVES	TOTAL	EU MOVES	NON-EU MOVES
	n = 1,080	n = 556	n = 524	n=1,532	n =646	n =886
Working with leading scientists	27.7%	29.5%	25.8%	22.5%	19.5%	25.5%
Career progression	12.2%	11.3%	13.2%	11.8%	13.7%	10.0%
International networking	10.6%	11.9%	9.4%	11.8%	11.6%	11.9%
Research autonomy	7.9%	7.6%	8.2%	11.1%	11.9%	10.3%
Access to research facilities and equipment	6.3%	8.3%	4.1%	7.9%	6.1%	9.7%
Quality of training and education	4.5%	5.4%	3.6%	6.8%	7.7%	5.8%
Availability of suitable positions	7.5%	7.9%	7.1%	5.5%	4.2%	6.8%
Availability of research funding	7.6%	6.8%	8.4%	5.0%	6.4%	3.7%
Balance between teaching and research time	1.3%	0.5%	2.1%	3.7%	3.1%	4.2%
Personal/family reasons	4.4%	3.4%	5.5%	3.5%	5.2%	1.8%
Remuneration	0.9%	0.2%	1.7%	1.7%	1.3%	2.0%
Culture and/or language	2.0%	1.8%	2.3%	1.3%	1.9%	0.6%
Job security	0.7%	0.5%	1.0%	1.2%	1.5%	0.8%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Distribution of moves by target groups (2020: n = 974)
- Based on question 44 “What was your main motive to move to these countries”.
- With “moves” defined as moves of three months or more in the last ten years to another country than the country of citizenship of the researcher
- (2020: n=1,532, 2017: n=1,080)

Motives for > 3 months employer mobility: main motives per move

'Employer mobility' refers to moves that include a change of employer. Reasons for this type of change can be expected to be different from motives to move only temporarily (without a change in employer).

The largest differences can be observed for career progression and the availability of research funding, which are more important when engaging in a move with a change in employer. Career progression is important for 7% for moves without a change in employer and 24% for moves with a change in employer. The availability of a research funding is important for 3% of respondents without a change in employer versus 11% with a change of employer. This is in line with existing literature which indicates that researcher scientists use job – employer - mobility to improve their career prospects (either at home or abroad⁹¹).

Working with leading scientists and international networking are less important motives for employer mobility: working with leading scientists is important for 25% of moves without employer mobility and 18% for moves with employer mobility. In comparison, international networking is important for 14% without any change in the researcher's employer versus 5% without. All the results mentioned are consistent with figures from the MORE3 Global Survey.

⁹¹ Ackers, L. (2005). Moving people and knowledge: scientific mobility in the European Union. *International migration*, vol 45 (5), pp 99-131.

Table 41: Importance of motives for > 3 month international mobility, main motive per move.

	2017			2020		
	Total	No employer change	Employer change	Total	No employer change	Employer change
	n = 1,080	n= 689	n = 391	n=1,532	n=1,115	n=417
Working with leading scientists	10.6%	35.7%	13.6%	21.5%	24.7%	18.3%
Career progression	27.7%	7.1%	21.2%	15.5%	7.1%	23.8%
Research autonomy	6.3%	9.0%	5.9%	10.4%	11.6%	9.1%
International networking	4.5%	13.5%	5.6%	9.6%	14.1%	5.1%
Access to research facilities and equipment	4.4%	8.7%	2.0%	7.3%	9.2%	5.5%
Availability of research funding	12.2%	1.9%	17.6%	6.7%	2.7%	10.6%
Quality of training and education	7.5%	3.2%	6.9%	6.1%	7.1%	5.1%
Availability of suitable positions	7.6%	7.1%	8.2%	5.0%	6.5%	3.6%
Personal/family reasons	7.9%	1.6%	9.5%	4.2%	2.1%	6.3%
Balance between teaching and research time	0.9%	1.3%	1.3%	3.4%	4.0%	2.8%
Job security	1.3%	0.3%	1.5%	1.6%	0.5%	2.7%
Remuneration	0.7%	1.2%	0.5%	1.2%	2.0%	1.5%
Culture and/or language	2.0%	2%	2%	1.5%	0.8 %	1%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Distribution of moves by target groups (n =)
- Based on question 44 “What was your main motive to move to these countries”
- With “moves” defined as moves of three months or more in the last ten years to another country than the country of citizenship of the researcher
- (2020: n:1,532, 2017: n:1,080)

Destination: Distinguishing between EU and non-EU moves with a change in employer does not reveal any significant differences (cf. Table 60 in annex 8). No motive was indicated as substantially more important for EU moves than for non-EU moves in 2020.

7.4.2. *Barriers to mobility*

Both EU and non-EU researchers working in non-EU countries were questioned in the MORE4 Global Survey about their willingness to return or to come to Europe and the factors that were perceived as hindering this move. The survey included questions on the barriers that have been experienced by those having come to Europe previously as researchers, or that have actively tried to move to Europe, as well as the barriers that are expected to be difficult to overcome for those that have never worked in the EU before (and have not undertaken concrete steps).

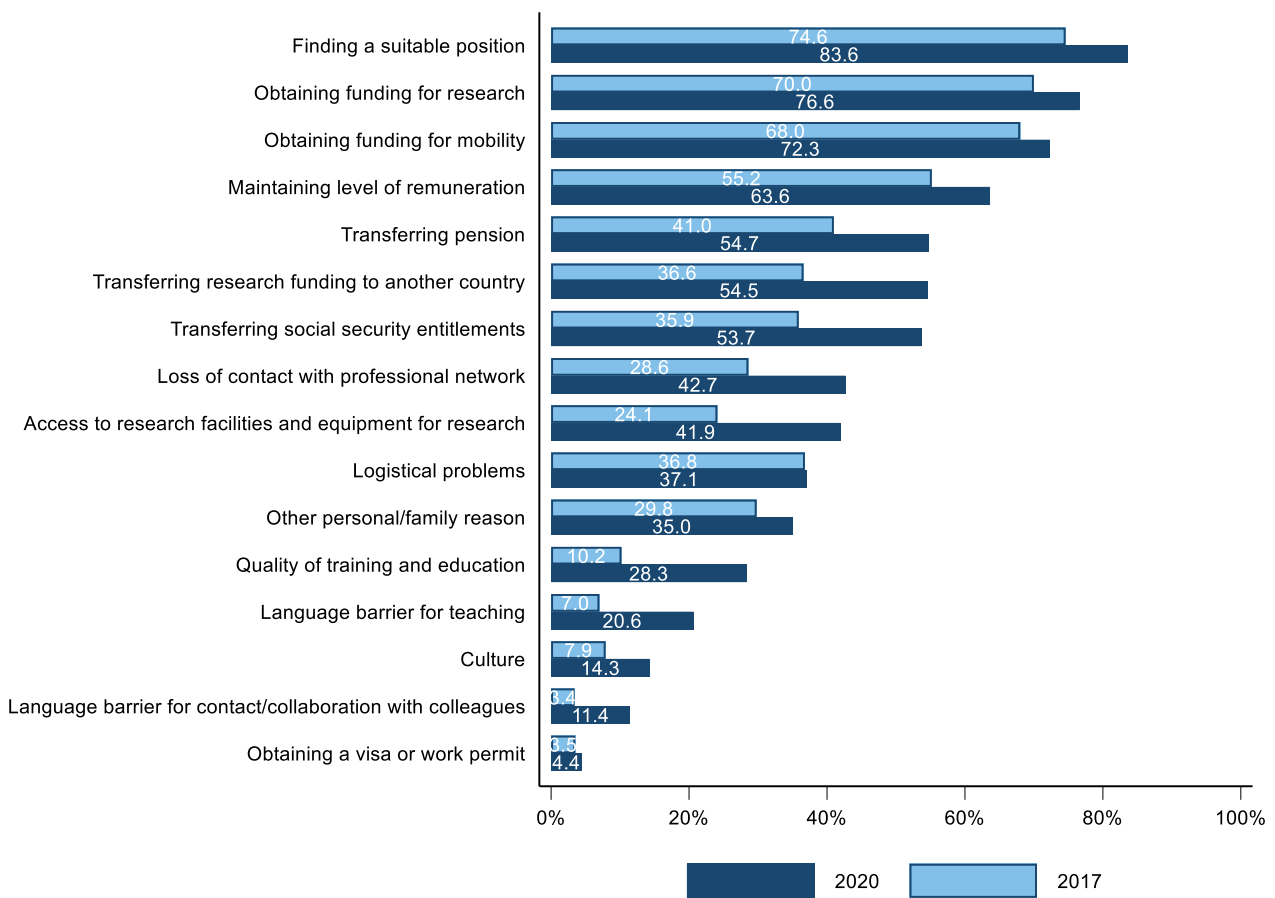
Experienced barriers for mobility towards Europe

52% of EU researchers working abroad claim not to be interested in moving back to Europe in the next 12 months (compared to 63% in 2017). The rest of the researchers are divided between those that are considering a return to Europe (25% vs 18% in 2017) and those that are undecided (23% vs 19% in 2017).

The interest to return seems to be related to the types of contracts researchers have: researchers with more stable positions tend to be less inclined to return to Europe. While only 18% of EU researchers with a permanent contract are interested in moving back to Europe, this share reaches 44% among EU respondents with a fixed term contract (>1-2 years), and 24% among those with a longer fixed-term contract (>2-4 years).

Among those that are considering a return to Europe (of TG1), the majority state that they have taken concrete steps to do so (73%). The main barriers that this group of researchers has found are position- and funding-related (Figure 93): 84% declare that they have experienced difficulties finding a suitable job position, 77% obtaining funding for research, and 72% obtaining funding for mobility. Similar barriers were identified as main barriers for returning to Europe by researchers in 2017.

Figure 93: Experienced difficulties in the efforts to come back to Europe for European researchers living abroad (TG1).



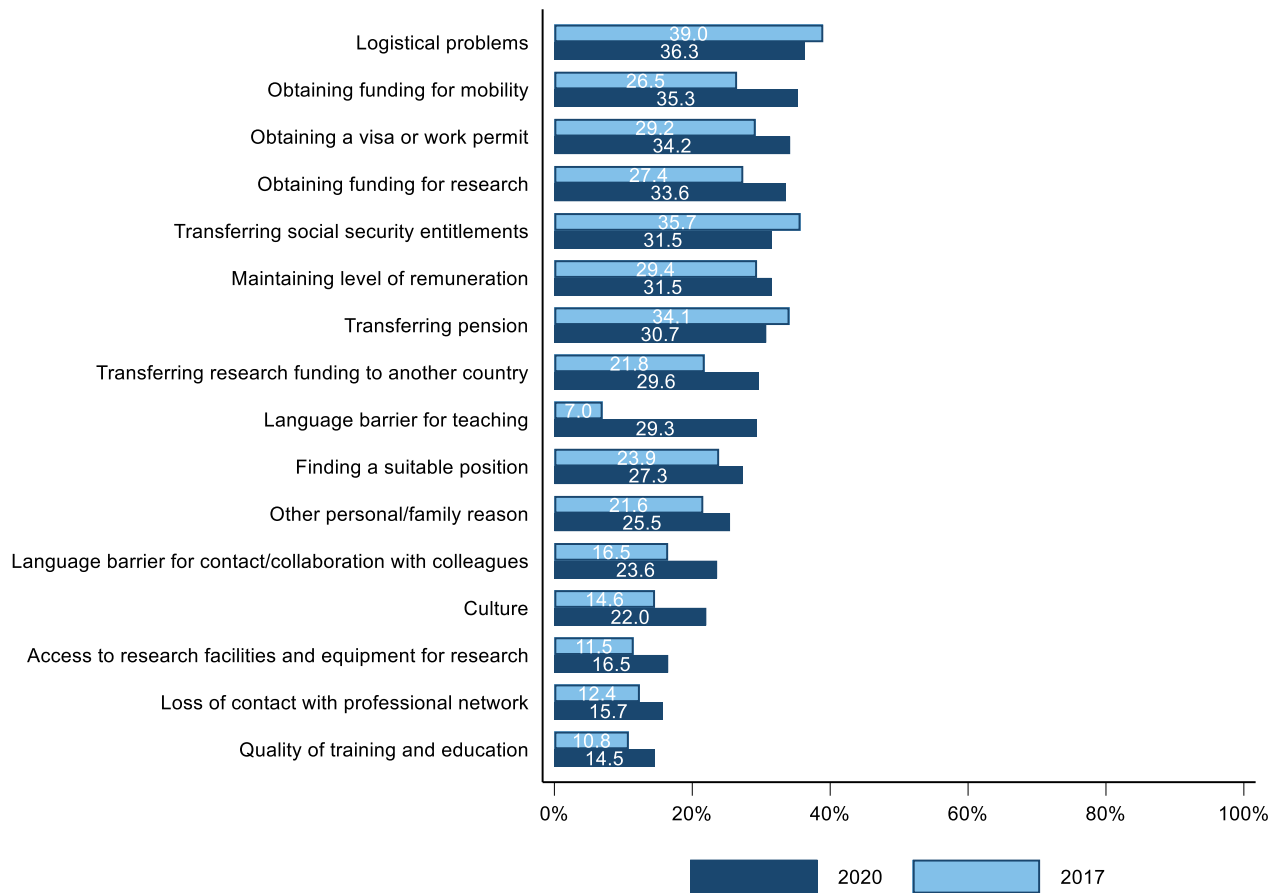
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 53 “Have you faced any of the following difficulties in your efforts to move back to Europe?”
- (2020: n = 327, 2017: n = 417)

Among the non-EU researchers that have worked in the EU before (TG2), the main difficulties experienced in moving to Europe appear to be very different (Figure 94). For these researchers, the most frequent barriers are logistical problems (36% vs 39% in 2017), obtaining funding for mobility (35% vs 27% in 2017), obtaining a visa or work permit (34% vs 29% in 2017), obtaining funding for research (34% vs 27% in 2017), and transferring social security entitlements (32% vs 36% in 2017). Some differences in the difficulties experienced in coming back to Europe for non-European researchers are observable over time. As indicated above, funding- and visa-related factors have become more important. In addition, Figure 94 shows that the language barrier for teaching has become significantly more important in 2020 (29%) with respect to 2017 (7%; increase by 22 pp).

Figure 94: Experienced difficulties in the efforts to come back to Europe for non-European researchers having worked in Europe in the past (TG2).



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 60 “Have you faced any of the following difficulties in your move to Europe?”
- (2020: n = 407, 2017: n=263)

Expected hindering factors for mobility towards Europe

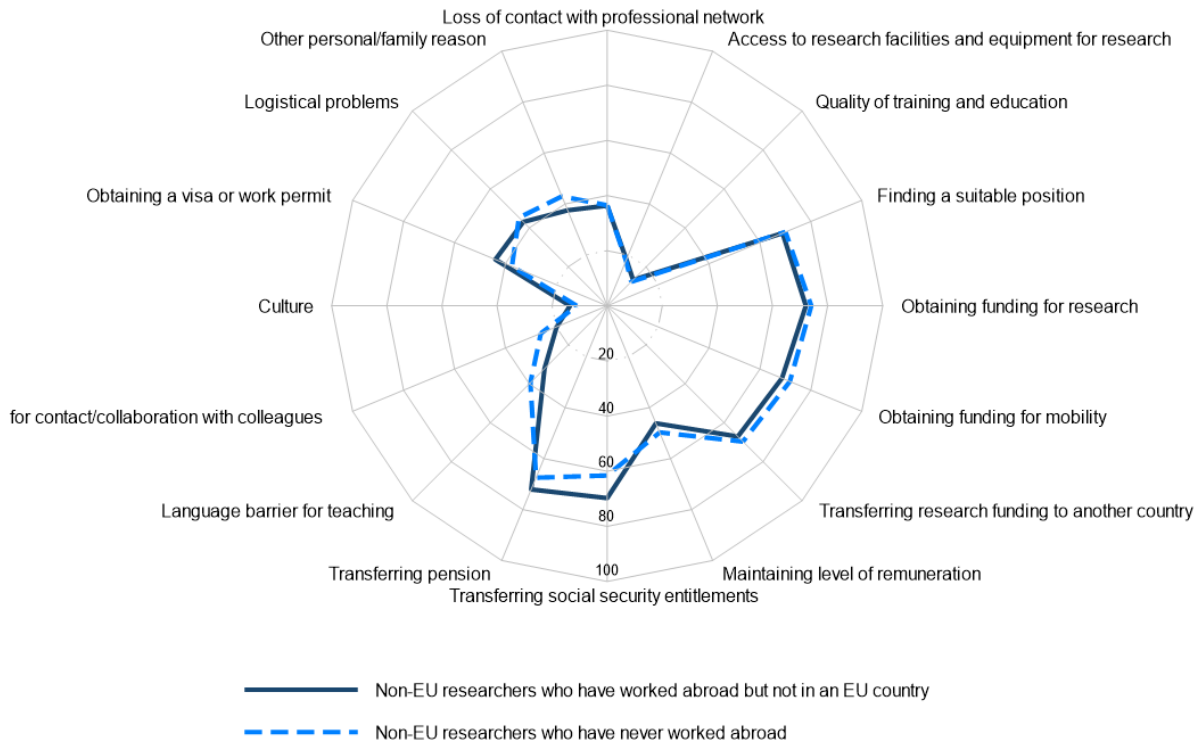
The survey also included questions on the extent to which different elements were expected to be problematic for those not having moved to the EU and not having considered it at all.

Target groups: Figure 95 and Table 42 show the share of researchers who expect that each of the factors might be difficult to deal with in a possible move to the EU. This question is answered by two target groups: non-EU researchers having worked abroad, but never in the EU (TG3); and non-EU researchers that have never been mobile (TG4).

The most frequently cited hindering factors among the former (TG3) are the difficulty in obtaining research funding (72%), the transfer of pensions (72%) and social security entitlements (70%), and in finding a suitable position (70%). In 2017, non-EU researchers having worked abroad but never in the EU (TG3) indicated the same difficulties more frequently. Among the latter group, researchers that have never been mobile (TG4), indicate obtaining research funding (74%) and funding for mobility (72%), finding a suitable position (70%), and transferring research funding to another country (70%)

as being the most frequent barriers. Overall, the most frequently-mentioned barriers were the same in 2017 and in 2020. However, the shares are somewhat lower in 2020 than 3 years earlier.

Figure 95: Expected difficulties to come to Europe for non-EU researchers who have never worked in Europe before.



Source: MORE4 Global Survey (2020).

Notes:

- Based on question 70 “Do you think it would be easy or difficult to deal with the following factors if you would like to work in Europe in the future?”
- (2020: n = 1,634; 2017: n = 1,047)

Table 42: Expected difficulties to come to Europe for non-EU researchers who have never worked in Europe before.

	2017		2020	
	TG3: NON-EU RESEARCHERS WHO HAVE WORKED ABROAD BUT NOT IN THE EU	TG4: NON-EU RESEARCHERS WHO HAVE NEVER WORKED ABROAD	TG3: NON-EU RESEARCHERS WHO HAVE WORKED ABROAD BUT NOT IN THE EU	TG4: NON-EU RESEARCHERS WHO HAVE NEVER WORKED ABROAD
	n =178	n=869	n=254	n =1,380
Obtaining funding for research	80.3%	81.8%	72.1%	74.0%
Obtaining funding for mobility	73.7%	79.9%	68.6%	71.7%
Transferring pension	78.3%	75.1%	72.1%	67.5%
Finding a suitable position	77.4%	78.8%	68.9%	70.0%
Transferring research funding to another country	71.6%	74.5%	67.1%	69.7%
Transferring social security entitlements	78.1%	77.1%	69.8%	61.5%
Maintaining level of remuneration	58.1%	54.5%	46.2%	49.7%
Logistical problems	45.2%	56.0%	43.1%	45.3%
Obtaining a visa or work permit	44.2%	41.1%	43.9%	37.4%
Other personal/family reason	55.0%	54.7%	37.5%	43.0%
Loss of contact with professional network	27.9%	34.2%	36.7%	36.5%
Language barrier for teaching	42.9%	44.9%	32.2%	39.4%
Language barrier for contact/collaboration with colleagues	24.0%	31.4%	19.8%	26.1%
Access to research facilities and equipment for research	18.2%	17.9%	18.2%	17.8%
Quality of training and education	8.4%	8.0%	13.3%	12.4%
Culture	11.3%	14.7%	13.5%	11.0%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 70 “Do you think it would be easy or difficult to deal with the following factors if you would like to work in Europe in the future?”
- (2020: n = 1,634; 2017: n = 869)

Barriers for mobility to third countries

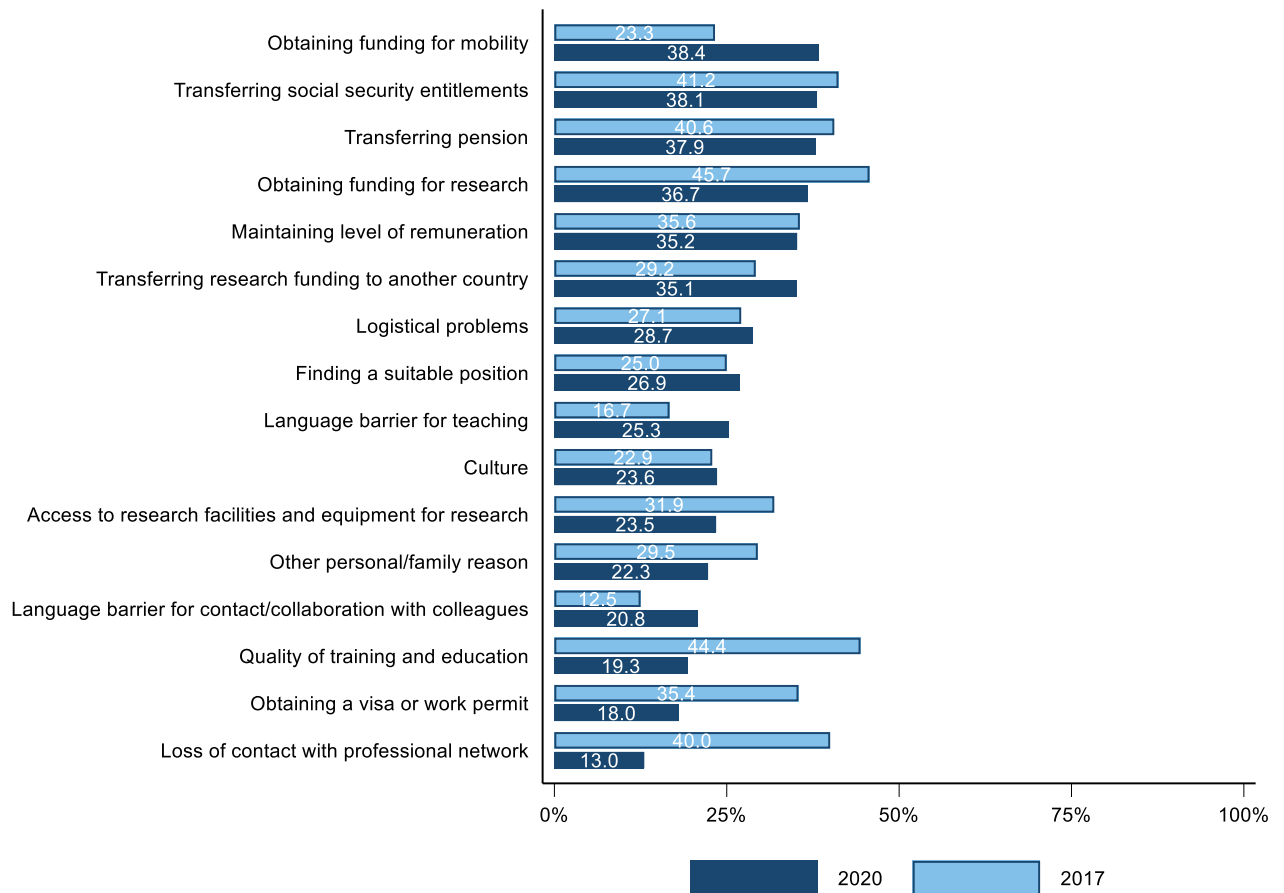
Mobile researchers working in a set of non-European countries (mainly larger S&T countries), different from their own, received special attention in the MORE4 Global Survey. More specifically, a series of items were specifically designed to collect information about the main barriers experienced by mobile researchers when moving to 18 countries.⁹² Although the list of countries is very heterogeneous, it is interesting to note that two out of three researchers working in these countries declare that they are willing to stay, or that they would have liked to stay in the country (67% vs 89% in 2017).

Figure 96 illustrates the main barriers experienced by these researchers in their move to the selected countries. The five most frequently-mentioned barriers coincide with the most frequently found barriers for researchers moving or having moved to Europe. These barriers are: obtaining funding for mobility (38%), transferring social security entitlements (38%), transferring pensions (38%), obtaining funding for research (37%) and maintaining the level of remuneration (35%). The number of responses per country is too low to perform a more detailed cross-country comparison.

With respect to 2017, there is a significant change: three out of the most frequently-mentioned difficulties in the MORE3 Global Survey are now the least-mentioned difficulties: the quality of training and education (44% in 2017 vs 19% in 2020), obtaining a visa or work permit (35% in 2017 vs 18% in 2020), and the loss of contact with professional networks (40% in 2017 vs 13% in 2020). On the other hand, obtaining funding for mobility is one of the main barriers faced by researchers in 2020 (38%) compared to only 23% in 2017 (16 pp difference). These results point to volatility in the barriers experienced by researchers when moving to another non-EU country. However, it is difficult to draw conclusions given the changing composition of the sample over time and the limited number of observations in this specific subgroup.

⁹² Brazil, Singapore, Turkey, Canada, Malaysia, Israel, China, Indonesia, India, Thailand, Japan, United States, Australia, New Zealand, Argentina, Chili, Mexico, and South Africa.

Figure 96: Experienced barriers to move to selected non-EU countries.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 75 "Have you faced any of the following difficulties in your move to?"
- (2020: n = 254, 2017: n=53)

7.4.3. Effects of mobility

The next subsection shows the effects of stays abroad for the group of EU researchers currently working outside Europe (TG1), the group of non-EU researchers who worked in the EU in the past (TG2) and the group of non-EU researchers who worked in a different country than their current country of employment, but not in the EU (TG3).

Feedback from researchers on the effects of mobility were requested based on a number of different categories of impacts. These included:

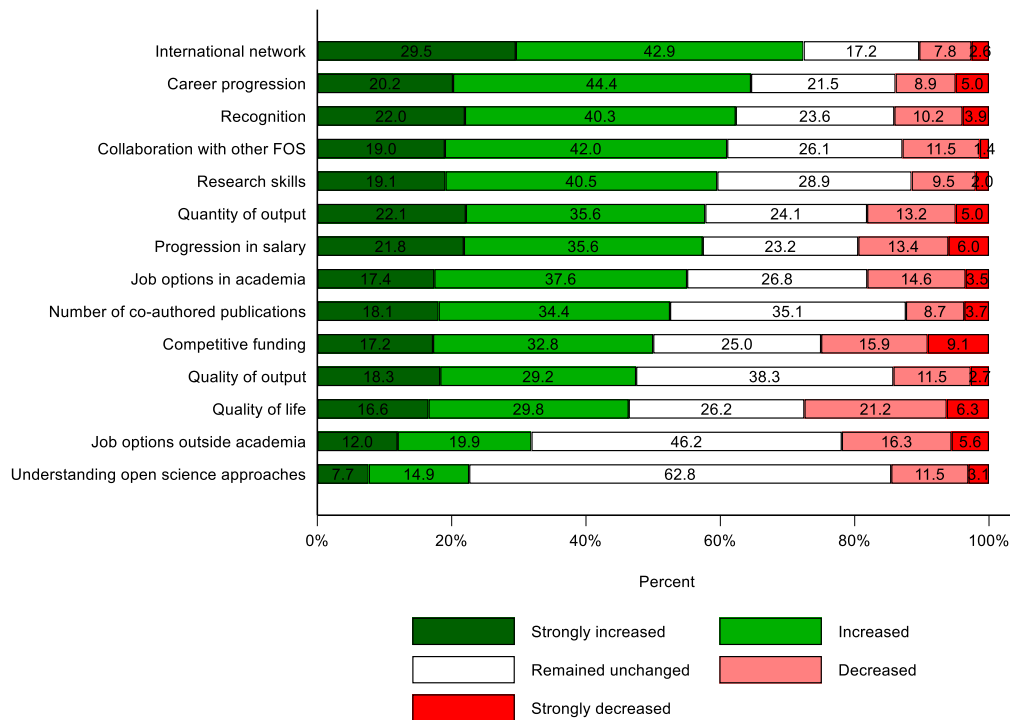
- The impact on scientific output (the quality and quantity of publications or the number of co-authored publications); and
- More input-related items, such as the ability to obtain research funding; gaining advanced research skills; fostering interdisciplinary collaboration; networking effects in terms of both increased contacts and recognition in the international research community; job options in- and outside academia; overall career progression; progression with respect to salary, and quality of life.

EU researchers abroad (TG1)

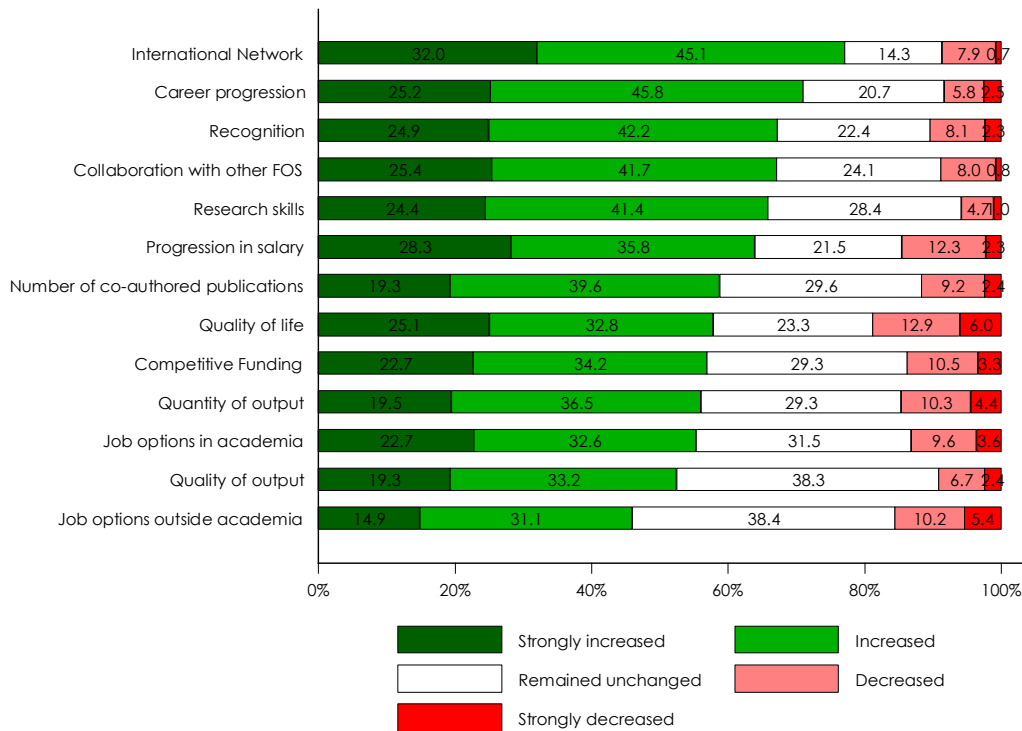
Overall, for EU researchers abroad (TG1), a majority of respondents experienced positive effects across all of these categories, with the most negative effect being a decrease in quality of life for 28% of respondents (Figure 97). A decrease in quality of life was also the most negative effect indicated in the MORE3 Global Survey. However, this then concerned 19% of researchers (9 pp less than in 2020). The largest positive effects are observed in terms of gaining an international network (72%), overall career progression (65%) and gaining recognition in the research community (62%). This is consistent with the findings on the motives for mobility (cf. section 7.3.1.2), thus indicating that in general the expected effects are also to a large extent realised according to the respondents. The effects of the stay abroad on job options and an understanding and application of open science approaches were the least influential factors. These results are also consistent with the results extracted from the MORE3 Global Survey.

