MORE3 study

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

Fourth interim report (D4):
Task 2 – Global survey results

Prepared by: **IDEA Consult**
WIFO

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1. Introduction

1.1. Objectives of the MORE3 study

The MORE 3 study, entitled "support of data collection and analysis concerning mobility patterns and career paths of researchers" intends **to update, improve and further develop the set of indicators** of the MORE2 study in order to meet the need for indicators over time and assess the impact on researchers of policy measures introduced during implementation of the EPR (European Partnership for Researchers). The MORE3 study provides new indicators and thus is based on new surveys to meet emerging policy needs and priorities.

The main objective of the MORE3 study is defined in the Terms of Reference as:

"carrying out two major surveys and developing indicators to help monitor progress towards an open labour market for researchers"

For this, four tasks are identified:

I. 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);

II. Carry out a Global survey of researchers currently working outside Europe regarding their mobility patterns, career paths and working conditions (Task 2);

III. Update the set of internationally-comparable indicators on researchers (Task 3);

IV. Draft a final report that provides a comparative, policy-relevant analysis of the mobility patterns, working conditions and career paths of researchers (Task 4).

This report is the Fourth Interim report of the MORE3 study, presenting the results of the survey of researchers currently working outside Europe (the final report for Task 2: Global survey results).

1.2. Scope of the Global survey

The Global survey focusses 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[1]
Target region of employment	Researchers currently working IN the EU	Researchers currently working OUTSIDE the EU
Target sector[2]	Researchers at higher education institutes	No specific sectoral focus (both researchers from higher education institutes and other organisations can participate)

[1] Consistent with the MORE2 approach.

[2] 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.

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, no weights are applied and 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 MORE2[3]):

- TG1: European researchers currently working outside the EU[4];
- 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.

1.3. Guide to the reader

In what follows, we first summarise the existent insights on global mobility in section 2. In section 3, we resume the general conceptual framework of the MORE3 study and in section 4 we point out a number of implications of the methodology for the interpretation of the results.
Sections 5 to 8 contain the results of the Global survey in Task 2 of the study, structured according to this conceptual framework:

- Section 5: Characteristics of researchers and career paths
- Section 6: Working conditions in current position
- Section 7: Mobility and collaboration, broken down into:
  - International mobility
  - Interdisciplinary mobility
  - Intersectoral m
  - Collaboration
- Section 8: Attractiveness of the European Research Area
- Section 9 summarises the findings of these sections in relation to the policy context.

In the Annexes more details are provided on the survey methodology and the questionnaire. Also additional data and tables are included there (per chapter).

[3] 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.

[4] EU28 + 3 associated countries (Switzerland, Norway and Iceland).

2. Existing insights on global mobility

2.1. Motives and effects of mobility

Previous studies have also addressed differences in the motives, working conditions and career development across countries and between mobile and non-mobile researchers.

Motives for outward mobility

As research based on MORE2 data shows (Janger and Nowotny, 2016)[5], the choice between jobs in academia is generally more driven by factors relevant to scientific productivity than by personal or non-science related factors, where productivity refers to publication performance. Factors influencing scientific productivity can be, for instance, the quality of collaboration partners (working with leading scientists will be more beneficial for productivity) or working conditions including research funding and research autonomy. While academic researchers are willing to trade off salary against superior conditions for research, ceteris paribus salaries also matter. Issues such as quality of life do not work as attractors when they are better, only as barriers when they are worse. The OECD/UNESCO study on Careers of Doctorate Holders (CDH 2009) shows that the US is not only the country attracting major flows of researchers due to the quality of its PhD programmes and working conditions for researchers - it is also the country in which the highest median gross annual earnings are found.

While there are important common factors which drive mobility, there are important differences depending on the origin and destination of researchers. This is likely to be interrelated with the different working conditions across countries. The MORE1 and MORE2 studies consistently reported that working conditions are typically seen as being better outside the EU, and most notably in the US, especially concerning remuneration. This was also confirmed by Veugelers and Van Bouwel (2015)[6] which indicate that these motivations are more strongly related to EU-US mobility than in the case of intra-EU mobility. Very similar results were presented in the 2012 Researchers´ Report of the European Commission[7]. However, quality of life is perceived as being better in Europe than abroad.

Studies focusing on PhD candidates report results that go in a similar direction. Results of the Global Science project indicate that the prestige of PhD programs, career progression prospects and life-style all play an important role in deciding the location of PhD studies (Stephan et al., 2015)[8]. These motives, however, are not always ranked equally for all destination countries. Moving to the US to do a PhD is generally related to the prestige of its programs and the prospects for career progression, but the negative perceptions of its life-style discourage many to move to the US[9].

Motives for return mobility

The OECD/UNESCO study on Careers of Doctorate Holders (CDH 2009) shows that return mobility can be due to a large variety of motives, such as academic or job-related

[5] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.
[6] Veugelers, R., Van Bouwel, L. (2015). The effects of international mobility on European researchers: comparing intra-EU and US mobility. *Research in Higher Education, 56* (4), 360-377.
[7] Researchers' Report 2012, EC, DG Research and Innovation. http://ec.europa.eu/euraxess/index.cfm/general/researchPolicies
[8] 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.
[9] 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.

reasons, or family and personal factors. Motives for this type of mobility were analysed in-depth in the previous MORE1 and MORE2 studies. Similar trends were found in both studies.

Effects of mobility

There is also some evidence on the positive effects of mobility. In the framework of the Global Science project, Scellato et al. (2012)[10] found out that mobile researchers tend to collaborate with researchers from more countries and tend to be more successful in their research collaboration than those that have never been mobile. The same authors even indicate the existence of a "performance premium" for foreign-born researchers and returnees (Franzoni et al., 2012)[11]. Other studies, however, nuance these claims. In a study on the effects of mobility among Spanish researchers, Cañibano et al. (2008)[12] found that while international mobility is related to easier access to international funding and networking, the link between this type of mobility and publications or patenting performance is not so strong. Other studies also stress that career paths also matter in determining the effects of mobility: Lawson and Shibayama (2015)[13] claimed that Japanese bioscience professors who have been mobile were more likely to be promoted sooner, but only if they already had permanent contracts; that is, that they do not change employer.

2.2. ERA priorities

Mobility of researchers has been a key element of EU policies in recent decades. Since the introduction of the concept of the European Research Area in 2000[14], efforts have been made towards achieving a more efficient and effective public research system. Five key priorities were put forward:

1. More effective national research systems;
2. Optimal transnational cooperation and competition;
3. An open labour market for researchers (facilitating mobility, supporting training and ensuring attractive careers);
4. Gender equality and gender mainstreaming in research;
5. Optimal circulation and transfer of scientific knowledge.

Commissioner for Research, Science and Innovation, Carlos Moedas, put forth the three Os[15] as the next chapter in the ERA and Innovation Union policy: Open Innovation, Open Science and Open to the World. The aim is to foster innovation, knowledge transfer and research and international collaboration.

In this context, the Global survey (Task 2 of the MORE3 study) on the mobility patterns, career paths and working conditions of researchers currently working outside Europe will shed light on the perceptions of four important groups:

[10] Scellato, G., Franzoni, C., & Stephan, P. (2012). Mobile Scientists and International Networks, NBER Working paper n.18613, December.
[11] Franzoni,C., Scellato,G., & Stephan, P. (2012). The Mover's Advantage. Scientific Performance of Mobile Academics. NBER Working paper n. 18577, November 2012.
[12] Cañibano, C., Otamendi, J., & Andújar, I. (2008). Measuring and assessing researcher mobility from CV analysis: the case of the Ramón y Cajal programme in Spain. Research Evaluation, 17(1), 17-31.
[13] Lawson, C., & Shibayama, S. (2015). International research visits and careers: An analysis of bioscience academics in Japan. Science and Public Policy, 42(5), 690-710.
[14] COM(2000) 6: Towards a European research area. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0006:FIN:en:PDF
[15] Speech of 22 June 2015. http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm

- EU researchers currently working outside the EU[16];
- Non-EU researchers who have worked in the EU in the past;
- Non-EU researchers who have worked abroad, but not in the EU;
- Non-Europeans who have never worked abroad.

The results and insights of this Global survey will allow to better define and position the strengths of the ERA as an optimal breeding ground for the development of research, as compared to other (research) areas in the world. This survey therefore contributes to shedding light on different dimensions of the ERA priorities:

- *More effective national research systems.* The results of the survey provide insights into the effectiveness of the European research area through the lenses of the researchers currently working outside Europe[17].
- *Optimal transnational cooperation and competition.* The survey provides evidence of the barriers and incentives to move to Europe for researchers coming from third countries. As such, it can provide a sound basis for the development of joint actions that can foster transnational cooperation.
- *An open labour market for researchers.* The differences in recruitment and career paths, patterns of intersectoral mobility or portability of grants between researchers working in EU institutions (EU HE Survey) and those located in third countries help analysis of the characteristics of EU institutions and HE systems in a global context.
- *Optimal circulation and transfer of scientific knowledge.* Mobility and collaboration are important pathways for accessing and transferring knowledge to other sectors, so that both the scientific and the economic use of knowledge can be improved. In this sense, knowing from a global perspective how researchers collaborate within and across sectors, what their main patterns of mobility are and which effects can be expected from that, will support European policy makers in the development of evidence-based policy decisions. This survey therefore constitutes a good basis for the fostering and deepening of those initiatives related to the three key dimensions Open Science, Open Innovation and Open to the World.

2.3. Mobility programmes and flows

In the EU context, policy measures such as the EU's Marie Skłodowska-Curie actions programme or Euraxess, have been introduced over the years to promote the international mobility of researchers. The main reason to foster geographic mobility lies in the fact that it is related to more intense knowledge flows through international collaboration and, as a consequence, increases scientific productivity which may in turn affect economic competitiveness. These goals are not considered important only in the EU: being able to compete in the global research arena is a source of concern and an objective for many countries and regions, and not only among the most industrialised. For instance, countries like Brazil and China have boosted their efforts on promoting inward and outward mobility[18] as have South Korea, India and Turkey[19]. The MORE3 Global survey will contribute to complementing the views and data gathered by previous studies.

The OECD Science, Technology and Industry Scoreboard 2015: Innovation for Growth and Society provides a newly-developed indicator of the international mobility of scientific authors. These data allow for analysing the annual inflows and outflows of scientific

[16] EU28 + 3 associated countries.
[17] No analysis at the country level is possible due to low number of responses in certain countries. Analyses are conducted at the level of country-groups.
[18] OECD, 2016. Researchers on the move: The impact of brain circulation.
[19] GRL, GRDC Programmes of National Research Foundation of Korea in South Korea, UKIERI and CEFIPRA Programmes in India and YABSIS, foreign researcher system in Turkey.

authors according to the changes in the institutional affiliations of researchers´ scholarly publication. The available country reports – Japan, Korea, and the United Kingdom - indicate that the US is, unsurprisingly, the main receptor of net inflows from most of the countries (OECD, 2015)[20]. In spite of the limitations of this type of indicator, such as only tracing mobility linked to publications, it shows that it is not only the quantity of mobility that matters, but also its quality. Countries are interested in attracting the best researchers: according to OECD data, the United Kingdom, Singapore, Hong Kong (China), and Chinese Taipei are measured by the number of citations, the most successful countries in managing to attract better researchers than those who leave the country in terms of their citation impact.

2.4. Researchers' awareness of EU mobility initiatives

The results of existing studies point to the need to increase the awareness of the policy measures that are already in place to enable mobility, either to facilitate return mobility of talented researchers or to boost potential positive effects of mobility on scientific productivity. Enabling mobility to escape ineffective national research systems should be regarded as a temporary solution, with the first best solution addressing the effectiveness of the research system (see ERA priority number one). The Mapping University Mobility project (MAUNIMO 2010-2012)[21] already stressed the need to achieve a greater awareness among researchers of the tools and services that can help them be mobile. Regarding EU policies, the MORE2 project found out that Euraxess platforms and services were known by 25% of the EU researchers working outside the EU, but only by 9% of the non-European researchers who had worked previously in the EU. Marie Curie Actions were known to 50% of the EU researchers abroad and to 33% of the non-EU researchers. Awareness is therefore key to further improve the reach of these tools and initiatives.

[20] OECD, 2016. Researchers on the move: The impact of brain circulation.
[21] http://www.eua.be/activities-services/projects/past-projects/learning-teaching/mapping-university-mobility-of-staff-and-students.aspx.

3. Conceptual framework and definitions

Within the context of these policy developments, the conceptual framework defines and structures a set of overarching concepts that are then applied consistently in the four different tasks of the MORE3 study (including the Global survey). It is as such a tool for guidance in structuring and interpreting the findings in each of the tasks and integrating them in the final report. The conceptual framework is also strongly based on the framework used in the MORE2 study (2012) for reasons of consistency and comparability[22]. The results of the Global survey in the report at hand are thus also structured according to this framework. In the next section, we therefore introduce this framework briefly.

The definitions of the mobility concepts applied throughout the MORE3 study further take into account the existing standards or secondary sources so that comparability with other studies and contexts is maximised. In the second section of this chapter, we repeat the definitions of a number of key concepts (consistent across tasks of MORE3 and with MORE2): researchers, fields of science and research career stages. Furthermore we elaborate on the key concept of mobility and how it is adapted based on the findings of MORE2. Finally, a summary is provided of the refinements made to a number of concepts of career paths and working conditions, based on the identified evolutions in the policy context since 2012.

3.1. Conceptual framework

Figure 1 shows the conceptual framework as it was developed for Task 1 of MORE3 – EU HE survey. It is based on the conceptual framework of MORE2, the discussed definitions in the Annex, and the identification of new topics from the literature review. 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 our 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; both taken together 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 bad working conditions drive researchers away to other countries within the same sector 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, which can be used for monitoring issues of attractiveness.

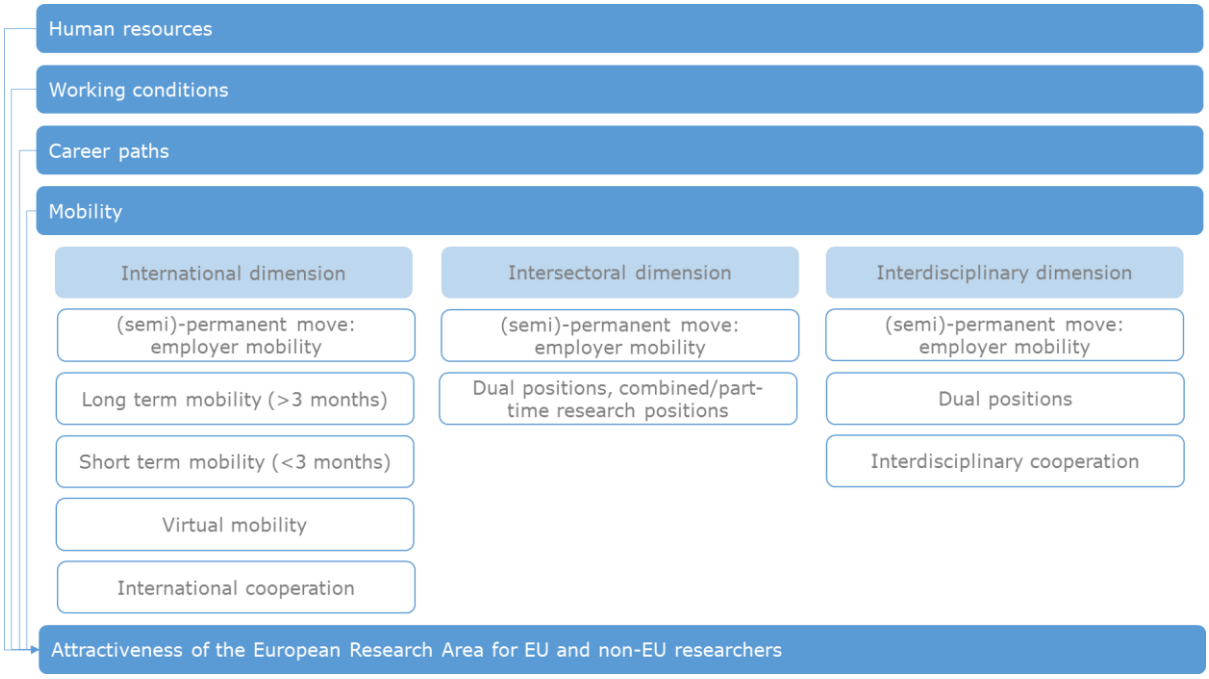
For each of the concepts (in dark blue) and their dimensions (in light blue), a number of key indicators are identified for data collection and analysis in (each of the tasks in) MORE3 (see Figure 1). The main types of indicators are given in Figure 2. Each of these are further elaborated and detailed in the analysis sections (sections 5 to 8). 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

[22] IDEA Consult et al. (2013) Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. FINAL REPORT (deliverable 8).

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 8) and on the comparative perspective between working in the EU and outside the EU.

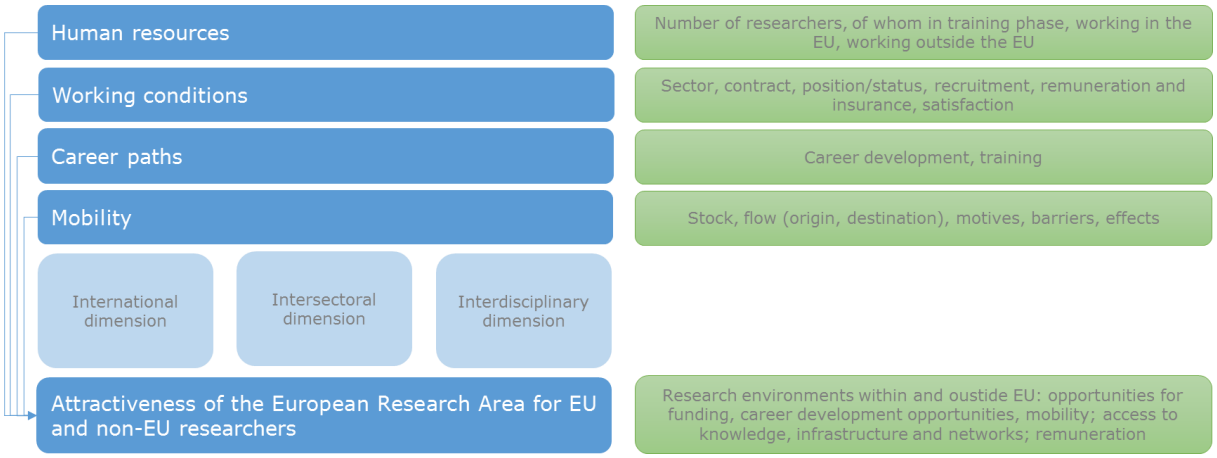
We explain in the following sections the definitions of concepts used in the indicators as well as the policy-driven developments (compared to 2012) that have an impact on the definition, scope or interpretation of the indicators.

Figure 1: Final conceptual framework for the MORE3 study



Source: IDEA Consult based on MORE1, MORE2 and literature review

Figure 2: Framework for definition of indicators in the MORE3 study



Source: IDEA Consult based on MORE1, MORE2 and literature review

3.2. Main definitions

For the MORE3 project, we build further on the definitions of MORE2 and make suggestions for improvements where necessary. A detailed overview of the definitions of researchers, career stages and fields of science (as developed in the Tasks 1 and 3 of the MORE3 study), is provided below.

3.2.1. Researchers

The main definition of a researcher applied in the MORE1 and MORE2 surveys is also used in the MORE3 study. A researcher is defined in accordance with the Frascati manual[23], identifying researchers as *"professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned"*.

As with the MORE2 surveys and the EU HE survey in Task 1 of MORE3, we have included the following self-selection paragraph in the introduction of the Global survey. This to clearly define "researcher" to the respondents and allow them to self-select into this category:

> 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.