Figure 97: Effects of stay abroad for EU researchers.

In 2020:



In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only EU researchers who work outside the EU (TG1).
- Based on question 49: "Please indicate below how your stay outside Europe has influenced the following factors"
- (2020: n=327, 2017: n= 315-406)

Country of current employment: Table 43 shows the findings grouped by current country of employment. Across all categories, EU researchers who work in the US report slightly more positive effects than their counterparts in other countries. This suggests that the EU researchers in the US work in excellent research institutions. This can also be observed in the MORE3 Global Survey: results were more positive in the US than in other countries in 2017. On the other hand, the researchers indicated less positive results for the US in 2020 than in 2017. The differences in the effects between the US and other countries are more evident for: obtaining competitive funding, job options in and outside academia, and recognition in the research community. Interestingly, for quality of life, the effects are slightly less negative in the US but more negative in Anglo-Saxon and Non-EU OECD countries. The effects of staying abroad hence confirm the results of the preceding direct comparison between research systems (section 7.2), where the US stood out by comparison with the EU.

The MORE4 Global Survey included the effect of understanding and application of open science approaches. This option was not available in the MORE3 Global Survey. Table 43 shows that this effect is relatively low in all country groups.

Table 43: Effects of stay abroad for EU researchers, grouped by current country of employment.

	2017				2020			
	Anglo Saxon	USA	Non-EU OECD	BRICS	Anglo Saxon	USA	Non-EU OECD	BRICS
Career progression	0.97	1.16	0.91	0.6	0.85	1	0.74	0.7
Collaboration with other FOS	0.95	1.14	0.87	0.58	0.72	0.77	0.65	0.63
Competitive Funding	0.7	1.02	0.66	0.49	0.49	0.83	0.43	0.16
International Network	1.09	1.33	1.06	0.63	0.88	1	0.9	0.93
Job options in academia	0.72	1.01	0.67	0.39	0.65	0.84	0.59	0.42
Job options outside academia	0.53	0.93	0.4	0.42	0.31	0.65	0.19	0.17
Number of co-authored publications	0.76	0.89	0.7	0.23	0.62	0.57	0.55	0.58
Progression in salary	0.89	0.97	0.86	-0.03	0.64	0.88	0.61	0.55
Quality of life	0.75	0.05	0.67	0.18	0.48	0.13	0.38	0.18
Quality of output	0.73	1.02	0.68	0.14	0.67	0.78	0.61	0.28
Quantity of output	0.69	0.79	0.6	0.31	0.7	0.73	0.64	0.57
Recognition	0.96	1.29	0.87	0.42	0.83	1.15	0.73	0.67
Research skills	0.96	1.2	0.91	0.36	0.8	0.96	0.8	0.38
Understanding and application of open science approaches					0.2	0.12	0.13	0.08

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only EU researchers who work outside the EU (TG1), grouped by their current country of employment.
- With the average calculated by assigning values to each category: 2 = strongly increased; 1 = increased; 0 = unchanged; -1 = decreased; -2 = strongly decreased.
- Based on question 49: "Please indicate below how your stay outside Europe has influenced the following factors"
- (2020: n=327, 2017: n= 315-406)

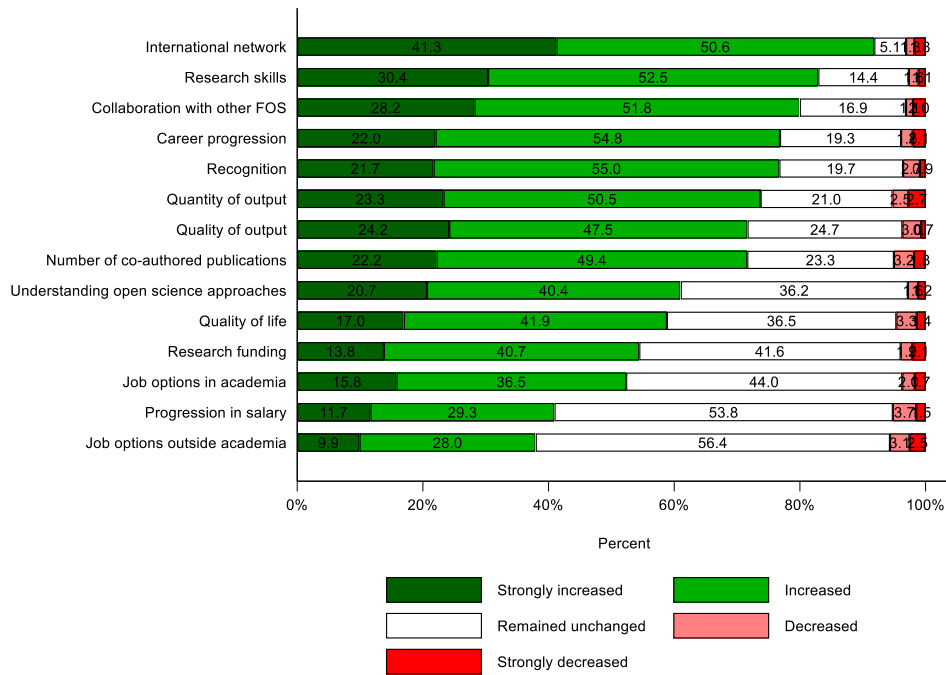
Non-EU researchers who worked in the EU in the past (TG2)

The second group of researchers is comprised of non-EU researchers who worked in the EU in the past (TG2). They also report mostly positive effects from their stay in Europe, with fewer respondents overall indicating negative effects than in the group of EU researchers. However, there were also other types of effects where the majority of respondents perceived there to have been no change (e.g. job options outside academia (56%) and salary progression (54%); see Figure 98).

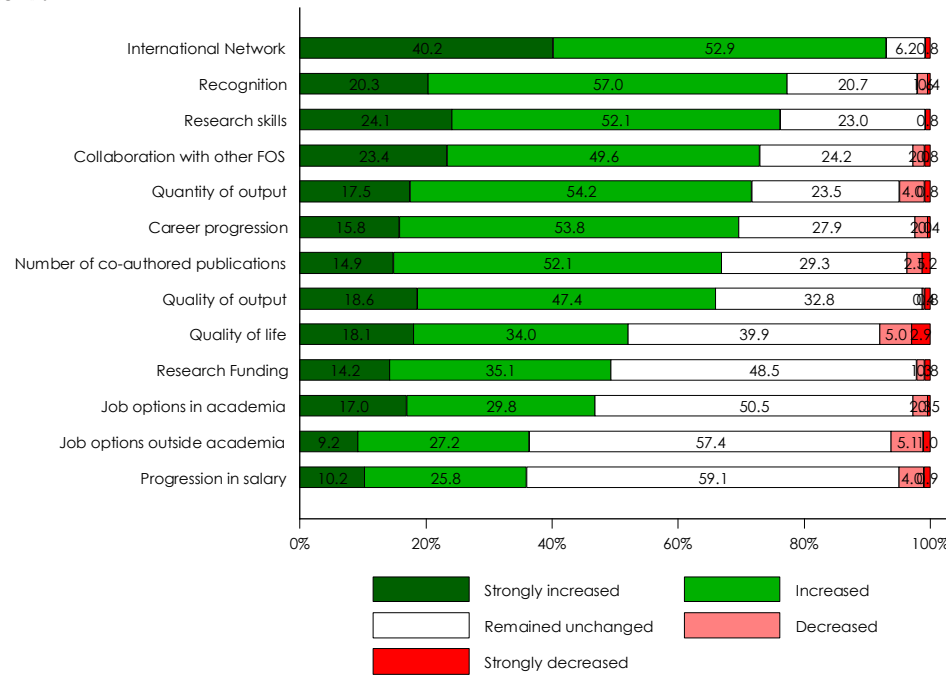
The categories of effects that increased most strongly are similar to those in the group of EU researchers and to the results from 2017: international network effects (92%), research skills (83%) and collaboration with other sub(fields) of research (80%). The categories that received the smallest positive boost by the stay abroad are almost identical to the group of EU researchers (with the exception of the ones who stayed in the US), such as job options (52%), and research funding (54%). By contrast progression in salary (40% in 2020 and 36% in 2017), which is indicated as having a low positive effect for non-EU researchers, is considered as one of the main effects for EU researchers (57% in 2020 and 64% in 2017).

Figure 98: Effects of stay in the EU for non-EU researchers.

In 2020:



In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only non-EU researchers who have been mobile to the EU.
- Based on question 59: "Please indicate below how your stay in Europe has influenced the following factors."
- (2020: n=463, 2017: n= 195-259)

Country of current employment: Table 44 again differentiates respondents by their current country of employment. Overall, the effects of a mobility stay in Europe are more positive in general for researchers who now work in emerging countries (BRICS or other countries).

In the MORE4 Global Survey, it can be observed that the understanding and application of open science approaches is also a more important effect for researchers who worked in emerging countries.

Table 44: Effects of stay abroad for non-EU researchers, grouped by current country of employment.

	2017				2020			
	Anglo Saxon	Non-EU OECD	BRICS	Other	Anglo Saxon	Non-EU OECD	BRICS	Other
International Network	1.29	1.26	1.48	1.3	1.34	1.33	1.26	1.27
Research skills	0.84	0.9	1.18	1.1	0.79	1.02	1.17	1.09
Collaboration with other FOS	0.76	0.82	1.22	0.95	0.92	0.96	1.03	1.09
Recognition	0.92	0.9	1.0	1.13	1.04	1	0.98	0.87
Career progression	0.68	0.77	0.85	1.03	0.85	0.98	0.96	0.87
Number of co-authored publications	0.16	0.27	0.48	0.81	0.78	0.8	0.93	0.88
Quantity of output	0.23	0.29	0.43	0.7	0.72	0.79	0.94	0.93
Quality of output	0.74	0.77	0.98	0.89	0.62	0.81	1.04	0.9
Quality of life	0.7	0.75	0.96	0.95	0.64	0.66	0.76	0.68
Job options in academia	0.42	0.53	0.59	0.94	0.53	0.66	0.67	0.57
Research Funding	0.45	0.5	0.73	0.91	0.37	0.52	0.56	0.74
Progression in salary	0.37	0.52	0.75	0.68	0.27	0.44	0.42	0.5
Job options outside academia	0.69	0.71	0.91	0.82	0.3	0.46	0.32	0.42
Understanding and application of open science approaches					0.21	0.53	0.84	0.9

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only non-EU researchers who have been mobile to the EU, grouped by their current country of employment.
- Based on question 59: "Please indicate below how your stay in Europe has influenced the following factors."
- (2020: n= 463, 2017: n= 195-259)

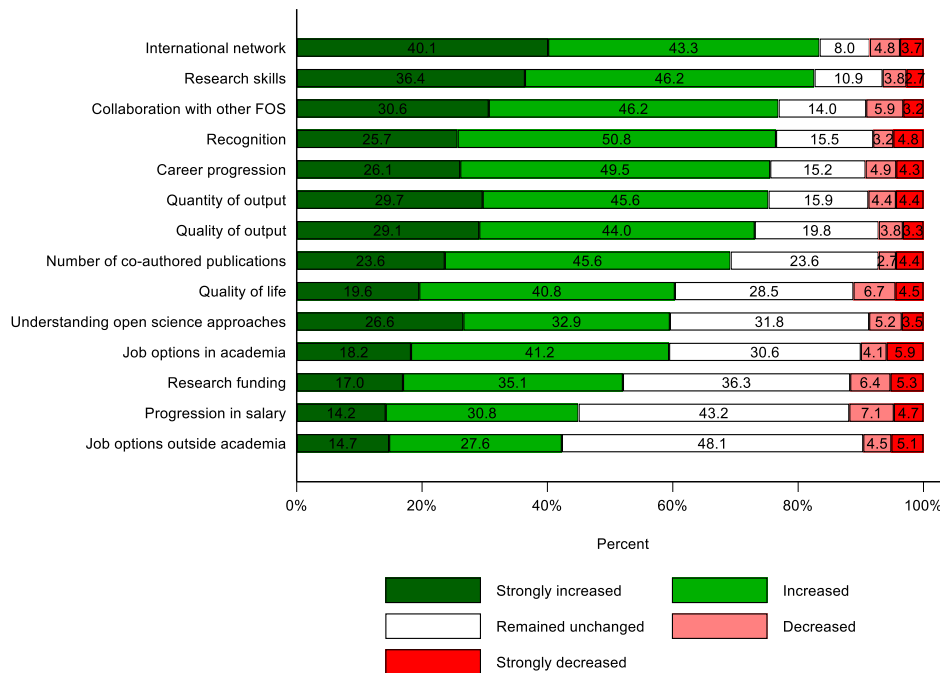
Non-EU researchers who were mobile to a non-EU country (TG3)

Finally, we look at the group of non-EU researchers who were mobile for more than three months to a non-EU country (TG3). This is a smaller group of 255 respondents, so we present only Figure 99 with the total.

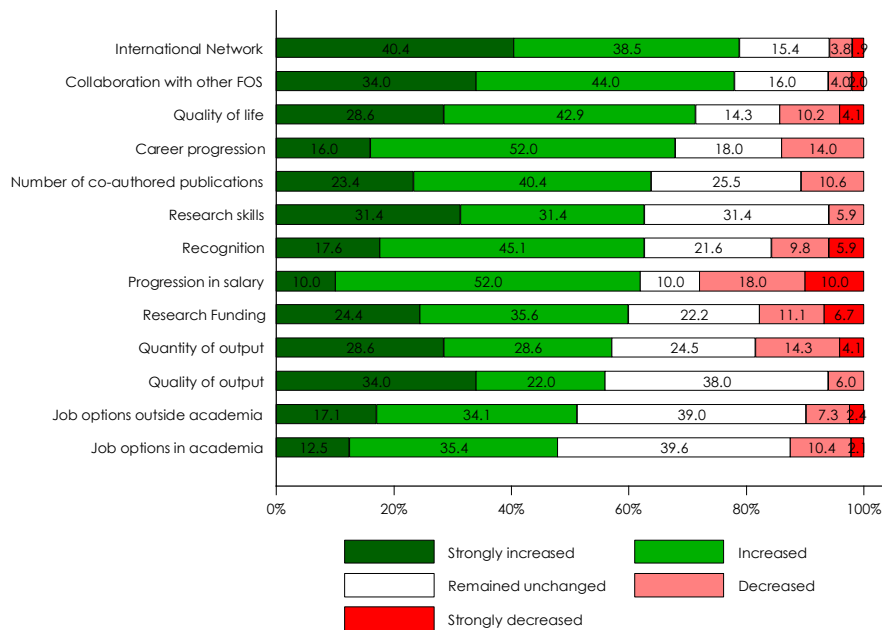
Similar to other researcher groups and consistent with both the results on the motives of researchers (section 7.3.1) and the MORE3 Global Survey, the largest effects are observed for the network of international contacts and collaboration with other research (sub)fields, but also for overall research skills, recognition, and career progression. An increase in job options outside academia, progression in salary and research funding are the least often indicated as being among the effects of mobility. These effects are also found in the lower half of the effects which were ranked in 2017. While on average the majority of respondents report positive effects, for this group of non-EU researchers there is a higher share of respondents reporting negative effects (i.e. a decrease in the listed factors). However, this share, even if higher than for other target groups, is still lower than the share reported in the MORE3 Global Survey.

Figure 99: Effects of long-term stay in a non-EU country for non-EU researchers.

In 2020:



In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only non-EU researchers who have been long-term mobile to a non-EU country.
- Based on question 74: "Please indicate below how your stay in ... has influenced the following factors."
- (2020: n=191, 2017: n= 47-52)

Overall, a stay abroad, or mobility, leads to positive effects in various domains, most strongly so for network effects, as would be expected. Confirming the analysis from a direct comparison of research systems in section 7.3, EU researchers who work in the US report higher effects across the board, with the exception of quality of life.

7.5. Interest to work in Europe

7.5.1. EU researchers (TG1): return mobility

25% of EU researchers who are currently working outside the EU indicated that they are interested to move back to the Europe in the coming 12 months, compared to 20% in 2017. 23% indicated that they do not know, compared to 18% in 2017.

Career stage: The interest in moving back to the EU is highest amongst R1 (31%) and R2 (43%) as compared to R3 (19%) and R4 (21%) researchers. The indicator increased for all career stage groups since 2017. This is in line with other studies, which show that when researchers become established at an institution, they are less likely to move.⁹³ The willingness to move for career reasons is highest for early-stage researchers. This is also important for EU or national policies targeting EU researchers abroad aiming at return mobility (see section 7.5).

Of the 25% of researchers who indicated that they are considering moving back to Europe in the coming 12 months, 73% have also undertaken concrete steps to return to Europe. No differences appear in MORE4 compared to the MORE3 Global Survey.

Country of current employment: Between 24% and 32% of EU researchers currently located in the US, China and Canada indicated that they are not considering moving back to the Europe in the next 12 months (only countries with more than 30 respondents are considered in the analysis). For the US and Canada, the shares are thus similar to the general average, for China slightly higher. Figure 100 shows that results are similar in 2017 and 2020.

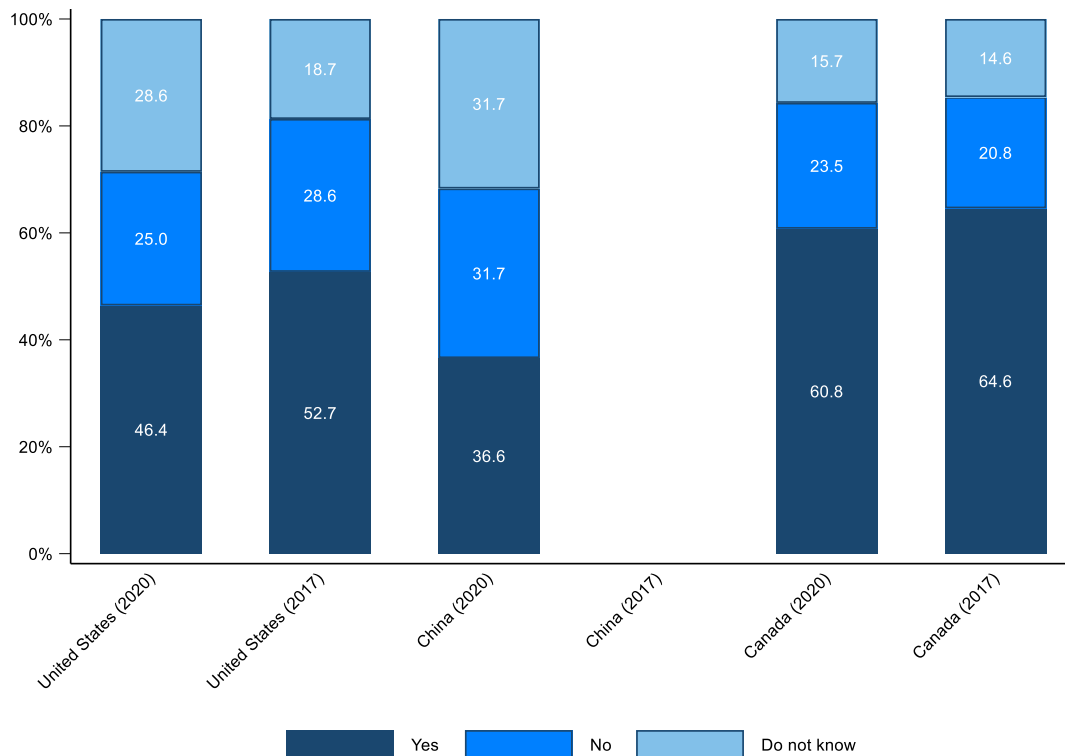
Country of citizenship: When comparing UK, German, French and Italian researchers currently working outside the EU, it can be observed that UK researchers are the least inclined to return to Europe in the coming 12 months (11% in 2020 and 7% in 2017) compared to Germany (28% in 2020 and 26% in 2017), France (17% in 2020 and 25% in 2017) and Italy (37% in 2020 and 22% in 2017).

Contract type: The share of EU researchers currently working outside the EU who are considering to move back to Europe in the coming 12 months is, not surprisingly, higher amongst the researchers with a fixed-term contract (35% in 2020 and 28% in 2017) than among the ones with a permanent/open contract (18% in 2020 and 10% in 2017).

Motives for mobility: 29% (20% in 2017) of the EU researchers currently working outside the EU who felt forced to move indicated that they are considering moving back to Europe in the coming 12 months. The interest to return is lower amongst researchers who chose to move to improve their working conditions (22% in 2020 and 8% in 2017) and higher for those who chose to move because international mobility – though not required – will be appreciated in their career and working conditions (49% in 2020 and 34% in 2017) and for the opportunities international mobility offers in terms of networking and knowledge exchange (22% in 2020 and 27% in 2017).

⁹³ E.g. Laudel, G., "Migration currents among the scientific elite", *Minerva*, 2005, 43(4), pp. 377–395.

Figure 100: Return mobility of EU researchers who currently work abroad, by country of current employment.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 51 “Are you considering moving back to Europe in the coming 12 months” and question 22 “What is your country of current employment”.
- (2020: n=148, 2017: n = 325).

7.5.2. *Non-EU researchers who have worked in the EU in the past (TG2): interest to work in Europe*

The non-EU researchers who have worked in the EU in the past generally have a positive view on working in Europe in the future:

- 87% of them would have liked to stay in Europe as a researcher⁹⁴ (compared to 77% in 2017).
- 95% are interested in working in Europe in the future.⁹⁵
- 95% would also recommend working in Europe as a researcher to other colleagues⁹⁶.

⁹⁴ Based on question 61 “Would you have liked to stay in Europe in as a researcher?”

⁹⁵ Based on question 64 “Would you be interested to work in Europe as a researcher in the future?”. The comparison with the abovementioned share of EU researchers interested in coming back to the EU is, however, limited by the fact that the wording of the question was not the same: whereas Europeans were asked about a specific time period (“in the next 12 months”), the question for non-EU researchers only included a reference to the “future”, hence using a more generic term.

⁹⁶ Based on question 65 “Would you recommend working as a researcher in Europe to other colleagues?”

Career stage: The levels of interest in working in Europe are very high (above 90%) for all career stage groups. In 2017, the highest level was found amongst early-stage researchers (R1) and the lowest amongst leading researchers (R4), confirming the picture of a higher willingness to be mobile during the early career stages. However, the results from the MORE4 Global Survey show that interest in working in Europe in the future is higher among R2 and R3 (respectively 98% and 97%) researchers compared to R1 and R4 researchers (93% and 91% respectively).

Contract type: Like in 2017, in 2020, the share of non-EU researchers who have worked in the EU in the past and who are interested to work in the EU in future is similar amongst researchers with a fixed-term contract than those with a permanent/open contract (95%).

Motives for mobility: 94% of non-EU researchers who worked in the EU in the past and who felt forced to move to Europe indicated that they would be interested in working as a researcher in Europe in the future. This share is similar for researchers who indicated that they chose to move because international mobility will be appreciated in their career and working conditions (93%) and for researchers who chose to move to the EU to take advantage of the opportunities that international mobility offers in terms of networking and knowledge exchange (95%). The level of interest among the other groups was similar to that in the MORE3 Global Survey.

MORE3 Global Survey: Overall, there are no substantial changes in the level of interest to work in Europe among non-EU researchers who have worked in the EU in the past over the 2017 – 2020 period.

7.5.3. *Non-EU researchers who have worked abroad but not in the EU (TG3): interest to work in Europe*

Of the non-EU researchers with no work experience in the EU, 90% would be interested in working in Europe in the future⁹⁷ (MORE3: 85%). Among these researchers, 57% of researchers (vs. 42% in 2017) have also recently investigated the possibility of working as a researcher in Europe⁹⁸.

7.5.4. *Non-EU researchers who have never worked abroad (TG4): interest to work in Europe*

88% of the researchers that had been mobile over 10 years ago (without specifying the destination country) indicated that they would be interested to work in Europe as a researcher in future⁹⁹ (compared to 83% in 2017). In addition, 40% of researchers who indicated that they would be interested in doing so, have recently investigated the possibility of working as a researcher in Europe¹⁰⁰. This share has gone up from 37% to 40% since 2017.

Despite their lack of previous mobility experiences, 92% of the non-mobile researchers indicated that they would be interested to work as a researcher in Europe in the future¹⁰¹. In addition, 50% of the researchers who indicated this interest have recently investigated the possibility of working as a researcher in Europe¹⁰². This represents 13 pp more than in 2017 (37%). Overall, although we cannot claim that the results are representative, these findings point in principle to high levels of interest in

⁹⁷ Based on question 68 "Would you be interested to work in Europe as a researcher in the future?"

⁹⁸ Based on question 69 "Have you recently investigated the possibility of working as a researcher in Europe?"

⁹⁹ Based on question 68 "Would you be interested to work in Europe as a researcher in the future?"

¹⁰⁰ Based on question 69 "Have you recently investigated the possibility of working as a researcher in Europe?"

¹⁰¹ Based on question 68 "Would you be interested to work in Europe as a researcher in the future?"

¹⁰² Based on question 69 "Have you recently investigated the possibility of working as a researcher in Europe?"

Europe and to a perception of an attractive EU research system. Section 8.2 analyses more in detail how researchers working in different non-EU countries perceive the EU in direct comparison.

Career stage: The interest to work in Europe amongst non-EU researchers who have never worked abroad (TG4) is very high across all career stages (R1: 98%, R2: 93%, R3: 91%, R4: 84%). R1 and R2 researchers have also more frequently investigated the possibilities of working as a researcher in Europe (65% and 52%) compared to R4 researchers (29%). All percentages have increased by between 5 and 20 pp since 2017.

7.6. Improving the attractiveness of the EU as a destination for researchers: policies

Improving the attractiveness of the EU as a destination for researchers is contingent on many factors, as outlined in sections 6-7.4 and also in the report on the MORE4 EU HE Survey. The analyses in the previous sections have not only shown us the general picture of how attractive different areas are as research areas, but also which factors are decisive in determining this attractiveness, and which are enablers rather than drivers. Drivers are those crucial attractive conditions for research or scientific knowledge production that make researchers choose the EU as a location for their research because it will foster their career and advance their individual research agenda. Among these conditions are attractive career paths (a tenure track model) and career perspectives and working with leading scientists. Important enabling framework conditions – or barriers to coming to the EU - are immigration options (rules relating to non-EU nationals working in the EU), the general availability of jobs in the ERA as well as getting funding for research. Many policies at the EU, national and regional level address the factors that are potentially relevant for attractiveness. In this section, we focus more specifically on two EU-level policy instruments, Euraxess and EU research funding instruments, but first an overview is provided of the main findings from the previous sections.

7.6.1. The attractiveness of the EU as a destination for researchers

Euraxess and EU funding instruments address, among other factors, two main issues for (mobile) researchers: the availability of job positions (or finding available job positions, as Euraxess aims to support researchers with) and funding for research or mobility. How do these two issues matter for mobility decisions of the researchers in our sample? How do they influence the attractiveness of the EU? The previous sections have already noted that they are very relevant as barriers to mobility and also important as motives for mobility. In the following, we set out with a concise comparison of which role funding and the availability of positions play for the mobility decisions across our four groups of researchers as a gauge of the potential lever Euraxess and funding programmes have on improving the attractiveness of ERA; this overview synthesises the insights from the previous sections.

Table 45 synthesises the various questions in the survey which the different researcher groups were asked about regarding the role of the availability of positions and of (research and mobility) funding:

- as a main motive to move (row 1 in Table 45 below);
- as an important factor in outward mobility decisions (row 2);
- as a barrier to mobility (back to Europe for the EU researchers, to the EU for the non-EU researchers) (row 3); and
- as a factor for leaving the EU (the non-EU researchers who were mobile to the EU) (row 4).

The evidence from the MORE4 Global Survey clearly shows that the availability of research funding and suitable positions are enablers, but not drivers of mobility, in the sense that if they did not exist, people interested in international mobility would otherwise have struggled to become mobile; their main motivation to become mobile is however only in a minority of cases related to funding and the availability of positions (8% for positions, 10% for funding; see the first part of the table below). The main motivation across all groups is, rather, related to working with leading scientists, career progression as well as international networking (also see section 7.4.1 on the main motives for undertaking mobility).

The availability of funding and positions are thus major enablers, as many researchers cite them as being among the most important factors driving, or conversely barriers to mobility (row 3 Table 45). The exceptions to this pattern is non-EU researchers who were mobile to other countries (TG3) (questions 60 and 75 in row 4) who were asked about their current mobility. The low share of researchers that considers this to be a barrier to their mobility indicates that they had secured a position or funding before they came to other countries. This is not surprising as they would not have moved without having secured a position or the necessary funding beforehand. For EU researchers thinking about moving back to the EU, finding a suitable position is obviously a major challenge (questions 53 and 54). Funding and the availability of a position are hence conditions for mobility, particularly in the case of mobility involving a change of employer, but not drivers.

Table 45: Role played by the availability of positions and funding for mobility decisions across the different researcher groups.

Availability of a suitable position as a...		Availability of research funding as a...	
1	...main motive for mobility (Question 44)	8.0%	...main motive for mobility (Question 44) 9.9%
2	...important decision factor for outward mobility		...important decision factor for outward mobility
	TG1 (Question 46)	83.4%	TG1 (Question 46) 69.4%
	TG2 (Question 56)	73.0%	TG2 (Question 56) 85.2%
	TG3 (Question 72)	73.9%	TG3 (Question 72) 77.6%
3	...barrier to future mobility		...barrier to future mobility
	TG1 Moving back to Europe (Question 53 - Research funding)	83.6%	TG1 Moving back to Europe (Question 53 - Research funding) 76.6%
			TG1 Moving back to Europe (Question 53 - Mobility funding) 72.3%
	TG1 Moving back to Europe (Question 54)	78.9%	TG1 Moving back to Europe (Question 54) 78.9%
	TG3 & TG4 Moving to Europe (Question 70)	51.2%	TG3 & TG4 Moving to Europe (Question 70 - Research funding) 51.3%
			TG3 & TG4 Moving to Europe (Question 70 - Mobility funding) 50.4%
4	...barrier to past/actual mobility		...barrier to past/actual mobility
	TG2 Moving to Europe (Question 60)	73.9%	TG2 Moving to Europe (Question 60 - Research funding) 33.8%
			TG2 Moving to Europe (Question 60 - Mobility funding) 37.2%

	Availability of a suitable position as a...	Availability of research funding as a...
	TG3 Moving to a non-EU Country (Question 75) 27.8%	TG3 Moving to a non-EU Country (Question 75 - Research funding) 36.6%
		TG3 Moving to a non-EU Country (Question 75 - Mobility funding) 38.9%
5		...decision for leaving the EU
		TG2 (Question 62) 26.7%

Source: MORE4 Global Survey (2020).

Notes:

- Based on questions indicated in table.
- (n=19-1,590)

This implies that a combination of EU funding for mobility and support through the Euraxess network to identify an available research position can provide an attractive context in terms of enabling mobility to the EU – or preventing forced outward mobility of talents - if people want to come to the EU in the first place. Section 7.3 also shows that the EU is generally perceived to be worse in terms of funding and the availability of positions by EU researchers working abroad in developed non-EU OECD countries, including particularly the US. Non-EU researchers who have been mobile to the EU, on the other hand, perceive the EU to be better in terms of funding and positions. But the attractiveness of the EU as a research destination is determined by additional factors, particularly those related to the conditions for scientific knowledge production mentioned above, such as working with leading scientists and attractive career paths which provide stable time horizons for implementing long-term research agendas.

In the next section, the answers to the questions in the MORE4 Global Survey on Euraxess and on EU funding are examined in detail. In addition, the level of awareness about support services available through Euraxess for researchers looking for mobility positions and knowledge about EU funding as to the role that the availability of funding and positions plays in making mobility decisions are further explored.

7.6.2. EU policies: Euraxess and (EU) funding

Awareness of Euraxess

Target groups: Figure 101 reports on the relative shares among researchers who either know, or do not know about Euraxess Links, and among those who are already familiar with the existence of the Euraxess support network, whether they have created an online account or not. It reveals that knowledge of Euraxess is more widespread among researchers with a connection to the EU, be it EU researchers abroad (TG1) or non-EU researchers who have been mobile to the EU in the past (TG2). The level of awareness of Euraxess ranges between 48-52% among researchers in these two groups, a considerable increase over MORE3 (29-40%).

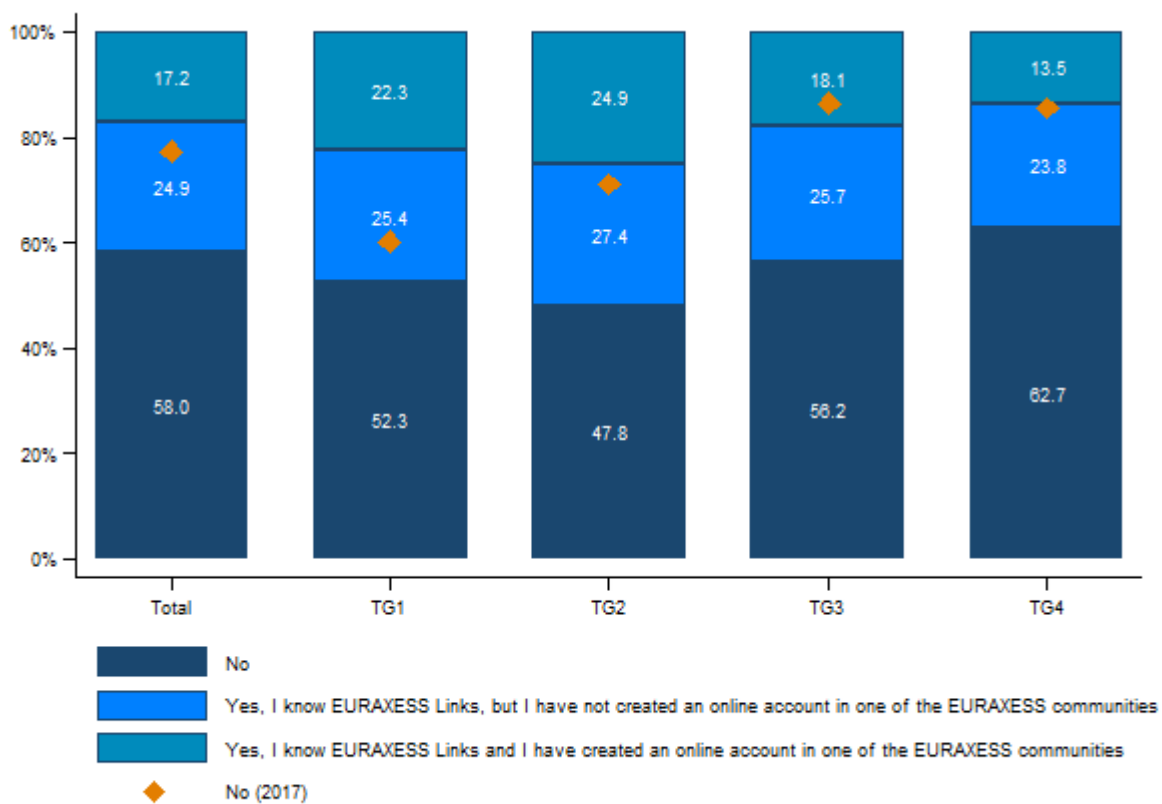
Euraxess is comprehensively promoted by the European Commission, also at a worldwide level through Euraxess Worldwide with dedicated teams in several countries and regions.¹⁰³ Activities include not just online information, but also on site activities, which so far number up to 120 events and 190 missions, reaching around 15.000 researchers. The increase in awareness may also be linked to the compulsory use of Euraxess for the advertisement of positions by research institutions who

¹⁰³ See <https://euraxess.ec.europa.eu/worldwide>.

have been certified with the HR Excellence in Research label, based on the Human Resources Strategy for Researchers (HRS4R).

In the other two groups (TG3 and TG4), where researchers are neither from the EU nor have worked in the EU before, knowledge of Euraxess is lower varying between 44-38% depending on the country from which the researchers originate. This also represents a strong increase from 14% awareness in these TG compared to MORE3, bearing in mind the changing composition of the sample. In total, levels of awareness about Euraxess are much higher among researchers working outside Europe (42%) than working inside (see MORE4 EU HE Survey, 19%), although the samples cannot readily be compared.

Figure 101: Awareness of Euraxess across researcher groups.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

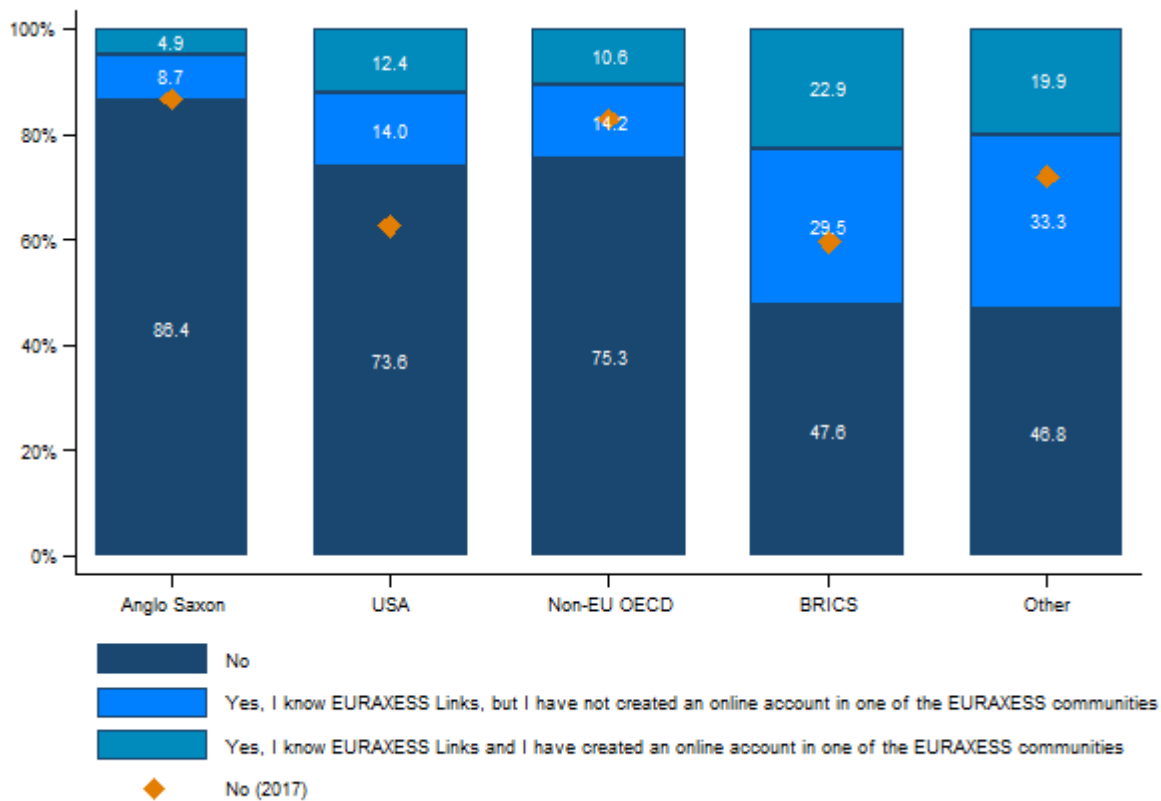
Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369; 2017: n=1,727)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 79: "Do you know Euraxess Links?"

Country of current employment: Figure 102 shows that since 2017, awareness about the Euraxess Links has grown in the BRICS countries and in 'other' countries. Awareness has improved in all countries within scope, with the exception of the US. The higher level of awareness of Euraxess Links in the BRICS countries may be because more EU or non-EU researchers who have been mobile to the

EU are working there. Awareness is particularly high in Brazil (67%) followed by China (57%) and India (56%) while it is comparably low within the surveyed group of Russian researchers (15%). This may be linked to the sampling strategy, as Euraxess Links officers were also invited to advertise and distribute the MORE4 Global Survey. As it may be interesting for policy purposes, we provide the full list of countries with awareness about Euraxess Links in the annex 8 (Table 60).

Figure 102: Awareness of Euraxess by country of employment of researchers.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 79: "Do you know Euraxess Links?"
- (2020: 2,369; 2017: n=1,727)

Table 46 shows the shares of researchers who know about Euraxess Links by the role played by the availability of a position enabling their mobility (relating back to Table 45). If shares are higher than in Figure 101, Euraxess is better known among researchers who consider the availability of positions as being important for outward or return mobility. The survey responses show that the majority of EU researchers that do consider moving back to Europe (63% vs 65%¹⁰⁴) and that see the availability of a position as a barrier to mobility back to Europe (66% and 60%¹⁰⁵) know about Euraxess Links. In general, awareness is much higher for those EU researchers considering moving back¹⁰⁶ (63%) than awareness among European researchers working outside Europe in general (TG1: 47%). Awareness is also slightly higher among TG2 researchers citing the availability of positions as important for

¹⁰⁴ Questions 51 and 52 in the MORE4 Global survey.

¹⁰⁵ Questions 53 and 54 in the MORE4 Global survey.

¹⁰⁶ Questions 51 and 52 in the MORE4 Global survey.

mobility (e.g., in Figure 101 52% of TG2 researchers are aware of Euraxess, comparing with 57% in questions 56 and 60). This indicates that Euraxess does properly address its potential target group.

However, awareness among non-EU researchers who have been mobile but not to the EU (TG3) and who see the availability of positions as being an important factor in, or conversely barrier to mobility is about equal as in total TG3 at approx. 44-45% (much higher though than in MORE3); so that there may be potential to increase awareness among this group in particular. There could be a chicken and egg problem here, in that if researchers are not so interested in the first place to move to Europe for a research career, they will be less motivated to look for potential job platforms such as Euraxess Links. Euraxess Links should hence be seen in combination with efforts aimed at increasing the overall attractiveness of ERA in combination with tools which reduce barriers to mobility.

Table 46: Awareness of Euraxess Links for researchers who see the availability of positions as an important motive for, factor in or barrier to mobility versus awareness among all respondents.

Availability of suitable position as a...	Awareness of Euraxess among all respondents (Question 79)	
...main motive for mobility (Question 44)	60.1%	42.0%
...important decision factor for outward mobility		
TG 1 (Question 46)	50.0%	47.7%
TG 2 (Question 56)	57.4%	52.2%
TG 3 (Question 72)	45.1%	43.8%
...barrier to future mobility		
TG 1 (Question 53)	65.6%	47.7%
TG 1 (Question 54)	60.0%	47.7%
TG 3 & TG 4 (Question 70)	34.6%	
...barrier to past/actual mobility		
TG 2 (Question 60)	57.1%	52.2%
TG 3 (Question 75)	49.1%	43.8%
TG1: Considering moving back to Europe (Question 51)	62.9%	47.7%
TG1: Undertaken concrete steps in order to return to Europe (Question 52)	64.5%	47.7%

Source: MORE4 Global Survey (2020).

Notes:

- Based on question 79: "Do you know Euraxess Links?" and questions indicated in the table. Note that the cross section of question 79 and 54 is only 15 respondents.
- (n=15-246)

Participation in and awareness of/interest in EU funding

In the next section, we turn to (research and mobility) funding. The first question about this topic in the MORE4 Global Survey related to whether respondents obtained different types of funding, including EU funding (EU Framework Programme Funding, for instance through Horizon 2020, such as through a portable ERC or MSCA research grant). Table 47 reveals that while the majority of researchers obtained funding from national sources through a competitive process (by way of submitting a research proposal), a significant share also received industry funding. The various EU funding instruments are less frequently used. This finding is however not surprising, as by definition all of the researchers present in the figure work outside the EU.

The higher share of "No funding" in the group of researchers which was never internationally mobile (TG4) indicates that funding does play a role in mobility, either in that more able researchers may be better at obtaining funding for their research and move due to this funding, or insofar as funding is a pre-requisite for mobility.

Table 47: Types of funding obtained by researchers in the four groups.

	ERC	Marie Skłodowska-Curie Action	Industry funding	National (public) competitive funding	Other EU funding (e.g. H2020)	No funding
TG1	5.2%	8.0%	19.3%	61.8%	11.6%	30.6%
TG2	6.3%	7.8%	13.3%	58.7%	7.7%	33.9%
TG3	1.6%	0.6%	18.3%	55.8%	4.1%	38.9%
TG4	2.6%	1.7%	14.9%	51.4%	5.0%	43.9%
Total	3.5%	3.5%	15.6%	54.6%	6.3%	39.8%

Source: MORE4 Global Survey (2020).

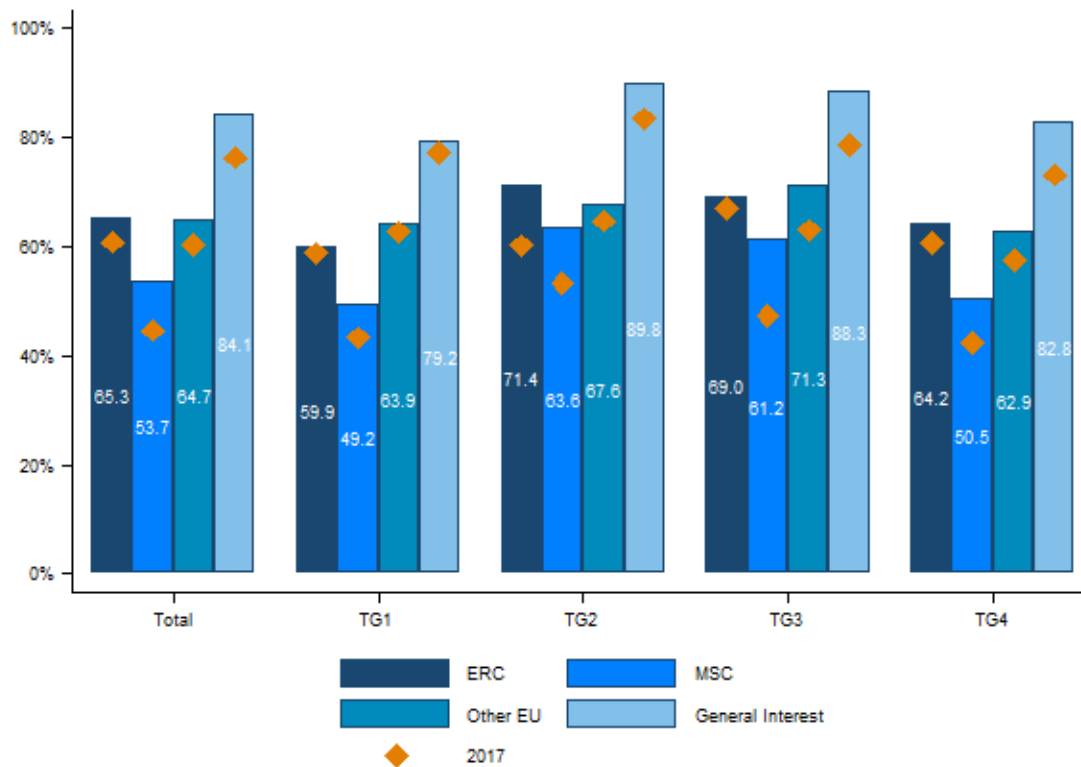
Notes:

- Based on question 80: "Have you obtained competitive funding for basic research from one or more of the following sources?"
- (2020: n=2,369; 2017: n=1,727)

Low use of EU funding in the sample of researchers currently working outside the EU does not preclude very high levels of interest in EU funding, particularly for the ERC grant instrument and MSCA grants funded through Horizon 2020 within the Framework Programmes. General interest in EU funding is even higher at 84% than in 2017 (MORE3: 76%).

Target groups: By group of researchers, interest is high even for non-mobile researchers (TG4), indicating the potential of EU funding to foster collaboration and mobility (as funding can in general only be obtained by non-EU researchers in collaboration with EU researchers).

Figure 103: Interest in applying for EU funding across researcher groups.



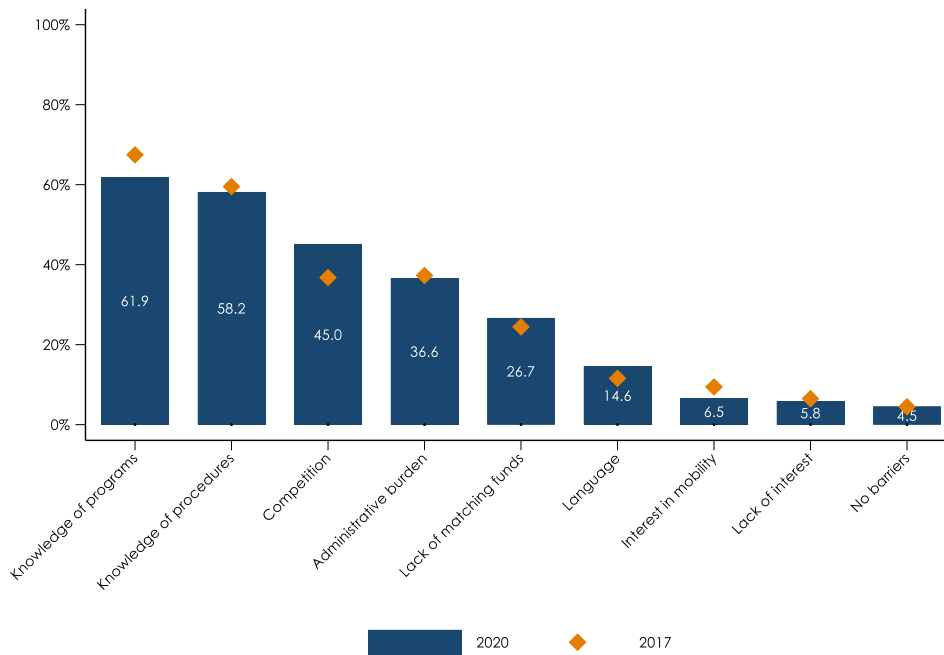
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (n= 2,369)
- TG1: EU researchers currently working outside the EU (n= 327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 81: “Are you interested in applying for (other) EU funding in the future?”

Given such a high interest in applying for EU funding, the question as to the most important barriers to accessing EU research funding is of particular relevance. Figure 104 shows that these barriers relate mainly to a lack of knowledge about the instruments and the procedures for applying for EU funding. As a consequence – given that 60% of respondents don’t know about EU funding – the other barriers are much less relevant, possibly with the exception of too much competition at 45% (up from 39% in MORE3). These barriers could become more relevant if researchers knew more about funding opportunities and tried to apply for the funding.

Figure 104: Barriers for applying for EU funding.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 82: “What are the main barriers for applying for EU funding?”
- (2020: n=2,369; 2017: n=1,727)

Target groups: By group of researchers, it is perhaps not surprising that researchers with EU exposure (TG1 and TG2) are less likely to cite lack of knowledge of EU programmes and procedures as a barrier to the use of EU funding. However, given this increased knowledge, EU researchers working abroad (TG1) also report administrative burdens much more as a barrier than the other three groups of researchers. In contrast, researchers who were never mobile (TG4) much more frequently cite language as being as a barrier than mobile researchers from TG1-TG3.

Table 48: Barriers to the use of EU funding by group of researchers.

	Total	TG1	TG2	TG3	TG4
Administrative burden	36.6%	51.1%	35.6%	35.3%	33.7%
Competition	45.0%	45.6%	47.2%	43.3%	44.6%
Interest in mobility	6.5%	4.9%	4.2%	7.7%	7.4%
Knowledge of procedures	58.2%	51.1%	50.7%	63.4%	61.1%
Knowledge of programs	61.9%	58.1%	57.7%	65.7%	63.3%
Lack of interest	5.8%	4.3%	3.1%	6.7%	6.8%
Lack of matching funds	26.7%	23.2%	20.6%	24.6%	29.7%
Language	14.6%	4.0%	11.7%	11.8%	18.4%
No barriers	4.5%	4.9%	6.2%	4.9%	3.9%

Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU (n=2,369)
- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1,380)
- Based on question 82: “What are the main barriers for applying for EU funding?”

The issue of a lack of knowledge about EU funding programmes among some researchers is now considered, as this relates to the importance of funding as a driving factor in, or conversely a barrier to mobility (Table 45). This helps in developing an understanding as to the potential role of EU funding instruments in overcoming barriers to mobility or in increasing the attractiveness of the EU as a destination for researchers. For a potentially positive effect of funding, the lack of knowledge should be lower in the left column of the table below than in the right half when EU researchers intend to move back to the EU, or when non-EU researchers want to become mobile to the EU. Lack of knowledge is indeed lower among EU researchers intending or considering moving back to the EU (33 resp. 39% vs. 58%), but not among non-EU researchers asked about a potential move to the EU (similar at 63-66%). Among EU researchers abroad who indicated taking concrete steps to return, lack of knowledge was however much higher than in general.

In contrast with the MORE3 Global Survey, these differences are higher than registered in terms of awareness levels about Euraxess Links (an instrument addressing the availability of positions, e.g. awareness of Euraxess Links among EU researchers indicating the availability of positions as a difficult factor to move back to Europe was 23 percentage points higher than overall). This suggests that the availability of positions may be more directly related to enabling researchers coming back to the EU, or being mobile to the EU, while research funding may be a subsequent issue, once a position has been secured, or when the position does not have any associated funding with it. This is supported by the analysis of barriers to mobility in section 7.4.2., where the availability of positions is more often cited as a barrier.

Table 49: Lack of knowledge of EU funding among researchers who indicated that funding was an important factor or barrier to mobility versus lack of knowledge among all respondents.

Availability of research funding as a...	Lack of knowledge of programs across all researchers	
...main motive for mobility (Question 44)	59.7%	61.9%
...important decision factor for outward mobility		
TG 1 (Question 46)	59.6%	58.1%
TG 2 (Question 56)	56.2%	57.7%
TG 3 (Question 72)	78.2%	65.7%
...barrier to future mobility		
TG 1 Moving back to Europe (Question 53 – Research funding)	33.3%	58.1%
TG 1 Moving back to Europe (Question 53 – Mobility funding)	38.9%	58.1%
TG 1 Moving back to Europe (Question 54)	100.0%	58.1%
TG 3 & TG 4 Moving to Europe (Question 70 – Research funding)	66.3%	TG3:65.7%; TG4:. 63.3%
TG 3 & TG 4 Moving to Europe (Question 70 – Mobility funding)	66.8%	TG3:65.7%; TG4:. 63.3%
...barrier to past/actual mobility		
TG 2 Moving to Europe (Question 60 – Research funding)	58.2%	57.7%
TG 2 Moving to Europe (Question 60 - Mobility funding)	56.0%	57.7%
TG 3 Moving to a non-EU Country (Question 75 - Research funding)	67.7%	65.7%
TG 3 Moving to a non-EU Country (Question 75 - Mobility funding)	68.3%	65.7%
...decision for leaving the EU		
TG 2 (Question 62)	55.5%	57.7%
TG1: Considering moving back to Europe (Question 51)	61.2%	58.1%
TG1: Undertaken concrete steps in order to return to Europe (Question 52)	76.2%	58.1%

Source: MORE4 Global Survey (2020).

Notes:

- Based on question 82: “What are the main barriers for applying for EU funding?” and the questions indicated in the table.
- (n=15-321)
- Note that question 54 was answered only by 15 respondents, so should be interpreted with caution.

Overall, this analysis of EU funding and Euraxess Links as EU instruments to foster the attractiveness of the ERA to talented researchers from the EU and around the globe suggests that instruments targeted at the availability of positions and at research and mobility funding can potentially play a very important role as enablers of mobility. They can hence work as a kind of framework condition for realising the full attractiveness potential of the EU. However, they are not the main drivers of career-oriented mobility, so that policies also need to more directly target the attractiveness of research positions themselves, by improving the conditions for scientific knowledge production (as in working with leading scientists, research autonomy, attractive career paths, and an attractive time balance between teaching, research and administration work). The availability of positions is an important motive when mobility entails a change of employer among EU researchers moving abroad,

often in a forced way (escape mobility when there is a lack of research positions domestically) (see section 7.4.1). However, EU and national research policies should also aim to increase the attractiveness of the ERA for researchers from effectively functioning research systems, who can self-select to undertake a mobility period. Research funding is also one of those conditions enabling scientific knowledge production, but it does not rank that highly in terms of being a motive for mobility.

Coming from the potential importance of EU instruments as a lever for attractiveness to the current levels of awareness and use by researchers, there is clearly potential for increased awareness and use of such funding instruments among researchers.

8. Estimation of the number of EU researchers outside Europe

In addition to gathering the qualitative and quantitative information on mobility from researchers outside Europe (as described above), the aim of Task 2 is to estimate the total number of EU researchers and doctoral candidates enrolled in third countries (the US, Canada, Japan, China, Korea, Australia, New Zealand, Brazil and Chile). This is a challenging task as there is no single, ready-to-use database that registers EU researchers abroad. The survey planned in Task 2 is not representative and therefore the survey results cannot be used to make this estimation. The 9 non-European countries in this analysis were selected based on the two main criteria: the availability of data and the country's level of (economic) development/importance as a competitor for the talent in regard with the EU. Accordingly, out of 9 third countries selected for the analysis 5 (the United States, Canada, Australia, New Zealand and Japan) were developed countries, whereas 4 (South Korea, China, Brazil and Chile) were developing economies¹⁰⁷. The availability of data in this case refers to bibliometric data – i.e. publication records of researchers in the Microsoft Academic Graph database, as well as readily available data from databases and statistical reports on the number of EU/European doctoral candidates enrolled in these countries.

8.1. Methodology and sources of data to estimate the numbers of EU researchers in selected countries

Overall, we followed several steps to provide an estimate of both actual numbers and time trends:

- First, to estimate the numbers of early-stage researchers (R1)/doctoral candidates in third countries, we use the data collected from existing databases. More specifically, the OECD Statistics database¹⁰⁸ and other sources of information that provide immediate data on doctoral candidates of EU origin enrolled in third countries, as well as data that allows extrapolation, were used;
- Second, to estimate the numbers of more senior career stage researchers (R2-R4 stage), we used an innovative bibliometric analysis/big data approach that was not used in the previous MORE studies. More specifically, to estimate the number of more experienced (R2-R4) European-born researchers working outside Europe, we use bibliometric data from Microsoft Academic Graph database (<https://academic.microsoft.com/home>).

The most comprehensive source of information on the numbers of European doctorate candidates /R1 stage researchers is provided by OECD statistics, which collects data on enrolment of international candidates by origin (including doctorate candidates category)¹⁰⁹. This source of information provides immediate data on the numbers of early stage researchers/doctorate candidates of European origin in a number of selected third countries, including Canada, Australia, Japan, South Korea, Brazil, New Zealand and Chile. For two countries on our list – the US and China – the OECD Statistical database does not provide information on enrolment of international (doctoral) students by origin. To calculate

¹⁰⁷ Based on the UN classification of 2020: World Economic Situation Prospects, The United Nations, 2020 https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/WESP2020_Annex.pdf.

¹⁰⁸ OECD Statistics, <https://stats.oecd.org/>.

¹⁰⁹ https://stats.oecd.org/index.aspx?DatasetCode=EDU_GRAD_FIELD#

the numbers of doctoral candidates of EU origin enrolled in the US, we used the data provided by the Student and Exchange Visitor Information System (SEVIS)¹¹⁰, a web-based system that the Department of Homeland Security (DHS) uses to maintain information on students in the United States, including the data on students' country of citizenship. The estimations on the number of doctoral candidates in China were made based on the extrapolations on statistical data provided by the Chinese Ministry of Education¹¹¹¹¹².

Overall, MA provides similar information to other bibliometric databases, such as Scopus or Web of Science. However, it also contains many additional features such as information on the paper topics and links to external identifiers, such as "Global Research Identifier Database" (GRID). Compared to Scopus and Web of Science, MAG has much better and wider coverage containing three or four times as many papers as other databases. Since MA is a newer source, its accuracy has not been studied as much as the other sources, but the existing studies did find evidence that MAG data is of poorer quality compared to the alternatives¹¹³.

We estimated the share of European researchers who currently work outside Europe by analysing the researcher affiliation data from researcher publication records in the Microsoft Academic Graph database. During their careers, researchers publish their work and some data about the institutions with which these researchers are affiliated is made public. From this data we can learn in which country/region a researcher is working at the time of publication. By analysing this data over a period of time, we can detect instances when a researcher has started his/her scientific career in one region and then moved somewhere else. In other words, a researcher, who produced his/her first publication(s) while affiliated to a European-based institution but recently produced publications while affiliated to a third country-based institution, can be considered as a researcher who moved from Europe to a third country for his/her research career and is currently working outside Europe as a researcher. Note that in this context, there is no certainty about the nationality or citizenship of the researcher. The assumption is that a researcher whose first publications were produced in affiliation to a European higher education institute is an EU-born researcher. This means that even a foreign-born person/foreign citizen, who made her/his first publications while affiliated to an EU-based institution is counted in this approach as an 'EU researcher'.

The approach starts with identifying EU researchers working in third countries in the MAG database. One great advantage of using MAG is the MAG Author-ID assigned to authors by the curators of the database. The author-ID is assigned based on matching authors by name and their study field. Naturally, this process is not perfect and it is possible for a single person to have multiple author IDs. However, still MAG author ID is of comparable quality to the author ID in Scopus database, which is current industry standard. We take additional measures to address this issue by only considering authors with more than four papers. In addition to other things, this approach also eliminates a vast majority of duplicate author IDs.

In this approach, a researcher is considered **an EU researcher working in a third country if they have published their first two publications while affiliated with an institution in an EU country, whereas at least 1 most recent publication was made while affiliated to a third country-based**

¹¹⁰ <https://studyinthestates.dhs.gov/sevis-by-the-numbers/sevis-by-the-numbers-data>.

¹¹¹ http://www.moe.gov.cn/jyb_xwfb/xw_fbh/moe_2069/xwfbh_2017n/xwfb_170301/170301_sjtj/201703/t20170301_297677.html

¹¹² Statistical report on international students in China for 2018, http://en.moe.gov.cn/documents/reports/201904/t20190418_378692.html

¹¹³ Huang, C.K., Neylon, C., Brookes-Kenworthy, C., Hosking, R., Montgomery, L., Wilson, K. and Ozaygen, A., 2020. Comparison of bibliographic data sources: Implications for the robustness of university rankings. *Quantitative Science Studies*, 1(2), pp.445-478.

institution.¹¹⁴ In addition, we filtered out doctoral candidates (who are included in the R1 figures based on existing databases) by filtering out researchers with fewer than 4 publications. This is based on a rationale that most PhD candidates publish no more than 2-3 articles during their PhD stage. Setting this criterion should most likely eliminate from the analysis most of the PhD candidates, but entails a risk of eliminating also a number of later stage researchers, in particular R2 researchers. We thus set a rather strict criterion here to avoid overestimation.

As shown below, using this method, we calculated the estimated numbers of EU researchers (R2-R4 career stage) working in third country institutions for the two reference periods: 2009-2013 and 2014-2019. Thus, for example, calculating the estimated numbers of EU researchers abroad for the time frame of 2009-2013, means that we count as an EU researchers working in a third country during this period any researcher who meets the following criteria: made his/her first publications at any point in time while affiliated to an EU based institution; and during the period 2009-2013 made his last publication(s) while affiliated to a third country institution (for more details, see further next section on the results).

In addition, in the development of the algorithm used to estimate the numbers of EU researchers abroad, we calculated a lower and upper bound. The upper bound represents an estimation using a more liberal or relaxed set of criteria, while the lower bound represents a stricter set of criteria used to identify the European researchers. The main difference between the upper and lower bound is that for the lower bound we only consider researchers with publishing spans longer than 4 years. I.e. we only consider researchers with more than 4 years between their first and last paper. Imposing this requirement is an additional safeguard to ensure that the numbers we get really correspond to bona fide career researchers and to eliminate those researchers who could have published more during their PhD studies.