3.2.2. Field of Science

Fields of science (FOS) are defined according to the FOS classifications proposed by the OECD in 2006[24]:

- FOS 1 (Natural Sciences)
- FOS 2 (Engineering and technology)
- FOS 3 (Medical Sciences)
- FOS 4 (Agricultural Sciences)
- FOS 5 (Social sciences)
- FOS 6 (Humanities)

Similar as in MORE2 and MORE3 task 1, 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)

[23] OECD (2002) Frascati Manual. Proposed Standard Practice for Surveys on Research and Experimental Development. OECD, Paris.

[24] http://www.oecd.org/science/inno/38235147.pdf

3.2.3. Research career

The MORE3 study, as with its predecessors, takes the perspective of the individual researcher within academic careers and applies the EC model for career stages. This Task 2 on the Global survey also includes individual researchers outside academics. 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)[25] 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).

3.2.4. 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
- Private industry: SME or start-up

3.2.5. Mobility

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 types of originating countries.

[25] http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf

In MORE3 the definitions of mobility are strongly based on those applied in MORE2 for reasons of consistency. However, as new concepts of researcher mobility developed, and policies towards mobility and the evaluation of researchers' achievements had to be revisited[26], the definitions for this study also needed improvement and updating. 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[27] 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 change of topics or disciplines was not explicitly included in the MORE2 study but is now elaborated in MORE3 so that this current study covers all four types of mobility. In the Global survey (Task 2) of the MORE3 study, the focus is on geographical mobility. Intersectoral and interdisciplinary mobility are touched upon, and virtual mobility is not surveyed.

The definitions of types of mobility are based on those formulated in MORE2. In Table 1, they 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[28], intersectoral and interdisciplinary mobility in this table are analysed in this report in the indicated sections.

[26] New concepts of researcher mobility – a comprehensive approach including combined/part-time positions. Science Policy Briefing, ESF, April 2013.
[27] "Excellence, Equality and Entrepreneurialism building sustainable research careers in the European Research Area" (2012), by the Expert Group on the Research Profession.
[28] In the Global survey, only PhD degree mobility is included.

Table 1: Definitions of mobility forms analysed in MORE3[29]

<table>
<tr><th></th><th></th><th>PhD mobility</th><th colspan="2">Post-PhD mobility</th></tr>
<tr><td></td><td></td><td>Mobility of researchers enrolled in a PhD programme during their R1 career stage[30]</td><td colspan="2">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.</td></tr>
<tr><td rowspan="4">Geographical or international mobility</td><td rowspan="4">Moving to another country</td><td>PhD degree mobility: Mobility with the purpose of obtaining the PhD in another country</td><td rowspan="2">>3 month mobility: Mobility with duration of 3 months or more</td><td>Employer mobility: Mobility including a change of employer</td></tr>
<tr><td>>3 month mobility during PhD: Mobility of three months or more during the PhD while still obtaining the PhD in the home country</td><td>Mobility without employer change</td></tr>
<tr><td>PhD students´ non-mobility: Never been PhD degree or during PhD mobile to another country</td><td colspan="2">Non-mobility: never been mobile to another country for >3 months at a time</td></tr>
<tr><td></td><td colspan="2"><3 month mobility: Mobility with duration of less than 3 months</td></tr>
<tr><td>Intersectoral mobility</td><td colspan="4">Moving to another sector, e.g. from a higher education institution to a private firm</td></tr>
<tr><td>Interdisciplinary mobility</td><td colspan="4">Having switched to another (sub)field during the academic research career[31]</td></tr>
<tr><td>Virtual mobility</td><td colspan="4">The use of web-based or virtual technology to collaborate internationally - based on tangible cross-border research collaboration</td></tr>
</table>

Source: IDEA Consult

[29] Short-term (<3 months) mobility among PhD students (R1) is out of the scope of the MORE3 study. It is hence not included in this survey.
[30] It is also possible that researchers who are pursuing a PhD are not enrolled in a PhD programme.
[31] Which is to be distinguished from interdisciplinary research as such.

Motives: escape, expected and exchange mobility

In MORE2, a number of 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, we have analysed 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 will 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' and is situated in-between the two concepts of escape and exchange mobility. Moreover, this information can point to important differences between disciplines, related to the discussion on effects of mobility per discipline.

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.

Policy-driven developments in concepts of career paths and working conditions

Recent developments in the R&D policy context in Europe have necessitated the revision of certain concepts about career paths and working conditions:

- Combined/part-time researcher positions;
- Dual careers/restart of careers;
- Measurement of researchers' achievements;
- Open Innovation, Open Science, Openness to the World;

The concepts of combined/part-time researcher positions, dual careers or career restarts, the measurement of researchers' achievements and open science in the 3Os framework (Open Science, Open Innovation, Open to the world)[32] are discussed in more detail in annex 3. In the development of the questionnaire for the MORE3 Global survey, we have taken into account each of these concepts to the extent relevant and complementary to what is already being monitored in other studies (such as the DG EAC study "Research Careers in Europe", cf. infra). This also means that these concepts are new when compared to MORE2 and analysed for the first time in this context.

[32] Commissioner for Research, Science and Innovation, Carlos Moedas, has put forth the three O's as a next chapter in the ERA and Innovation Union policy: Open Innovation, Open Science and Open to the World. Each of these are regarded as strategic priorities to foster research and innovation in Europe for the years to come.
Speech of 22 June 2015. http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm
Open Innovation, Open Science, Open to the World - a vision for Europe. Directorate-General for Research and Innovation. May 2016.

3.2.6. Target groups based on citizenship and mobility patterns

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[33]):

- TG1: EU researchers[34] currently working outside the EU;

  EU researchers, by citizenship, who are currently mobile[35] (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 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 note that EU and non-EU researchers currently working in the EU have been studied through another survey: the MORE3 HE Survey.

[33] 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.
[34] EU28 + 3 associated countries (Switzerland, Norway and Iceland).
[35] With mobility defined as "international mobility experience as a researcher after gaining their highest education qualifications (PhD or other)".

4. Methodology

This section gives an overview of the sampling and country focus followed by the distribution strategy of the Global survey. Subsequently the survey implementation, response rate and sample composition are discussed.

4.1. Sampling strategy and country focus

The sampling approach for the Global survey is characterised as 'convenience' sampling (similar to the MORE2 Extra-EU survey[36]). 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 4.2);
- Via the Euraxess Links (Officers), email addresses of researchers were obtained. These researchers were contacted via email, including a personalised link to the online survey;
- Via an open communication strategy, a non-personalised link to the online survey was distributed on the MORE3 website, EC websites and via intermediary organisations.

The Global survey is directed towards researchers currently working outside the EU; the survey is global in its outlook. A special emphasis was put on the (larger) countries that have an S&T agreement with the EU, on some countries associated to H2020 such as Turkey and Israel and on the ASEAN countries. Below an overview is provided of these countries. 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.

- (Large) countries with an S&T agreement[37]: Argentina, Australia, Brazil, Canada, Chile, China, Colombia, India, Japan, Mexico, New Zealand, (Russia), South Africa, (South Korea), United States;
- ASEAN: Singapore, Malaysia, Indonesia and Thailand;
- Other associated countries with H2020 (FP7): Turkey and Israel.

Box 1: Limitations of the sampling and strategy methodology

As indicated, this Global survey does not provide representative data at the level of the countries covered. As there are no weights applied, 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.

[36] IDEA Consult et al. (2013) Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. EXTRA-EU report.
[37] http://ec.europa.eu/research/iscp/index.cfm?pg=countries

4.2. Distribution strategy

Different communication channels were used in order to reach out to as many researchers outside the EU as possible. The multi-channel strategy includes a direct contact approach and an indirect contact approach:

- In the direct contact approach, researchers received a personalised email with a link to the Global survey.
- In the indirect contact approach, a link to the Global survey was included on the website of MORE3 and the EC. 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 2).

Table 2: Overview table 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.
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. Due to the open approach, it is possible that non-HE researchers responded to the survey.

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):

- 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 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 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.

In MORE2, the main focus of this approach was on US researchers. The aim of the MORE3 study is broader and therefore the strategy entailed a broader outreach (see also section 4.1).

Email to researchers via Euraxess Links officers

Euraxess Links is a networking tool for the community of European Researchers abroad[38]. 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[39]. Euraxess Links was launched in 2006 in the US. Now there are Euraxess links officers in North America, Japan, China, India, ASEAN (Singapore, Malaysia, Indonesia and Thailand) and Brazil.

Via the Euraxess Links officers, the contact details (email) of researchers who are connected with Euraxess Links countries were obtained 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 we did not have control over who participates to the study and we were 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 (the population of researchers in the world).

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

- A dedicated website on the MORE3 project with information on the context and set-up of the study was developed and launched as part of the first phase of the MORE3 project: http://www.more3.eu. The link to the online Global survey was placed visibly on the main page of the website so that all website visitors could easily access the survey. In addition, if researchers had questions on the survey or inquired more information on the project they could contact the project team via the designated email address: surveyGLOBAL@more3.eu.
- The open weblink has been communicated via the EC's own communication channels, more specifically Euraxess Worldwide and the Marie Skłodowska-Curie website.
- 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.
  - Euraxess Worldwide;
  - National research funding agencies;
  - The EU centres of excellence around the world.

Snowballing

In addition to the different approaches explained above, also "snowballing" was 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).

4.3. Survey implementation and response

4.3.1. Survey implementation

The survey was launched on the 14th of March 2017 and was closed on the 5th of July 2017. 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 89 questions and was available in English. The average time needed to complete the survey was 19 minutes and 44 seconds. More information is provided in Annex 4.

4.3.2. Response

The entire panel size (collected email addresses) consists of 305,128 people identified by the aforementioned sampling method:

- 8.3% of the emails bounced;
- 0.6% of the emails were refused;
- 12.4% opened the invitation email.

The survey has a total response of 2,876 respondents of which 2,659 were obtained from the panel and 217 from the non-panel approach.

Table 3: Survey response

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

Source: MORE3 Global survey (2017)

A number of responses came from researchers currently working in Europe or from people who did not consider themselves to be researchers (475 respondents in total). These responses were outside of the scope of this study and were thus not included in the analysis.

4.3.3. Sample composition

Researchers were ex-post classified 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 4 below.

213 responses were obtained from EU researchers who have been mobile more than 10 years ago 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 Extra-EU survey and the MORE3 EU HE survey).

Table 4: Survey response rate 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	417	(81)	(132)*	630	32.5%
TG2: Non-EU researchers who have worked abroad in the EU in the last ten years	263			263	13.6%
TG3: Non-EU researchers who have worked abroad but not in the EU	178			178	10%
TG4: Non-EU researchers who have never worked abroad		211	658	869	44.8%
Total	**858**	**292**	**790**	**1,940**	
Responses outside the scope				213 (81+132)	
Total sample				**1,727**	

Source: MORE3 Global survey (2017)
*Note: There were 132 researchers currently working abroad who have never been mobile that have an EU nationality. These cases can refer to very diverse circumstances. People with double citizenship (EU and non-EU) but who have never been to the EU. People who moved to another country to do their Master degree are not considered mobile in this study. People who were born outside Europe or that moved as a child but retained EU nationality would also be included in this group. Due to the heterogeneity of this group, these researchers are not taken into account for the analysis.

In the sample of the MORE3 Global survey, the researchers were asked to indicate their country of citizenship, residence, current employment and country where they obtained or will obtain their PhD. Table 5 provides an overview of the overlap between the different reference countries. This percentage of overlap is high between the different countries; specifically, the overlap between country of current employment and country of residence (98%) is high. Therefore, we focus the analysis on country of current employment, country of citizenship and country of PhD (consistent with the MORE3 EU HE survey).

For the analysis of the responses, countries are often 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 (tables in annex 5 for more detail). A more precise comparison (i.e. by countries) is not possible for most countries given the too low observation numbers.

Table 5: Overlap between reference countries in the MORE3 Global survey

	Country of citizenship	Country of residence	Country of current employment	Country of PhD
	(n = 1,727)	(n = 1,727)	(n = 1,727)	(n = 1,615)[40]
Country of citizenship[41]	-	73.9%	73.1%	70%
Country of residence	73.9%	-	97.6%	58.1%
Country of current employment	73.1%	97.6%	-	57.8%
Country of PhD[42]	70%	58.1%	57.8%	-

Source: MORE3 Global survey (2017)

An overview of country of citizenship per target group is provided in **Error! Not a valid bookmark self-reference.**. The respondents of the Global survey consist of 417 EU citizens and 1,310 non-EU citizens. The majority of responses were obtained from researchers originating from Anglo-Saxon countries.

Table 6: Distribution of respondents by countries of citizenship and target groups

Country of current citizenship	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
Total					
	417	**263**	**178**	**869**	**1,727**
European citizenship					
	417	**0**	**0**	**0**	**417**
Austria	14	0	0	0	14
Belgium	19	0	0	0	19
Bulgaria	2	0	0	0	2
Cyprus	2	0	0	0	2
Czech Republic	1	0	0	0	1
Denmark	4	0	0	0	4
Finland	2	0	0	0	2
France	52	0	0	0	52
Germany	55	0	0	0	55
Greece	11	0	0	0	11
Hungary	2	0	0	0	2
Iceland	1	0	0	0	1
Ireland	15	0	0	0	15
Italy	55	0	0	0	55
Malta	1	0	0	0	1
Netherlands	23	0	0	0	23

[40] 112 respondents indicated that they did not obtain a PhD or that they are currently not working on a PhD.
[41] Double citizenship is possible (195 respondents indicated that they have dual citizenship).
[42] 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.

Norway	3	0	0	0	3
Poland	13	0	0	0	13
Portugal	11	0	0	0	11
Romania	5	0	0	0	5
Slovakia	2	0	0	0	2
Slovenia	1	0	0	0	1
Spain	34	0	0	0	34
Sweden	2	0	0	0	2
Switzerland	13	0	0	0	13
United Kingdom	74	0	0	0	74
Non-European citizenship					
	0	**263**	**178**	**869**	**1,310**
Argentina	0	8	7	19	34
Australia	0	40	18	128	186
Brazil	0	27	16	66	109
Canada	0	40	21	114	175
Chile	0	7	9	30	46
China	0	8	3	11	22
Colombia	0	18	7	49	74
India	0	14	2	28	44
Indonesia	0	3	3	3	9
Israel	0	6	9	12	27
Japan	0	5	1	11	17
Malaysia	0	0	1	6	7
Mexico	0	13	7	32	52
New Zealand	0	20	11	47	78
Russia	0	8	5	42	55
Singapore	0	0	2	2	4
South Africa	0	6	7	42	55
South Korea	0	0	3	5	8
Thailand	0	3	0	8	11
Turkey	0	8	7	39	54
United States	0	14	26	110	150
Other	0	15	13	65	93

Source: MORE3 Global survey (2017)

A more detailed overview of the respondents per country of current employment and target group is provided in Table 7. The majority of responses were obtained from researchers currently working in Australia (17%), the United States (14%) and Canada (13%).

Table 7: 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
Argentina	4	7	8	19	38
Australia	94	42	26	135	297
Brazil	13	27	14	65	119
Canada	48	34	26	114	222
Chile	12	8	8	30	58
China	11	9	2	8	30
Colombia	7	20	6	48	81
India	3	8	1	19	31
Israel	8	7	9	15	39
Japan	48	7	3	11	69
Mexico	3	13	10	35	61
New Zealand	44	25	14	61	144
Russia	2	6	5	40	53
South Africa	11	9	14	53	87
Turkey	1	8	4	39	52
United States	91	17	15	113	236
Other	17	16	13	64	110
Total	**417**	**263**	**178**	**869**	**1,727**

Source: MORE3 Global survey (2017)

Box 2: Comparison with MORE2 Extra-EU survey

For Task 1 of the study, the MORE3 EU HE report, a comparison was made between the results of the MORE2 EU HE survey and the MORE3 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.

Such a comparison between the two surveys is not possible for the Global survey, primarily because this survey is not based on a representative sample of researchers currently working outside the EU. In addition, the scope of the MORE3 Global survey is much broader than it was in MORE2. While in the MORE2 extra-EU survey the main focus was on US researchers, the scope now is broadened with (large) countries with which the EU has an S&T agreement, ASEAN countries, as well as other Associated Countries with H2020 and FP7. A comparison of the geographical spread in the MORE2 and MORE3 Global survey is provided in the table below.

Table 8: Comparison MORE2 and MORE3 response per country of current employment

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)	
United States	55.3%	Australia	17.2%
Australia	10.9%	United States	13.7%
Turkey	6.7%	Canada	12.9%
Brazil	3.6%	New Zealand	8.3%
Israel	2.3%	Brazil	6.9%
Russia	1.6%	South Africa	5.0%
Mexico	1.4%	Colombia	4.7%
Canada	1.3%	Japan	4.0%
India	1.3%	Mexico	3.5%
Japan	1.2%	Chile	3.4%
Croatia	1.2%	Russia	3.1%
Other countries	13.3%	Turkey	3.0%
		Israel	2.3%
		Argentina	2.2%
		India	1.8%
		China	1.7%
		Other countries	6.4%

Source: MORE2 Extra-EU survey (2013) and MORE3 Global survey (2017)

5. Characteristics of researchers and career paths

As in the MORE3 EU HE survey, this chapter follows a sequential structure with respect to researchers' characteristics and careers, with however less detail due to the more limited nature of the data gained at a global scale. 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. In addition to this main information, detailed information about the dual positions of the respondents to the survey is provided.

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. 80% of researchers in the sample have obtained a PhD and a further 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. Thus, one central task in this section is to evaluate whether researchers perceive their recruitment process as transparent, fair and merit based. Questions on recruitment conditions and which factors play a role in recruitment are asked and analysed. Recruitment conditions might play a role in mobility decisions and career planning. 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' perception of whether career paths are clear and transparent, and of whether career progression is based on merit is analysed. Moreover, researchers' perception of skills that are the driving factors to work one's way up are examined.

As these sections will 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 3: 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
  - Do researchers perceive their recruitment process as transparent, fair and merit-based?
  - 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?
  - How confident are researchers about their future prospects for their research careers?

5.1. Profile characteristics

5.1.1. Sociodemographic information

Analogous to the MORE3 EU HE survey, the MORE3 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 research (FOS) and their career stage are provided. In what follows, we present an overview of the key sociodemographic characteristics in the next paragraphs (and in Table 9). 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[43]. Together TG1 and TG2 constitute 39% of the sample (Table 9). About 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 (10%).

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 45.6 years, the majority is living together with a partner.

According to the self-classification of respondents in terms of field of science, nearly one-third works in social sciences, one-fifth in natural sciences and 18% in engineering and technology. Fewer researchers work in medical sciences, humanities and agricultural sciences. Researchers were also asked to select their current career stage[44], the largest share in the sample are established researchers (R3: 39%), followed by leading researchers (R4: 24%). The percentage of recognised and first stage researchers is lower (R2: 21%; R1: 15%).

Due to the sampling method - based on "convenience sampling" in the absence of a reliable sampling framework[45] - it is not possible to judge whether the sample is truly

[43] For more details on the four subgroups (TG1 – TG4) see section 3.2.6 "Target groups based on citizenship and mobility patterns" and section 4.3.3 "Sample composition",
An overview of country of citizenship per target group is provided in **Error! Not a valid bookmark self-reference.**. The respondents of the Global survey consist of 417 EU citizens and 1,310 non-EU citizens. The majority of responses were obtained from researchers originating from Anglo-Saxon countries.

Table 6.

[44] For more details on the definition of the four career stages see section 3.2.3.

[45] 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 4 and annex 4.

representative or not[46]. What can be said is that these are the researchers who could be reached through the channels used.

Table 9: Sociodemographic information of researchers currently working outside the EU

Characteristics of researchers currently working outside the EU *All researchers (n=1,727)*								
	Per target group		**Per gender**		**Per FOS**		**Per current career stage**	
2017 (n=1,727)	TG1:	24.1%	F:	39.8%	AGR:	3.8%	R1:	15%
	TG2:	15.2%	M:	60.2%	ENG:	18.4%	R2:	21.5%
	TG3:	10.3%			HUM:	10.1%	R3:	39.1%
	TG4:	50.3%			MED:	14.8%	R4:	24.4%
					NAT:	20.4%		
					SOC:	32.5%		

Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- 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 asked to indicate their country of residence, current employment and citizenship.

Country of residence: Among the 53 countries of residence named by all respondents of the sample, Australia, the United States and Canada are the ones most frequently named, followed by New Zealand and Brazil (see Figure 111 in annex 6). Within the group of EU researchers currently working outside the EU (TG1) the most favoured countries of residence are Australia (94) and the United States (79), followed by Japan, Canada (both: 48) and New Zealand (43).

Country of current employment: Among the 48 country of current employment indicated by all respondents of the sample, Australia, the United States and Canada are the ones most frequently named, followed by New Zealand and Brazil (see Table 7 in section 4.3.3). As indicated in section 4.3.3, 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 81 countries of citizenship[47] named by all respondents of the sample, again Australia, Canada and the United States, followed by Brazil and New Zealand are those most frequently named (see Figure 112 in annex 6). Not surprisingly, within the group of EU researchers currently working outside the EU (TG1), many come from the largest countries: United Kingdom (74), Germany (55), Italy (55), France (52) and Spain (34). The analysis of the non-EU respondents who were mobile, but not to the EU (TG3) shows again that the majority originates from the five above-mentioned countries that dominate the total sample (Australia, Brazil, Canada,

[46] There are no global benchmark data available which would allow one to judge the representativity of the sample.
[47] 195 indicated that they have a double citizenship.

New Zealand and the United States). Among the target group TG2 (Non-EU researchers who have worked in the EU in the past) the top 6 countries of citizenship are Australia and Canada, Brazil, New Zealand, Colombia and the United States.

Due to the sampling strategy of this work[48] the distribution cannot be considered representative of the real proportions of the populations outside the EU.

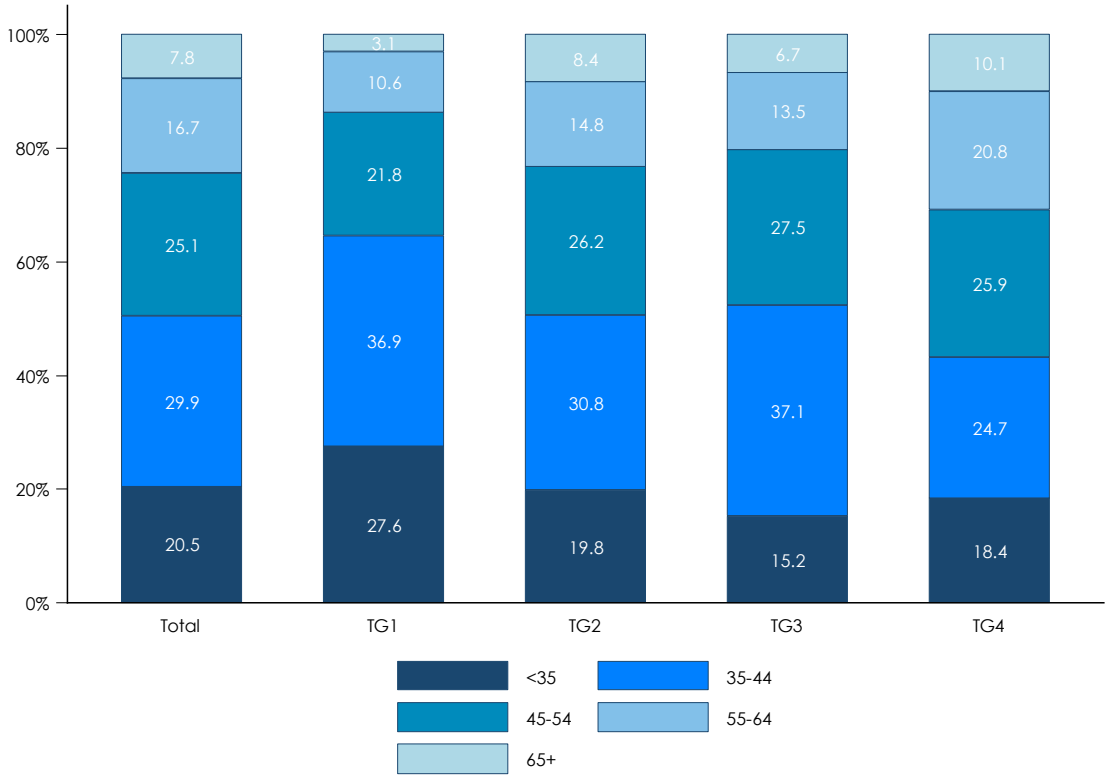
Age structure: On average, researchers that participated in the MORE3 Global survey are 46 years old. One-fifth of the total sample of researchers currently working outside the EU is younger than 35, and less than one-tenth is older than 64. The largest age group (30%) is that comprised of researchers between 35 and 44 years old, followed by the 45 - 54 year olds (25%).

Figure 3 shows that the age distribution differs across the target groups. The share of young researchers (less than 35) is much higher among the subgroup of EU researchers currently working outside the EU (T1: 28%), compared to the other three target groups.

The opposite is the case for researchers older than 64 (TG1: 11%) or the group of 55 – 64 years old (TG1: 3%). In the group of non-mobile non-EU researchers (TG4) nearly one third (30%) is older than 54 (versus 14 in TG1), and more than half of the researchers (57%) are older than 44 years, whereas in the subgroup of EU researchers currently working outside the EU (TG1) researchers older than 45 sum up to a share of just 36%. The different age distribution is also reflected in the average age by target group. Within the group of EU researchers currently working abroad, the average age of 42 years is clearly below the other target groups (both TG2 and TG3: 46 years, T4: 47 years). To a certain extent, the lower average age in TG1 might be due to the fact that researchers in TG1 are only required to be mobile at the point of taking the survey, whereas researchers in TG2 were mobile in the past and then moved back outside the EU, so they were mobile at least twice.

[48] For details see section 4 on the "Methodology".

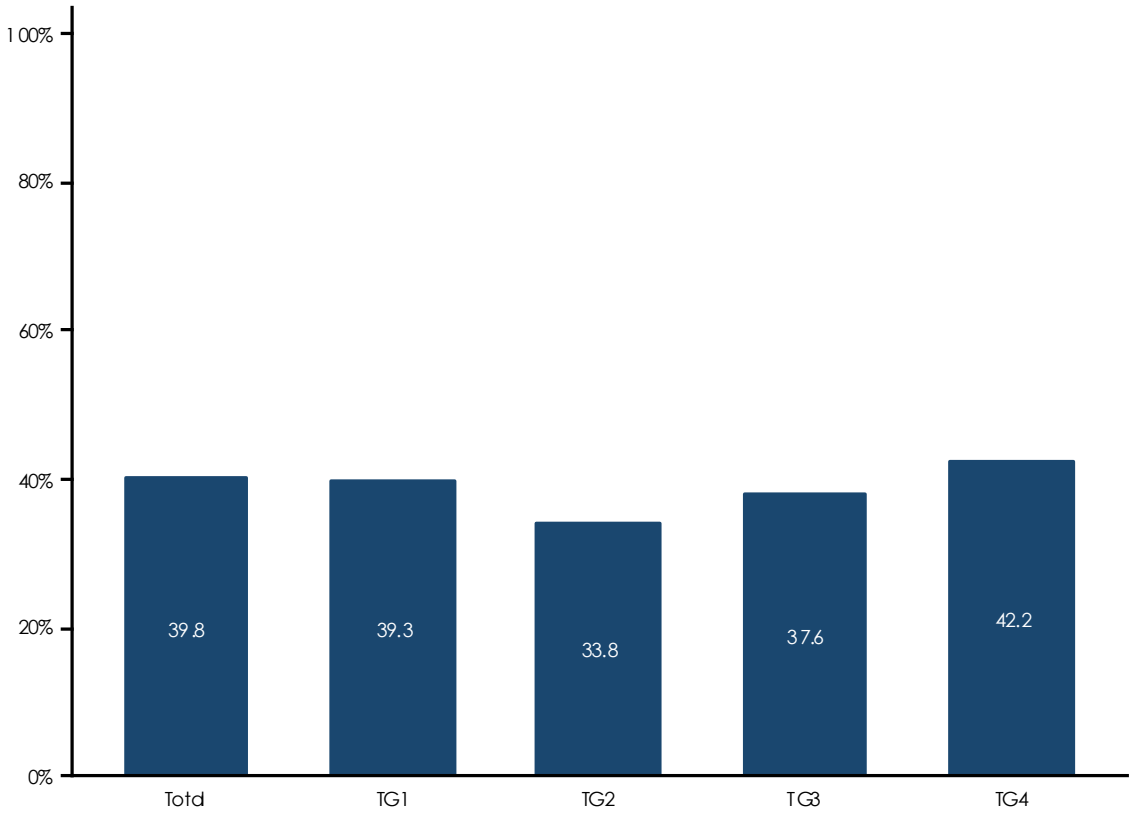
Figure 3: Age structure and target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 3: "What is your year of birth"

Gender: About 40% of all researchers in the sample currently working outside the EU are female. Figure 4 gives an overview of the distribution by gender over the four target groups. Woman are less represented in the group of non-EU researchers who have worked in the EU in the past (34% in TG2 as compared to the average share of 40%). One possible explanation is that TG2 consist of a larger group of researchers in engineering and technology (see later in Figure 7) where the share of female researchers is lower (Figure 8). Among the non-mobile researchers (TG4), female researchers account for 42%, which is above the average and clearly above TG2. Overall, the share of female researchers is slightly lower in the group of mobile researchers than in the groups of non-mobile researchers.

Figure 4: Female representation across target groups



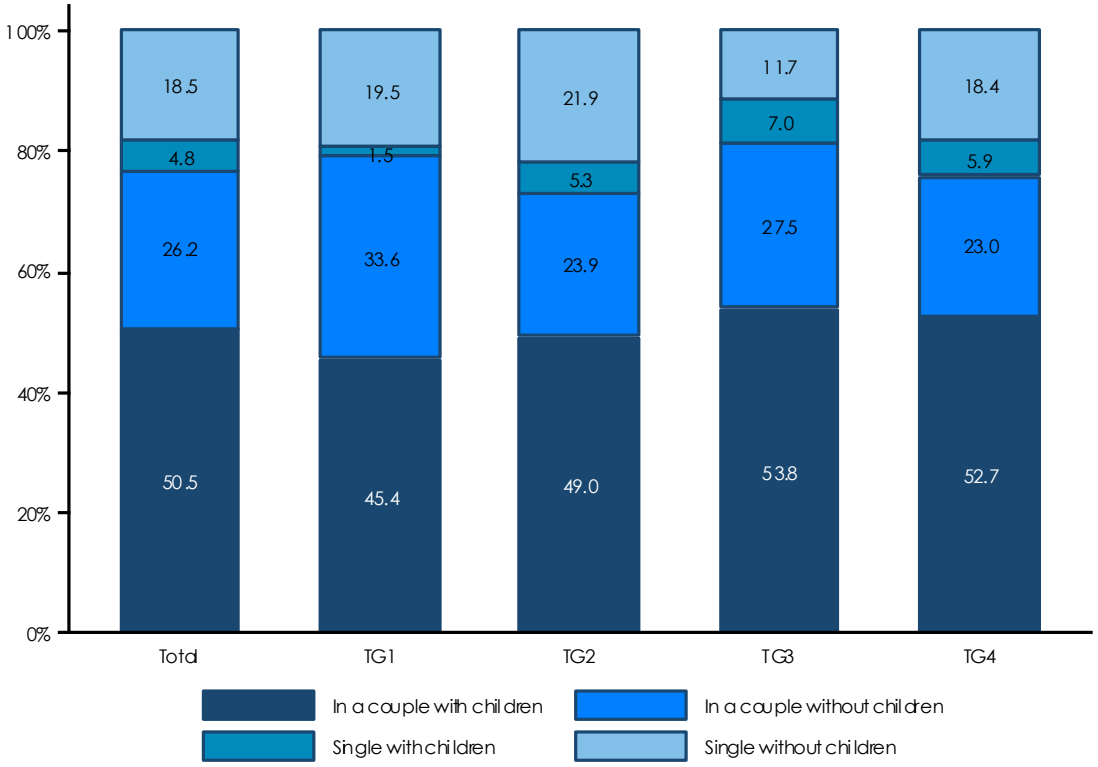
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 2: "What is your gender"

Looking at the same information the other way round (Figure 113 in annex 6) confirms the differences in terms of gender composition across the four target groups. Among all female researchers currently working outside the EU, the subgroups of non-EU women who have worked in the EU in the past is clearly smaller (TG2: 13%) than among all male researchers (TG2: 17%). The opposite is the case for the non-mobile target group. No large differences between female and male researchers can be seen for the share of the two target groups T1 and T3. Male researchers in the sample are therefore slightly more mobile, and more of them have worked in the EU in the past compared to the sample of female researchers currently working outside the EU.

Family composition: Researchers were asked to indicate their marital status. 5% preferred not to disclose this information. Just 22% are living as a single household (5% as a single with children), whereas the majority (73%) is living with a partner.

In the total sample of all researchers who did answer the questions referring to their marital status, again more than one-fifth are living as singletons. 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) less often have children (either as a couple or as a single) compared to non-EU researchers (Figure 5).

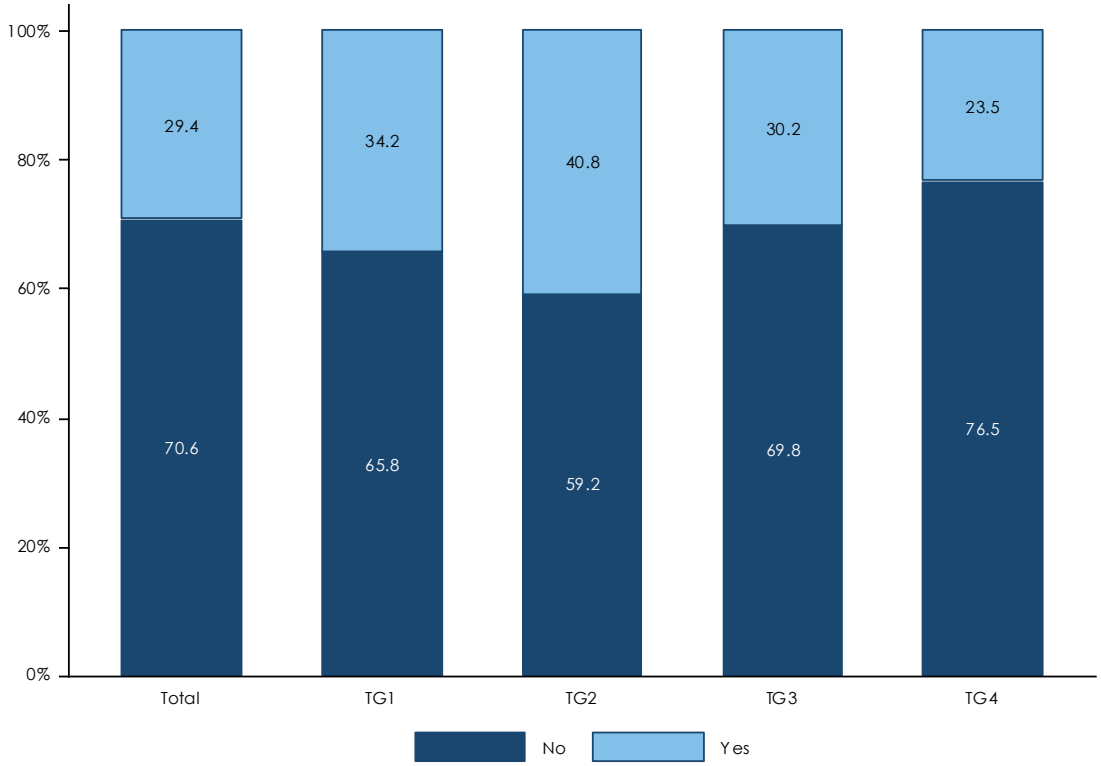
Figure 5: Marital status and target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,637)
- TG1: EU researchers currently working outside the EU (n=399)
- TG2: Non-EU researchers who have worked in the EU in the past (n=247)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=171)
- TG4: Non-EU researchers who have never worked abroad (n=820)
- Respondents who preferred not to disclosure 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 additionally disclosed the information on whether their partner works as a researcher, 29% have a researcher as partner. In the two intercontinentally mobile target groups T1 and T2, the share of researchers living together with a researcher as a partner (T1: 34%, T2: 41%) is clearly higher than for the non-mobile target group (T4:24%).

Figure 6: Partner status by target group

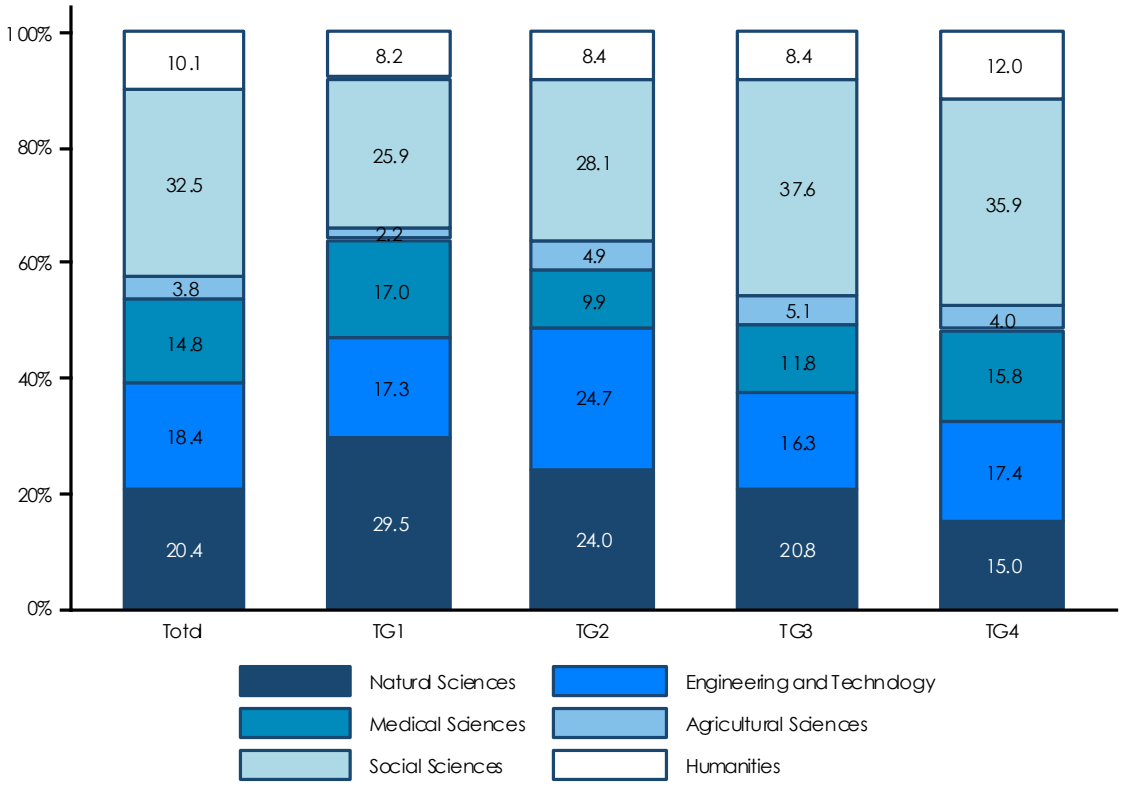


Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,248)
- TG1: EU researchers currently working outside the EU (n=313)
- TG2: Non-EU researchers who have worked in the EU in the past (n=179)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=139)
- TG4: Non-EU researchers who have never worked abroad (n=617)
- Only researcher who indicated, that there 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 MORE3 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 3.2.2). 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 (32%), the smallest to Agricultural Sciences (4%). Within the group of EU researchers currently working outside the EU (TG1), Natural Sciences and Medical Sciences have a prominent weight, compared to the average. Whereas in the group of non-EU researcher mobile to the EU in the past (TG2), Engineering and Technology Sciences gains a higher share than in the total sample, Social Sciences are more dominant within TG3 (non-EU researchers who have worked abroad but not in the EU).