Establishing these lower and upper bounds allowed us to provide a realistic range for the estimate of the number of EU researchers working abroad, stricter or more relaxed depending on the set of criteria we select.

Overall, to identify the number of EU researchers working in third countries, using the MAG database, we relied on the following criteria:

- A researcher has no less than 4 publications in his/her record;
- Out of these total publications, at least the first two¹¹⁵ publications were published while affiliated with an institution in an EU country, whereas at least the most recent publication was made while affiliated to a third country-based institution;
- (In case of lower bound) The time span between the first and the last publication is more than 4 years.

The introduction of the above-described approach to estimate the number of more experienced researchers through bibliometric data available in the MAG database constitutes a significant methodological change compared to the previous MORE studies. Overall, the above-described

¹¹⁴ As shown below, using this method, we calculated the estimated numbers of EU researchers (R2-R4 career stage) working in third country institutions for the two reference periods: 2009-2013 and 2014-2019. Thus, for example, calculating the estimated numbers of EU researchers abroad for the time frame of 2009-2013, means that we count as an EU researchers working in a third country during this period any researcher who meets the following criteria: made his/her first publications at any point in time while affiliated to an EU based institution; and during the period 2009-2013 made his last publication(s) while affiliated to a third country institution (for more details, see further next section on the results).

¹¹⁵ A threshold of two publications was chosen, in order to avoid accidental matches.

bibliometric method has the following advantages compared to the method used in the previous MORE3 study:

- To estimate the overall number of European researchers based in third countries, the previous MORE3 study used data on EU-born doctoral candidates to extrapolate the overall numbers of researchers in third countries, while relying on a number of strong assumptions (e.g. assumptions on the length of research careers, the assumption that every year one-fifth of EU-born doctoral candidates finishes their studies, assumption that the share of EU-born researchers in the stock of EU-born HRST in the US is the same as in all the other third countries analysed, etc.). We believe that the current approach relying on bibliometric data, while having its own weaknesses, requires less strong assumptions and extrapolations. The current approach could therefore provide more accurate estimates of the numbers of European researchers working in third countries, as it is based more on the directly available data (publications) and less on extrapolations.
- Some sources of data that were of key importance in extrapolations done in the MORE3 study (e.g. statistics on European-born U.S. research doctorate recipients with definite commitments for research position in the U.S. after graduation) have not been updated since then and, therefore, it would not have been possible to replicate the analysis done in MORE3 with updated data. In contrast, the use of the bibliometric approach based on the MAG database has allowed us to estimate the most recent numbers of EU researchers abroad.
- The MAG database itself has several advantages, compared to other, commercial bibliometric databases (such as Scopus). First, MAG is an open-source database, which guarantees consistency with similar exercises in the future. More specifically, it is possible to save the dataset used in the calculation and use the same researcher IDs for similar exercises in the future. This would enable a full panel analysis of the researcher population with all the associated advantages.
- Another advantage of MAG, as compared with other databases is the quantity and coverage of data: currently the MAG database contains information on around 120 million publications (in comparison Scopus has records of around 12 million publications). Moreover, MAG has a wider coverage of different world regions and a larger variety of publications (e.g. includes data on conference papers and not only academic articles). For the purpose of identifying the number of EU researchers abroad, a broader geographical and thematic coverage is an advantage. The wide geographical coverage of the MAG database means the above-described approach to estimating the numbers of EU researchers abroad could cover more countries and regions compared to the previous approach used in the MORE3 study (e.g. by adding information on EU researchers who are currently publishing in countries like China, South Korea, Brazil, etc.). For this analysis, we have included all document types available in MAG. That of course includes journal publications, but also extends to conference papers, book chapters and patents. This choice was made to have a fuller picture of researchers' publication outputs. We only considered documents for which author affiliation data as available. Such documents constituted roughly 78% percent of all author-publications.

The above-listed advantages of the bibliometric method to estimate the numbers of EU researchers abroad do not mean, however, that the method has no strong assumptions or weak points. The weaknesses and potential risks involved with this approach are:

- Data quality issues: bibliometric data is not perfect. None of the bibliometric databases capture the full scholarly output: some publications might not be indexed and relevant data not accounted for. Furthermore, it might be that identifiers for individual researchers

are duplicated, meaning that the same person might have multiple IDs and appear in our dataset more than once. However, this issue was largely addressed with imposing a minimum publication requirement for the author to be considered. Also, bibliometric data tend to be biased towards fields of science in which publications are more indexed than in others (although MAG has the best coverage of conference papers and book chapters from all bibliometric sources, thus improving the representation of fields such as social sciences/humanities/computer science compared to databases like Scopus or Web of Science)¹¹⁶.

- There is also a risk of some geographical bias in favour of the EU researchers going to certain third countries. More specifically, there is a risk that the estimation is biased in favour of the EU researchers working in “Western” countries (i.e. the US, Canada, New Zealand and Australia). At the same time, this bias might produce less accurate figures for EU researchers working in other regions (Africa, South Asia, etc.). The main reason for this is that “Western” academic journals (European, US, Canadian and Australian, New Zealand etc.) are more likely to be included in academic databases compared to the academic journals in other regions. Thus, the approach has a limitation that publications in the “Global South” are captured to a somewhat smaller extent. This means that there is some risk that we might miss some of these publications, including those made by EU researchers working in non-Western countries, which in its turn, can potentially prevent the analysis from capturing these researchers and reduce their overall estimated number. This bias, however, is related to the bibliographic approach in general, not the specific algorithm applied in the MORE4. Moreover, currently it is not possible to estimate the extent of this bias in MAG database.
- This approach can only capture changes in location if a researcher publishes. Moves to non-publishing sectors (e.g. to industry) are not captured.
- As noted above, this approach does not allow us to distinguish between the nationality or citizenship of the researchers. Therefore, we cannot measure the number of EU-born researchers working outside Europe in this approach without making the assumption that researchers are from the same region as their first scholarly affiliation, i.e. that everyone who published their first scientific paper while affiliated with a European institution are Europeans. While true for the majority of cases, this adds some noise to the data. In other words, all non-EU students who came to European universities to do their PhD (or before), made their first publications in a European institution and then returned home, would be counted as European researchers who moved away to a third country. At the same time, this definition can be read as “the number of researchers who started their research career in Europe and are currently working outside of Europe”. This provides valuable insights into “the likelihood of moving outside Europe after starting a research career in Europe”, and with this, insights into “the lost human research potential for Europe”. Additionally, Europeans who made their first publications after moving to another country would be excluded from our data.
- Similarly, the approach makes a strong assumption that a European researcher is currently residing in a third country if he/she has been publishing in a third country and has made his/her most recent publication(s) while affiliated to a third-country institution. This assumption, again, while true for the majority of cases, will not take into account cases where a researcher has made his/her most recent publications while affiliated to a third country institution but has recently returned to Europe.
- Finally, due to the entirely different methodology used to estimate numbers of more experienced (R2-R4) researchers, it will be difficult to compare the estimated overall

¹¹⁶ Thelwall, Mike. "Microsoft Academic: A multidisciplinary comparison of citation counts with Scopus and Mendeley for 29 journals." *Journal of Informetrics* 11, no. 4 (2017): 1201-1212.

number of EU researchers in third countries with the previous MORE studies that largely relied on extrapolation of statistical data available through sources such as OECD statistics.

While implementing the analysis, we excluded persons with double affiliations¹¹⁷ and only took into account the consistent data that indicates a researcher has changed his/her institutional affiliation (see the processes and criteria of selection described above).

Overall, the combination of the above methods – publicly available databases, such as the OECD statistics, used for the estimation of R1 researchers, and the above-described bibliometric approach to estimate later stages of researchers – ensures to a certain extent the continuity between MORE3 and MORE4 studies for the R1 stage, and allows introducing the new method for the present task. As explained above, the newly proposed method relies on a new definition of ‘EU researchers working abroad’, i.e. no longer relying on citizenship status or place of birth of researchers analysed but rather on where their (publishing) research career started based on their institutional affiliation. At the same time, as mentioned, this new method allows coverage of broader geographical areas that were not included in the previous analysis.

8.2. Results of estimating the numbers of EU researchers abroad

Following the above-mentioned method, we first collected data on the numbers of doctoral candidates (R1 stage researchers) of European origin enrolled in third country institutions. The main source of evidence for this type of data was the OECD Statistical database¹¹⁸, which includes a category ‘Enrolment of international students by origin’ and allows filtering the numbers of student according to the level of education (including Doctoral or equivalent level (ISCED2011 level 8)).

Table 50: Number of doctoral candidates (R1 stage researchers) of EU origin enrolled in third country institutions over time (in case of China – doctoral candidates of European origin).

COUNTRY/YEAR	2013	2014	2015	2016	2017
US	8572 ¹¹⁹	8572	8603	8772	8799
Canada	2 322	2 457	2 562	2 754	2 919
Japan	451	465	417	461	543
Australia	1 810	1 862	1 946	2 000	1 834
South Korea	72	84	99	99	93
New Zealand	610	613	609	617	627
Chile	1	8	49	33	31
China	1378 ¹²⁰	X	x	x	3 828 ¹²¹

¹¹⁷ E.g. to avoid the case of a researcher with EU and non-EU affiliation whose last publication is a non-EU affiliation (and who would thus be counted as residing outside Europe), while he or she mainly resides in Europe.

¹¹⁸ OECD Statistics, <https://stats.oecd.org/>

¹¹⁹ 2014 is the earliest data available.

¹²⁰ Number for the year 2012.

¹²¹ Number for the year 2018.

COUNTRY/YEAR	2013	2014	2015	2016	2017
Brazil	x	245	280	289	267

Source: OECD Statistics, <https://stats.oecd.org/>. International Graduate Admissions Survey, Council of Graduate Schools, <https://cgsnet.org/international-graduate-admissions-survey>.

As mentioned, for two countries on our list – the US and China - the OECD Statistical database did not provide information on enrolment of international (doctoral) students by origin. To calculate the numbers of doctoral candidates of EU origin enrolled in the US we used the data provided by the Student and Exchange Visitor Information System (SEVIS)¹²², a web-based system that the Department of Homeland Security (DHS) uses to maintain information on students in the United States, including the data on students' country of citizenship. This data provided direct information on the number of doctoral candidates holding EU citizenship¹²³ enrolled in US institutions in 2014-2019.

The estimations on the number of doctoral candidates in China were made based on the extrapolations on statistical data provided by the Chinese Ministry of Education. According to Statistical report on international students in China for 2018¹²⁴:

- In 2018, there were a total of 492,185 international students from 196 countries/areas pursuing their studies in 1,004 higher education institutions in China;
- Among them, 73,618 or 14.96% were from Europe (the statistical report does not provide information on doctoral candidates from the EU specifically);
- Among the total number of international students, 25,618 or 5.2% were enrolled as doctoral candidates.

Although the statistical report does not provide direct figures on doctoral candidates from Europe enrolled in Chinese institutions, assuming that the share of European doctoral candidates in China is similar to the overall share of doctoral candidates among all the international students in China, from the above data we can estimate that **the number of doctoral candidates of European origin enrolled in Chinese institution in 2018 was around 3,828**. It must be noted that this figure includes doctoral candidates from all European countries and not exclusively students of EU origin. In 2012, the total number of European students enrolled in Chinese HEIs was 54,453 or 16.58% of all the international students. Among the overall number of international students in China, 8,303 or 2.53% were doctoral candidates in 2012. **Accordingly, the estimated number of European doctoral candidates in China in 2012 was 1,378**.

Finally, using the above-described bibliometric approach, we also calculated the estimated numbers of EU researchers (R2-R4 career stage) working in third country institutions during the two reference periods: 2009-2013 and 2014-2019. See Table 51 below for detailed figures for the estimated numbers of EU researchers per country, for the two reference periods. Choosing different time frames instead of strict spots in time/specific year was necessary since the main criterion/instrument to estimate the mobility of a researcher is his/her publication record and publishing usually takes some time (e.g. a European researcher could move to a US institution in 2010 but only make his/her first publication(s) there in 2011 or even 2012). Thus, for example, calculating the estimated numbers of EU researchers

¹²² <https://studyinthestates.dhs.gov/sevis-by-the-numbers/sevis-by-the-numbers-data>.

¹²³ The data is based on active immigration related records. The data captures anyone who are pursuing education at U.S. degree-granting institutions with institution-sponsored visas. Those who are not counted might be EU citizens with dual-US citizenship, EU citizens with U.S. permanent residency, and EU citizens who are in the U.S. with a visa that derives from their spouse or parent's visas (e.g., an employment based visa). However, it should be capturing anyone with "student visas".

¹²⁴ Statistical report on international students in China for 2018, http://en.moe.gov.cn/documents/reports/201904/t20190418_378692.html

abroad for the time frame 2009-2013 means that we count any researcher who meets the following criteria as an EU researchers working in a third country during this period:

- made his/her first publications at any point in time while affiliated to an EU based institution;
- and during the period 2009-2013 made his most recent publication(s) while affiliated to a third country institution.

In addition to the numbers of EU researchers working in third country institutions, using the bibliometric approach we also calculated the total numbers of **EU researchers with any extra-EU mobility experience at some point in their career during the two reference periods in question (2007-2013) and (2014-2019)** (see category ‘EU researchers with any out-EU mobility experience at some point in their career’ in the table below). This figure includes the researchers, who, according to their bibliometric record:

- have started their career in the EU (i.e. made their first publication(s) in an EU-based institution) and currently work in a third country institution (i.e. have made their most recent publication(s) while affiliated to a third country institution);
- as well as researchers who started their career in an EU-based institution, were then affiliated to a third country institution (i.e. made at least one publication while affiliated to a third country institution) and finally moved to an EU-based institution again (i.e. made their most recent publication(s) while affiliated to an EU-based institution, not necessarily their first EU institution)¹²⁵.

Table 51: Numbers of EU researchers (R2-R4 career stage) working in third country institutions during the two reference periods: 2009-2013 and 2014-2019.

COUNTRY/YEAR	2009-2013 LOWER BOUND	2009-2013 UPPER BOUND	2014-2019 LOWER BOUND	2014-2019 UPPER BOUND
US	20 715	22 934	30 184	32 771
Canada	2 988	3 295	4 115	4 450
Japan	880	1 000	1 322	1 493
Australia	4 123	4 473	6 881	7 242
South Korea	344	394	551	623
New Zealand	723	764	973	1 012
Chile	205	243	494	563
China	1 662	2 078	4 081	4 988
Brazil	897	998	1 476	1 645
Total in 9 countries	32 537	36 179	50 077	54 787
EU researchers with any out-EU mobility experience at some point in their career	111 768	124 620	174 306	189 929

Source: own calculations based on Microsoft Academic Graph database of publications <http://academic.microsoft.com>.

¹²⁵ Researchers with double affiliations are not counted.

Summing up the above data on the number of R1 researchers/doctoral candidates and the R2-R4 researchers working in third countries during the two reference periods we can calculate the approximate overall numbers of EU researchers in third countries during the two reference periods in question (see Table 52). More specifically, to calculate the total estimated numbers of EU researchers abroad, we summed the numbers of EU doctoral candidates abroad in 2013 with the numbers of R2-R4 researchers during the corresponding reference period (2009-2013). Similarly, for the second reference period we summed the numbers of EU doctoral candidates abroad in 2017¹²⁶ with the numbers of R2-R4 researchers during the corresponding reference period (2014-2019).

Table 52: Estimates on overall numbers of researchers of EU origin working in third countries during the two reference periods: 2009-2013 and 2014-2019.

COUNTRY/YEAR	2009-2013	2009-2013 UPPER	2014-2019	2014-2019
	LOWER BOUND	BOUND	LOWER BOUND	UPPER BOUND
US	29 287	31 506	38 983	41 570
Canada	5 310	5 617	7 034	7 369
Japan	1 331	1 451	1 865	2 036
Australia	5 933	6 283	8 715	9 076
South Korea	416	466	644	716
New Zealand	1 333	1 374	1 600	1 639
Chile	206	244	525	594
China	3 040	3 456	7 909	8 816
Brazil	1 142	1 243	1 743	1 912
Total in 9 countries	47 998	50 189	69 018	73 728
EU researchers with any out-EU mobility experience at some point in their career	111 768	124 620	174 306	189 929

Source: composed by PPMI based on summing up the data on estimates of R1 and R2-R4 researchers.

In general, the analysis of the above estimates on the number of EU researchers abroad, over different time periods and by different career stages, shows the following key trends:

- Overall, in the most recent reference period (2014-2019) there were **a total of 69 018 EU researchers, according to lower bound calculations, or 73 728 researchers, according to the upper bound calculations**, in the 9 non-European countries covered in our analysis (see Figure 105 and Figure 106 below). The total number of EU researchers in the 9 non-European countries in question constitutes around 3.5% - 3.8% of the total number of researcher in EU (according to Eurostat data ¹²⁷, in 2017 there was around 1.97 million researchers in the EU countries);
- Between the two reference periods (2007-2013 and 2014-2019) **the total estimated number of EU researchers has increased in nearly every third country included in our analysis**. According to the lower bound (strict) calculations, between the 2009-2013 and 2014-2019

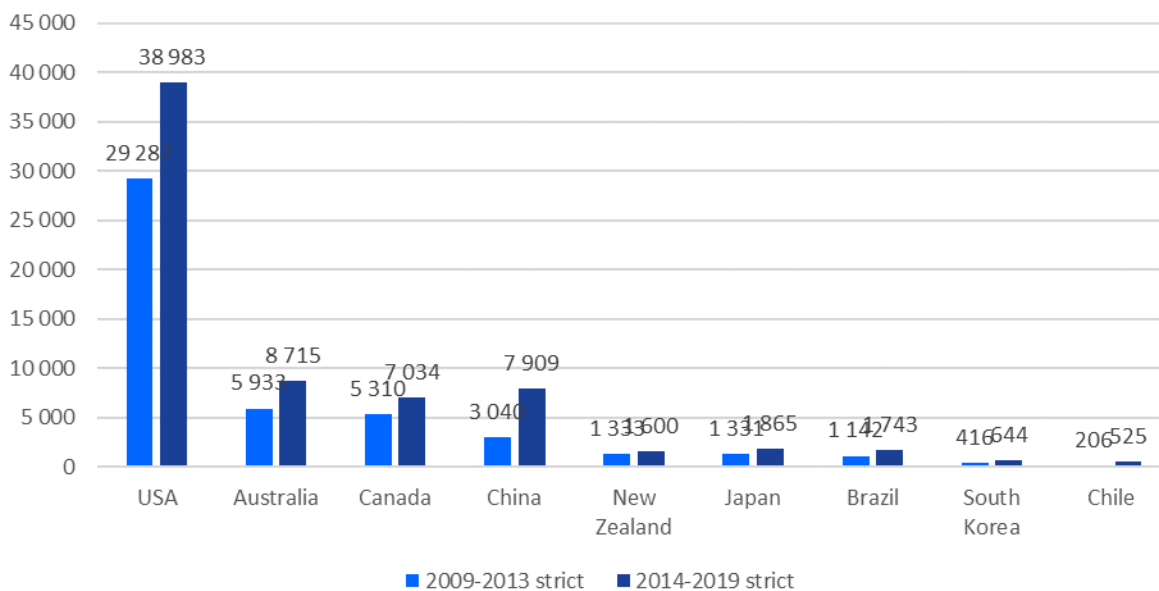
¹²⁶ For China and the US, the numbers of doctoral candidates relevant for the reference period 2014-2019 were available for the year 2018 and 2015 respectively.

¹²⁷ R&D Personnel, Eurostat, https://ec.europa.eu/eurostat/statistics-explained/index.php/R_%26_D_personnel

periods, the overall estimated number of EU researchers working in the 9 countries included in our analysis increased by around 44%, from 47 998 to 69 018 (lower bound);

- **The most significant increase was found in China**, where the number of researchers has almost tripled across the two reference periods, from 3 040 to 7 909;
- **The most frequent destination for EU researchers was the US**, which attracted more EU researchers than the combination of all the remaining third countries included in the analysis. The total estimated number of EU researchers in the US has increased from 29 287 to 38 983 (lower bound) across the two reference periods in question. **Other popular destinations for EU researchers were Australia, China and Canada;**
- Between the two reference periods, **the numbers of early stage (R1) researchers of EU origin have increased slightly or remained stable in most of the third countries included in our analysis**. The exception was China¹²⁸, where the estimated number of EU researchers has almost tripled across the two reference periods;
- In contrast, **senior career stage (R2-R4) researchers of EU origin were mostly responsible for the increase in the total numbers of EU researchers abroad** between the 2009-2013 and 2014-2019 reference periods. For example, the number of this category of EU researchers in the US and Australia has increased by around 46%, and Canada by around 38%. The number of more experienced EU researchers (R2-R4) has increased by more than 50% in Japan and South Korea, and has also more than doubled in China during this period;
- Finally, the number of EU researchers with any extra-EU mobility experience at some point in their career has increased from 111 768 to 189 929 or by around 70% during this period.

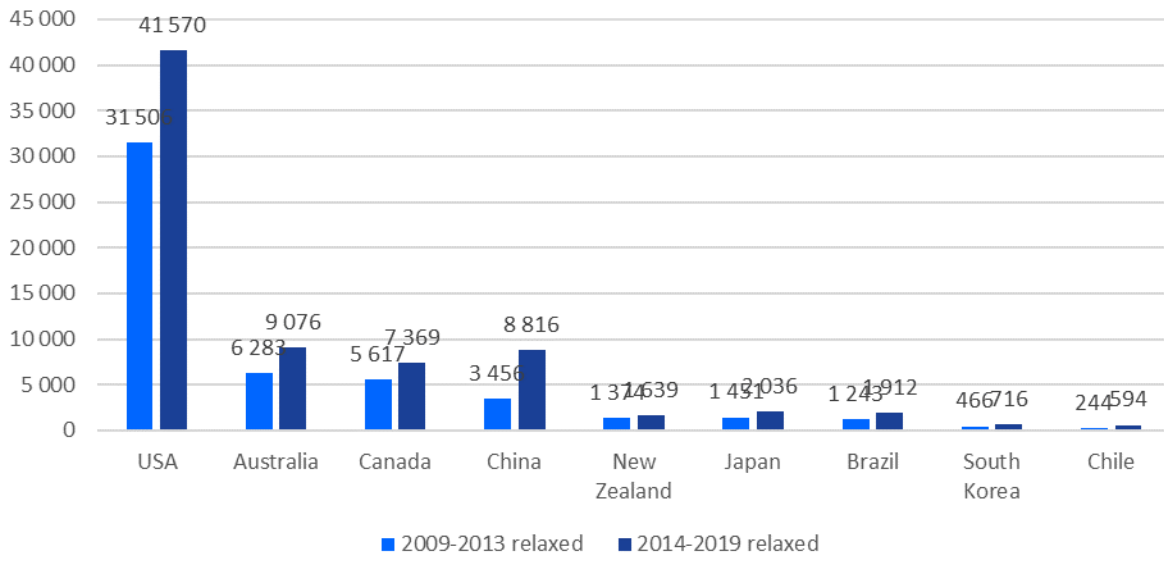
Figure 105: Estimates on overall numbers of researchers of EU origin working in third countries during the two reference periods: 2009-2013 and 2014-2019 (lower bound/strict criteria).



Source: PPMI.

¹²⁸ As mentioned earlier in the analysis, this estimation for R1 researchers in China is based on the assumption that the overall international doctoral candidate growth in China reflects on the European doctoral student share.

Figure 106: Estimates on overall numbers of researchers of EU origin working in third countries during the two reference periods: 2009-2013 and 2014-2019 (upper bound/relaxed criteria).



Source: PPMI.

9. Summary of main findings

This section presents an overview of the main findings of the Global Survey. Please note that this Global Survey does not provide representative data at the global level, nor at the level of the countries covered. Therefore, results need to be interpreted with care. However, the findings show in general a high consistency both with previous research and the MORE3 Global Survey, in spite of the different sample composition in terms of country of employment of researchers compared to that of the MORE3 Global Survey.

9.1. Profile characteristics – sociodemographic information and dual positions

GENDER IMBALANCES, IN PARTICULAR ACROSS CAREER STAGES AND IN TECHNOLOGICAL FIELDS PERSIST

40% (MORE3: 40%) of the sample of researchers working outside the EU are women. Among leading researchers, female representation is clearly smaller (R4: 24%; MORE3: 28%) than at the first career stage (R1: 46%; MORE3: 51%). In technological fields in particular, gender imbalances are prominent, increasing with the stage of the career; only 25% (MORE3: 23%) of researchers in the field of Engineering and Technology are female.

9.2. Education and training: PhD studies

PHD REMAINS THE MAIN POINT OF ENTRY INTO RESEARCH CAREERS: 88% (MORE3: 94%) OF RESEARCHERS HOLD A PHD OR ARE ENROLLED IN PHD STUDIES

A very high share of the sample of researchers has either finished their PhD studies (77%; MORE3: 80%) or is currently enrolled in a PhD programme (12%; MORE3: 14%). The total shares of researchers having obtained a PhD or being currently enrolled in PhD programs range from 84% (MORE3: 90%; non-mobile researchers; TG4) to 96% (MORE3: 99%) in the group of EU researchers working abroad (TG1).

In our sample, about 43% of researchers have obtained or will obtain their PhD in an EU- or OECD-country (MORE3: 75%). 26% have obtained or will obtain their PhD in a BRICS country, and 31% in a different country from Asia, South America, Africa or Europe (e.g. Ukraine, Argentina, Malaysia, Thailand). 29% (MORE3: 55%) obtained or will obtain their PhD from an Anglo-Saxon country, while 19% (MORE3: 27%) graduated or will be graduating from an EU country (including the three associated countries Iceland, Norway and Switzerland). The difference with MORE3 is the result of the different sample composition.

The **shares of PhD holders among researchers in our sample are higher in developed OECD economies than in emerging countries**. By contrast, while joint degrees are rare overall (10%; MORE3: 8%), they are more common in the emerging countries, BRICS (10%) and 'other' countries (13%), as compared with Anglo-Saxon (3%) or non-EU OECD countries (7%).

STRUCTURED PHD-STUDIES ARE PARTICULARLY COMMONPLACE IN THE US

In the US, 77% (MORE3: 82%) of PhD students surveyed were embedded in supervisory committees or doctoral schools, compared with 54% (MORE3: 46%) in the EU and 52% (MORE3: 37%) in the BRICS

countries. In our sample, only 9% of researchers in the US did their PhD following the more traditional model where PhD-students are supervised by a single researcher, against 40% in the BRICS, 38% in the EU, and 25% in the non-EU-OECD.

TRANSFERABLE SKILLS ARE WIDESPREAD, BUT DIFFERENT COUNTRIES EMPHASISE DIFFERENT SKILLS

In our sample, 96% of the respondents (MORE3: 93%) indicated that they have received some form of training in transferable skills during their PhD studies, predominantly related to skills necessary for research activities, such as research skills (91%) or skills related to creative thinking, decision making or communication (69%-72%). More general work management-related skills, such as time and project management, as well as the ability to work in a team, are less common, at around 50%. Skills related to engaging with other areas of society and business, such as collaboration with citizens (32%), entrepreneurship (12%) or intellectual property rights (17%), are the least frequently received by researchers in our sample, in line with the results observed in Europe in the MORE4 EU HE Survey.

By country of graduation, collaboration with citizens and governments is less a feature in PhD studies in the EU (23%) than in either non-EU-OECD countries (29%) or in the BRICS countries (38%). Training on communication and presentation skills is commonplace (85%) in the US PhDs in the sample, while these types of training reach only 63% of respondents in 'other' countries and 59% in the EU. Entrepreneurship is a skill that is taught in a minority of PhD studies across all country groups (11-13%).

Ethics is less taught in the EU and in 'other' countries (around 41%) than in non-EU-OECD countries (55%) and BRICS countries (62%). Proposal and grant writing is more frequently taught in the US (65%) than in the EU (32%), as is teamwork (59 vs. 45%), creative thinking (88 vs. 69%) and time management (59 vs. 53%).

9.3. Career Paths

LESS THAN HALF OF RESEARCHERS AGREE THAT LANGUAGE IS NOT A BARRIER AND THAT SELECTION PROCESSES ARE CLEAR AND TRANSPARENT

Less than 50% of researchers agree that a lack of knowledge of the national language is not a barrier for candidates (49%) and that the whole selection process is clear and transparent (40%). However, more than half of the researchers agreed that the levels of qualifications and competencies required are in line with the needs of the position (76%), that job advertisements include clear and detailed information on the job (69%) and that complaint procedures exist (58%). Furthermore, more than 50% of researchers agree that there are measures to foster the representation of underrepresented groups (57%), that the administrative burden for candidates is kept to a minimum (54%), and that the selection process includes feedback to all candidates about their strengths and weaknesses (53%).

The distribution among target and country groups is rather balanced, with researchers working in Anglo-Saxon countries most likely (84%) to agree that there are measures in place to foster the representation of underrepresented groups. Researchers in non-EU OECD countries and Anglo-Saxon countries (19-21%) are less likely to agree that there are transparent selection procedures and that the lack of mastering the national language is not a barrier (28-33%), compared with researchers working in BRICS and other countries (37-45% for transparent selection, 51-54% for language).

THE SHARE OF RESEARCHERS AGREEING THAT CAREER PROGRESSION IS MERIT-BASED AND TRANSPARENT AND TENURE CONTRACTS ARE BASED ON MERIT ONLY IS THE HIGHEST IN ANGLO-SAXON COUNTRIES (AS COMPARED TO OTHER NON-EU REGIONS)

Researchers' perceptions with regard to the regulation and determinants of career progression show a similar pattern as compared to the MORE4 EU HE Survey, but are lower on average. Career paths are considered transparent by 59% (MORE3: 61%) of researchers, but slightly less perceive them to be merit-based (56%; MORE3: 57%). As with recruitment, there is little variation between target groups regarding the perception of whether career paths are clear and transparent for researchers, but larger differences exist between country groups. In comparison to other country groups, the share of researchers agreeing with the statement that obtaining a tenured contract based on merit only is common practice is particularly high among researchers currently working in Anglo-Saxon countries (69%). For non-EU OECD Countries, 61% agree, while in BRICS countries only 50% of researchers agree.

INTERNATIONAL AND INTERDISCIPLINARY MOBILITY IS PERCEIVED AS BEING IMPORTANT FOR RECRUITMENT AND CAREER PROGRESSION, WHILE INTERSECTORAL MOBILITY IS LESS IMPORTANT

The ranking of factors perceived as being important for recruitment and career progression is similar to the ranking observed in the MORE4 EU HE Survey. While 78% (MORE3: 73%) of researchers perceive international mobility as a positive factor for recruitment and 67% (MORE3: 62%) of researchers agree with respect to interdisciplinary mobility experiences, only 47% (MORE3: 43%) of the sample of researchers perceive intersectoral mobility experiences to the private sector (and 48% to the public sector) to be a positive factor for recruitment. The numbers are very similar for career progression. International mobility is the factor with the highest share of researchers perceiving it as positive for recruitment, in comparison to other factors across all target groups and career stages (between 74% and 82%). While only 39% in TG1 value intersectoral mobility to the private sector (40% to the public sector) as positive for career progression, between 48% and 55% do so within the target groups of non-EU researchers.

The largest difference between target groups can be observed with respect to open access activities: while about 60% of the surveyed non-European researchers think that it is important to publish in open access journals or share data, only 46% of European researchers currently working abroad (TG1) agree. The share is highest within the group of non-European researchers that have never been mobile (64%).

In terms of skills perceived as important for career progression, the results are also similar to the MORE4 HE EU survey. Skills at the core of an academic research career are most valued, such as skills regarding critical and autonomous thinking, decision making and problem solving, and communication and presentation (all above 95%). Entrepreneurship (64%) and dealing with IPR (69%) are on average deemed to be less important for career progression, but there are some differences between target groups. Generally, European researchers currently working abroad (TG1) attach less importance to digital skills, entrepreneurship, collaboration with citizens, government and broader society, ethics and IPR than other target groups.