Looking at the same information the other way round shows again differences referring to the mobility across FOS. The field of science with the highest rate of non-mobile researchers is Humanities (TG4: 59%), the one with the highest share of mobile researchers Natural Sciences (sum T1 to T3: 63%), followed by Engineering and Technology Sciences (T1 to T3: 52%). In the former case, the group of EU researchers currently working outside the EU (TG1) stands out (reaching above the average shares; TG1-share: 35% in Natural Sciences, compared to 24% in the total sample), whereas in the latter case the subgroup of non-EU researchers mobile to the EU shows above average results (TG2-share: 21% in Engineering Sciences; compared to 15% in the total sample).

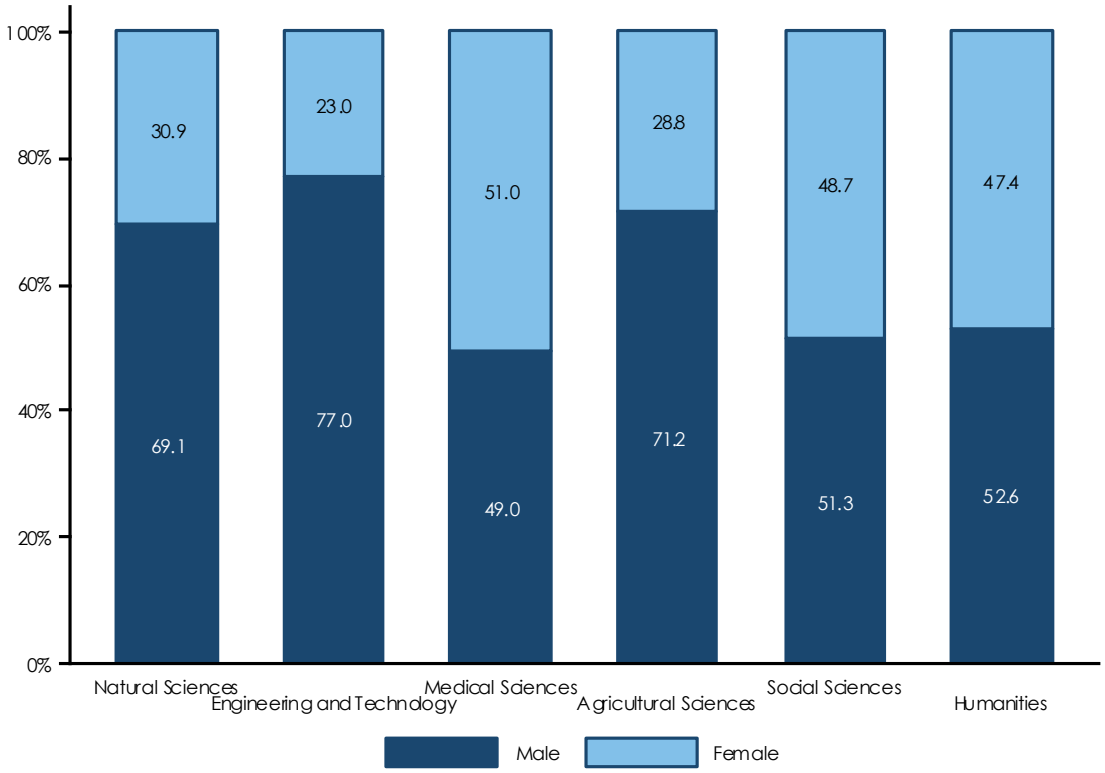
Figure 7: Fields of science by target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- 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. The most balanced disciplines are Medical Sciences, Social Sciences and Humanities, in which 51%, 49% and 47% of the researchers are women. However, the imbalance is found in Engineering and Technology (23% female); also in the Agricultural (29%) and in Natural Sciences (31%) the presence of women is clearly lower.

Figure 8: Differences in gender across fields of science



Source: 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?"
- (n=1,727)

Career stage: Researchers were asked to select their current career stage from the following four stages: first stage researcher (R1), recognised researcher (R2), established researcher (R3) and leading researcher (R4). In the total sample, established researchers constitute the largest group (39%). Together with the leading researchers they represent nearly two-third of the sample. First stage researchers (R1) constitute the smallest part of the sample (15%)[49].

Figure 114 (in annex) shows the distribution of researchers over career stages per countries[50]. While in certain countries shares of researchers in some career stages are much larger than in others, in other countries the different career stages are approximately comparable in size (for example, India). 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 of the "pyramid".

When comparing the four target groups by researchers' career stages, one can observe that among the non-EU researchers mobile to the EU, the share of leading researchers

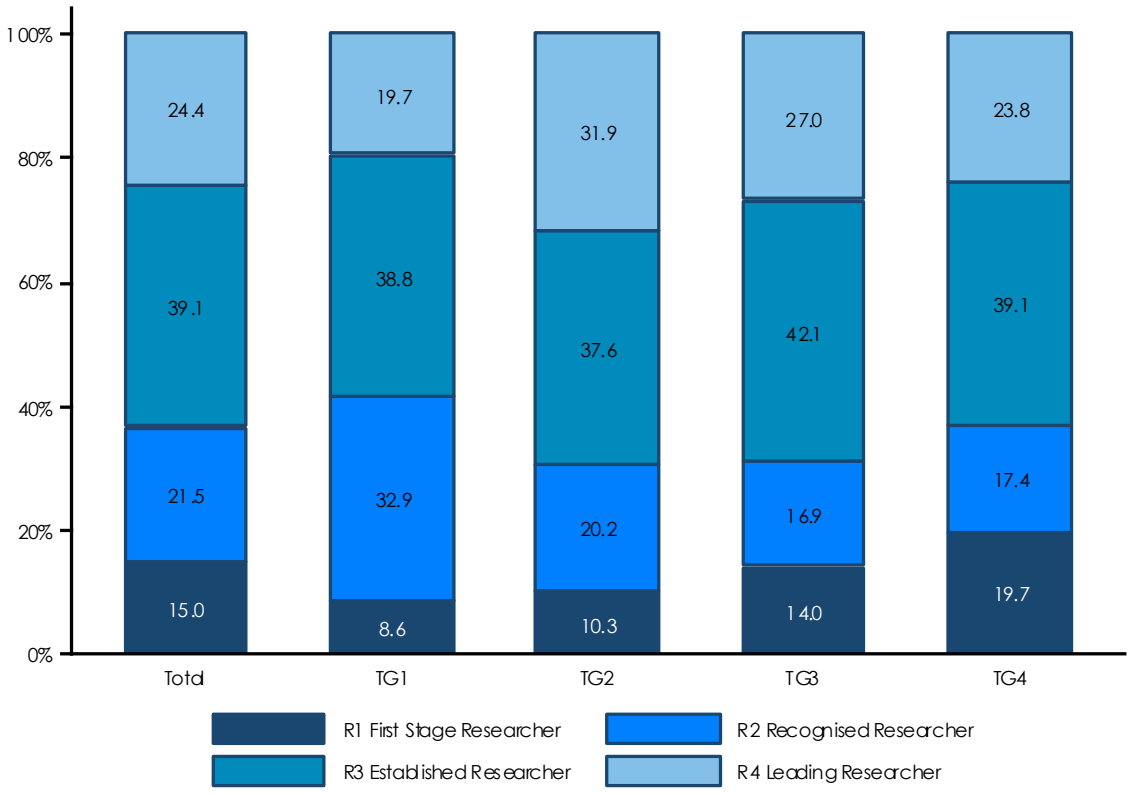
[49] The majority of responses are obtained via contacts of the web-based email generation process. R1 researchers are often underrepresented via this method, as R1 researchers are overall more difficult to identify/detect at the website of higher education institutions. This is primarily because R1 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).

[50] Only countries with n > 30 are included.

(R4) is rather high (32%), whereas just 20% of the EU researchers currently working abroad self-selected themselves as leading researchers. This might, to a certain extent, be due to the lower average age of the EU researchers currently working abroad and the fact that researchers in TG1 are only required to be mobile at the point of taking the survey, whereas researchers in TG2 were mobile at least twice.

The share of first stage researchers (R1) is the lowest in the subgroup of EU researchers abroad (9%). This is accompanied by a relatively high share of recognised researchers among the EU researchers currently working abroad (see Figure 9).

Figure 9: Target groups by researchers' career stages

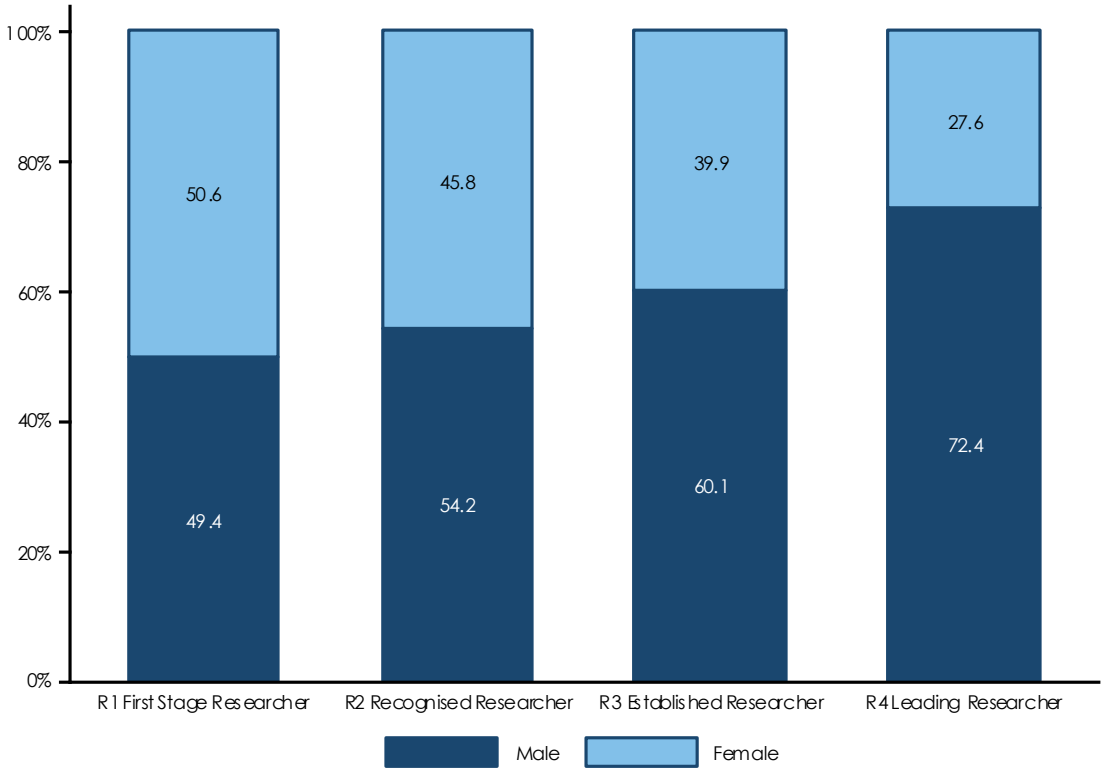


Source: MORE3 Global survey (2017)
Notes:

- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 10: "In which career stage would you currently situate yourself?"

There is no evidence in the results of the MORE3 Global survey that the glass ceiling for women to reach higher career stages has been smashed. Among R4 researchers, only 28% of the total sample are female, whereas female representation is clearly higher in lower career stages (R3: 40%; R2: 46%) and reaches the highest share in the lowest career stage, where more than 50% of all first stage researchers (R1) are women. Looking at the same information the other way round confirms the gender difference with respect to career stages. Just 17% of all female researchers in the sample self-selected themselves as leading researcher (R4), compared to 29% of all men (see Figure 114 in annex). Whereas the proportion of first and second career stage (R1 or R2) is clearly higher among female (44%) researchers compared to the male respondents (32%).

Figure 10: Differences in gender across career stages



Source: 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?"
- (n=1,727)

Overall, while our sample is not representative at the country level, several characteristics are roughly in line with sociodemographics observed in other studies (MORE3 HE survey) or statistics (OECD statistics on researchers). This concerns e.g. 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).

5.1.2. 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[51]. This section presents results about the situation of researchers currently in a dual position which may facilitate such knowledge spillovers.[52] A dual position is defined as employment in more than one institution or organisation at

[51] 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."

[52] Although dual positions are only one way to achieve knowledge spillovers.

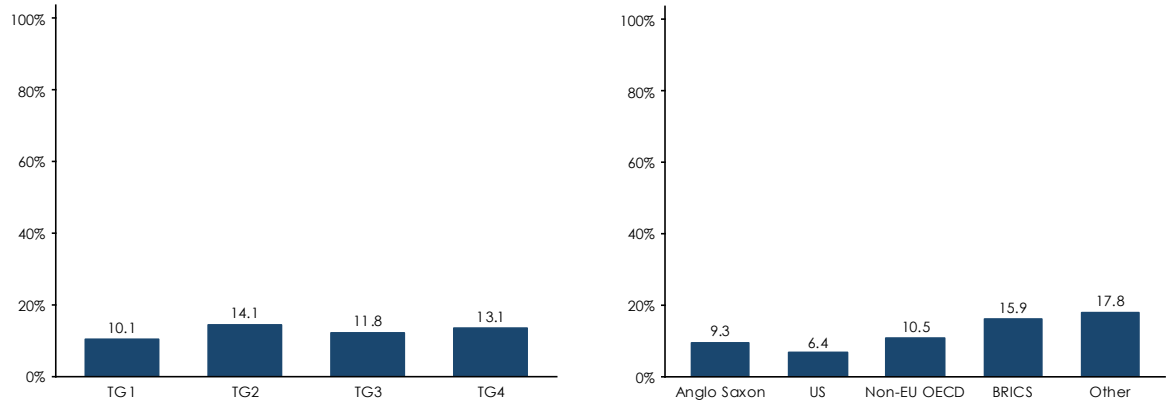
the same time (either combined positions in more than one HEI or combined positions in a HEI and in another sector).

Just a small proportion of all the respondents to the Global Survey (researchers currently working outside the EU) have a dual position (12%), either inside or outside the higher education sector.

Target groups: Figure 11 shows that there are no large differences across the four main target groups in this area: the largest difference (only 4 percentage points) is found between EU researchers currently working outside the EU (TG1: 10% holds a dual position) and non-EU researchers who have worked in the EU in the past (TG2: 14%). However, this difference is too small to enable extraction of meaningful or generalisable conclusions.

Country of current employment: The differences between country groups of current employment are somewhat more prominent (see second graph of Figure 11; and Table 50 in annex 5 for the definition of these county groups of employment). Among researchers currently employed in the US just 6% state that they are in a dual position, whereas in the group of BRICS countries the share of researchers employed in a dual position is clearly higher (16%). This might be due to lower satisfaction with working conditions in the BRICS. For instance, the satisfaction with salaries is generally lower in BRICS countries. Researchers' perception of remuneration in section 6.2 shows that only 12% of researchers working in BRICS nations think that they are well-paid. However, having a dual position need not correspond with better or worse working conditions. Dual positions might be seen at the level of directors – chairing a non-academic organisation may go hand in hand with being a professor - or professors at universities for applied sciences keep their position in industry, particularly to ensure their close links to industry. Therefore a double position need not be a matter of employment conditions but it could also be a matter of choice related to motivations to combine theory and practice.

Figure 11: Share of researchers currently in a dual position by target groups and by current employment country groups



Source: MORE3 Global survey (2017)
Notes:

- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 16: "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"
- This is a broader definition of "dual position" than in MORE2 and, thus results here cannot be compared with MORE2 values. In MORE2 it was only asked if researchers combine employment in the HE sector with a position outside the HE sector.

Career stage: Questions on dual positions were asked to all four career stages in the MORE 3 Global survey[53]. Across career stages, researchers are roughly equally likely to engage in a dual position (R1: 14%, R2: 12%, R3: 11%, R4: 14%). As outlined, this may hide differences in position, with R4 researchers co-chairing institutions in different sectors and R1 or R2 researchers forced to take on a dual position to make ends meet. Within the group of men the share of those employed in a dual position is similar (13%) to that among female researchers (12%,

Table 53 in annex 6).

Current sector of employment: The survey questioned researchers on the sectors where they work as researchers and on whether they have a dual position. In the latter case researchers were asked to state also the sector of their second position. Table 10 shows the results of both researcher groups with and without a dual positon, however in the latter case just the main position is used. The large majority of the total sample is employed at a university or in a higher education institution: on average 88% of all researchers in the sample mentioned the university or a higher education institution 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: 92%) and the lowest share among all non-mobile non-EU researchers (TG4: 86%), compared to the average. 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 4% in TG3 to 9% in TG1). 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 3% (TG1) to 4% in the group of EU researchers currently working outside the EU (TG1).

Table 10: Distribution of researchers across sectors of current employment by target group

	Total	TG1	TG2	TG3	TG4
University or higher education institution	87.6%	86.6%	89.7%	92.1%	86.4%
Public or government sector, e.g. research-performing organisation	7.1%	9.4%	5.3%	3.9%	7.2%
Private, not-for-profit sector, e.g. research foundation, NGO	1.7%	1.4%	1.5%	1.7%	2.0%
Private industry: Large firm	0.9%	1.7%	0.4%	0.6%	0.8%
Private industry: SME or start-up	0.9%	0.7%	1.1%	1.1%	0.9%
Other	1.7%	0.2%	1.9%	0.6%	2.6%

Source: MORE3 Global survey (2017)
Notes:

- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 17: "What is your current sector of employment as a researcher?" and question 18: "You are currently in a dual position whereby you are employed in more than one institution/organisation at the same time. Can you please indicate the sector of your 2 main research position?"
- In case of researchers in dual positions the main position is used (question 18).

[53] In the MORE3 EU HE survey only R2-R4 researchers answered the question on dual positions.

Sectors of dual positions: As indicated, 12% of the respondents hold a dual position. Three-quarters of all researchers in a dual position indicated the university or a HEI as their main position. Although the share is lower than in the total sample of all researchers (not restricted just to those in dual positions), the opposite is the case for the public or government sector. For researchers in dual positions (Table 11) the public sector has higher importance as main sector of employment (14%) than in the total sample (7%, Table 10).

Table 11: Number of researchers by main position of current employment in a dual position and by target group

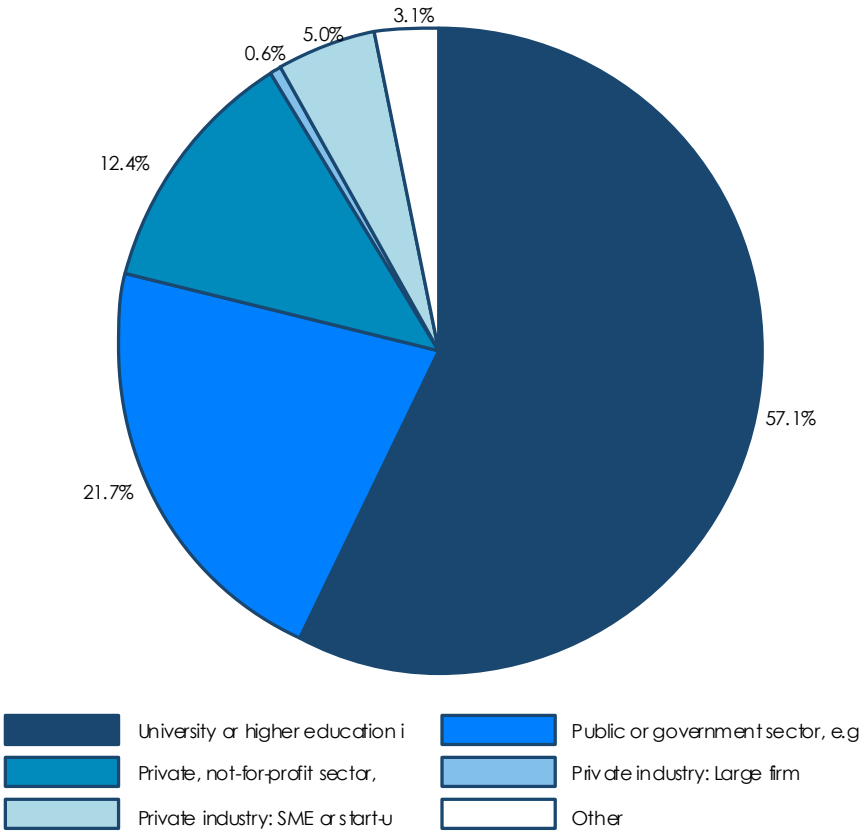
	Total	TG1	TG2	TG3	TG4
University or higher education institution	161	33	30	17	81
Public or government sector, e.g. research-performing organisation	31	6	4	2	19
Private, not-for-profit sector, e.g. research foundation, NGO	9	1	2	1	5
Private industry: Large firm	3	-	-	1	2
Private industry: SME or start-up	5	2	-	-	3
Other	5	-	1	-	4
All sectors	214	42	37	21	114

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=214)
- TG1: EU researchers currently working outside the EU (n=42)
- TG2: Non-EU researchers who have worked in the EU in the past (n=37)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=21)
- TG4: Non-EU researchers who have never worked abroad (n=114)
- Based on question 18: "You are currently in a dual position whereby you are employed in more than one institution/organisation at the same time. Can you please indicate the sector of your 2 main research position?" (Main position/second position)
- This is a broader definition of "dual position" than in MORE2 and, thus results here cannot be compared with MORE2 values. In MORE2 it was only asked if researchers combine employment in the HE sector with a position outside the HE sector.
- Just the main position is used.
- Due to low n value in TG3 just absolute frequencies and no shares are shown.

Restricting the sample to cases of dual positions where the university or HEI is the main position (see

Figure 12) shows that most of these researchers combine the HE sector as the primary sector with another university or HEI. More than one-fifth combine the HEI as the main position with an employment at the public or government sector and 18% with an employment in the private sector (non-profit: 12%, SME or start-up: 5%, large firm less than 1%).

Figure 12: Distribution of second position of current employment in a dual position if main position is at a university/HEI



Source: MORE3 Global survey (2017)
Notes:
- Just researchers in dual positions where the main position is university.
- Based on question 18: "You are currently in a dual position whereby you are employed in more than one institution/organisation at the same time. Can you please indicate the sector of your 2 main research position?"
- (n=161)

Looking at the number of combinations of the HE sector with positions in another, non-HE sector[54] – regardless of whether the HEI is the main or second position – shows that more than half (114[55]) of all 214 researchers currently employed in a dual position combined a HE position with an non-HE position. However, n-values are – especially for TG3 - too low to extract meaningful additional analysis across target groups from the results.

[54] Additionally one should keep in mind that the questions on dual positions were answered by researchers at all career stages (R1-R4) in the MORE3 Global survey. Whereas in the MORE3 EU HE survey only R2-R4 researchers answered the question.

[55] This corresponds to 7% of the total sample. However one has to keep in mind that citizenship requirements in public institutions might hinder non-citizen movers to work in public institutions.

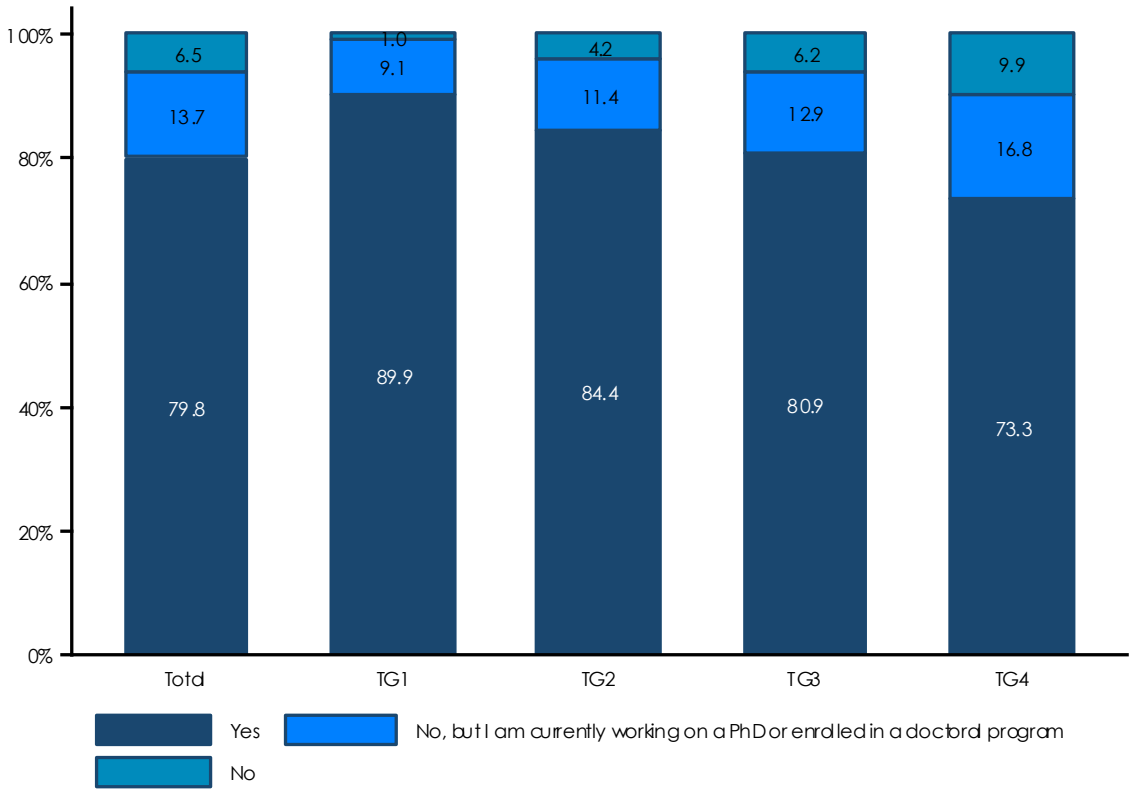
5.2. Education and training: PhD studies

By comparison with the MORE3 EU HE survey, the MORE3 Global survey included fewer questions on PhD studies. Questions were asked 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. Questions on characteristics of PhD training and EU principles of doctoral training were left out for the MORE3 Global survey.

5.2.1. PhD degree or enrolment in PhD programme

Similar to the results from the MORE3 EU HE survey, a very high share of researchers has either finished their PhD studies (80%) or is currently enrolled in a PhD program (14%; Figure 13). Shares of researchers having obtained a PhD and currently enrolled in PhD programs reach 99% in the group of EU researchers working abroad (TG1), only slightly decreasing across target groups down to 90% in target group 4, the group of non-mobile researchers. Hence, 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 13: PhD graduation and enrolment in PhD programs by target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 11: "Did you obtain a PhD degree?"

Target groups: To get an idea about where researchers graduated or will be graduating across the four target groups, Figure 14 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.

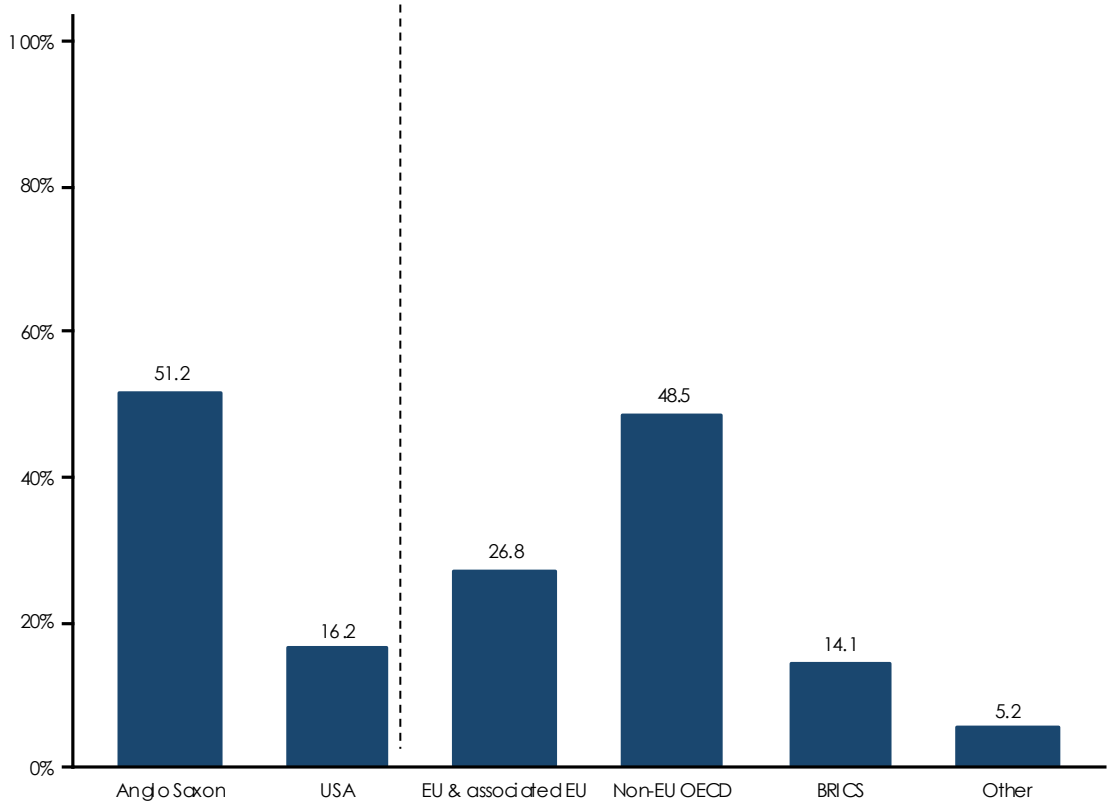
More detailed information about the country groups is provided in Table 51 in annex 5.

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[56]. About 75% of researchers have obtained a PhD in an OECD-country, while only 19% did or are doing their PhD in an emerging country such as a BRICS country or a different country from Asia, South America or Africa; more than half obtained or will obtain their PhD from an Anglo-Saxon country, while 27% graduated or will be graduating from an EU country, including the three associated countries Iceland, Norway and Switzerland.

Country of graduation: Table 12 shows country of graduation by all surveyed researchers. Again, most researchers in the various groups have obtained their PhD from an EU or a non-EU OECD country. About 42% of all respondents who have obtained or will obtain a PhD have a different citizenship to their country of graduation.

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

Figure 14: Country of graduation among researchers who have obtained or are enrolled in PhD studies



Source: MORE3 Global survey (2017)
Notes:
- Based on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- (n=1,615)

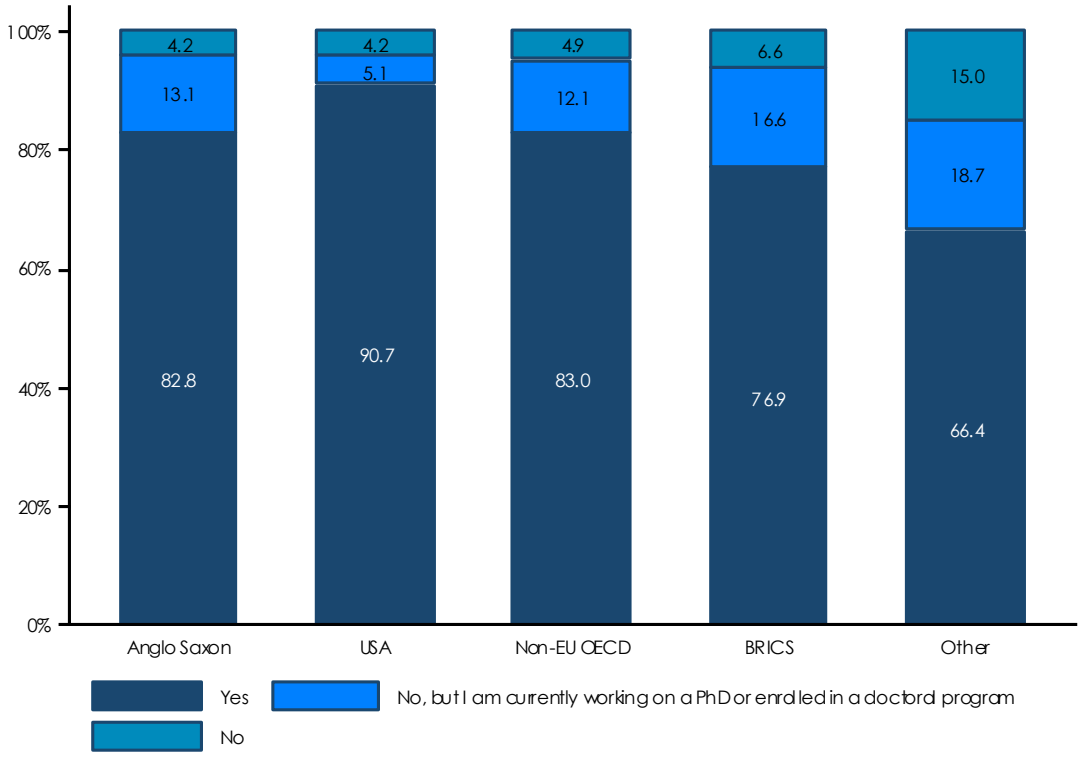
Table 12: Country of graduation by target group

	Anglo-Saxon	US	EU and associated EU	Non-EU OECD	BRICS	Other
TG1: EU researchers currently working outside the EU	26.8%	6.3%	47.8%	16.7%	1.8%	0.6%
TG2: Non-EU researchers who have worked in the EU in the past	31.1%	7.4%	15.6%	31.1%	10.8%	4.1%
TG3: Non-EU researchers who have worked abroad but not in the EU	32.6%	16.6%	6.9%	33.2%	7.9%	2.7%
TG4: Non-EU researchers who have never worked abroad	33.7%	10.8%	5.3%	34.6%	11.3%	4.2%
Total	54.8%	17.3%	28.6%	51.8%	15.0%	5.6%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- (n=885/279/462/837/243/90)
- Note that a small share of researchers in TG3 and TG4 indicated graduation from an EU country. Researchers were questioned about their mobility patters after gaining their highest educational qualification (PhD or other).

Country of current employment: Figure 15 finally shows the country of employment of researchers by their PhD status. More developed countries such as the US and other non-EU OECD countries show higher shares of PhD graduates among the researchers who responded to the MORE3 Global survey, indicating 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, yet again pointing to the crucial role of the quality and quantity of PhD training for attractive research systems. The difference with the BRICS countries is, however, only small.

Figure 15: Country of employment of researchers by PhD-status

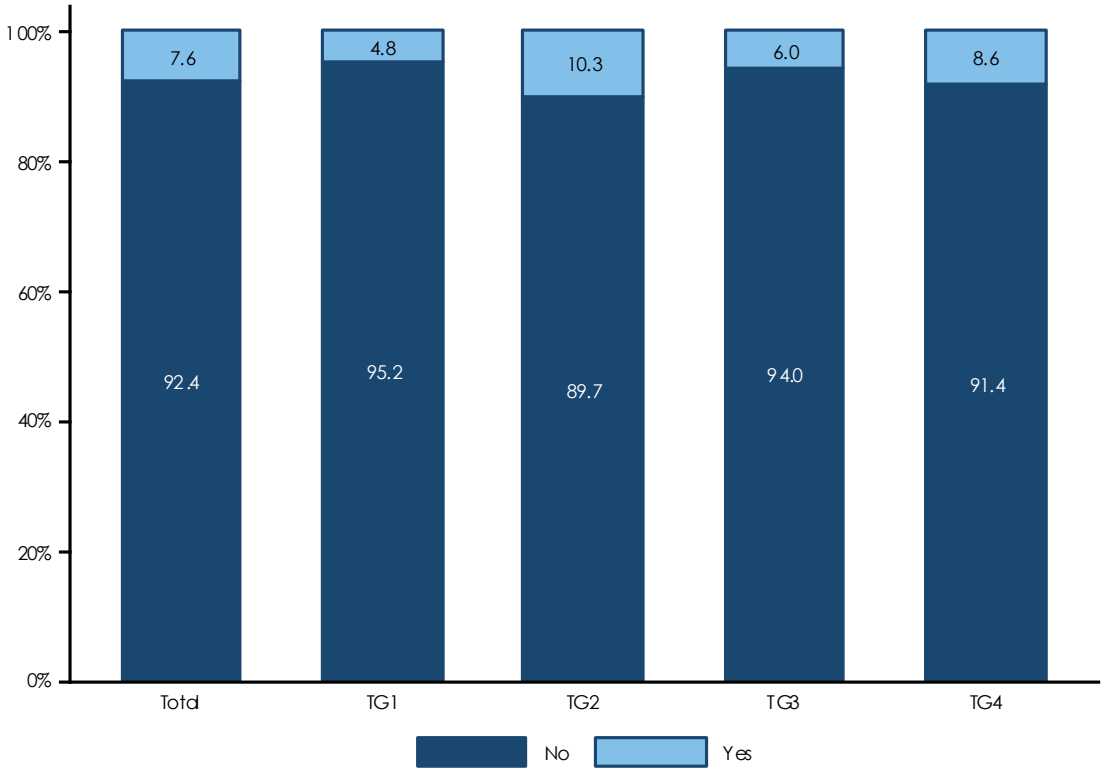


Source: MORE3 Global survey (2017)
Notes:
- Based on question 11: "Did you obtain a PhD degree?" and question 22 "Country of current employment"
- (n=1,727)

Target groups: The MORE3 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. Across target groups, Figure 16 indicates that joint degrees are a rare phenomenon, ranging from 5% among EU researchers working abroad (TG1) to 10% among non-EU researchers who have been mobile to the EU (TG2).

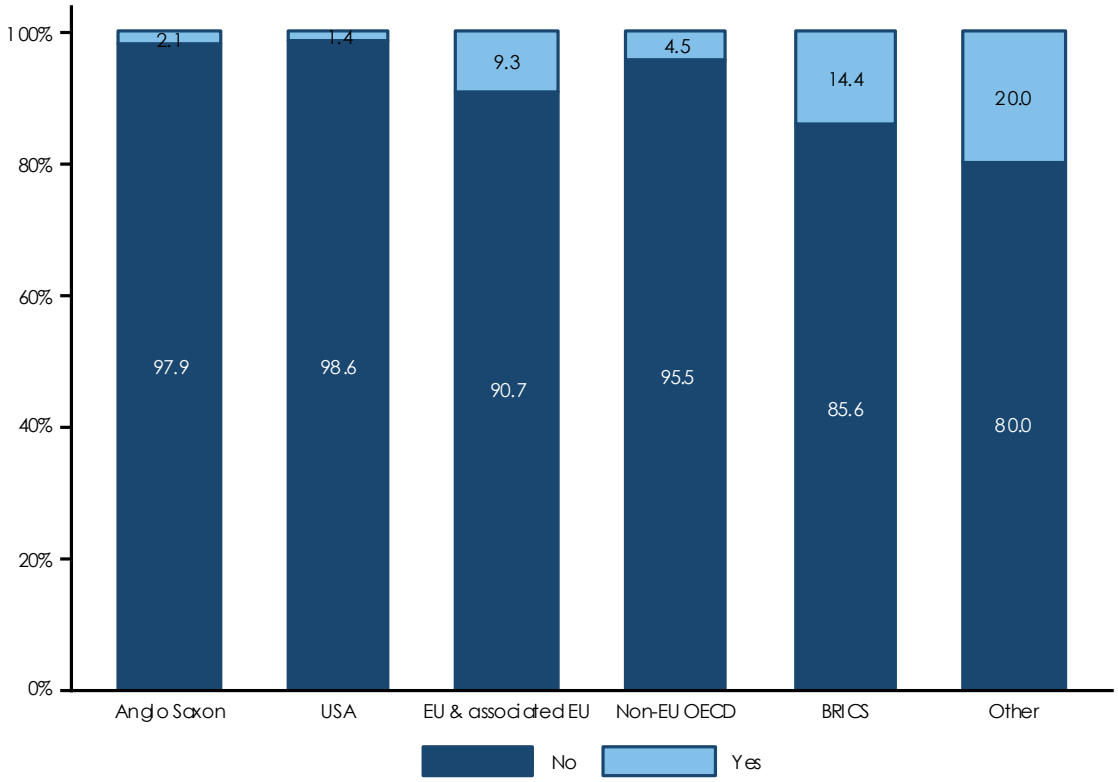
Country of graduation: The distribution of joint degrees among researchers by country of graduation (Figure 17) seems to indicate that joint degrees are more common in emerging countries, as joint degrees in the BRICS and in other countries make up 14-20% of all degrees. While the questionnaire did not 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.