THE SHARE OF RESEARCHERS THAT LACK CONFIDENCE IN THEIR FUTURE CAREER PROSPECTS IS HIGHEST IN THE GROUP OF EARLY-STAGE RESEARCHERS (R1 AND R2), WHILE LEADING OR ESTABLISHED RESEARCHERS (R4 AND R3) SHOW HIGHER LEVELS OF OPTIMISM

On average, 80% (MORE3: 79%) of the researchers in the sample feel very confident or somewhat confident about the future prospects for their research careers. Only 4% of researchers report that they very much lack confidence. Non-EU researchers who have worked abroad but not in the EU (TG3) show the highest shares of (very) confident researchers (83%) with respect to their future career prospects. The share of confident researchers is lower among EU researchers currently working abroad (74% of TG1).

9.4. Working conditions

90% OF THE SURVEYED RESEARCHERS HAVE A FULL-TIME POSITION AND HAVE BEEN EMPLOYED IN THEIR CURRENT POSITION FOR 12 YEARS ON AVERAGE

The share of female researchers working part-time (12%) is higher than the share of male researchers (8%) across all target groups. Larger differences between target groups can be observed regarding the length of employment, pointing at the heterogeneity of research careers. Differences between target groups are most evident between European researchers currently working abroad (TG1: 10 years) and non-EU researchers who have never worked abroad (TG4: 15 years).

DUAL POSITIONS BETWEEN HEI INSTITUTIONS AND OTHERS ARE RARE

20% of the researchers currently working outside the EU are employed in more than one institution or organisation. Dual positions between higher education institutions and non-HEI are rare (10%).

ONE IN SIX RESEARCHERS FEEL WELL PAID (17%), AND ALMOST HALF OF THE RESEARCHERS THINK THAT THEY ARE PAID A REASONABLE SALARY (40%)

The share of researchers feeling well or reasonably paid is the highest among EU researchers currently working abroad (74% of TG1, compared to 57% in total), and it is considerably lower among the non-mobile non-EU researchers (53% of TG4). Moreover, some variation with respect to country groups are observed: the shares of researchers feeling well paid is particularly high in Anglo-Saxon countries (34%) and in the US (28%). In comparison to male researchers, female researchers are less likely to feel well paid (14% vs. 19%) or paid a reasonable salary (37% vs. 42%), while they are more likely to feel badly paid (12% vs. 9%) or are not paid at all (9% vs. 6%) for their work as researchers.

RESEARCHERS' PERCEPTION OF REMUNERATION CONSIDERABLY DIFFERS BETWEEN CAREER STAGES AND DEPENDS ON THE TYPE OF POSITION

The share of early stage researchers feeling well paid is rather low (7% of R1) in comparison to the group of leading researchers who feel well paid (29% of R4). Overall, researchers in higher career stages tend to be more satisfied with their remuneration – this likely reflects pay schemes based on seniority. Moreover, the shares of researchers feeling well-paid with full-time positions (21%) and with permanent contracts (22%) are higher than the shares of part-time researchers (14%) and researchers with fixed-term contracts (12%) who feel well-paid. In line with this result, researchers who only hold one position are more likely to feel well paid or reasonably paid than researchers with dual positions.

COMPARISON WITH NON-ACADEMIC POSITIONS: 53% OF RESEARCHERS WORKING IN ACADEMIA FEEL THEY ARE PAID WORSE

On average, 53% of researchers currently working inside academia feel less well paid than their counterparts outside academia. In comparison to other target groups, the lowest shares of researchers perceiving their remuneration package as worse compared to researchers outside academia is located in the group of non-EU researchers who have never worked abroad (TG4).

Moreover, researchers are less likely to feel worse paid than their non-academic counterparts later in their career stage: while 49% of R4 researchers feel worse paid, the corresponding proportion of R1 researchers is 61%. Although this is a perception, it may reflect an actual wage gap in early career stages, which reduces in later career stages. The finding could be expected to influence the attractiveness of academic research careers for younger researchers.

Differences between country groups are less apparent, but the share of researchers feeling worse paid than their non-academic counterparts is highest in the US (60%) (as compared to other non-EU regions). This result could be based on a higher number and more lucrative industry research opportunities offered in the US. However, further research would be needed to confirm this.

THE PERSPECTIVE OF RESEARCHERS WORKING OUTSIDE ACADEMIA CONFIRMS THE PATTERN: 38% FEEL THAT THEY ARE PAID WORSE OUTSIDE ACADEMIA

Only 38% of researchers working outside academia perceive their remuneration to be worse than the remuneration of people working inside academia, while 25% feel better paid. Overall, with respect to the perception of being worse paid, only small differences between target groups have been observed. Only EU-researchers (TG1) perceive their remuneration to be worse than that of non-EU researchers (31% vs. 39% for TG2, TG3 and TG4). The shares of researchers thinking that they are better paid than researchers with similar skills inside academia is higher in the group of EU researchers currently working abroad (33%) than in the group of non-EU researchers (21% to 26%). There are no remarkable differences between career stages.

9.5. Mobility and collaboration

9.5.1. International long-term mobility (>3 month)

GERMANY, UNITED KINGDOM AND FRANCE ARE THE MOST FREQUENT EUROPEAN DESTINATIONS (IN LINE WITH THE PREVIOUS GLOBAL SURVEY AND THE MORE4 EU HE SURVEY)

The most frequent destinations for EU researchers (TG1) and non-EU researchers having previous worked in Europe (TG2) have been the United Kingdom, Germany and France.

Among non-EU researchers who have been mobile but not towards the EU (TG3), the United States, Japan, South Korea and Australia are the most frequent destinations.

44% OF THE RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU HAVE UNDERTAKEN AN INTERNATIONAL MOVE WITH A CHANGE OF EMPLOYER AT LEAST ONCE IN THE LAST TEN YEARS (MORE3: 45%)

23% of the moves of more than three months made in the last ten years by researchers currently working outside Europe are related to a change of employer. This figure reaches 49% among EU researchers working outside Europe.

DURATION OF MOBILITY: MOVES WITH A DURATION OF BETWEEN 3 TO 6 MONTHS ARE MOST COMMON. THESE FIGURES ARE STABLE COMPARED TO 2017

More than half of the moves (53%) concern mobility between 3 to 6 months, while 14% have a duration of over 3 years.

The duration of the moves among EU researchers (TG1) is usually longer (28% last for more than three years) than that of non-EU researchers who have been to the EU in the past (TG2) (7%).

DESTINATION SECTOR: AS IN 2017, THE MAIN SECTOR OF EMPLOYMENT IS BY FAR A UNIVERSITY OR HIGHER EDUCATION INSTITUTION

The main sector of employment for the different moves is university or other higher education institutions (81%). This is very similar across the different target groups (> 75%). 12% of the international moves are related to moves towards the public or government sector. These figures are in line with the findings of the 2017 MORE3 survey.

9.5.2. Retention and return potential

ONE IN FOUR EU RESEARCHERS WORKING OUTSIDE EUROPE ARE INTERESTED IN RETURNING TO EUROPE IN THE COMING 12 MONTHS

Comparing UK, German, French and Italian researchers currently working outside the EU, we observe that UK researchers are the least inclined to return to Europe in the coming 12 months (11%) compared to German (28%), French (17%) and Italian researchers (37%). An interest in returning to Europe is highest amongst early stage R1 and R2 researchers.

POSITIVE EXPERIENCE OF MOBILITY TO EUROPE FOR NON-EU RESEARCHERS

87% of the non-EU researchers who have worked in the EU in the past (TG2) would have liked to stay in Europe as a researcher. 95% are also interested in working in Europe in the future. This interest is highest amongst first stage researchers (R1) and lowest amongst leading researchers (R4).

95% of the non-EU researchers who have been to the EU in the past (TG2) would recommend working in Europe as a researcher to other colleagues.

9.5.3. Interest to work in Europe

NON-EU RESEARCHERS HAVE HIGH LEVELS OF INTEREST IN WORKING IN EUROPE

90% of the non-EU researchers with no working experience in the EU (TG3) would be interested in working in Europe in the future. 57% of these interested researchers have also recently investigated the possibility of working as a researcher in Europe.

Interestingly, also among the non-mobile non-EU researchers (TG4), 88% of the researchers that had been mobile more than 10 years ago indicated that they would be interested in working in Europe as a researcher in the future. In addition, 40% of the researchers that indicated they would be interested in doing so have also recently investigated the possibility of working as a researcher in Europe.

The potential of attracting non-EU researchers is evidenced by these high shares. The analysis of motives and barriers for mobility further sheds light on what hinders this potential to be fully deployed.

9.5.4. International short-term mobility (<3 month)

40% OF THE RESEARCHERS WHO CURRENTLY WORK OUTSIDE THE EU HAVE WORKED ABROAD FOR LESS THAN 3 MONTHS AT LEAST ONCE IN THE LAST TEN YEARS.

This indicator has remained stable since 2017. This contrasts with the findings obtained in the MORE4 EU HEI survey, where it was found that short-term mobility seemed to be slowly declining over time.

Women tend to exhibit less short-term mobility (in the last ten years) than men: 38% versus 40% respectively. However, the shares seem to be converging over time.

NON-EU RESEARCHERS HAVING BEEN TO EUROPE IN THE PAST (TG2) ARE THOSE THAT DISPLAY THE HIGHEST LEVEL OF SHORT-TERM MOBILITY IN THE LAST TEN YEARS: 63% (MORE3: 60%).

A trend observed in 2017 is confirmed in 2020: EU researchers working abroad are less likely to move for short-term periods compared to mobile non-EU researchers: 53% of EU researchers (TG1) have done so compared to 63% of non-EU researchers that have previously worked in EU countries (TG2).

There are no large differences across the target groups reflecting mobile researchers (TG1, TG2, and TG3) with respect to the patterns of types of short international travel and the patterns are similar to those seen in 2017.

9.5.5. European network

THE MOST FREQUENT CONNECTIONS MAINTAINED WITH EUROPE ARE 1) HAVING A WIDE INFORMAL NETWORK OF FRIENDS/ACQUAINTANCES/COLLEAGUES AND 2) THE PARTICIPATION IN CONFERENCES. THESE FINDINGS ARE IN LINE WITH THE RESULTS OF THE MORE3 GLOBAL SURVEY.

9.5.6. *Intersectoral mobility*

ABOUT 21% OF THE SAMPLE OF RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU HAS ENGAGED IN INTERSECTORAL MOBILITY

The same level of intersectoral mobility was observed in 2017. No large differences in intersectoral mobility across target groups are observed. Beyond higher education institutions, the sectors that attract most researchers are the public sector and the private, not-for-profit sector. These figures are stable, with no major changes observed between 2017 and 2020.

9.6. Interdisciplinary mobility

ABOUT ONE THIRD OF THE SAMPLE OF RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU HAS ENGAGED IN INTERDISCIPLINARY MOBILITY

INTERDISCIPLINARY MOBILITY IS HIGHER IN ENGINEERING AND TECHNOLOGY THAN IN OTHER DISCIPLINES

Interdisciplinary mobility reaches the highest level in the field of Engineering and Technology (36%). Within this field, EU researchers currently working outside the EU (TG1) exhibit more interdisciplinary mobility than the non-EU researchers (TG2, TG3 and TG4). Conversely, non-EU researchers display higher shares of interdisciplinary mobility than EU researchers abroad in other fields like Natural Sciences and in the Humanities.

9.7. Attractiveness of the ERA

In the Global survey, both EU researchers abroad and non-EU researchers who were mobile to the EU were asked to compare the EU in terms of conditions for research with their current position in a non-EU country. International or intersectoral mobility may be driven by the extent to which researchers consider other countries and sectors attractive. Mobility indicators can therefore also be interpreted as indicators of attractiveness

INDIVIDUAL SATISFACTION WITH RESEARCH JOBS IS HIGH, BUT SATISFACTION WITH THE CONDITIONS FOR DOING THAT RESEARCH IS LOWER

The quality of working conditions is an important determinant of attractiveness. Looking at non-science related working conditions in the current research environment outside Europe (e.g. job and social security), as well as at working conditions relevant to scientific knowledge production (research funding, intellectual support and time balance between research and teaching) illustrates the conundrum of embarking on a career in research – a very high intellectual challenge and satisfaction with job-specific content runs up against uncertain career perspectives or the opportunities for continually engaging in a satisfactory job. Moreover, researchers employed in Anglo-Saxon countries, including the US, are particularly satisfied. On average, across all surveyed factors, the share of satisfied researchers is 10 percentage points higher in Anglo-Saxon countries (7 pp. for the US) than the country groups' average.

SATISFACTION WITH WORKING CONDITIONS IS HIGHER IN MORE DEVELOPED COUNTRIES

More developed countries show above-average shares of satisfied researchers in all categories of satisfaction at work. This is the case for the non-EU OECD and Anglo-Saxon countries, and the US in

particular. In particular, the BRICS and other nations are below-average with regard to satisfaction with quality of life (the share of satisfied researchers is e.g. 13 and 19 percentage points lower compared to the US and the group of Anglo-Saxon countries respectively) and dynamic work environment (-10 and -10pp). Researchers employed in the US are particularly satisfied with their contribution to society (+9 percentage points higher than the average of country groups). Moreover, in the US the share of satisfied researchers regarding research funding (45% of researchers are satisfied), intellectual support (94%), balance between research and teaching (67%) and career and mobility perspectives (74% and 62% respectively) is the highest compared to other non-EU country groups. This is in line with the fact that research universities in the US are at the vanguard according to various composite rankings, including several aspects like research, citations and teaching. It should be noted, however, that the US higher education system is very heterogeneous.

EU RESEARCHERS WORKING IN THE US PERCEIVE THE US TO BE PARTICULARLY ATTRACTIVE

EU researchers currently working abroad (TG1) and non-EU researchers who have worked in the EU in the past (TG2) were asked to compare working inside the EU with working outside, from their experience. The comparison with the US is particularly striking: EU researchers currently working in the US (part of TG1) perceive the US to be better across most categories, including the quality of education and training. Among conditions for scientific knowledge production, there are few researchers who think that working with leading scientists (balance between better and worse is -46%), research funding (-44%) and career paths (-66%) are better in the EU than in the US. The ease of commercialisation of research results (-63%) or collaboration with industry (-38%) is also perceived to be better in the US than in the EU.

With respect to social security, job security and pension plans, EU researchers abroad (TG1) perceive the EU to be better than the US. This does not apply to remuneration in a narrow sense, however, which is negatively valued (-62%), i.e. the US is perceived to pay better salaries than EU countries (although one has to take into account heterogeneity in the EU).

EU RESEARCHERS ABROAD, IN PARTICULAR THOSE WORKING IN OECD COUNTRIES, ARE MORE CRITICAL OF THE EU THAN NON-EU RESEARCHERS WHO HAVE BEEN MOBILE TO THE EU IN THE PAST

Overall, EU researchers working in economically developed non-EU OECD countries rate the EU as worse than their current country of employment with respect to most categories (career perspectives; conditions for scientific knowledge production; engagement with industry; perspectives for mobility; availability of positions and remuneration), with the exception of education and training; administrative burden; social and job security, as well as pension plans.

With respect to EU researchers working in emerging countries (the BRICS and other countries), the assessment of the EU is generally better with regard to the categories remuneration and other material factors, quality of education and training and engagement with industry. In this group, the EU is assessed as worse with regard to the attractiveness of career paths (BRICS only) and the availability of positions (BRICS and other countries). A higher share of researchers from both country groups (non-EU OECD and BRICS) sees working with leading scientists in the EU as better than in the countries where they work now.

A DIFFERENT PICTURE IS PROVIDED BY NON-EU RESEARCHERS WHO HAVE WORKED IN THE EU IN THE PAST: THE EU IS PERCEIVED AS BETTER THAN THE NON-EU COUNTRIES OF THE OECD

Non-EU researchers who worked in the EU in the past provide a very different picture: for them the EU is perceived to be better than the non-EU countries of the OECD, with the exception of the availability of positions. The share of researchers who see the EU as better is particularly high for the categories: working with leading scientists, research funding and mobility perspectives. This result might partly be driven by a lower number of researchers working in the US. Non-EU researchers currently working in BRICS countries and in other emerging countries who have been to the EU in the past, perceive the EU to be better across all categories. They have a more positive opinion of the EU than researchers now working in non-EU OECD countries, which is plausible as higher education institutions in economically advanced countries are likely to offer more attractive conditions for research.

ATTRACTIVENESS: QUALITY OF LIFE AND SOCIAL SECURITY NEEDS TO BE STRENGTHENED WITH POSITIVE CONDITIONS FOR SCIENTIFIC KNOWLEDGE PRODUCTION IN THE EU

Even though the picture is more nuanced when looking at the entire group of non-EU countries in the sample, it is apparent that in the comparison with the US in particular, key career-related job characteristics are perceived to be better in the US than in the EU. The EU is seen to be better concerning quality of life, social and job security, as well as pension plans. International evidence and the MORE surveys show that career-related aspects are decisive factors for researchers to move away from their home country (e.g. research autonomy, working with leading scientists and attractive career paths), while they move back rather for personal or family reasons. This general finding means that the current advantages of the EU in terms of quality of life and job characteristics related to social and job security work less as drivers of attractiveness, than the conditions which influence the scientific productivity of researchers. Put differently: all else equal, quality of life and social security will play a role, but the conditions for scientific knowledge production need to be attractive first. The survey results therefore show a clear opportunity for the EU to strengthen the framework with positive conditions for scientific knowledge production, to possibly even attract researchers to the EU who do not even have personal or family reasons to return or to come to the EU.

AMONG THE EU RESEARCHERS CURRENTLY WORKING OUTSIDE EUROPE, 32% FELT FORCED TO MOVE (ESCAPE MOBILITY) OUTSIDE EUROPE COMPARED TO 37% IN 2017

To better understand the findings in terms of attractiveness of different global areas, it is interesting to look at the degree of forced, versus chosen/free mobility in the sample. 32% of the EU researchers abroad (TG1) described their mobility experiences as a form of “escape mobility” when moving outside Europe (where the largest majority felt forced to move because there were no options for a research career in their home country). 27% of the mobility concerned expected mobility (necessary for career purposes) and 17% chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange (exchange mobility).

AMONG THE NON-EU RESEARCHERS WHO HAVE WORKED IN THE EU IN THE PAST (TG2), 53% ENGAGED IN EXCHANGE MOBILITY (WHEN MOVING TO EUROPE)

53% of the non-EU researchers moved to Europe (TG2) to engage in exchange mobility, i.e. for the opportunities international mobility offers in terms of networking and knowledge exchange. About 17% felt forced to move to the EU (escape mobility) and 25% engaged in expected mobility.

The escape mobility amongst researchers from the Anglo-Saxon countries towards Europe is lower (6%) compared to the escape mobility amongst researchers from BRICS, non-EU OECD countries and 'other' countries (ranging between 14% and 16%). The expected mobility with respect to improving working conditions is highest amongst researchers from 'other' countries and from BRICS (respectively 12% and 10%) while the exchange mobility for networking and knowledge exchange is highest amongst Anglo-Saxon researchers (66%). This pattern again reflects the tendency to move to more developed countries for reasons of scientific knowledge production and for improving the researcher's overall situation, further confirmed by the analysis of specific motives per move (cf. next paragraph).

INTERNATIONAL NETWORKING AND CAREER PROGRESSION ARE THE MOST FREQUENT MOTIVES FOR MOBILITY BOTH TOWARDS THE EU AND OUTSIDE EUROPE

The most frequently indicated motives for EU researchers to move outside Europe are the availability of a suitable position (85%) and career progression (80%). The main motives for non-EU researchers to move to Europe are international networking (96%) and working with leading scientists (95%).

Social and job security and other benefits are indicated least frequently as factors in a researcher's decision to move outside Europe (among TG1 researchers) and to Europe (among TG2 researchers). Pension plans is not perceived as very important in the decision of EU researchers to move outside Europe (29%) or of non-EU researchers for their move towards Europe (41%).

CAREER PROGRESSION AND WORKING WITH LEADING SCIENTISTS ARE MORE IMPORTANT FOR MOVES THAT ENTAIL A CHANGE OF EMPLOYER

DIFFICULTIES TO FIND A JOB POSITION, TO OBTAIN FUNDING FOR MOBILITY AND FUNDING FOR RESEARCH ARE HINDERING RETURN MOBILITY

The return of EU researchers to Europe seems to be hindered above all by the difficulties in finding a job position (84%), to obtain funding for research (77%) and to obtain funding for mobility (72%). Non-EU researchers were hindered in their move towards Europe by logistical problems, obtaining funding for mobility and research, and obtaining a visa or work permit.

EFFECTS OF INTERNATIONAL MOBILITY MOSTLY RELATE TO NETWORK, CAREER AND COLLABORATION

The effects of stays abroad include scientific output (quality and quantity of publications), co-authored publications, more input-related items, such as the ability to obtain research funding, gaining advanced research skills, interdisciplinary collaboration, network effects in terms of increased contacts and recognition in the international research community, job options in and outside academia, overall career progression, progression with respect to salary, quality of life and understanding and applying open science approaches.

Overall, for EU researchers working outside the EU (TG1) and other mobile researchers (TG2 and TG3), the majority have experienced positive effects in all these categories, with the most negative effect being job options outside academia. The biggest effects among EU researchers are seen in terms of gaining an international network (72%), overall career progression (65%) and recognition in the research community (62%). The expectations, i.e. motives, with which researchers engage in mobility are thus confirmed in the effects. The effects of the mobility on scientific output or on job options were less marked, but still positive.

EFFECTS OF INTERNATIONAL MOBILITY CONFIRM ATTRACTIVENESS OF THE US (AS COMPARED TO OTHER NON-EU REGIONS)

Across all different possible effects, with the exception of quality of life, EU researchers who currently work in the US report stronger effects than their counterparts working in other non-EU countries. Differences with the effects from staying in other countries are highest for obtaining competitive research funding, job options in- and outside academia, career progression and recognition in the research community. The picture is inverse for quality of life, where the effects are perceived as unchanged by researchers currently working in the US but more positive in other countries where EU researchers work.

9.8. Conclusions and implications for policy

After summarising the results of the analysis in the previous sections, we now conclude this chapter with a discussion of the main insights emerging from the MORE4 Global Survey as a basis for investigating more detailed policy options with respect to the five ERA priorities in a separate table below.

9.8.1. *Global characteristics of research*

First, there is something like a global mindset on which skills and training (a PhD) matter for a research career, and these factors matter for recruitment and career progression. Intersectoral mobility between public research or higher education institutions on the one side and firms on the other are low and not regarded as being very important for recruitment or career progression, while international and interdisciplinary mobility are seen as more influential experiences with higher expected effects on a researcher's scientific knowledge production and career. The findings of the MORE4 Global Survey on what matters in research are consistent both with the MORE4 EU HE Survey and the previous MORE3 studies, as well as existing literature.¹²⁹

By contrast, perceptions on how countries organise and structure research systems, i.e. the conditions they provide for researchers to reach their maximum creative research potential, are much more divergent. As an example, the structure of PhD training varies considerably, with the more traditional master-apprentice model still widespread in some countries. This model also applies in the EU, whereas doctoral schools or more team-based PhD-programmes dominate in the US. More structured PhD training also allows for imparting a wider set of transferable skills, a finding for which the MORE4 Global Survey gave indications. Satisfaction with merit-based recruitment and clear career progression based on merit are also divergent, with levels of satisfaction highest among researchers working in Anglo-Saxon countries, including the US.¹³⁰

The discrepancy between this 'global awareness' of what matters for successful research careers and the national differences in research systems give rise to varying perceptions of attractiveness between countries, as well as varying patterns of international mobility.

¹²⁹ Friesenhahn, I., Beaudry, C. The Global State of Young Scientists. Berlin: Akademie Verlag, 2014; Janger, J., Nowotny, K., Job choice in academia, *Research Policy* 45(8), 2016, p. 1672-1683.

¹³⁰ The organisation of the research systems could be further documented by information on the use of contracts and the number of temporary versus permanent positions. Though there, the MORE4 global survey can give only partial indications, as these factors in a post-PhD career further depend on age and seniority. These factors are diverse and not representative in the different subsets in the sample, and as with the excellence of the individual researcher, there is no objective indicator in the survey.

Below, we first present the attractiveness of ERA. Overall, even though our sample is not representative at the country level, the findings of the MORE4 Global Survey are in line with and confirm not only the results from the MORE4 EU HE Survey, and MORE3, but also from other studies. The pattern of responses between various subgroups of our respondents, as, for example, related to career stages, gender, country groups by economic development, is also plausible and intuitive. This lends support to the usability of the findings of this survey for policy-making, while, due to the limitations of the data, conclusions should be drawn with caution.

9.8.2. Attractiveness of ERA as seen by researchers currently working abroad

The MORE4 EU HE Survey has provided information on the perception of the attractiveness of the EU by EU and non-EU researchers working in the EU at the time of the survey. The MORE4 Global Survey complements this picture with the views of EU and non-EU researchers currently working outside Europe.

EU researchers currently working in economically developed OECD countries generally perceive working outside the EU as better than working inside the EU, with the exception of categories such as education and training, administrative burden, social security and pension plans.

However, non-EU researchers who were mobile to the EU from OECD countries in the past are more positive about the EU and find it better in most categories than their current country of employment. The same picture holds for BRICS and other countries, in that EU researchers working abroad are more critical of the EU than non-EU researchers who have been mobile to the EU. Overall, there is thus a mixed picture, with some researcher groups appreciating the EU in terms of research, while others are more reserved.

The MORE4 Global Survey confirms the results from the MORE3 Global Survey about the perception in terms of the attractiveness of the US as a location for academic research. The quality of the US system has been outlined above, with respect to PhD studies, recruitment and career progression. In addition, by direct comparison of research systems, it becomes evident that few researchers think that working in the EU is better than in the US. This holds for conditions for research (scientific knowledge production), such as working with leading scientists, career perspectives, research funding and research autonomy. It also holds for the quality of education and training and salaries, but not for factors such as social and job security and quality of life. The main reasons to move are also driven by research-related factors, such as collaboration with leading scientists, funding, etc., which are perceived to be very good in the US. Effects of mobility underscore this analysis, with researchers working in the US reporting significantly higher effects of mobility experiences with respect to scientific output and recognition in the research community.

9.8.3. Improving the attractiveness of ERA

By comparison with leading research systems, in particular the US, the EU definitely has the potential to improve its attractiveness. The results of the MORE4 Global Survey are similar to the MORE3 Global Survey and suggest a need for two mutually supportive policy directions; enablers refer to policies which tackle the main barriers to mobility to the EU, and drivers are the factors that are decisive in mobility decisions.

Enablers

The two most important barriers to mobility are the availability of a suitable position and availability of research funding. Euraxess and EU research funding play a potentially very important

role here, alongside instruments at the national level, as they directly address the availability of positions and research funding. The results on awareness and usage of these instruments among researchers in our sample show that, among researchers who single out the availability of positions or funding as main barriers to mobility, the awareness is higher, in particular as regards the Euraxess platform (i.e. researchers looking for a position turn towards Euraxess). On a positive note, at least among the respondents to the Global Survey, awareness of Euraxess was much higher than in 2017, by about 20 percentage points (although this increase can partially be due to the role of Euraxess Links in the distribution of the survey among researchers). However, in terms of both awareness, e.g. for non-EU researchers who were not mobile to the EU, and actual usage, there is room for improvement. The results of the MORE4 Global Survey (as in MORE3 and other studies) also show that policies aiming at return mobility for senior researchers may be limited in their effectiveness, as interest in return mobility is highest among early stage researchers.

Drivers

Funding and the availability of positions are, however, not the main motives driving self-chosen mobility to attractive research systems. The factors which drive this are much more related to the available career perspectives, in terms of a clear-cut tenure-track model where a permanent position depends only on performance, on working with leading scientists and other factors influencing scientific productivity (e.g. early independence in research – research autonomy).¹³¹

Therefore, improving the attractiveness of ERA also needs – in addition to enablers – an improvement of the conditions for scientific knowledge production in Europe; an improvement of the drivers of scientific productivity in terms of, for example, attractive career paths; innovative funding models which allocate funding to the most promising research (so more than just availability of funding); procedures for selection of young talented scientists; and high quality structured PhD training etc. These elements can generally be more effectively dealt with at the national level through reforms in higher education institutions, universities and research institutions; improving the effectiveness of national research systems is indeed the first ERA priority. However, the EU also has an important role to play, such as through facilitating the diffusion of best practice and monitoring of progress in implementing ERA, and through funding high quality training, as via the MSCA doctoral training subsidies. Note that funding schemes, such as the ERC, also indirectly affect public research systems, as universities and higher education policies try to improve in order to obtain more funding for excellent research.

As a basis for more detailed policy implications, we link the findings to the ERA and 3Os (Open Innovation, Open Science, Open to the World) in a summary table. The policy implications will be discussed in more detail in the final report, also taking into account the results of T1 MORE4 EU HE report.

¹³¹ Note that forced mobility involving a change of employer is associated with the availability of positions as a main motive. However, the EU or ERA certainly wants to be attractive even for researchers from well-working systems who are not forced to move because of the dire situation in their home country.

ERA PRIORITY AREAS	RELATED TO CONCEPTS	RELATED FINDINGS IN MORE4
<p>1. More effective national research systems</p>		<p>⇒ EU researchers working abroad perceive working outside the EU to be better than inside the EU. This holds particularly for the group of EU researchers working in non-EU OECD countries. Compared to other (non-EU) countries, the US stands out: career and mobility perspectives as well as conditions for research, such as funding, working with leading scientists and the time balance between teaching and research are perceived to be better. Non-EU researchers who have worked in the EU in the past are much more positive with respect to their experience in the EU. However, there is clear potential for further improving the effectiveness of national research systems, e.g. with respect to career perspectives and paths, recruitment and career progression practices, funding, autonomy and other factors influencing the scientific productivity of researchers. While remuneration does play a role, researchers do not see it as a main motive to move.</p>
<p>2. Optimal transnational cooperation and competition</p>	<p>International cooperation and competition</p>	<p>⇒ International mobility is an important vehicle for international collaboration which in turn boosts scientific productivity. Fostering exchange mobility (self-chosen mobility) or helping to overcome barriers to mobility is likely to contribute to collaboration and scientific productivity.</p> <p>⇒ The main expected hindering factors effecting mobility to the EU by non-EU researchers who have never been to the EU are research (obtaining funding for research, finding a suitable position) as well as non-research related (transferring pensions and social security).</p> <p>⇒ The most important difficulties hindering the return mobility of EU researchers currently working outside the EU are related to obtaining funding for mobility and funding for research.</p> <p>⇒ Non-EU researchers indicated that they are very interested in EU research funding, such as ERC- or H2020-related schemes. Participation in these programmes can help international cooperation and may help address global challenges.</p> <p>⇒ While a majority of researchers in the sample has obtained funding from national sources in a competitive way (by way of proposal) and a significant share has also received industry funding, the various EU funding instruments are much less used. This is not surprising, as by definition all of the researchers work outside the EU. The most important hindering factors to participate are a lack of knowledge of programmes and procedures. The lack of knowledge of programs and procedures is also more frequently indicated as a hindering factor by non-mobile researchers and by mobile researchers without EU-experience.</p>

ERA PRIORITY AREAS	RELATED TO CONCEPTS	RELATED FINDINGS IN MORE4
<p>3. An open labour market for researchers (facilitating mobility, supporting training and ensuring attractive careers)</p>	<p>⇒ Facilitating mobility, open labour market for non-native researchers</p>	<p>⇒ See the evidence on barriers to mobility above.</p> <p>⇒ Euraxess Links is known by about 42% of our sample of researchers currently working outside the EU (much higher than for MORE3). Euraxess Links is least known by researchers currently working in non-EU OECD countries and Anglo-Saxon countries and best known in BRICS and other countries.</p> <p>⇒ Less than 50% of researchers agree that a lack of knowledge of the national language is not a barrier for candidates in the recruitment process.</p>
	<p>⇒ Open labour market based on merit, recognition of all relevant skills</p>	<p>⇒ Less than 50% of researchers agree that the whole selection process is clear and transparent (40%). However, more than half of researchers agreed that the levels of qualifications and competencies required are in line with the needs of the position (76%), that job advertisements include clear and detailed information on the job (69%) and that procedures exist to be able to complain (58%). Furthermore, more than 50% of researchers agree that there are measures to foster the representation of underrepresented groups (57%), that the administrative burden for candidates is kept to a minimum (54%), and that the selection process includes feedback to all candidates about their strengths and weaknesses (53%).</p> <p>⇒ Researchers working in Anglo-Saxon countries are most likely (84%) to agree that there are measures in place to foster the representation of underrepresented groups; researchers in non-EU OECD countries and Anglo-Saxon countries (19-21%) are less likely to agree that there are transparent selection procedures and that the lack of mastering the national language is not a barrier (28-33%) than researchers working in BRICS and other countries (37-45% for transparent selection, 51-54% for language).</p> <p>⇒ The majority of researchers believe in non-standard activities and paths as positive factors for recruitment and career progression. The main one is international mobility, followed by alternative forms of research output and transferable skills. Some differences between (non-EU) country groups are observed, with researchers in the US being more sceptical about the recognition of international mobility experiences compared to all other country groups in the analysis.</p> <p>⇒ Regarding their future career, the vast majority of researchers working abroad agree that different types of transferable skills are important for a successful future career; in particular those of</p>

ERA PRIORITY AREAS	RELATED TO CONCEPTS	RELATED FINDINGS IN MORE4
		critical and autonomous thinking; decision-making and problem solving; communication and presentation; project management and networking.
	⇒ Training of research skills, as well as other skills to create openness towards careers outside academia	<p>⇒ The supervision of doctoral training varies between countries, with 62% of respondents embedded in a doctoral school in the US, compared to below 26% for the EU or other non-EU OECD countries.</p> <p>⇒ Training for young scientists in transferable skills broadens their labour market options. On average in the MORE4 Global survey, 96% of PhD candidates receive training in transferable skills. US graduates more often report having received training in transferable skills in various areas as compared with EU PhD graduates. Research skills are the most commonly trained skills. Communication and presentation skills, decision making and problem solving, and critical and autonomous thinking are also well covered in PhD programs. The least often offered training is entrepreneurship, collaboration with citizens, government and broader society.</p>
	⇒ Attractiveness of research careers	<p>⇒ Among EU researchers working abroad, working outside the EU is generally perceived to be better in terms of research autonomy, availability of suitable positions and attractive career paths. Working outside the EU is perceived to be worse in terms of training, social security and pensions. Specifically for EU researchers in the US, however, many researchers assess working conditions in the US to be better than in the EU.</p> <p>⇒ Among non-EU researchers who have been mobile to the EU, working in the EU is in general perceived to be better in terms of working with leading scientists, the availability of research equipment and facilities, research funding and training. In addition, social working conditions are also perceived as better.</p> <p>⇒ International evidence and the MORE surveys show that working with leading scientists is a key driver for researcher mobility and, thus, plays a major role in the battle for attracting the best talent. Only a small share of EU researchers currently working abroad think that working with leading scientists is better in the EU in comparison to working abroad, especially the US. On the other hand, non-EU researchers who have been to the EU in the past indicate that working with leading scientists is better in the EU than abroad. This may be driven by a small share of US-based researchers in this group.</p>
	Mainstreaming	⇒ 40% of researchers in the sample are women.

ERA PRIORITY AREAS	RELATED TO CONCEPTS	RELATED FINDINGS IN MORE4
<p>4. Gender equality and gender mainstreaming in research</p>		<p>⇒ Female researchers are more represented in the non-mobile group of researchers but are highest within the group of non-EU researchers who have been working in the EU in the past. The share of female researchers is the lowest in the group of EU researchers currently working outside Europe.</p> <p>⇒ There is a more balanced representation of female researchers in the early career stages (R1: 46%), but women are clearly underrepresented in the R4 career stage (R4: 24%). Male and female researchers are not equally distributed across fields of science. The most balanced disciplines are the Medical Sciences, the Humanities and Social Sciences, in which about 50% of the researchers are women. Conversely, in Engineering and Technology (24%) and the Natural Sciences (34%), the presence of women is clearly lower.</p>
	Equality	<p>⇒ Women researchers have participated less in international mobility and collaboration over the last ten years.</p> <p>⇒ The shares for interdisciplinary and intersectoral mobility, however, are rather equal between men and women.</p>
<p>5. Optimal circulation and transfer of scientific knowledge</p>	Open innovation	<p>⇒ Of all types of collaboration and mobility, intersectoral activities are the least common among the academic researchers in the MORE4 Global survey. This result could be partly driven by legal restrictions (e.g. depending on citizenship requirements). Intersectoral mobility is also not valued highly in recruitment or career progression (as compared to international and interdisciplinary mobility, which are more frequently regarded a positive factor). This is similar to the results of the MORE3 surveys and MORE4 EU Survey.</p> <p>⇒ The main focus of doctoral training is on research skills and critical and autonomous thinking. There is very limited cooperation with other sectors. Training for collaboration with non-researchers (citizens, government and broader society) is among the least often received training, often not even available as a training module.</p>
	<p>Open science:</p> <ul style="list-style-type: none"> - Digital innovations - New ways of disseminating research results 	<p>⇒ The majority of researchers believe in non-standard activities and paths as positive factors for their career progression. The main one is international mobility (75%), followed by interdisciplinarity (70%) and transferable skills (70%).</p>

ERA PRIORITY AREAS	RELATED TO CONCEPTS	RELATED FINDINGS IN MORE4
	<ul style="list-style-type: none"> - New ways of collaborating (globally) 	<p>⇒ 75% consider public awareness activities, collaboration with citizens, government, and broader society as important. 67% agree that open science activities are important for their career progression.</p>
	Open to the world	<p>⇒ EU and non-EU researchers who have worked in Europe in the past remain 'connected' with the EU by having informal networks of contacts, participating in conferences in the EU, being active in linkage mechanisms, and collaborating with scientific journals.</p>
	Knowledge circulation	<p>⇒ The above summarised factors of international, intersectoral, interdisciplinary mobility and collaboration show that there is significant interaction with other researchers and disciplines and to a lesser extent with other sectors. There are thus indications of strong knowledge circulation and efficiency in (academic) research, with important spillovers to other areas of society, or non-academic sectors of research.</p> <p>⇒ In addition, some heterogeneity between research stages with a higher share of early-stage researchers thinking non-standard activities and paths as positive for their career might hint at increasing knowledge circulation in the future.</p>
6. International cooperation	Cross-cutting priority	<p>⇒ Cf. priorities 2, 3 and 5.</p>

Annexes

Annex 1. Questionnaire

Cf. separate document.

Annex 2. Definitions

Research careers

According to the definitions given in the European Commission's communication, the different stages are sector-neutral (applicable to companies, NGO's, research institutes, research universities or universities of applied sciences) and are characterised as follows¹³²:

A **first stage researcher (R1)** will:

- "Carry out research under supervision;
- Have the ambition to develop knowledge of research methodologies and discipline;
- Have demonstrated a good understanding of a field of study;
- Have demonstrated the ability to produce data under supervision;
- Be capable of critical analysis, evaluation and synthesis of new and complex ideas and
- Be able to explain the outcome of research and value thereof to research colleagues."

Recognised researchers (R2) are doctorate holders or researchers with an equivalent level of experience and competence who have not yet established a significant level of independence. In addition to the characteristics assigned to the profile of a first stage researcher a recognised researcher:

- "Has demonstrated a systematic understanding of a field of study and mastery of research associated with that field
- Has demonstrated the ability to conceive, design, implement and adapt a substantial program of research with integrity
- Has made a contribution through original research that extends the frontier of knowledge by developing a substantial body of work, innovation or application. This could merit national or international refereed publication or patent.
- Demonstrates critical analysis, evaluation and synthesis of new and complex ideas.
- Can communicate with his peers - be able to explain the outcome of his research and value thereof to the research community.
- Takes ownership for and manages own career progression, sets realistic and achievable career goals, identifies and develops ways to improve employability.
- Co-authors papers at workshop and conferences."

An **established Researcher (R3)** has developed a level of independence and, in addition to the characteristics assigned to the profile of a recognised researcher:

- "Has an established reputation based on research excellence in his field.
- Makes a positive contribution to the development of knowledge, research and development through co-operations and collaborations.
- Identifies research problems and opportunities within his area of expertise Identifies appropriate research methodologies and approaches.
- Conducts research independently which advances a research agenda.

¹³² IDEA Consult et al. (2013) Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. FINAL REPORT (deliverable 8)

- Can take the lead in executing collaborative research projects in cooperation with colleagues and project partners.
- Publishes papers as lead author, organises workshops or conference sessions.”

A **leading researcher (R4)** leads research in his area or field. He/she leads a team or a research group or is head of an industry R&D laboratory. “In particular disciplines as an exception, leading researchers may include individuals who operate as lone researchers.” (European Commission 2011, p. 11). A leading researcher, in addition to the characteristics assigned to the profile of an established researcher:

- “Has an international reputation based on research excellence in their field.
- Demonstrates critical judgment in the identification and execution of research activities.
- Makes a substantial contribution (breakthroughs) to their research field or spanning multiple areas.
- Develops a strategic vision on the future of the research field.
- Recognises the broader implications and applications of their research.
- Publishes and presents influential papers and books, serves on workshop and conference organizing committees and delivers invited talks”.
- As this classification is not known from formal data sources on researchers, we introduce the classification by means of self-selection of the researchers in the surveys.

Annex 3. Additional info on sampling and survey implementation

Sampling

The development of the MORE4 Global Survey questionnaire was carried out at the same time as the identification of potential respondents. To this end, the research team worked in close collaboration with the University of Wolverhampton, who specialises in complex web-based data collection and analysis processes.

The entire sampling approach followed in MORE4 Global Survey is a ‘convenience’ sampling. It is based on a web-based method to collect large samples of researchers’ emails. This method has been previously used under MORE1, MORE2 and MORE3 to generate tens of thousands of academics’ email addresses for online surveying, and so it is known to work and to give good results.

- The first step of the method is to collect a large sample of URLs of academics’ home pages. This is achieved through Bing advanced site-specific searches of a list of thousands of European university web sites for keywords like “home page”, “homepage”, “CV” or “Curriculum Vitae”. The searches are conducted twice, once for normal HTML pages and once for PDF files, since many academics post CVs online in PDF format. These searches can be targeted at academics with particular profiles by adding appropriate keywords. For example, to target academics that have moved from the US, the searches would be run with names of prominent US universities as additional keywords. This method is imperfect as it can match conferences listed in CVs instead of previous employment histories but in a previous studies it had a reasonable success rate.
- The second step is to automatically download all the home pages and CVs identified from the searches and to automatically extract email addresses from them. The limitation of this step is that some academics omit or obscure their email address, but the method still gives reasonable results. The main limitation of this method is that it might under-represent universities that have a standard home page format for all their academics that does not include email addresses or that obscures their email address. In countries for which this method is proven insufficient (e.g. very large countries), efforts were made to extract additional email addresses from publications included in the Web of Science.

As mentioned previously, the survey particularly targets four groups of researchers:

- (1) EU researchers currently working outside the EU;
- (2) Non-EU researchers who have worked in the EU in the past;
- (3) Non-EU researchers who have worked abroad, but not in the EU; and
- (4) Non-EU researchers who have not worked abroad

A blanket approach was used to obtain this sample by surveying as many researchers as possible. Although it would be possible to scan CVs for mentions of relevant countries, researchers do not necessarily state their previous occupations on their home page so the research teams has applied an inclusive approach surveying all email addresses that could be found.

On top of this contact generation approach, the survey was announced to the researchers through various means. An open weblink to the survey has been distributed through different channels:

- MORE4 project website: The link to the online Global Survey has been placed visibly on the main page of the MORE4 website so all website visitors can easily access the survey. In addition, should researchers have questions on the survey or inquire more information on the project they can contact the project team via the designated email address: surveyGLOBAL@more-4.eu.
- Euraxess. Euraxess Links is a networking tool for the community of European Researchers abroad that also focuses on disseminating information and fostering collaboration with researchers in Europe and helping expatriate researchers to return to Europe. The websites of each Euraxess community have published a banner with information on the MORE4 Global Survey and the link to the survey.
- Consortium partners' websites. Information and links to the MORE4 Global Survey have been included in the websites of the project partners (PPMI, IDEA Consult and WIFO).
- Social media. A proactive social media communication has been developed by the project team in order to reach individual researchers. The project partners involved in MORE4 (PPMI, IDEA Consult and WIFO) have shared the survey on their public company LinkedIn pages (2000+ followers). Moreover, team members have further distributed the survey link in their networks in order to create a snowballing effect. Euraxess Links have also published posts with the information on the survey and the link in their LinkedIn accounts.
- Intermediaries. The consortium has contacted local intermediaries via email and invited them to include the open weblink to the online Global Survey on their websites, their newsletter or distribute it via other communication tools (e.g. social media). These contacts included an example of text to be used for the communication in newsletters or social media. The communication also contained a support letter from the European Commission to increase credibility and interest to collaborate in the project.
- EU Science counsellors. The European Commission forwarded the request to the relevant units to maximise the spread of the information about the Global Survey among the EU Science counsellors.

Survey implementation

After the data collection process described above, invalid email addresses were automatically removed from the list of email addresses collected through the web search tool. The valid email addresses were uploaded to the online survey tool. In terms of follow-up, some precautions were taken to maximize the output:

- The online tool offers the possibility of generating automatic reminder emails for those respondents who have not yet participated in the survey. The research team monitored the level of responses and decided on the optimal timing for sending out reminder emails.
- The invitation and reminder emails included an email address where they were able to address any questions or comments in relation to the questionnaire or the survey. A member of the research team was responsible for responding to these emails and providing clarifications or assistance when needed on a daily basis.
- The evolution of responses was monitored daily in order to take corrective measures if and when needed.

Finally, a “snowballing” effect was also encouraged as an additional source to increase the survey sample. All respondents of the survey had the opportunity to forward the survey link to people who could be potentially interested in the survey among their contacts.

Annex 4. Overview table country group allocation

Table 53: Country groups by country of employment of researchers.

REGION	COUNTRIES	TG1	TG2	TG3	TG4	TOTAL
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States	148	76	57	275	556
US	United States	56	19	13	84	172
Non-EU OECD	Australia, Canada, Chile, Colombia, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	189	140	105	462	896
BRICS	Brazil, China, India, Russia, South Africa	78	133	66	405	682
Other	Akrotiri, Algeria, Argentina, Bangladesh, Belarus, Cameroon, Ecuador, Egypt, Ethiopia, Ghana, Holy See (Vatican City), Hong Kong, Indonesia, Kazakhstan, Kenya, Malaysia, Nigeria, Panama, Peru, Philippines, Saudi Arabia, Senegal, Serbia and Montenegro, Singapore, Sudan, Taiwan, Thailand, Tunisia, Ukraine, Uruguay, Uzbekistan, Vietnam	60	190	100	918	1,268

Source: MORE4 Global Survey (2020), MORE 3 Global Survey (2017).

Notes:

- Based on question 20: "Country of employment"
- (2020: n=2,369)

Table 54: Country groups by country of PhD graduation of researchers.

REGION	COUNTRIES	TG1	TG2	TG3	TG4	TOTAL
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States, Ireland, United Kingdom	54	71	72	292	489
US	United States	26	29	38	137	230
EU and associated countries	Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Slovenia, Sweden, Switzerland, United Kingdom	210	94	25	135	464
Non-EU OECD	Australia, Canada, Chile, Colombia, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	59	101	99	406	665
BRICS	Brazil, China, India, Russia, South Africa	18	97	58	314	487
Other	Afghanistan, Albania, Algeria, American Samoa, Argentina, Armenia, Azerbaijan, Belarus, Bolivia, Bosnia and Herzegovina, Costa Rica, Cuba, Georgia, Ghana, Honduras, Hong Kong, Indonesia, Iran, Kenya, North Korea, South Korea, Lebanon,	40	171	89	930	1,230

REGION	COUNTRIES	TG1	TG2	TG3	TG4	TOTAL
	Malaysia, Moldova, Mongolia, Morocco, Netherlands, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Serbia and Montenegro, Singapore, Taiwan, Tanzania, Thailand, Tunisia, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam					

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 12: “Is/will your PhD degree (be) a joint doctorate?” and question 13: “What is/will be the country of graduation (of your PhD degree)?”
- (2020: n=2,095)

Table 55: Country groups by country of citizenship of researchers.

REGION	COUNTRIES	TG1	TG2	TG3	TG4	TOTAL
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States, Ireland and United Kingdom	/	71	51	258	380
US	United States	/	15	13	83	111
EU and associated countries	Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Slovenia, Sweden, Switzerland, United Kingdom	327	/	/	/	/
Non-EU OECD	Australia, Canada, Chile, Colombia, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	/	131	91	446	668
BRICS	Brazil, China, India, Russia, South Africa	/	134	70	404	608
Other	Afghanistan, Albania, Algeria, American Samoa, Argentina, Aruba, Bangladesh, Belarus, Bolivia, Bosnia and Herzegovina, Botswana, British Indian Ocean Territory, Cambodia, Cameroon, Democratic Republic, Congo, Costa Rica, Cuba, Dominican Republic, Egypt, Ethiopia, Gaza Strip, Georgia, Ghana, Guatemala, Guinea, Honduras, Hong Kong, Indonesia, Iran, Iraq, Isle of Man, Jamaica, Kazakhstan, Kenya, South Korea, Kyrgyzstan, Laos, Lebanon, Malaysia, Moldova, Mongolia, Morocco, Mozambique, Myanmar, Nepal, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Republic of North Macedonia, Serbia and Montenegro, Singapore, Sri Lanka, Sudan, Swaziland, Taiwan, Tanzania, Thailand, Tunisia, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zimbabwe	/	198	110	935	1,243

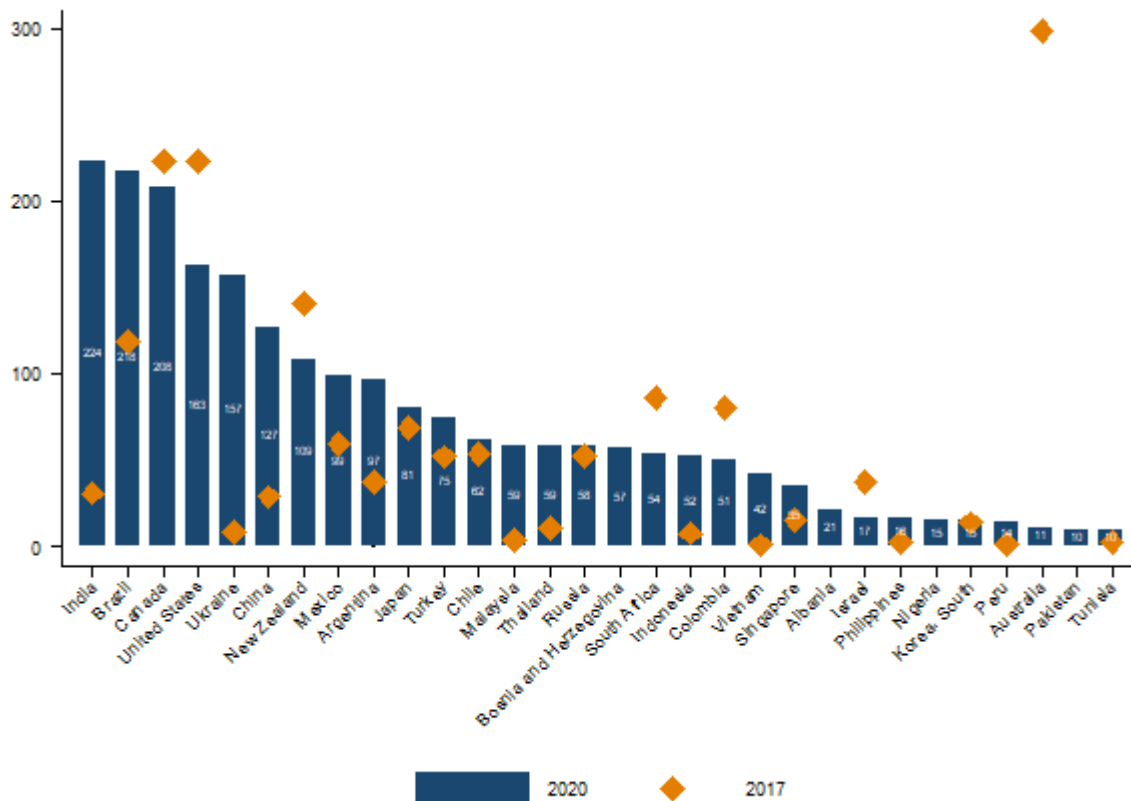
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only countries where at least 10 researchers indicated to use it for residence purposes.
- Based on question 5: “What is your country of citizenship?”
- (n=2,369)

Annex 5. Additional graphs and tables – chapter 4

Figure 107: Researchers' countries of residence.

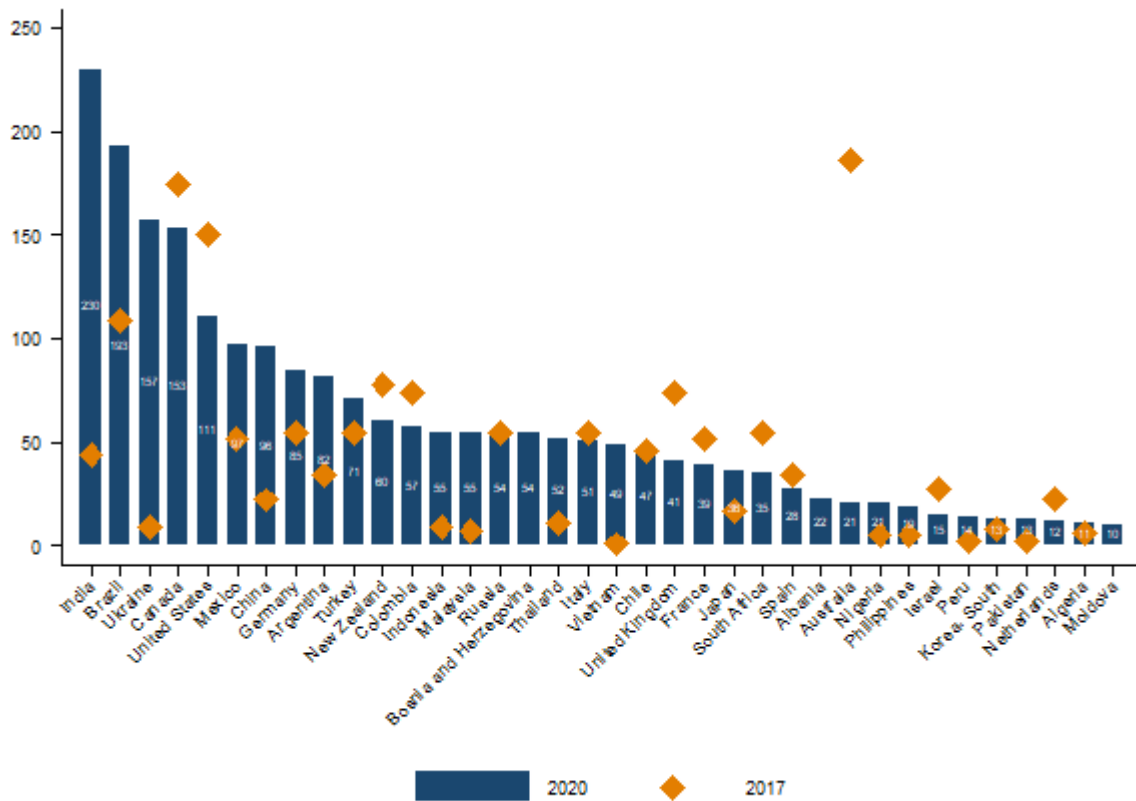


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only countries where at least 10 researchers indicated to use it for residence purposes.
- Based on question 4: "What is your country of residence?"
- (n=2,369)

Figure 108: Researchers' countries of citizenship.

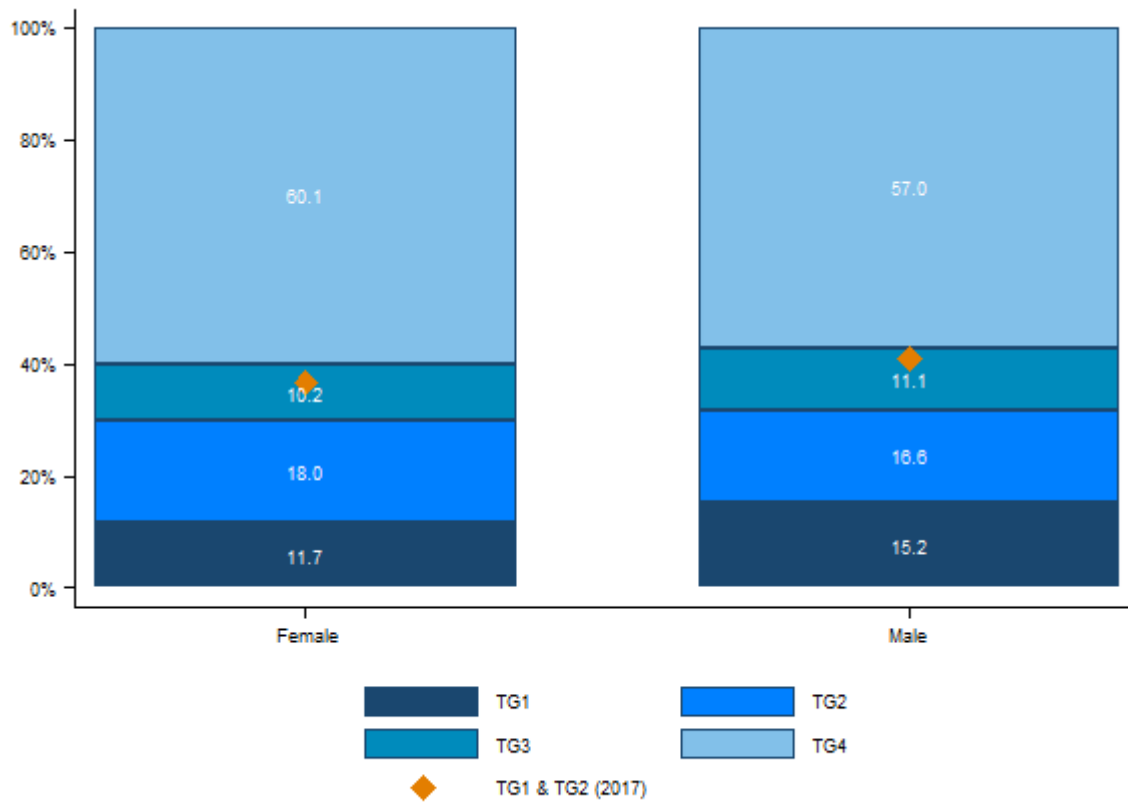


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Only countries where at least 10 researchers indicated it as their county of citizenship. In case of double citizenships just one country is included in the values.
- Based on question 5: ““What is your country of citizenship?”
- (n=2,369)

Figure 109: Distribution of researchers by gender and target group.

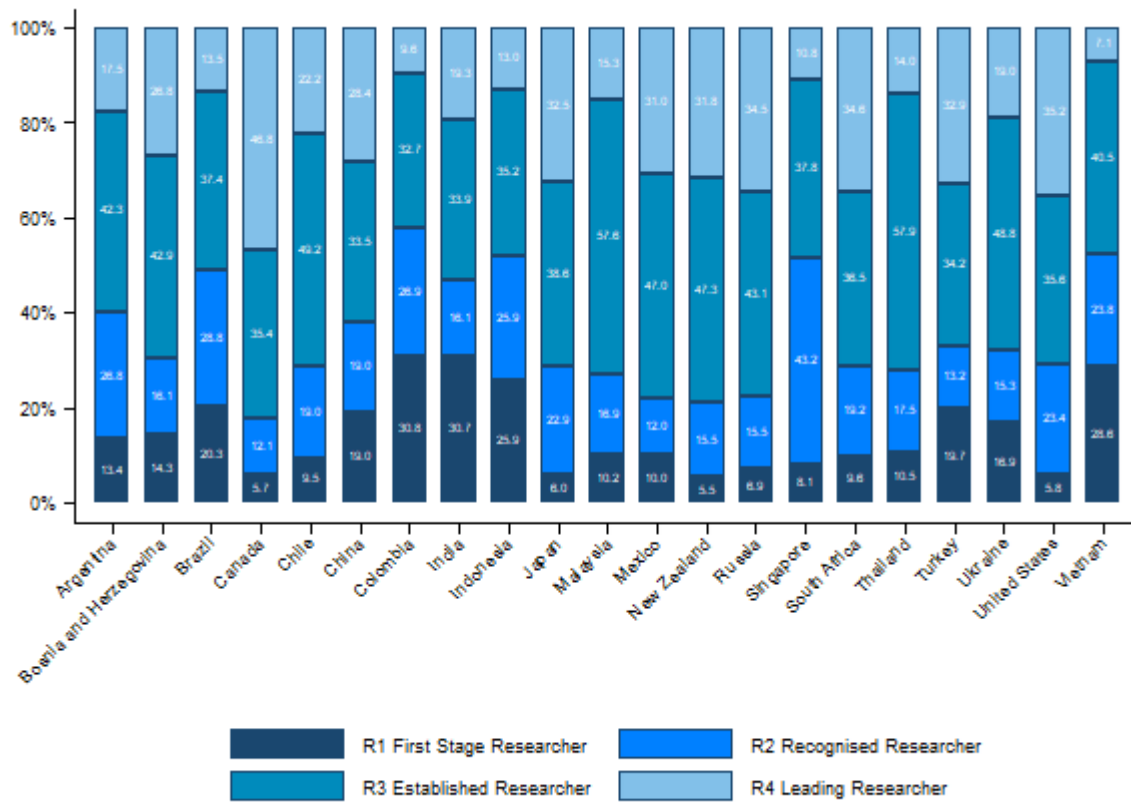


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU ((2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have worked abroad but not in the EU
- TG4: Non-EU researchers who have never worked abroad
- Based on question 2: "What is your gender"

Figure 110: Distribution of researchers across career stages (R1 to R4), by countries.

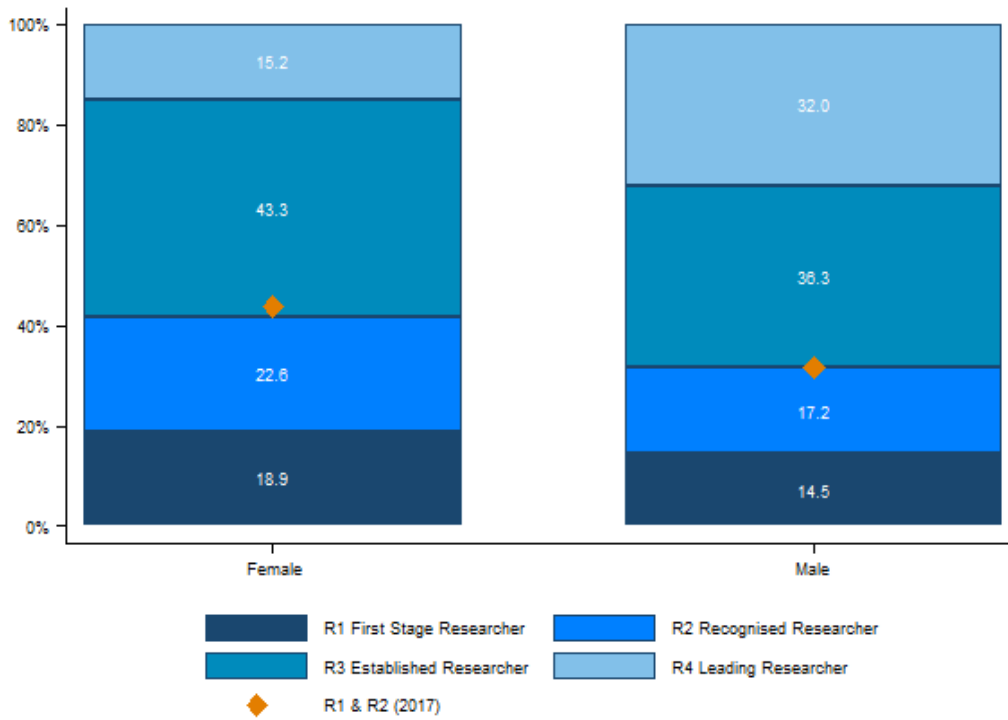


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 20 “What is your country of current employment?” and question 10: “In which career stage would you currently situate yourself?”
- Only countries where n > 30 included
- (n= 2,104)

Figure 111: Distribution of researchers by gender and career stage.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 2 “What is your gender?” and question 10: “In which career stage would you currently situate yourself?”
- (2020: n=2,369, 2017: n= 1,727)

Table 56: Researchers with a dual position in current employment.