Figure 16: Prevalence of joint degrees across the four target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,615)
- TG1: EU researchers currently working outside the EU (n=413)
- TG2: Non-EU researchers who have worked in the EU in the past (n=252)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=167)
- TG4: Non-EU researchers who have never worked abroad (n=783)
- Based on question 12: "Is/will your PhD degree (be) a joint doctorate?"

Figure 17: Joint degrees by country of PhD graduation



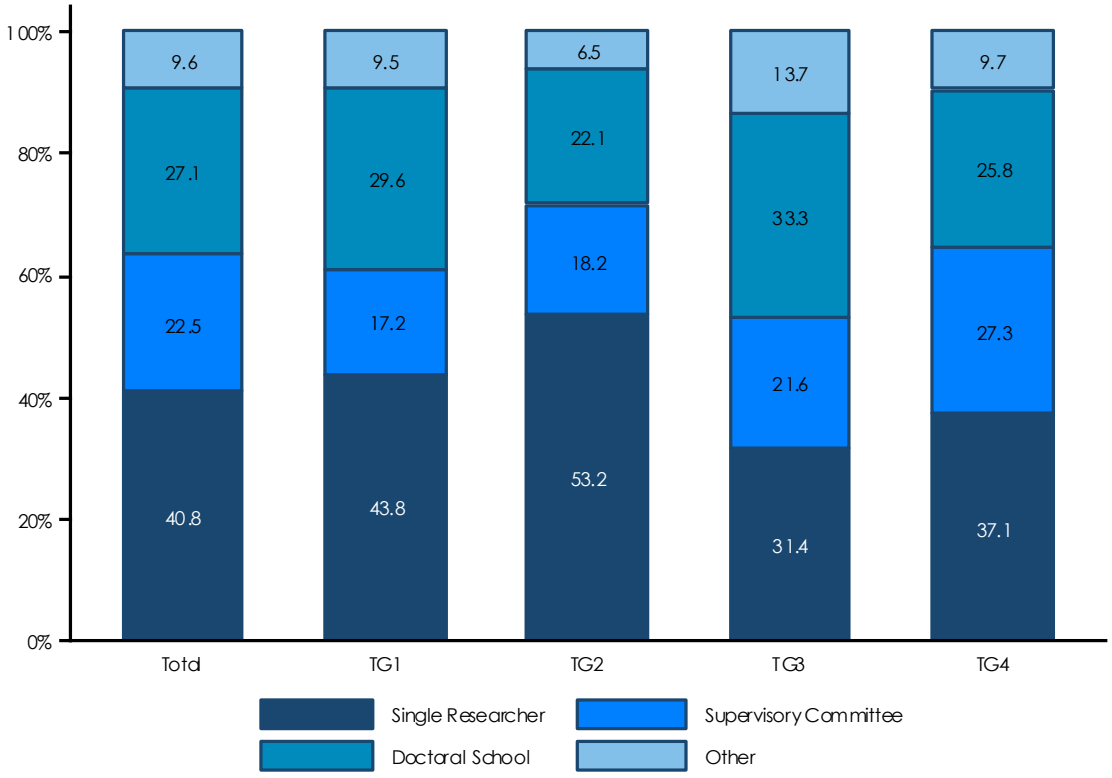
Source: MORE3 Global survey (2017)
Notes:
- Based on question 12: "Is/will your PhD degree (be) a joint doctorate?" and question 13: "What is/will be the country of graduation (of your PhD degree)?"
- (n=1,615)

5.2.2. PhD supervision structure

PhD supervision structures are an important characteristic of the professionalisation of PhD studies, with more traditional master-apprenticeship studies ("PhD supervision by just one senior researcher") struggling to impart broader skills sets to PhD graduates.

Target groups: Figure 18 shows that more traditional PhD studies are quite frequent, ranging from just under one third (31%) in the group of non-EU researchers who were mobile, but not towards the EU (TG3), to 53% in the group of non-EU researchers who were mobile to the EU (TG2). Broader and more structured PhD supervision structures, such as supervisory committees and doctoral schools, make up for 40% (non-EU researchers who were mobile to the EU) to 55% of all PhD degrees or enrolments (non-EU researchers who were mobile, but not to the EU).

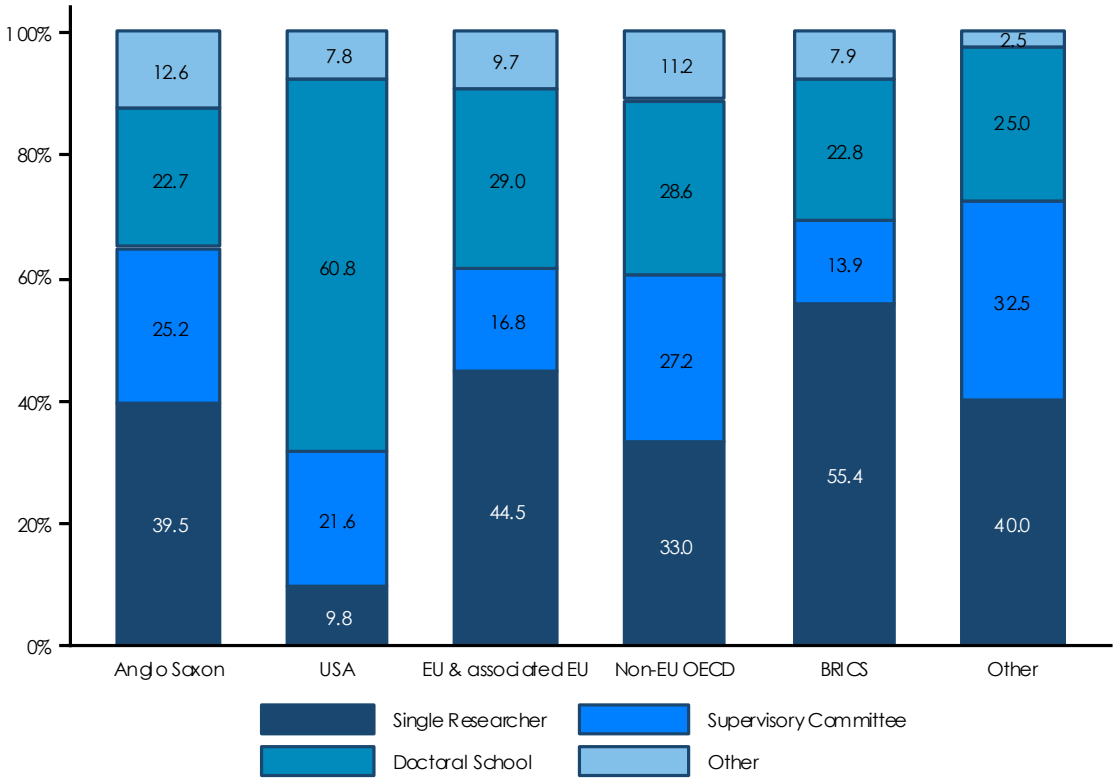
Figure 18: PhD supervision structures across target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=564)
- TG1: EU researchers currently working outside the EU (n=169)
- TG2: Non-EU researchers who have worked in the EU in the past (n=77)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=51)
- TG4: Non-EU researchers who have never worked abroad (n=267)
- Only R1 PhD candidates and R2 PhD holders.
- The answer could be either that PhD supervision was undertaken by just one senior, by a supervisory committee, embedded in a doctoral school or took another form.
- 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 an interesting insight, in that 61% of all PhDs obtained or being undertaken in the US are embedded in doctoral schools, and a further 22% have taken place or take place under the umbrella of a supervisory committee, while only 10% correspond to the more traditional Single Researcher-PhD-model. By contrast, 45% of PhD studies in the EU 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 MORE3 EU HE survey). In the BRICS, the share of the single researcher PhD model is even higher at 55%.

Figure 19: PhD supervision structures by country of graduation



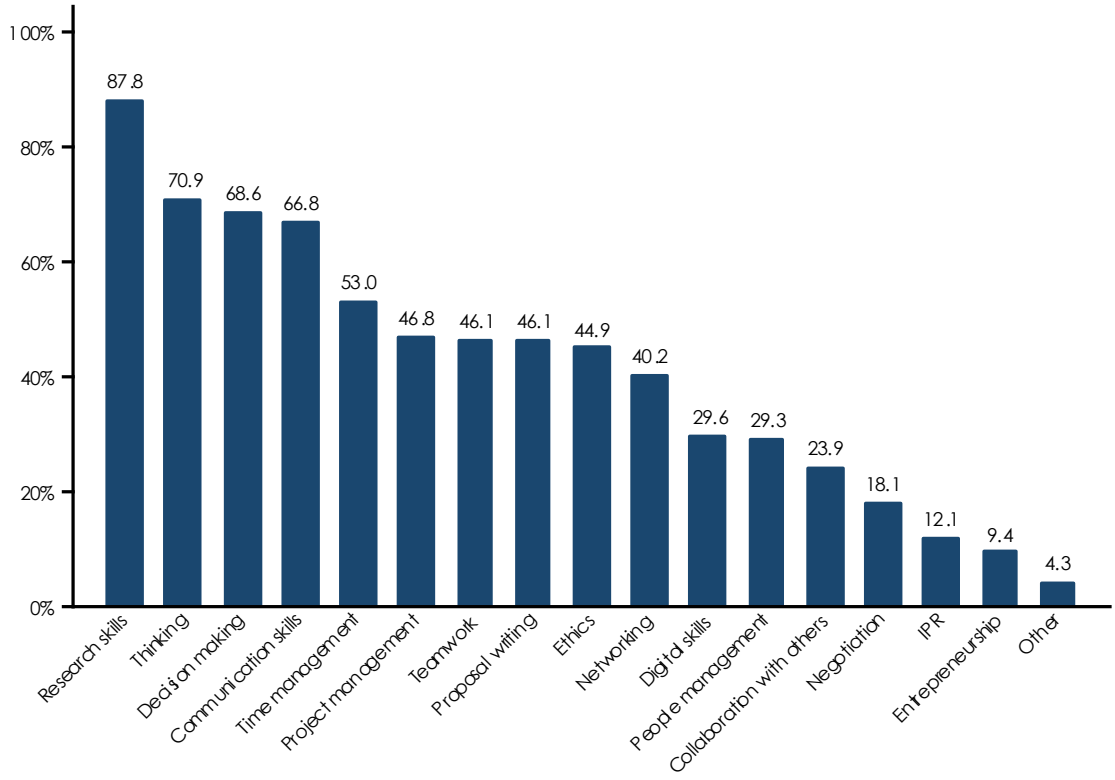
Source: MORE3 Global survey (2017)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- The answer could be either that PhD supervision was undertaken by just one senior, by a supervisory committee, embedded in a doctoral school or took another form.
- Based on question 14: "How would you describe your PhD in terms of supervision structure?" and on question 13: "What is/will be the country of graduation (of your PhD degree)?"
- (n=564)

5.2.3. 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 across the four groups of R1 and R2 researchers, 93% respond that they have received some form of training in transferable skills, with very little variation between the four groups.

The transferable skills researchers received during PhD studies are predominantly related to skills necessary for research activities themselves, such as research skills (88%) or skills related to creative thinking, decision making and communication (67%-71%). More general work management-related skills such as time and project management as well as the ability to work in teams come somewhat behind at around 50%. 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, in line with the MORE3 EU HE survey.

Figure 20: Prevalence of training in transferable skills by type of transferable skills, across all target groups



Source: MORE3 Global survey (2017)
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"
- (n=564)

Country of graduation: There are interesting variations across the country groups examined. For example, collaboration with citizens and governments was much less a feature in PhD studies conducted in the EU (14%) than in either non-EU OECD countries (28%) or in the BRICS countries (28%). Communication and presentation skills are near omni-present in US PhDs, while they reach only 50% in other countries and 68% in the EU. A similar picture can be seen for decision-making skills. The US also leads in digital skills, while interestingly entrepreneurship is a skill mostly taught in PhD studies of other countries, which are mainly emerging or developing countries from Asia, South America and Africa. This is potentially related to much higher entrepreneurship levels in poorer countries, i.e. higher education institutions may teach entrepreneurship in their PhD programmes because they are aware that it is a quite frequent labour market option for their graduates[57]. Note, however, that the evidence on entrepreneurship mostly does not distinguish by level of education, so this area warrants further research.

Ethics is less taught in the EU and in other countries (around 28%) than in non-EU OECD countries (56%). Proposal and grant writing occurs more frequently in the US (57%) than in the EU (42%), as does teamwork (65% vs 47%), creative thinking (88 vs 68%)

[57] Cf. the Global Entrepreneurship Monitor, http://www.gemconsortium.org/

and time management (71% vs. 48%). 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. 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.

Table 13: Transferable skills received by country group of graduation

	Anglo-Saxon	US	EU and associated EU	Non-EU OECD	BRICS	Other
Research skills	88.2%	99.6%	85.8%	90.9%	84.2%	85.0%
Thinking	72.7%	88.2%	67.7%	76.1%	64.4%	62.5%
Decision making	71.0%	84.3%	69.0%	71.0%	65.3%	60.0%
Communication skills	74.5%	94.1%	67.7%	72.5%	55.4%	50.0%
Time management	61.2%	70.6%	48.4%	61.6%	42.6%	37.5%
Project management	52.8%	52.9%	40%	52.2%	47.5%	40.0%
Proposal writing	49.7%	56.9%	41.9%	48.9%	44.6%	45.0%
Teamwork	46.9%	64.7%	47.1%	47.5%	44.6%	42.5%
Ethics	54.2%	54.9%	27.7%	55.8%	49.5%	27.5%
Networking	44.4%	51%	41.3%	43.5%	39.6%	20.0%
Digital skills	30.1%	39.2%	27.1%	31.2%	31.7%	22.5%
People management	32.2%	35.3%	26.5%	32.6%	24.8%	27.5%
Collaboration with others	28.0%	31.4%	14.2%	27.5%	27.7%	27.5%
Negotiation	18.2%	17.6%	14.2%	19.9%	20.8%	12.5%
IPR	11.2%	9.8%	11.6%	11.6%	12.9%	17.5%
Entrepreneurship	5.6%	5.9%	9.0%	7.6%	12.9%	17.5%

Source: MORE3 Global survey (2017)
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=564)

5.3. Recruitment

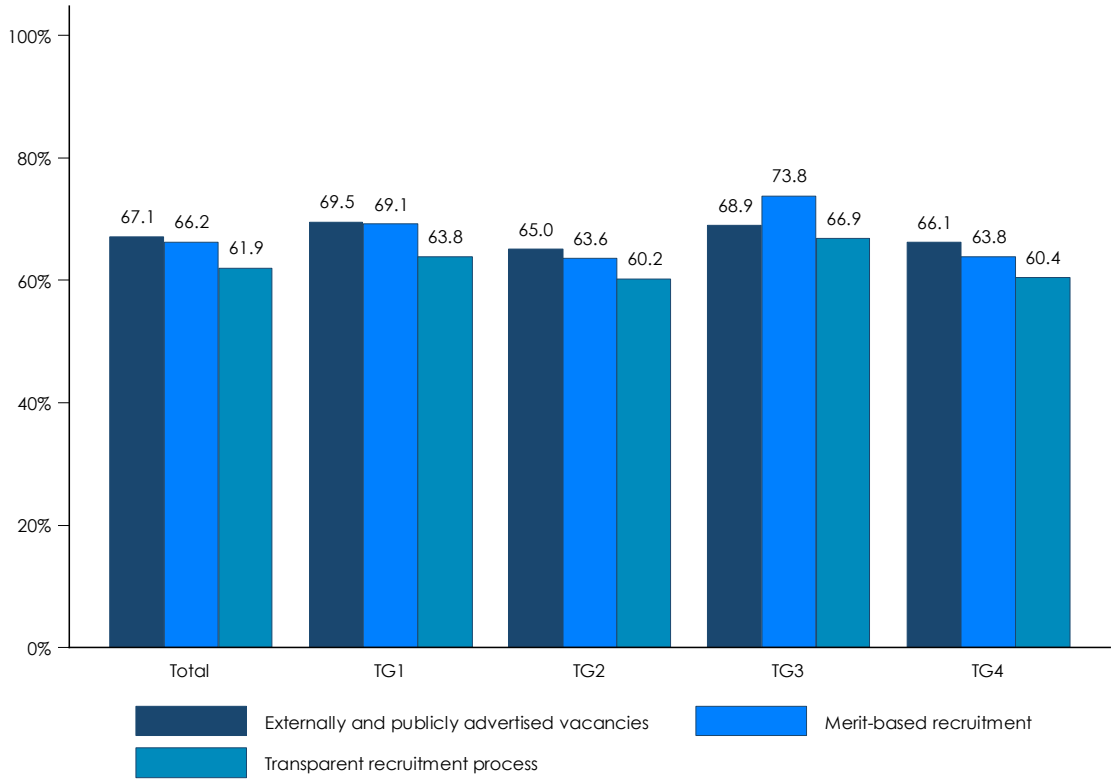
Recruitment policies are an important tool to shape universities' and other research insitutions' current and future research orientation and, of course, they directly affect researchers' career perspectives and perceptions of attractiveness of research jobs. The MORE3 Global survey included the same questions on recruitment as the MORE3 EU HE survey. Questions were asked on how recruitment is perceived (transparent, merit-based, publicly advertised) and which factors are perceived to have positive or negative impacts for recruitment in the researchers' home institutions. All researchers currently working at universities or higher education institutions were asked these questions.

5.3.1. Open, transparent and merit-based recruitment

Overall, the majority of researchers who participated in the MORE3 Global survey agreed that job vacancies are sufficiently publicly advertised, and that recruitment processes are sufficiently transparent and merit-based. However, in comparison with the MORE3 EU HE survey, fewer researchers perceive that vacancies were sufficiently advertised and that recruitment is sufficiently merit-based and transparent in their home institution (in a non-EU country). In total, 67% of respondents to the MORE3 Global survey perceive that vacancies are sufficiently externally and publicly advertised and made known by their home institution (MORE3 EU HE: 80%). Similarly, 62% of researchers perceive the recruitment process to be sufficiently transparent (MORE3 EU HE: 74%). 66% of researchers in the MORE3 Global survey perceive that recruitment is sufficiently merit-based in their home institution (MORE3 EU HE: 77%). Overall, the lack of sufficient public advertisement of job vacancies seems to be less often perceived as problematic than the absence of merit-based and transparent recruitment processes, which is in line with the general results of the MORE3 EU HE survey.