		TOTAL		BY GENDER		BY CURRENT CAREERSTAGE	
2020 (n=351)	Total	20.4%	M	21.8%	R1	24.6%	
			F	18.1%	R2	24.9%	
				R3	16.4%		
				R4	21.9%		

Source: MORE4 Global Survey (2020).

Note:

- Just researchers in dual positions where the main position is a university or HEI.
- Total: Researchers currently working outside the EU (n=1,721)

Table 57: Number of university and HEI researchers in a dual position by target group.

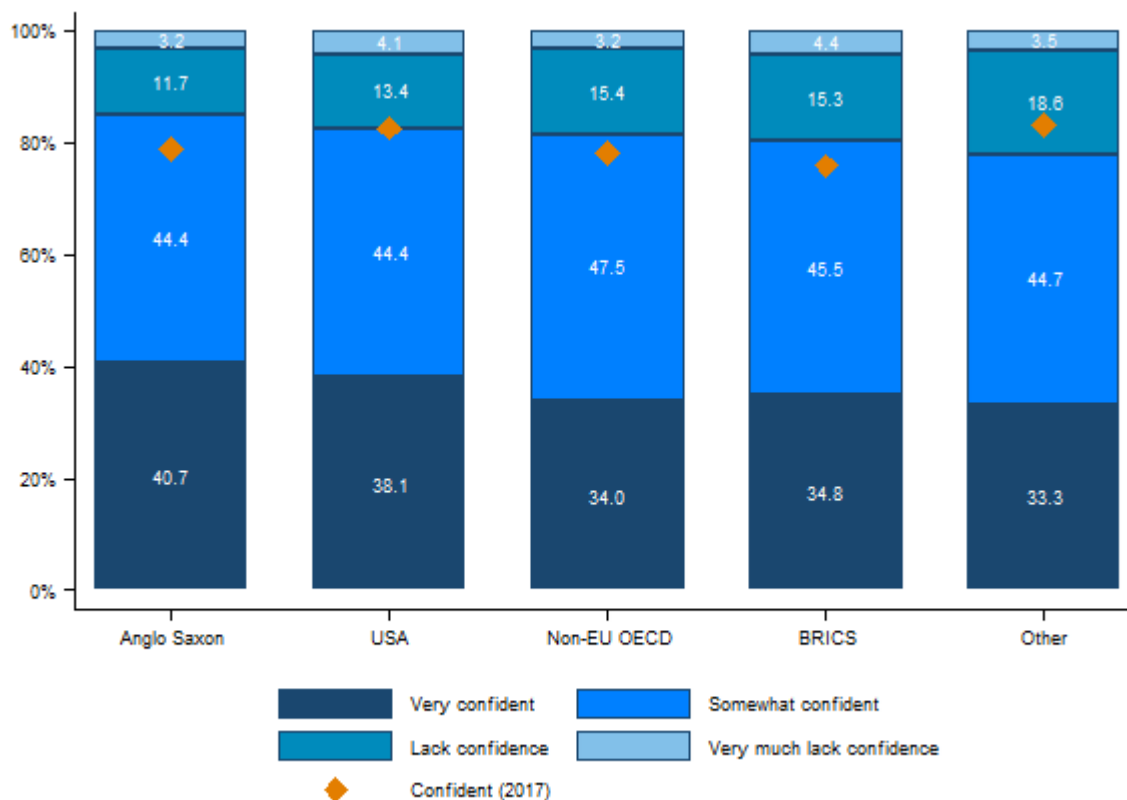
	TOTAL	TG1	TG2	TG3	TG4
2020 – MORE4 Global Survey	351	39	60	49	203
2017 – MORE3 Global Survey	161	33	30	17	81

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have worked abroad but not in the EU
- TG4: Non-EU researchers who have never worked abroad
- Based on question 17: “Are you currently in a so-called “dual position”, whereby you are employed in more than one institution/organisation at the same time? “Only researchers whose main position is at a university or HEI.

Figure 112: Confidence in future career prospects by country groups.

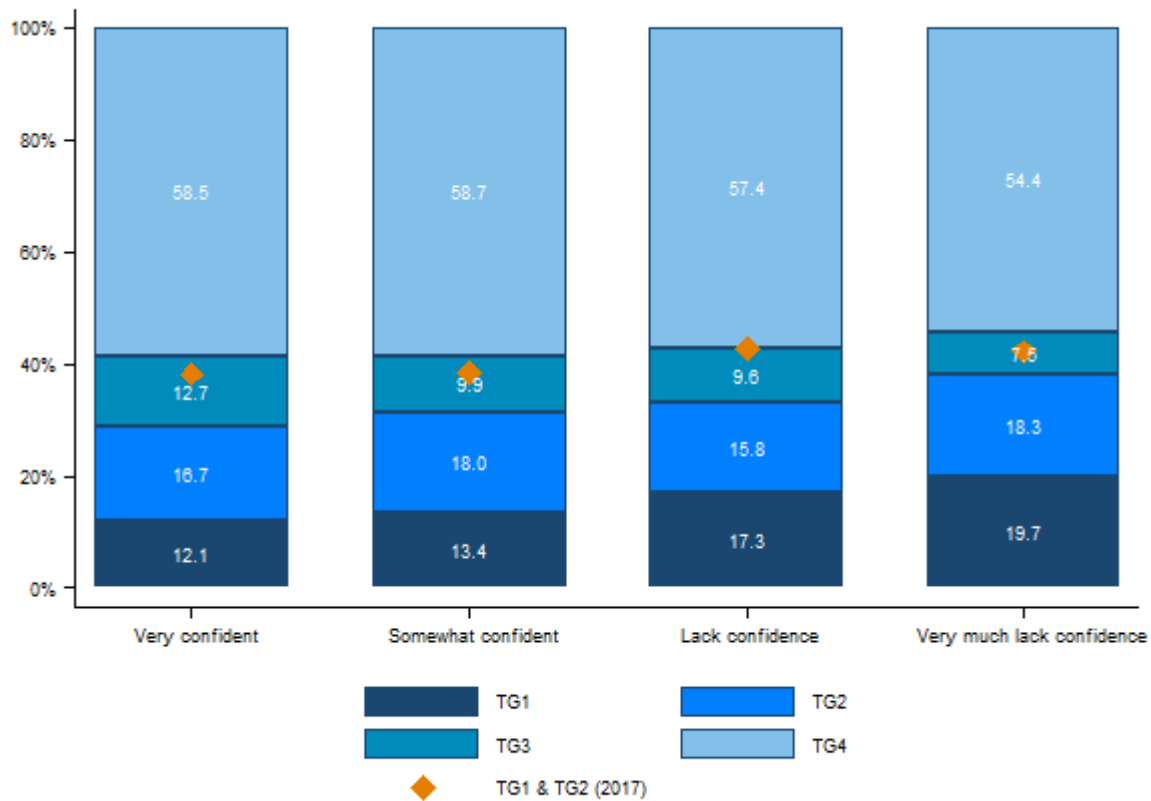


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 35: “Overall, how confident do you feel about the future prospects for your research career?”
- (2020: n=2,369, 2017: n= 1,727)

Figure 113: Distribution of target groups across levels of confidence in future career prospects.



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,369, 2017: n=1,727)
- TG1: EU researchers currently working outside the EU
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have worked abroad but not in the EU
- TG4: Non-EU researchers who have never worked abroad
- Based on question 35: "Overall, how confident do you feel about the future prospects for your research career?"

Table 58: Perception of positive factors for recruitment by target groups.

	POSITIVE FACTOR					NEGATIVE FACTOR				
	TOTAL	TG1	TG2	TG3	TG4	TOTAL	TG1	TG2	TG3	TG4
Interdisciplinarity	66.9%	60.6%	68.3%	66.9%	68.3%	5.5%	9.3%	3.7%	6.3%	4.8%
International mobility	78.3%	74.1%	82.2%	81.1%	77.5%	2.0%	1.2%	2.1%	2.9%	2.1%
Intersectoral mobility (public)	48.2%	39.1%	52.2%	44.7%	50.1%	5.7%	7.2%	3.1%	7.0%	5.9%
Open science	59.8%	45.9%	57.7%	61.2%	64.1%	5.0%	4.3%	5.2%	7.0%	4.8%
Intersectoral mobility (private)	46.9%	37.8%	49.3%	46.2%	48.7%	7.5%	7.7%	6.1%	10.4%	7.3%
Project-related work experience	83.1%	85.7%	83.9%	85.1%	81.7%	1.6%	0.4%	1.5%	1.7%	2.0%
Public awareness	66.5%	57.3%	68.3%	63.8%	69.1%	2.3%	1.5%	1.2%	2.2%	2.9%

	POSITIVE FACTOR					NEGATIVE FACTOR				
	TOTAL	TG1	TG2	TG3	TG4	TOTAL	TG1	TG2	TG3	TG4
Transferable skills	68.8%	62.8%	67.9%	71.2%	70.2%	2.3%	0.8%	2.6%	3.8%	2.4%
Knowledge transfer	79.4%	78.1%	80.3%	78.3%	79.7%	2.0%	0.4%	1.4%	2.9%	2.4%

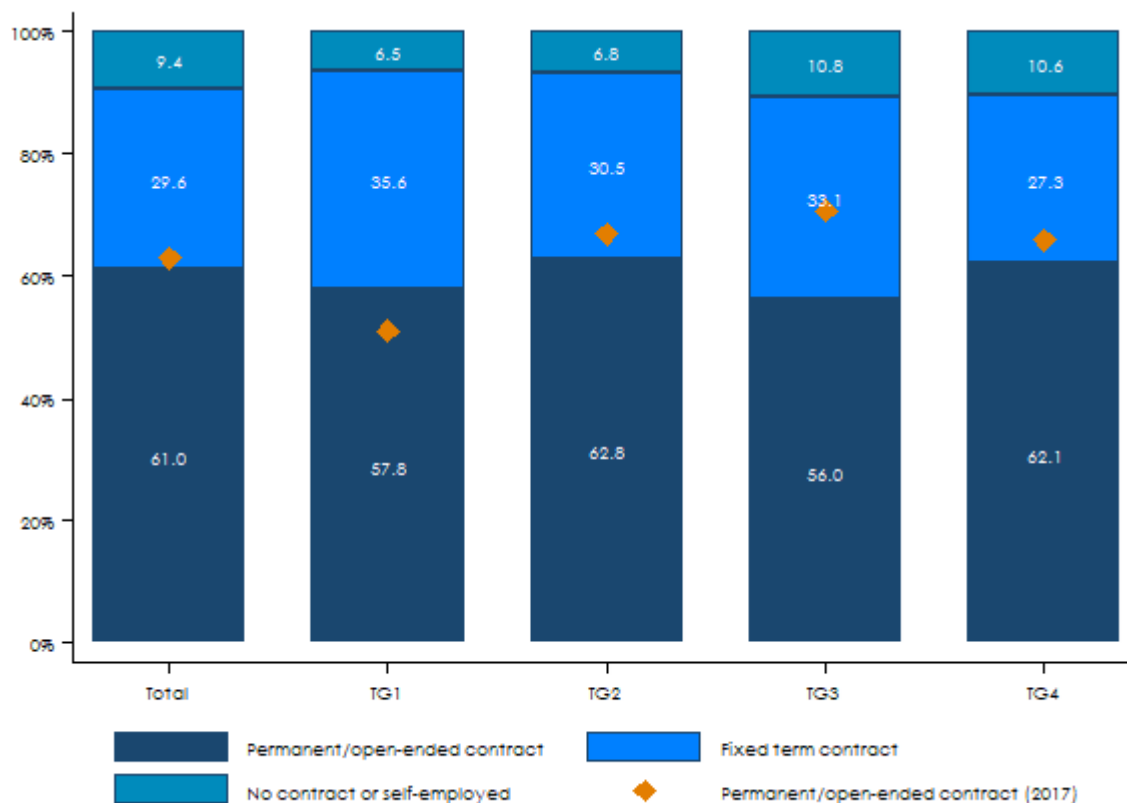
Source: MORE4 Global Survey (2020).

Notes:

- Total: Researchers currently working outside the EU
- TG1: EU researchers currently working outside the EU)
- TG2: Non-EU researchers who have worked in the EU in the past
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries
- TG4: Non-EU researchers who have never worked abroad
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Share of researchers agreeing that the factors are regarded as positive or negative for recruitment in their home institution. Devoid of the share of researchers indicating that the factor is not relevant.
- Based on question 31: “In your experience would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?”
- (n=1,536-1665)

Annex 6. Additional graphs and tables – chapter 5

Figure 114: Contractual situation of researchers by target groups.

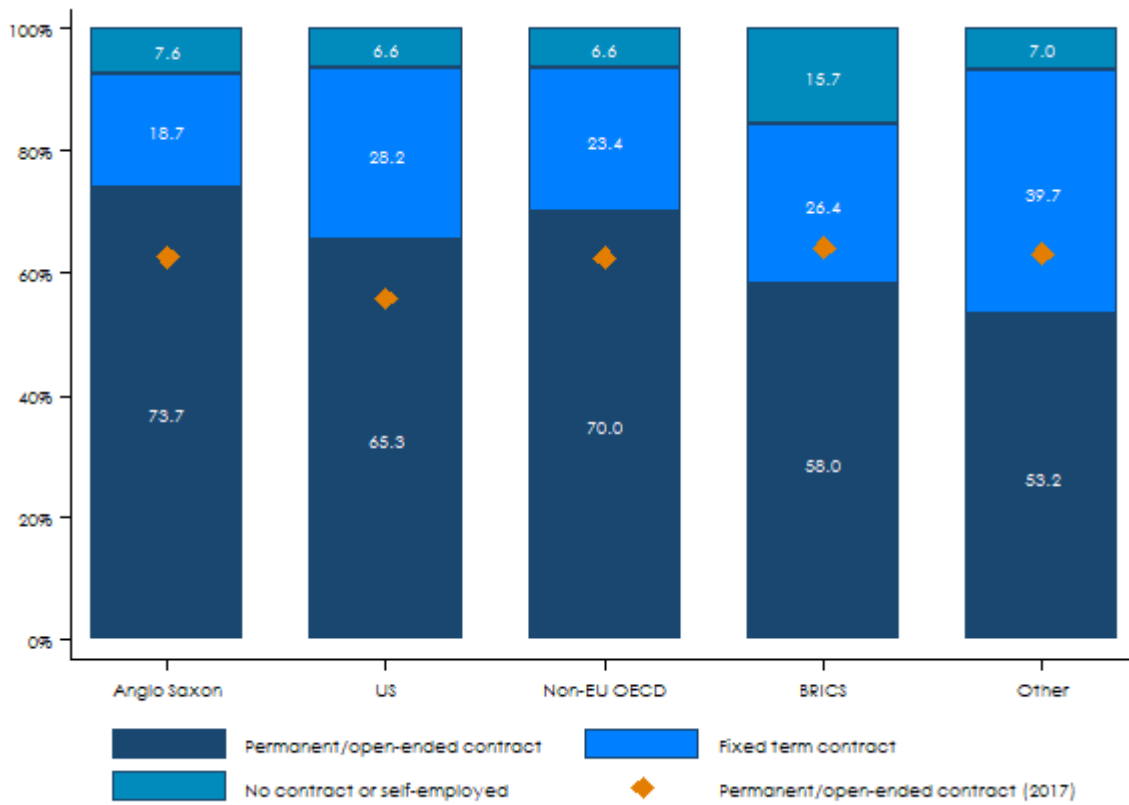


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Total: Researchers currently working outside the EU (2020: n=2,263; 2017: n=1,648)
- TG1: EU researchers currently working outside the EU (2020: n=306; 2017: n=404)
- TG2: Non-EU researchers who have worked in the EU in the past (2020: n=396; 2017: n=253)
- TG3: Non-EU researchers who have worked abroad but not in the EU (2020: n=244; 2017: n=171)
- TG4: Non-EU researchers who have never worked abroad (2020: n=1,317; 2017: n=820)
- Based on question 21: "Type of contract"

Figure 115: Contractual situation of researchers by country groups.

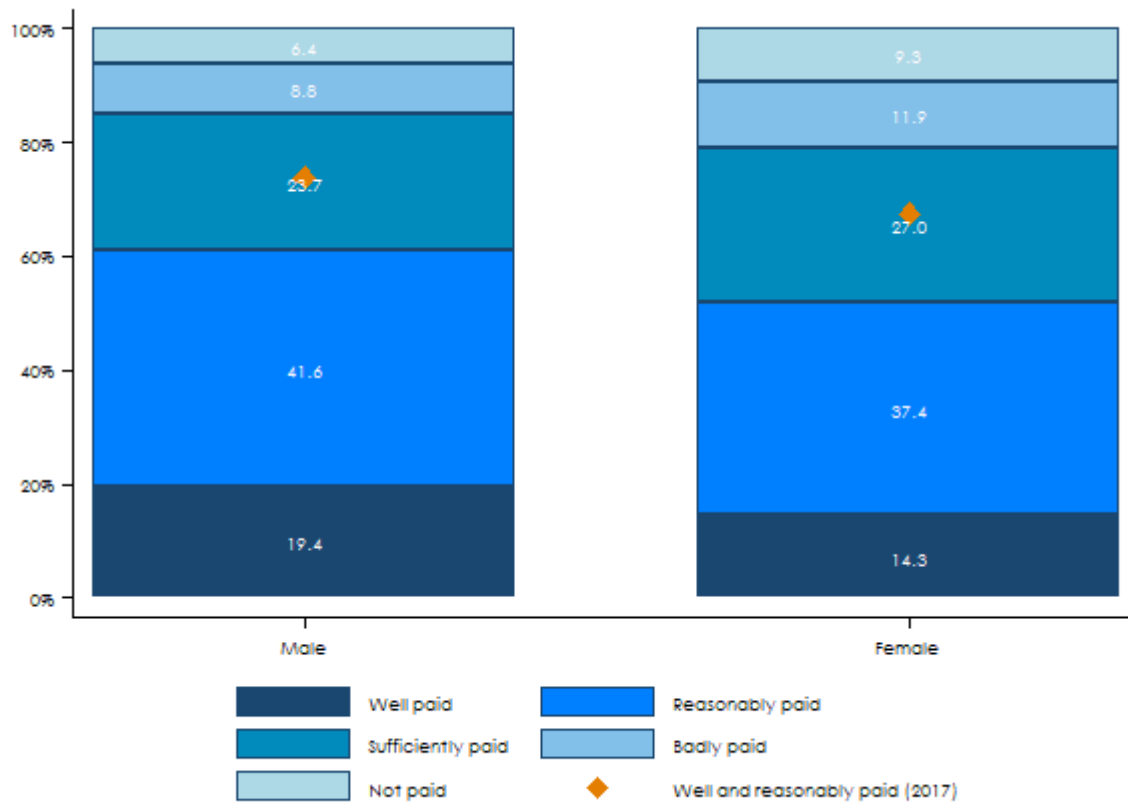


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 21: "Type of contract"
- (2020: n=2,263; 2017: n=1,648)

Figure 116: Researchers' perception of remuneration, by gender.

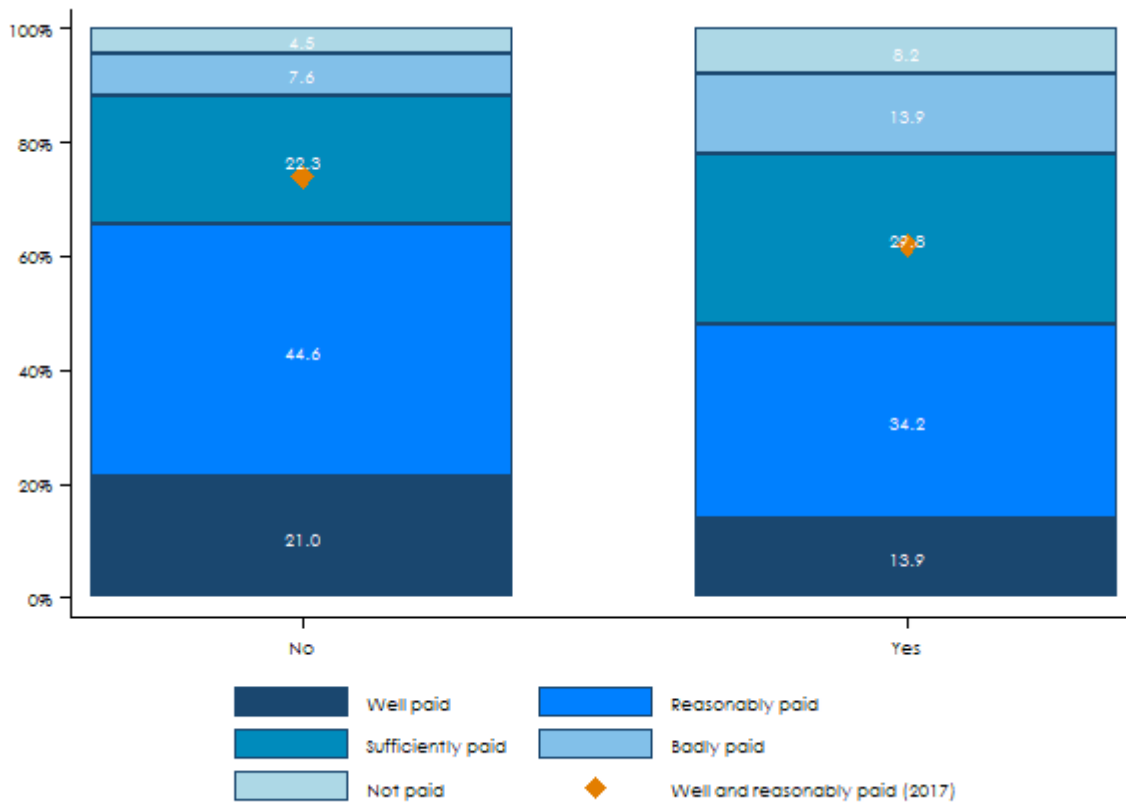


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 25: "How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be..." and question 2 "What is your gender?"
- (2020: n=2,369; 2017: n=1,727)

Figure 117: Researchers' perception of remuneration by dual positions.

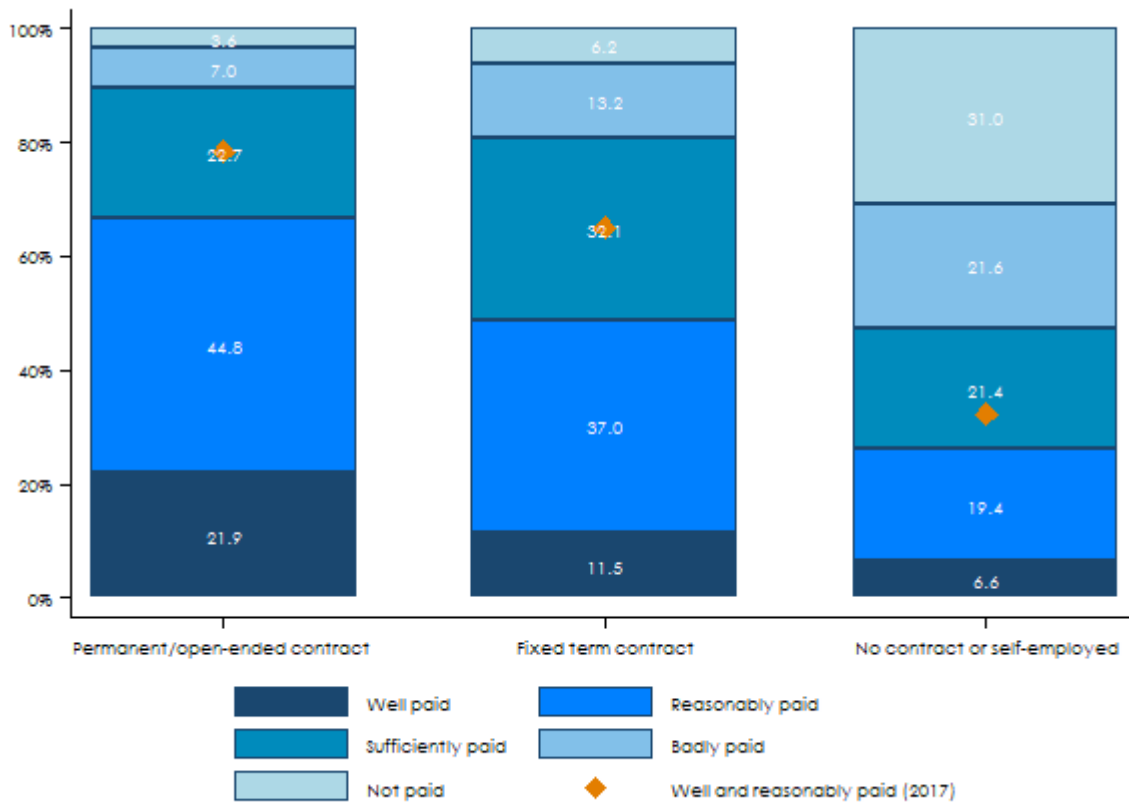


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 25: “How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be...” and question 17 “Are you currently in a so-called “dual position” whereby you are employed as a researcher in more than one institution/organisation at the same time?”
- (2020: n=1,722; 2017: n=1,615)

Figure 118: Researchers' perception of remuneration by type of contract.



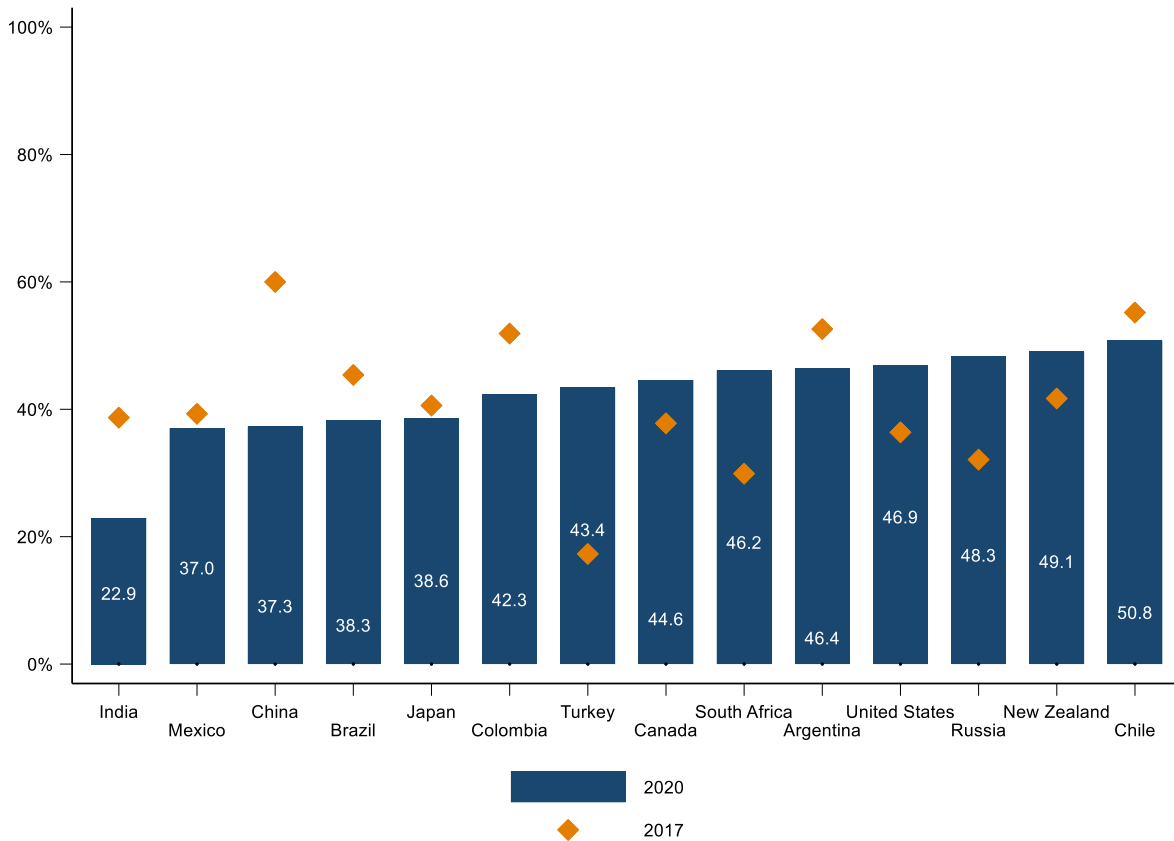
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 25: "How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be..." and question 21 "Type of contract"
- (2020: n=2,263; 2017: n=1,648)

Annex 7. Additional graphs and tables – chapter 6

Figure 119: Short-term mobility in the last ten years across countries.



Source: MORE4 Global Survey (2018), MORE3 Global Survey (2017).

Notes:

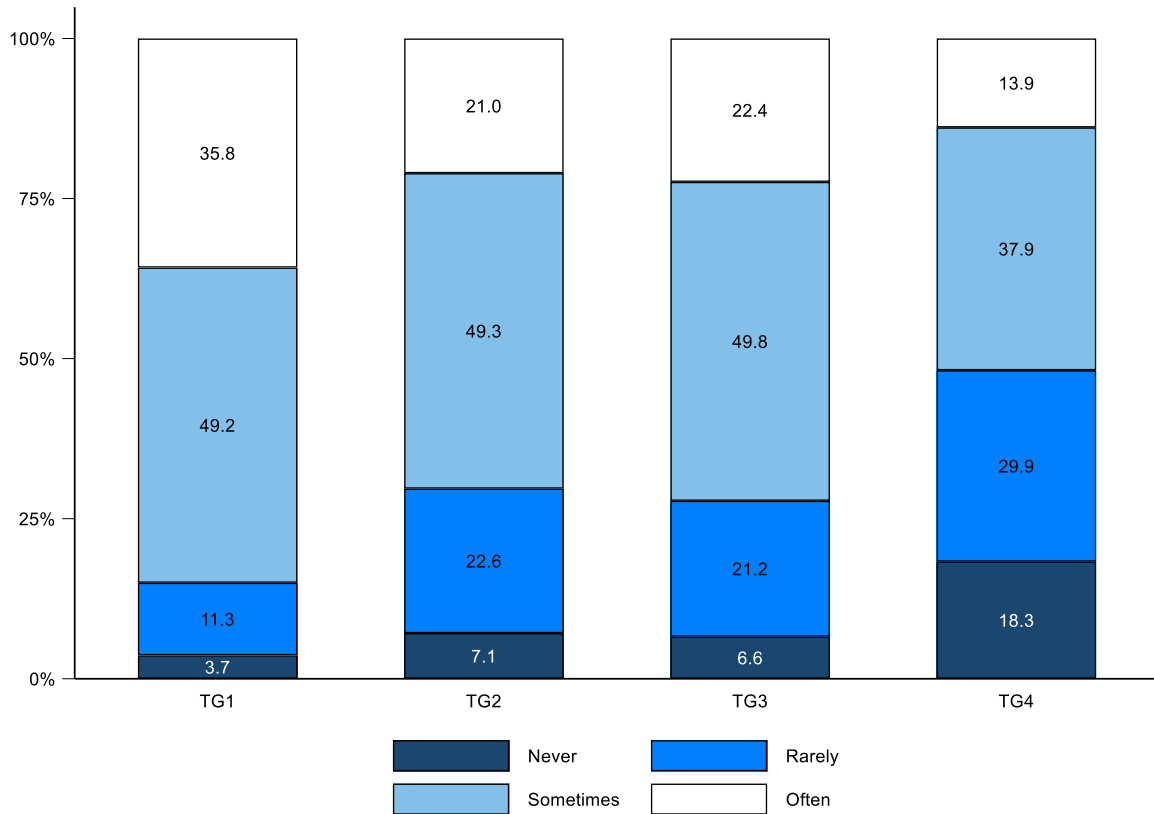
- The country of reference is the country where researchers are currently employed.
- All target groups are included.
- Only countries for which there are more than 30 respondents in the sample are displayed in the figure. Data for 2017 is only displayed when the country had more than 30 respondents in the 2017 sample.
- Based on question 77 “How would you typify your experience with short-term mobility (of less than 3 months at a time)?”
- (2020: n=2,369; 2017: n=1,727)

7.1. Short travel for conferences, visits and meetings

Conferences: Among the sample of researchers currently working outside the EU, 87% indicated to have undertaken a work-related international travel for conferences. This figure shows a decline compared to the results of the MORE3 Global Survey in 2017 (93%). Non-European researchers that have never been mobile (TG4) are less likely to do international travels to attend conferences than the rest of the

researchers: 30% versus 13% in the general population. Among the rest of the target groups (TG1, TG2 and TG3) no large differences are found: only a small minority declare that never does this type of move.

Figure 120: Frequency of international travel to attend conferences or events across target groups.



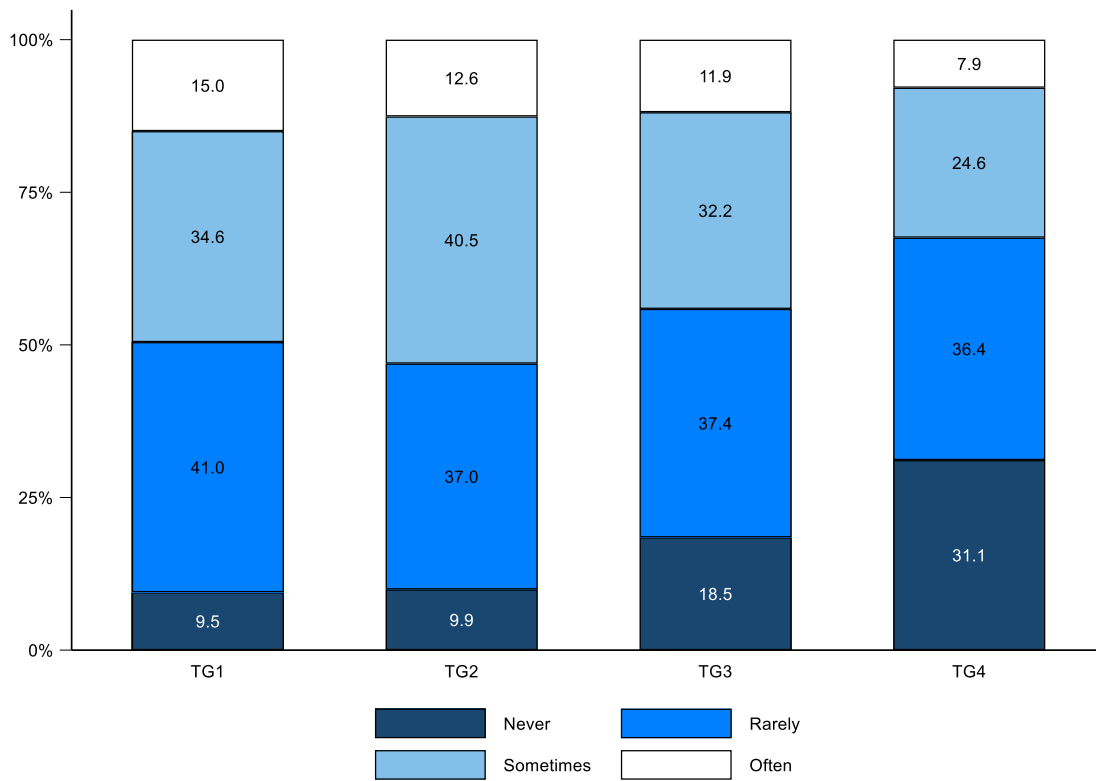
Source: MORE4 Global Survey (2020).

Notes:

- TG1: EU researchers currently working outside the EU (n= 327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1380)
- Based on question 78 “What types of work-related international travel have you undertaken during your research career?”

Study visits: Among the researchers currently working outside the EU, 77% indicated to have undertaken a work-related international travel for study visits, research visits and/or fieldwork (78% in 2017). With respect to this type of international travels, the situation across groups is quite homogeneous (see Figure 121). Non-mobile researchers (TG4) are those presenting by far the lowest tendency to do study visits (31% of them have never done this type of short-term travel).

Figure 121: Frequency of international travel for study visits across target groups.



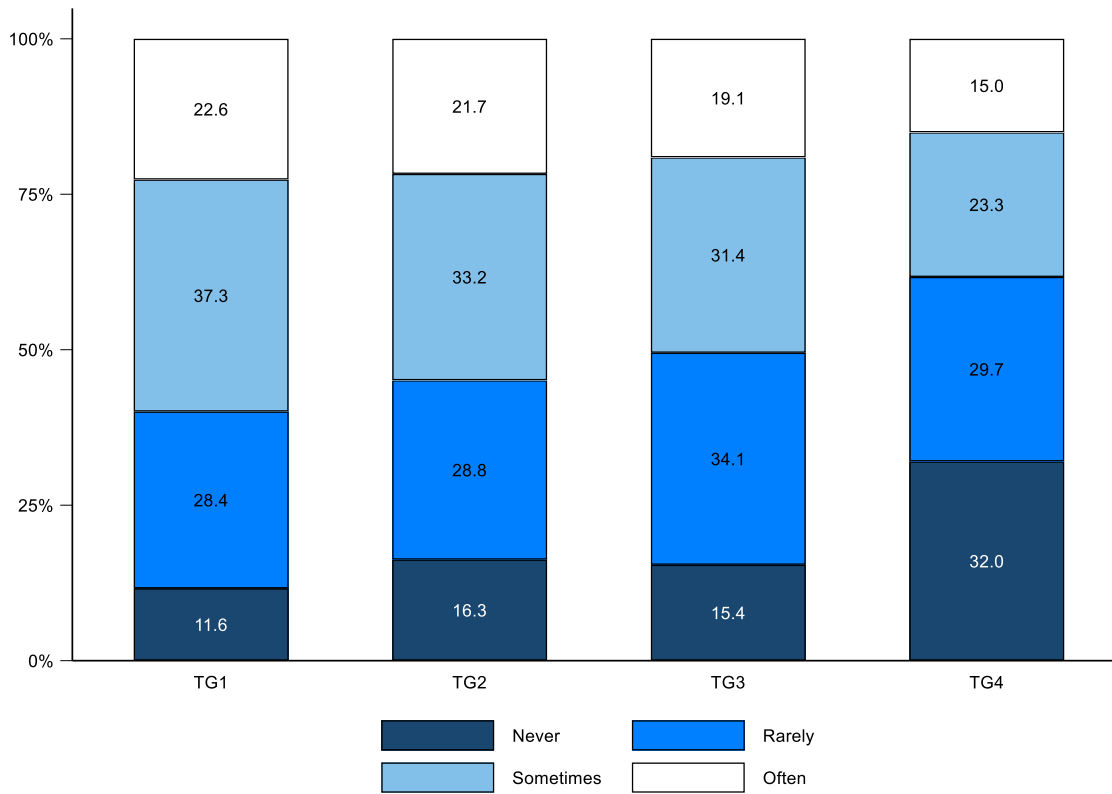
Source: MORE4 Global Survey (2020).

Notes:

- TG1: EU researchers currently working outside the EU (n= 327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1380)
- Based on question 78 “What types of work-related international travel have you undertaken during your research career?”

Meetings with supervisors, partners, and/or collaborators: 75% of the researchers currently working outside the EU indicated to have undertaken a work-related international travel for meetings with supervisors/partners/collaborators (76% in 2017). The patterns across target groups are very similar, except for the non-mobile researchers (TG4) who are less likely to do this type of short-term moves than their mobile counterparts.

Figure 122: Frequency of international travel for meetings with supervisors, partners, and/or collaborators across target groups.



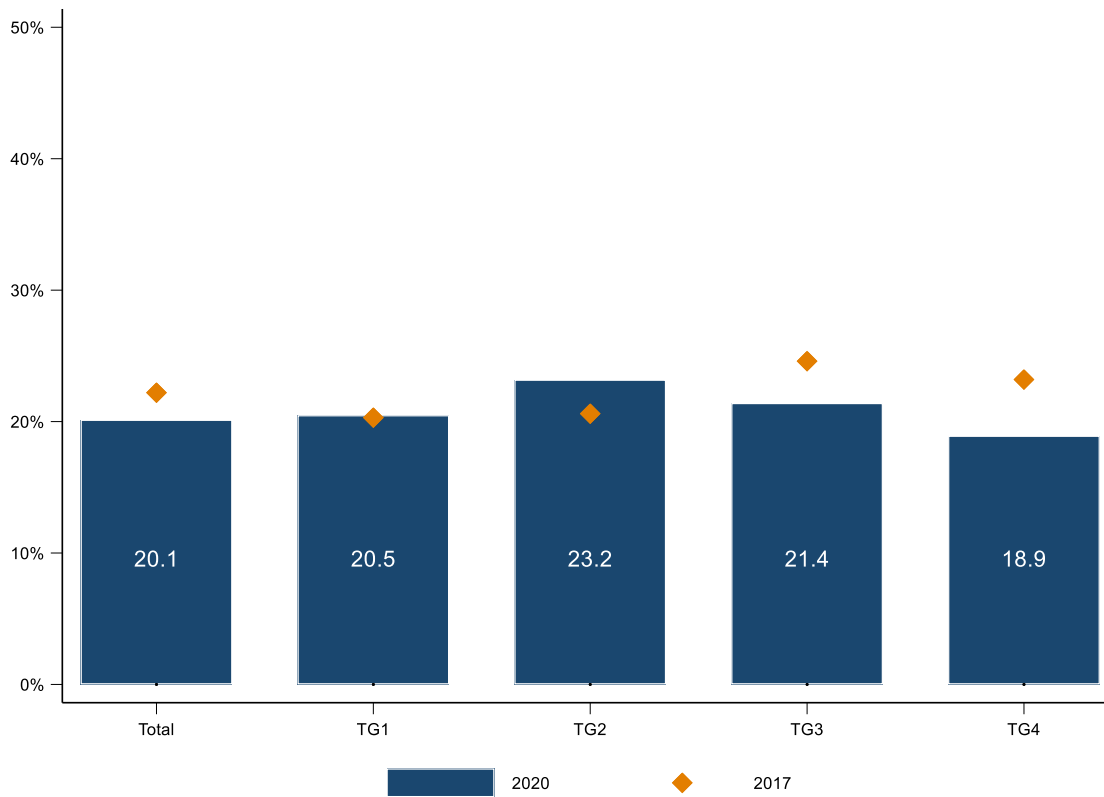
Source: MORE4 Global Survey (2020).

Notes:

- TG1: EU researchers currently working outside the EU (n= 327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=407)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=254)
- TG4: Non-EU researchers who have never worked abroad (n=1380)
- Based on question 78 “What types of work-related international travel have you undertaken during your research career?”

7.2 Intersectoral mobility

Figure 123: Intersectoral mobility in the last ten years.



Source: MORE4 Global Survey (2020).

Notes:

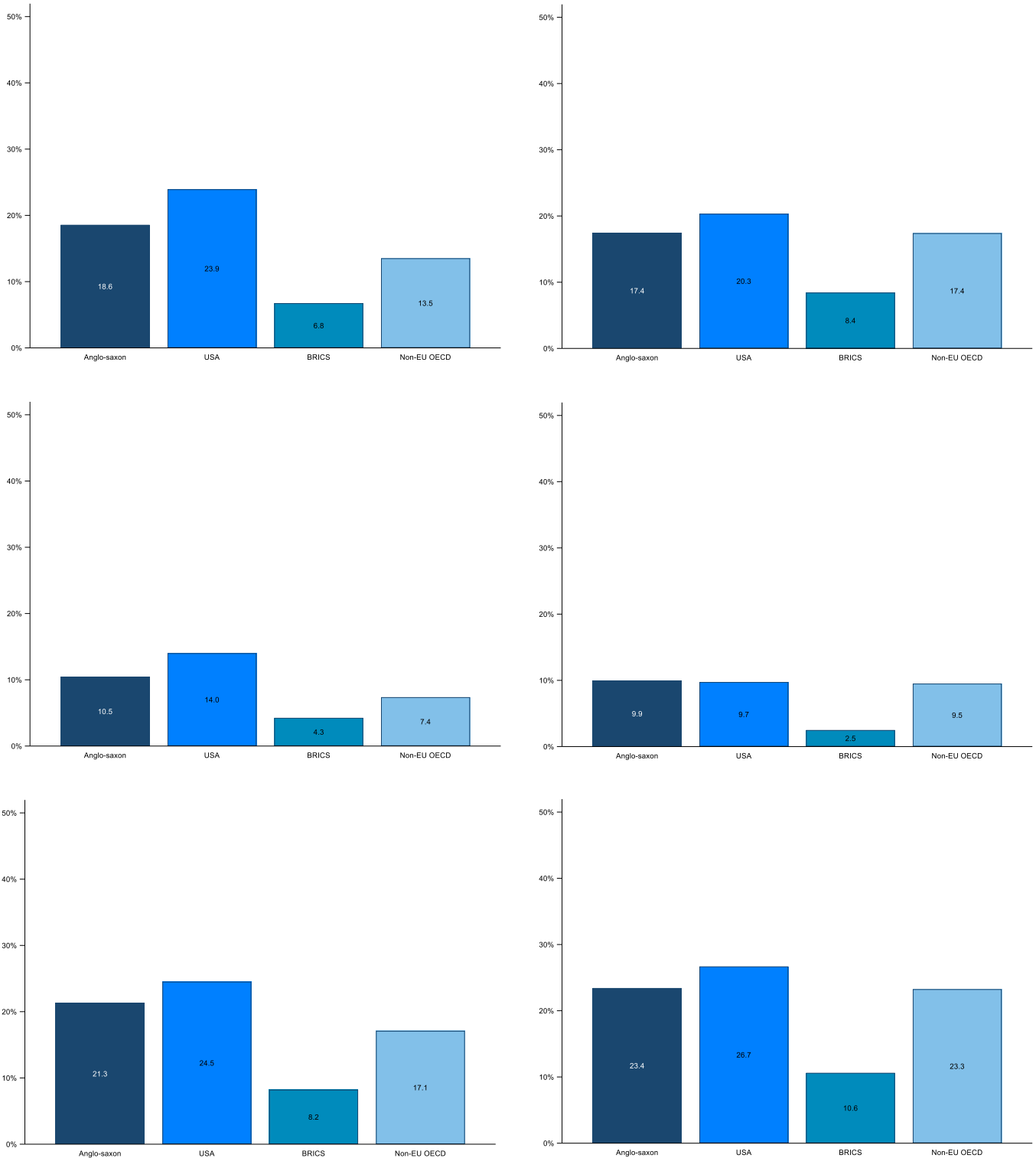
- The figure also reflects those that are employed in dual positions.
- Based on Question 16 “What is your current sector of employment as a researcher?”, and Question 18 “Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2010-2020)?”
- (2020: n=2,369, 2017: n=1,727)

7.3 Interdisciplinary mobility

Figure 124: Interdisciplinary collaboration (upper panel), intersectoral collaboration (middle panel) and international collaboration (lower panel) across countries.

In 2020:

In 2017:



Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 55 and question 66 “Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?”
- (2020: n=2,369, 2017: 893)

7.4 Collaboration

Table 59: Gender differences in collaboration across target groups.

		MORE4 (2020)			MORE3 (2017)		
		Male	Female	Difference	Male	Female	Difference
TG1	Researchers in other disciplines	63,6%	62,7%	0,9%	59.7%	58.5%	1.1%
	Researchers in another sector	36,4%	34,5%	1,9%	31.2%	29.3%	2.0%
	Researchers from another country	80,2%	74,5%	5,6%	81.0%	75.6%	5.4%
TG2	Researchers in other disciplines	64.1%	56.0%	8.1%	62.6%	62.9%	-0.3%
	Researchers in another sector	32.6%	36.3%	-3.7%	31.6%	24.7%	6.9%
	Researchers from another country	74.4%	66.8%	7.6%	79.3%	65.2%	14.1%

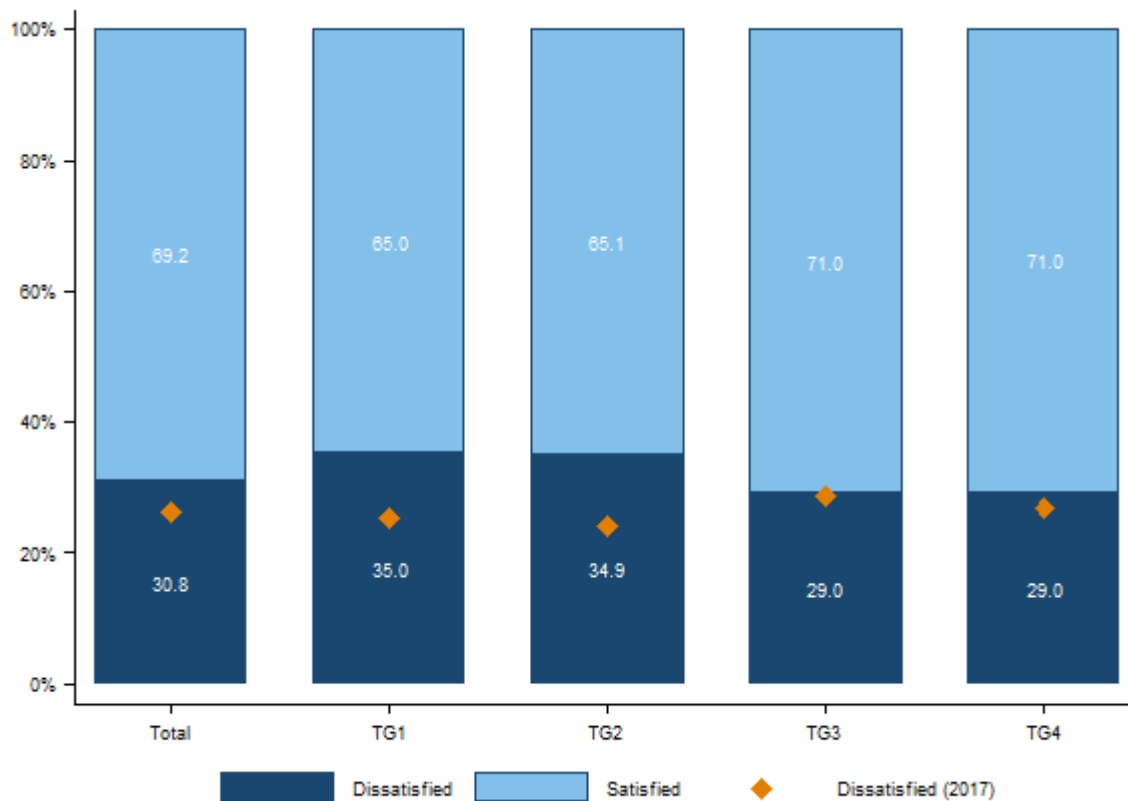
Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- TG1: EU researchers currently working outside the EU (n=327)
- TG2: Non-EU researchers who have worked in the EU in the past (n=463)
- Based on question 2 “Gender”, question 55 and question 66 “Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?”
- (n=790: 327 in TG1, 463in TG2)

Annex 8. Additional graphs and tables – chapter 7

Figure 125: Individual satisfaction with quality of training and education, by target groups.

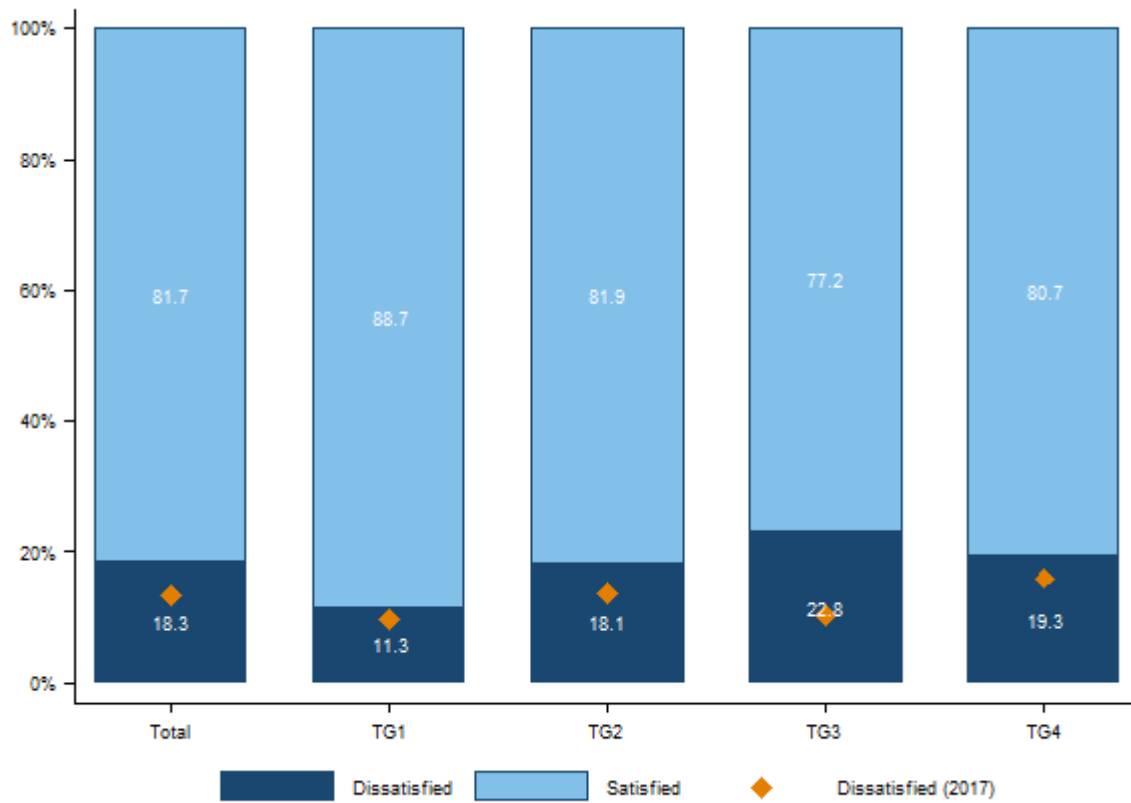


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."
- (2020: n=2,209; 2017: n=1,612)

Figure 126: Individual satisfaction with research autonomy, by target groups.

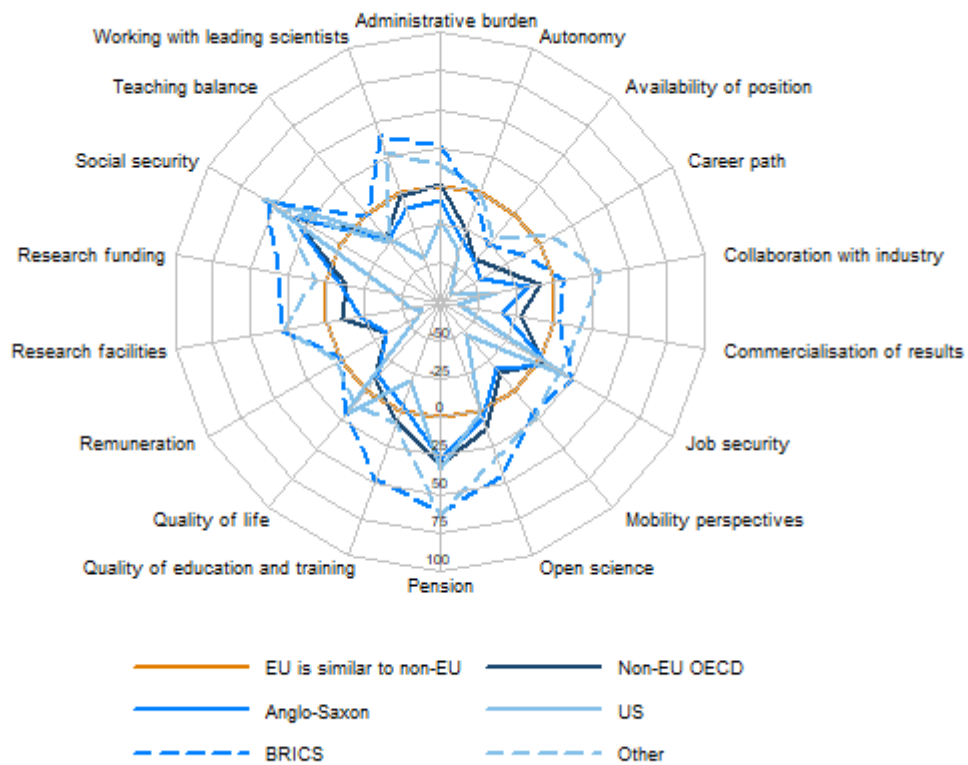


Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Based on question 24: "Please indicate your satisfaction with each factor as it relates to your current position."
- (2020: n=2,284; 2017: n=1,686)

Figure 127: Perception of EU attractiveness by EU researchers abroad grouped by their current country of employment.

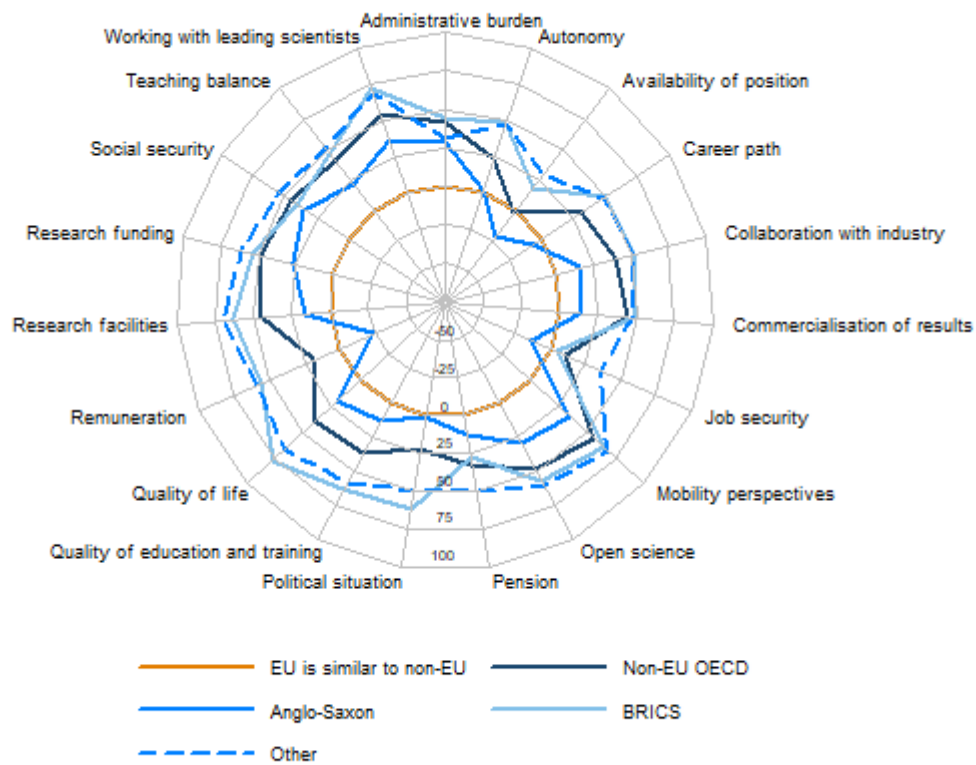


Source: MORE4 Global Survey (2017).

Notes:

- Only EU researchers who work outside the EU, grouped by their current country of employment.
- Based on question 48: "How does working in ... compare to working as a researcher in Europe? Please indicate if something is worse, similar or better in ... than in Europe."
- Positive values indicate higher shares of researchers assessing to work in the EU to be better than to be worse.
- (n= 245-318)

Figure 128: Perception of EU attractiveness by non-EU researchers who have been mobile to the EU grouped by their current country of employment.



Source: MORE4 Global Survey (2017).

Notes:

- Only non-EU researchers who have been mobile to the EU, grouped by their current country of employment.
- Based on question 58: "How does working as a researcher in Europe compare to your current employment in ...? Please indicate if something is worse, similar or better in Europe than in ..."
- Positive values indicate higher shares of researchers assessing to work in the EU to be better than to be worse.
- (n= 307-402)

Table 60: Importance of motives for > 3 month international mobility, main motive per move for moves with employer change.

SHARE OF MOVES WITH EMPLOYER CHANGE, FOR WHICH THE MOTIVE WAS INDICATED AS THE MAIN ONE						
	2020			2017		
	TOTAL	EU MOVES	NON-EU MOVES	TOTAL	EU MOVES	NON-EU MOVES
	N=	N = 790	N=	N = 391	N= 171)	N = 220
Career progression	23.9%	25%	24.5%	21.2%	21.1%	21.4%
Working with leading scientists	21.7%	16.7%	19.2%	13.6%	12.8%	14.1%
Research autonomy	9.7%	8.7%	9.2%	5.9%	3.5%	7.7%
Availability of research funding	8.7%	12.7%	10.7%	17.6%	17.5%	17.7%
Access to research facilities and equipment	7.8%	4.2%	6.0%	2.0%	3.5%	0.9%
Availability of suitable positions	4.5%	2.4%	3.5%	8.2%	8.2%	8.2%
International networking	4.5%	5.1%	4.8%	5.6%	8.2%	3.6%
Quality of training and education	4.5%	5.2%	4.8%	6.9%	9.9%	4.5%
Personal/family reasons	4.3%	8.3%	6.3%	9.5%	7.6%	10.9%
Balance between teaching and research time	3.3%	0.9%	2.1%	1.3%	1.2%	1.4%
Job security	2.8%	2.8%	2.8%	1.5%	0.6%	2.3%
Culture and/or language	1.2%	2.9%	2.1%	2.0%	1.2%	2.7%
Remuneration	0.6%	1.4%	1.0%	0.5%	0.0%	0.9%

Source: MORE4 Global Survey (2020), MORE3 Global Survey (2017).

Notes:

- Distribution of moves by target groups (n = 391)
- Based on question 44 “Did you change employer in this step?” and “What was your main motive to move to these countries?”
- With “moves” defined as moves of three months or more in the last ten years to another country than the country of citizenship of the researcher
- (2020: n:, 2017: n:)

Table 61: Awareness of Euraxess Links by country of employment.

	Aware	Not Aware	Observation
Argentina	36,1%	63,9%	97
Bosnia and Herzegovina	50,0%	50,0%	56
Brazil	67,6%	32,4%	222
Canada	9,6%	90,4%	209
Chile	27,0%	73,0%	63
China	56,4%	43,6%	131
Colombia	67,3%	32,7%	52
India	56,0%	44,0%	218
Indonesia	87,0%	13,0%	54
Japan	59,0%	41,0%	83
Malaysia	76,3%	23,7%	59
Mexico	22,0%	78,0%	100
New Zealand	6,4%	93,6%	110
Russia	15,5%	84,5%	58
Singapore	64,9%	35,1%	37
South Africa	3,8%	96,2%	52
Thailand	80,7%	19,3%	57
Turkey	30,3%	69,7%	76
Ukraine	20,5%	79,5%	157
United States	26,4%	73,6%	171
Vietnam	76,2%	23,8%	42

Source: MORE4 Global Survey (2020).

Notes:

- Based on question 79: "Do you know Euraxess Links?"
- Only countries with more than 30 respondents are listed.
- (n=2,369)

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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