Target groups: Only little variation between different target groups can be observed (see Figure 21). 67% of non-EU researchers who have been mobile, but not towards the EU (TG3) perceive recruitment processes to be transparent. In other target groups, the shares range between 60% and 64%. Similarly, the question of whether vacancies are sufficiently publicly advertised shows a rather small variation between different target groups. The range between the highest and the lowest share of researchers perceiving recruitment as sufficiently merit-based across target groups is a bit wider. In general, it can be noted that target groups TG2 and TG4, the group of non-European researchers having worked in Europe in the past and non-EU researchers who have never worked abroad, demonstrate the lowest approval ratings across all three issues related to this question (transparent, merit-based, publicly advertised). An important remark is that the results concern their current home institution and not the institution they may have been mobile to.

Figure 21: Researchers' perception of recruitment processes in their home institution, by target groups

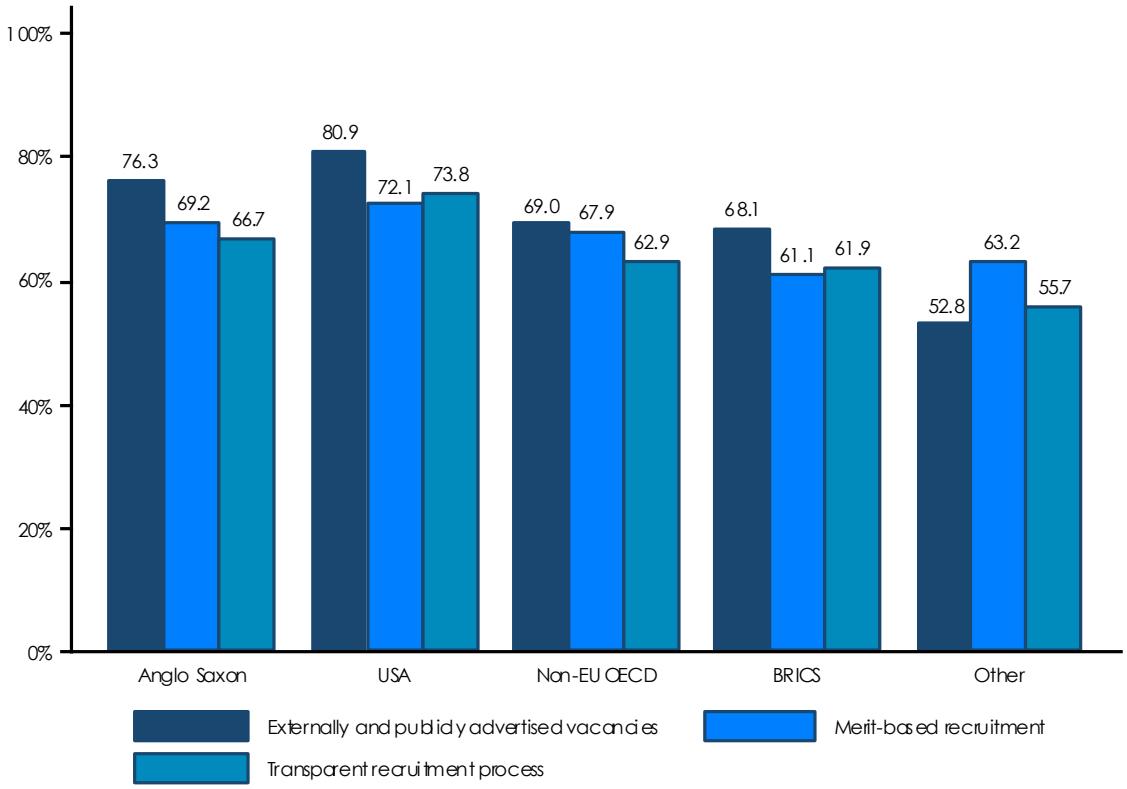


Source: MORE3 Global survey (2017)
Notes:

- Total: Researchers currently working outside the EU (n=1,512)
- TG1: EU researchers currently working outside the EU (n=361)
- TG2: Non-EU researchers who have worked in the EU in the past (n=236)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n=164)
- TG4: Non-EU researchers who have never worked abroad (n=751)
- 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 31: "What is your opinion on the following issues with respect to recruitment in your home institution?"

Country of employment: As shown in Figure 22, differences between certain groups of 'country of employment' can be observed, in particular for the US. In comparison with other (non-EU) country groups, the share of researchers perceiving recruitment as sufficiently transparent, publicly advertised and merit-based is the highest in the US. This is particularly striking with respect to transparency. The share of researchers that perceive the recruitment process to be sufficiently transparent is at least 10 percentage points higher in the group of researchers currently employed in the US than in the researchers currently employed in non-EU OECD, BRICS or other countries.

Figure 22: Researchers' perception of recruitment processes in their home institution, by country groups



Source: 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 recruitment in their home institution.
- Based on question 31: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=1,396-1,428)

Contract type: Researchers' perception of recruitment processes in their home institution also depends 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. While 70% of researchers with permanent contracts perceive recruitment to be sufficiently merit-based, only 60% of researchers with fixed-term contracts would agree (see Table 14). Similarly, the share of researchers who think that recruitment is sufficiently transparent is higher among researchers with permanent contracts (66%) than among researchers with fixed-term contracts (54%).

Table 14: Researchers' perception of recruitment processes in their home institution by types of contract

	Externally and publicly advertised vacancies	Merit-based recruitment	Transparent recruitment process
Permanent/open-ended contract	69.0%	69.8%	66.1%
Fixed term contract	63.6%	60.5%	53.9%
No contract or self-employed	65.1%	65.9%	59.8%

Source: 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 recruitment in their home institution.
- Based on question 31: "What is your opinion on the following issues with respect to recruitment in your home institution?" and question 23 "Type of contract".
- (n=1,336-1,368)

5.3.2. Factors for recruitment

Analogous to the MORE3 EU HE survey, the MORE3 Global survey includes questions on how non-standard research outputs, 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 and interdisciplinary mobility experiences (or interdisciplinary research approaches). Besides, it is also asked whether alternative forms of research output (e.g. project reports, grant writing, the development and maintenance of data infrastructure, organisation of research events or conferences) and transferable skills, i.e. skills developed in one situation which can be transferred to another situation (e.g. project management, data cleaning, networking), affect recruitment in researchers' home institutions.

With the exception of an intersectoral mobility experience in the private sector, two other forms of mobility (international and interdisciplinary mobility) are perceived as being important for recruitment by the majority of researchers in the MORE3 Global survey. As shown in Table 15, 73% of researchers perceive international mobility as a positive factor for recruitment and 62% associate positive effects on recruitment with interdisciplinary mobility experiences. In contrast, only 43% of researchers 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, closely followed by interdisciplinary mobility experiences (each approximately 10%). In comparison with the MORE3 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 MORE3 global survey.

Target groups: Differentiating between target groups reveals little variation with respect to alternative research output, transferable skills and interdisciplinary mobility experience (see Table 54 in annex). However, regarding positive effects of international mobility experiences, the range between the minimum share of researchers perceiving it as a positive factor for recruitment and the maximum share is about 10 percentage points. While 81% of researchers in group TG2 (non-European researchers having worked in Europe in the past ten years) agree that international mobility positively affects recruitment, only a share of 71% in group TG4 (non-EU researchers who have never worked abroad) agrees. The variation with respect to intersectional mobility across different target groups is less pronounced. At maximum, 46% of researchers in TG4 perceive intersectional mobility to be positive for recruitment, while 39% of researchers in TG1 (European researchers currently working abroad) agrees. However, the total

share of researchers that perceive intersectoral mobility experiences as a negative factor for recruitment (11%) is the highest among all factors, in particular in the group of non-European researchers which worked in Europe in the past (14%).

Country of current employment: Overall, little variation between country groups can be observed (see Table 54). However, with respect to international mobility and, to a lesser extent, intersectional mobility, the US represents an excepetion compared to other country groups of employment. While the shares of researchers who perceive international mobility as a positive factor for recruitment ranges from between 71% and 75% in other country groups, only 57% of researchers currently working in the US agree. 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. Similarly, among researchers currently working in the US, 35% perceive intersectoral mobility as a positive factor for recruitment in contrast to 44% (BRICS) and 52% (Other) of researchers who agree.

Table 15: 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
Inter-disciplinary mobility	63.0%	64.0%	61.9%	63.7%	60.6%	11.8%	9.1%	11.2%	8.1%	11.0%
Inter-national mobility	70.6%	56.7%	72.8%	75.4%	71.0%	4.9%	5.3%	4.6%	5.5%	11.1%
Inter-sectoral mobility	42.2%	34.7%	41.3%	44.4%	52.2%	10.9%	10.2%	11.0%	10.7%	10.2%
Research output	63.0%	64.0%	63.5%	67.3%	66.9%	8.6%	4.8%	8.2%	6.4%	6.3%
Trans-ferable skills	61.7%	60.5%	59.9%	61.7%	66.5%	3.9%	3.2%	4.5%	3.6%	7.1%

Source: 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 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 33: "In your experience would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=1,363-1,443)

Career stage: With regard to international mobility, no high levels of heterogeneity can be observed across career stages (see Table 16). The spread ranges from 74% of R4 researchers that regard international mobility experience as a positive factor for recruitment to 72% of R3 researchers. The largest difference between career stages can be observed with respect to transferable skills: 55% of R4 researchers and 71% of R1 researchers consider transferable skills as a positive factor for recruitment. Interestingly, a higher share of (young) early stage researchers perceive intersectoral and interdisciplinary mobility experience as well as transferable skills and non-standard research outputs as positive factors than do (older) established researchers. While only 38% of R4 researchers evaluate intersectoral mobility experience as a positive factor for recruitment, 52% of R1 researchers would agree. 58% of R3 researchers perceive interdisciplinary mobility as positive and 72% of R1 researchers would agree. This is in line with the results of the MORE3 EU HE survey. However, whether these results reflect an increasing importance of non-standard skills in research careers remains to be seen.

Table 16: Perception of positive factors for recruitment by career stages

	Positive Factor				Negative Factor			
	R1	R2	R3	R4	R1	R2	R3	R4
Interdisciplinary mobility	71.7%	66.1%	57.9%	60.0%	8.8%	9.3%	11.4%	11.5%
International mobility	72.9%	73.0%	72.3%	74.2%	7.2%	6.5%	5.6%	3.5%
Intersectoral mobility	51.5%	43.8%	43.1%	38.0%	10.1%	10.9%	9.6%	13.2%
Research output	71.4%	68.6%	62.9%	59.9%	4.9%	5.9%	9.6%	7.5%
Transferable skills	71.4%	64.6%	58.6%	55.5%	5.3%	3.4%	5.5%	3.9%

Source: 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 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 33: "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=1,363-1,440)

5.4. Career progression

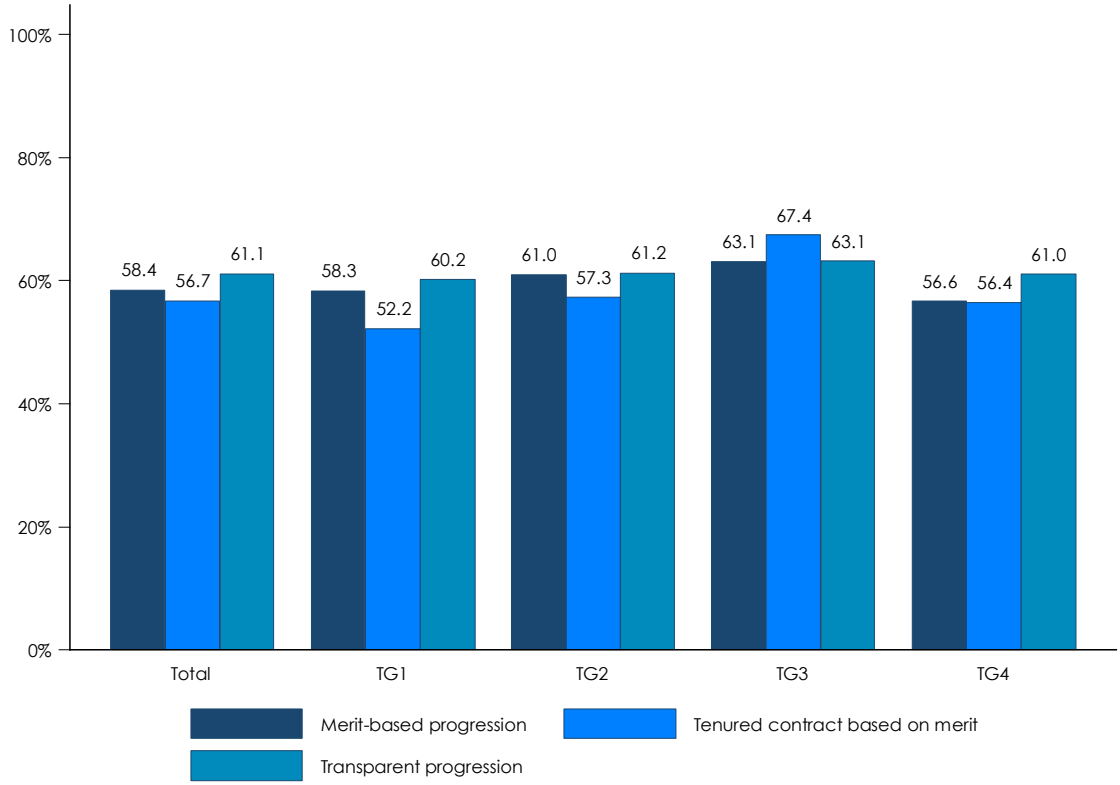
In line with the MORE3 EU HE survey, the MORE3 Global survey asked respondents several questions on how career paths, which regulate career progression, are perceived across countries and how non-standard research outputs and mobility phases influence progression along the career path. The next section 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.

5.4.1. 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 61%. 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: 58% and 57% of all researchers respectively. Results on career progression show a pattern similar to the results of the MORE3 EU HE survey. However, overall, 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 MORE3 EU HE survey (71%, 65% and 64% respectively) than in the MORE3 Global survey.

Target groups: As with recruitment, there is little variation between target groups in the perception of whether career paths are clear and transparent for researchers (see Figure 23). While 60% of European researchers currently working outside Europe (TG1) agree that career paths are clear and transparent in their home insititutions, the maximum share of researchers agreeing to that is only slightly higher (63%) and located in target group TG3, i.e. non-EU researchers who have been mobile but not towards the EU. Similarly, shares of researchers perceiving career progression as sufficiently merit-based range between 57% and 63% in the groups of non-EU researchers who have never worked abroad (TG4) and of non-EU researchers who have worked abroad but not in the EU (TG3) respectively. The largest differences between target groups can be observed regarding the question whether obtaining a tenured contract based on merit only is perceived common practice at their home institutions. The lower bound is in TG1, European researchers currently working abroad (52%), while the higher bound is located in TG3 (67%), non-EU researchers who have worked abroad, but not in the EU.

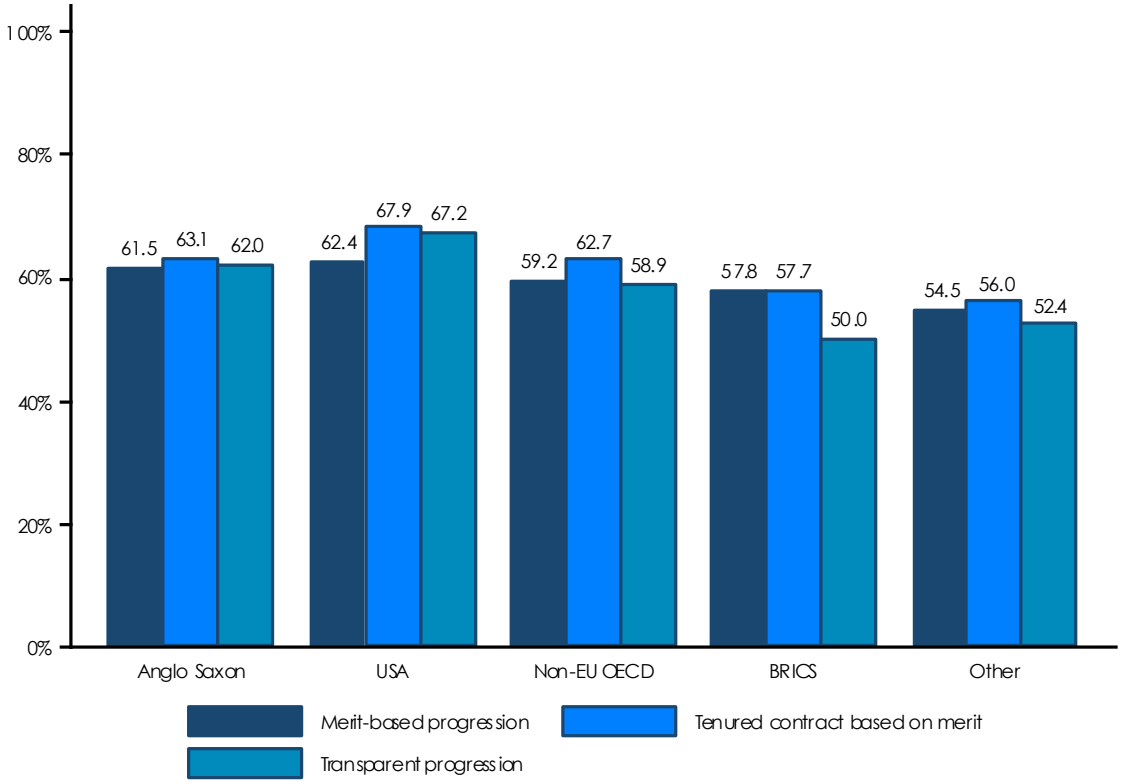
Figure 23: Perception of transparent and merit-based career progression in the home institution, by target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,512)
- TG1: EU researchers currently working outside the EU (n=361)
- TG2: Non-EU researchers who have worked in the EU in the past (n=236)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n=164)
- TG4: Non-EU researchers who have never worked abroad (n=751)
- 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 32: "What is your opinion on the following issues with respect to career progression in your home institution?"
- (n=1,308-1,434)

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 show the highest shares of perceived transparent and merit-based career progression in their home institution (see Figure 24). 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 (68%), while in BRICS countries only 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 24: Perception of transparent and merit-based career progression in the home institution by country groups



Source: 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 32: "What is your opinion on the following issues with respect to career progression in your home institution?"
- (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 (this is analogous to researchers' perception of positive factors for recruitment). Among those researchers, 66% perceive career paths as sufficiently clear and transparent; 63% think that obtaining a tenured contract is based on merit only; and 61% agree that career progression is sufficiently merit-based. In contrast, among the groups of researchers having fixed-term contracts, only 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 7 percentage points higher (52% respectively), but still below the shares of agreeing researchers in other contractual situations. In both groups, those with fixed-term contracts and the researchers that are self-employed or without contracts, the share of researchers thinking that obtaining a tenured contract based on merit only is common practice is significantly lower than in the group of researchers that have a permanent contract (45% and 46% in contrast to 63%).

Table 17: Perception of transparent and merit-based career progression in the home institution, by types of contract

	Merit-based progression	Tenured contract based on merit	Transparent progression
Permanent/open-ended contract	60.9%	62.9%	65.5%
Fixed term contract	51.7%	45%	51.6%
No contract or self-employed	60.7%	46.5%	58.1%

Source: 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 32: "What is your opinion on the following issues with respect to career progression in your home institution?" and question 23 "Type of contract".
- (n=1,260-1,375)

5.4.2. Factors for career progression

Analogous to recruitment, the MORE3 Global survey includes questions on how non-standard research outputs, transferable skills and mobility experiences affect career progression are included. Looking at the total shares of researchers, the ordering of the approval rates changes in comparison to the MORE3 EU HE survey (see section 5.4.3.2 EU HE survey results). While in the MORE3 EU HE survey the two highest approval rates are found with respect to international mobility and transferable skills (85% and 81% respectively), in the MORE3 Global survey 69% of researchers perceive international mobility experiences and 67% perceive alternative forms of research output positive for career progression. Another 62% of researchers perceive transferable skills and 60% interdisciplinary mobility experiences as positive factors for career progression. Only 40% 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 MORE3 Global survey than in the MORE3 EU HE survey. A similar observation was made for the analysis of factors influencing recruitment.

Table 18: Perception of positive factors for career progression by target groups

	Positive Factor					Negative Factor				
	Total	TG1	TG2	TG3	TG4	Total	TG1	TG2	TG3	TG4
Interdisciplinary mobility	59.9%	57.7%	60.4%	65.2%	59.6%	10.8%	8%	10.7%	9%	12.5%
International mobility	68.7%	65.3%	71.1%	70.1%	69.3%	4.7%	2.1%	7%	7%	4.7%
Intersectoral mobility	40%	36%	39.2%	42.9%	41.5%	14.6%	13.5%	12.2%	18.8%	14.9%
Research output	67.2%	69.9%	66.4%	66.3%	66.4%	9.3%	7.5%	9.9%	11.3%	9.4%
Transferable skills	61.9%	59.9%	59.1%	64.9%	63.2%	4.3%	2.7%	6.1%	2.7%	4.8%

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,512)
- TG1: EU researchers currently working outside the EU (n=361)
- TG2: Non-EU researchers who have worked in the EU in the past (n=236)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n=164)
- TG4: Non-EU researchers who have never worked abroad (n=751)
- 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 34: "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=1,387-1,446)

Target groups: Differentiating between target groups reveals only little differences (see Figure 22). In particular, regarding alternative research output, little variance between target groups is observed. In comparison to the 66% of the researchers in target group TG2, TG3 and TG4 that perceive alternative research output as a positive factor for career progression, 70% of European researchers currently working abroad (TG1) agree. Looking at the other factors (included in the survey), the shares of researchers perceiving them as positive for career progression are most often the highest in the group of non-EU researchers who have worked abroad but not in the EU (TG3). For instance, in comparison to 36% of TG1 researchers, 43% of TG3 researchers perceive intersectoral mobility positive for career progression, although also a share of 19% of TG3 researchers perceive intersectoral mobility as a negative factor for career progression.

Country of current employment: Interestingly, international mobility is the factor that is associated with the widest range between the highest and the lowest shares of researchers perceiving it as positive for career progression across country groups. While 76% of researchers employed in BRICS countries think international mobility is positive, only 58% of researchers employed in the US agree (see Table 19). This may be linked to the fact that the US is the leading research environment, so that international mobility may be less beneficial for US-based researchers. Regarding the other factors, differentiating between country groups reveals only small variation: between 58% (other countries) and 66% (US) of researchers perceive interdisciplinary mobility as a positive factor for career progression. Similarly, the shares of researchers thinking that alternative research output is a positive factor range between 61% (non-EU OECD) and 67% (other countries). The highest shares of researchers which consider intersectoral mobility as a negative factor for career progression is among researchers employed in the US and more generally in the group of Anglo Saxon countries (16% respectively).

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

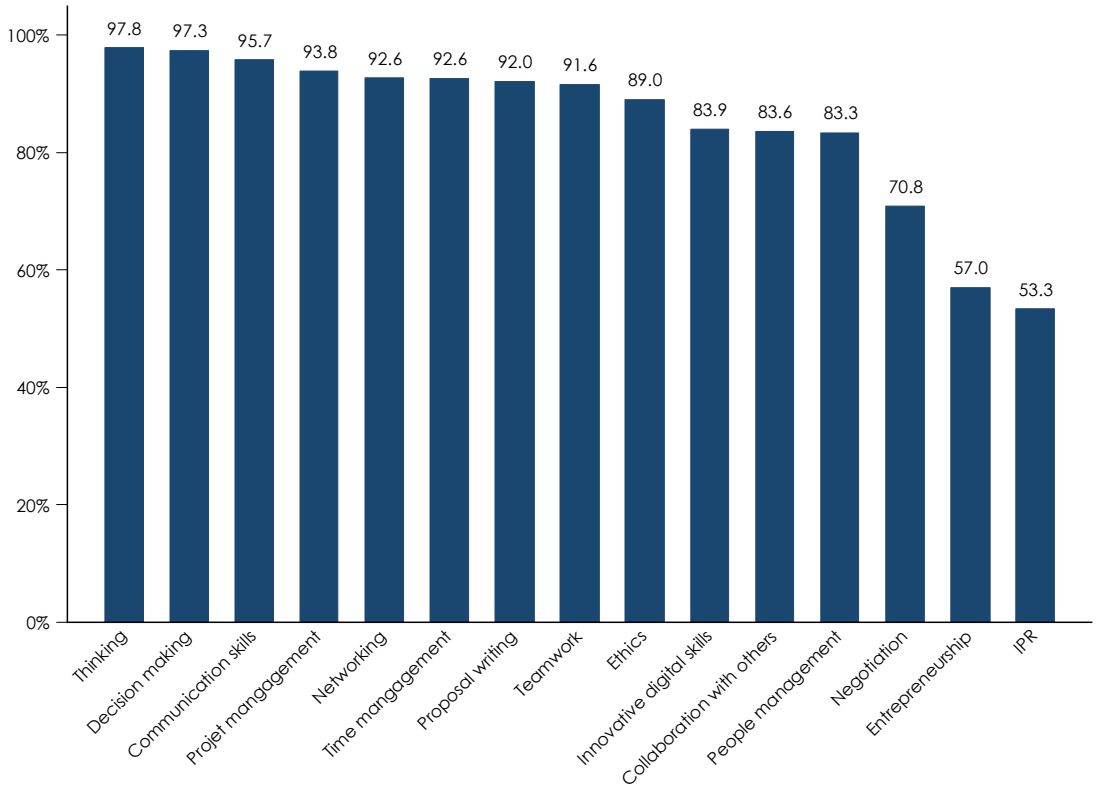
	Positive Factor					Negative Factor				
	Anglo-Saxon	US	Non-EU OECD	BRICS	Other	Anglo-Saxon	US	Non-EU OECD	BRICS	Other
Interdisciplinary mobility	61.5%	66.5%	60.3%	59.4%	57.6%	11.1%	10.4%	11.1%	8.4%	12.0%
International mobility	65.8%	58.2%	67.0%	75.8%	68.5%	4.0%	4.9%	4.1%	4.8%	8.0%
Intersectoral mobility	37.1%	32.2%	37.7%	45.6%	45.6%	15.9%	16.1%	15.4%	12.4%	12.5%
Research output	63.7%	68.8%	65.7%	72.2%	68.9%	11.7%	10.6%	10.5%	6.3%	6.2%
Transferable skills	62.1%	61.0%	60.6%	64.1%	66.9%	3.8%	3.3%	4.2%	4.1%	5.1%

Source: 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 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 34: "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=1,387-1,446)

5.4.3. Skills for future career progression

Regarding their future careers (in and outside academia), the vast majority of researchers in the MORE3 Global survey agree that skills for critical and autonomous thinking (98%), decision making and problem solving (97%), communication and presentation (96%), project management (94%), time management and networking (93% respectively) and grant and/or proposal writing (92%) are essential for a prosperous future career (see Figure 25).

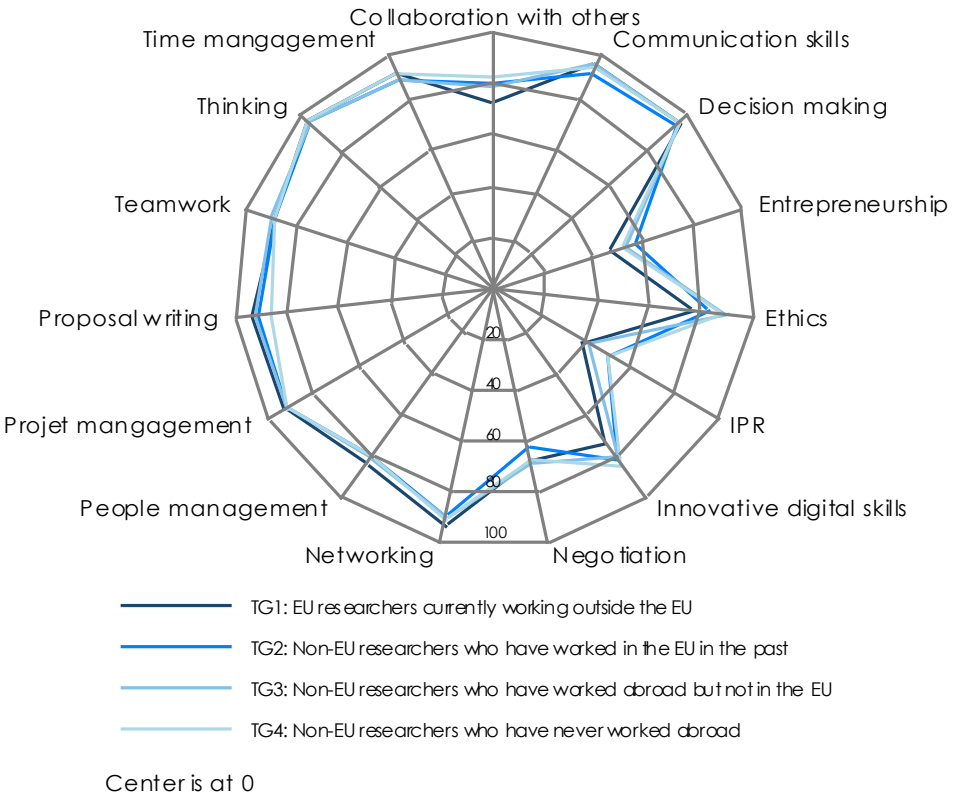
Figure 25: Perception of important skills for future research career



Source: MORE3 Global survey (2017)
Notes:
- Based on question 35: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=1,727)

Target groups: The perception of importance of skills for future research careers is rather homogeneous when the sample is split into the different target groups (see Figure 26). Only with respect to intellectual property rights (e.g. applying for patents), collaboration with citizens, government and broader society, entrepreneurship, ethics, negotiation and innovative digital skills (i.e. carrying out, disseminating, deploying and transforming research through digital tools, networks and media) small differences between target groups can be observed. For instance, while only 39% of European researchers currently working outside Europe (TG1) perceive skills in IPR as important for their future career, 51% of non-European researchers having worked in Europe in the past (TG2) agree. Generally, European researchers currently working abroad (TG1) attach less importance to digital skills, entrepreneurship, ethics and IPR than other target groups, but emphasise people and time management, proposal and grant writing, networking and communication skills instead.

Figure 26: Perception of important skills for future research career by target groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 35: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=1,727)

Comparative perspective: Greater differences in researchers' perception of the importance of skills can be observed between researchers who have received respective training in their past and researchers who have not received corresponding training. In general, the shares of researchers perceiving certain skills as important for their future research careers are higher among those researchers who actually received corresponding training in their past. For instance, while only 46% of researchers who have never received training in IPR think that it is an important skill for their future career, 84% of researchers who have received training in IPR agree. Similarly, 50% of researchers who have never had training in entrepreneurship perceive it as an important skill in contrast to 87% of researchers who have received training in entrepreneurship. On the other hand, some skills, like decision making and problem solving or critical and autonomous thinking, are perceived as being important by the vast majority of researchers, irrespective of whether respective training has been received before or not.

Table 20: Perception of important skills for future research career

	No training	Training
IPR	46.2%	83.8%
Communication	90.9%	97.3%
Decision making	93.2%	98.2%
Digital skills	79.6%	92.2%
Entrepreneurship	49.5%	86.8%
Ethics	71.7%	93.7%
Negotiation	67.3%	95.1%
Networking	88.4%	98.7%
People management	76.2%	95.2%
Project management	87.0%	98.1%
Proposal writing	88.2%	94.2%
Teamwork	88.5%	94.2%
Thinking	94.5%	97.5%
Time management	84.2%	97.7%

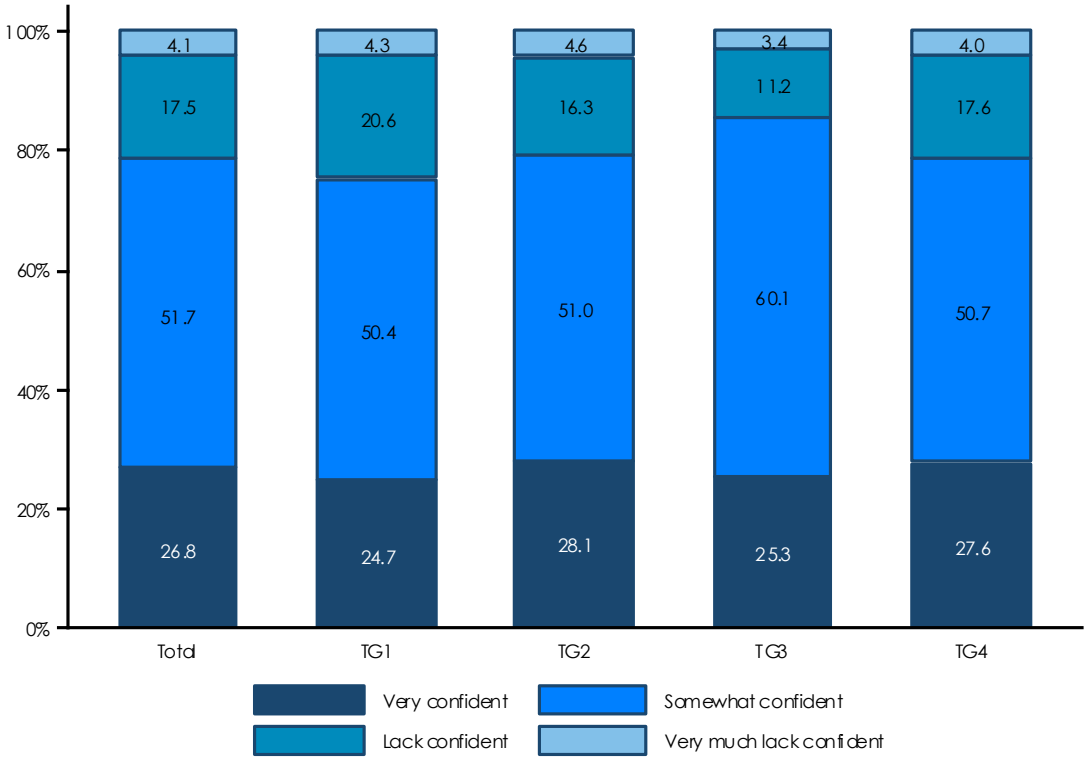
Source: MORE3 Global survey (2017)
Notes:
- Based on question 35: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=1,727)

5.4.4. Confidence in future career prospects

Researchers were asked how confident they feel about future prospects for their research career. In the MORE3 Global survey, about 27% of all researchers feel very confident and 52% feel somewhat confident about their future prospects for their research careers (see Figure 27). Only 4% of the respondents report that they very much lack confidence about the prospects for their future research career and another 17% of researchers say that they lack confidence.

Target groups: Some differences in the confidence levels of different target groups are observable. In particular TG3, non-EU researchers who have not worked in the EU but in other non-EU countries, show the highest shares of (very) confident researchers with respect to their future career prospects (see Figure 27). In total, 85% of TG3 researchers are (very) confident about future career prospects, while only 75% of European researchers currently working abroad (TG1) agree. In contrast, 21% of European researchers currently working abroad (TG1) lack confidence about their future career, while the percentage of researchers that agree is only half as much (11%) in the group of TG3 researchers.

Figure 27: Confidence in future career prospects by target groups



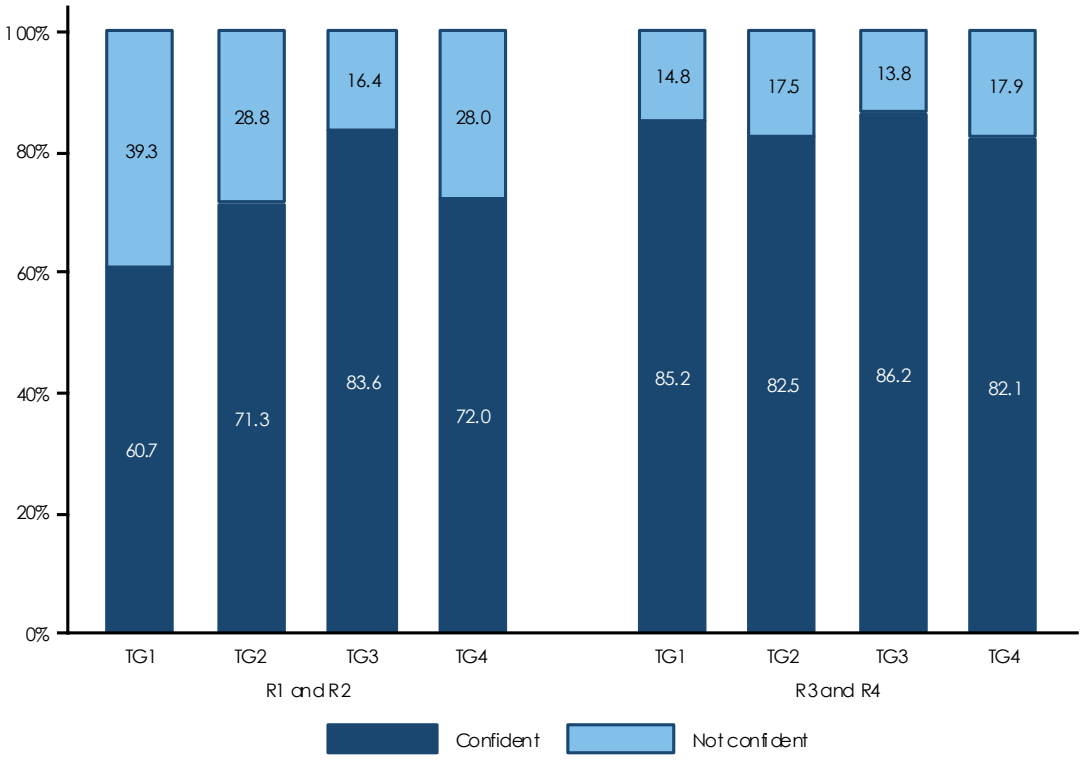
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 36: "Overall, how confident do you feel about the future prospects for your research career?"

Figure 116 in annex 6 adds to the impression that if any differences between confidence levels of target groups exist then they arise from target groups TG3, non-EU researchers who have worked abroad but not in the EU and TG1, European researchers currently working outside Europe. The distribution of target groups across different confidence levels is almost uniform, however in comparison to other confidence groups, TG3 researchers are more often included in the group of researchers feeling somewhat or very confident about their future career, while TG1 researchers, the European researchers currently abroad, are more often contained in the group of researchers that lack confidence.

Career stages: Results of the MORE2 and MORE3 EU HE survey suggest that the level of confidence in future research careers is also related to researchers' uncertainty levels due to their stage of professional rootedness and legal positions. The data of the MORE3 Global survey are therefore analysed by differentiating between different career stages as well. Since the number of observations of first-stage researchers (R1) in the target groups TG2 and TG3 are rather low (27 and 25 observations respectively), the two early career stages (R1 and R2) are aggregated. The share of confident researchers in the group of established researchers (R3) is similar to the share of confident leading researchers (R4). Thus, we aggregate those two groups for simplicity as well. In line with previous results, the share of researchers who lack confidence is the 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 28). 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). The share of early-stage researchers confident with their future career perspectives is particularly low among EU researchers currently working abroad (61%). In contrast, the share of early-stage researchers feeling confident about their future career is high among non-EU researchers (TG3 84%; TG2 71%; TG4 72%).

Figure 28: Confidence of researchers in future career prospects by career stage and target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 36: "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, only little variation can be observed (see Figure 114 in annex 6). While the share of researchers feeling (very) confident about their future career prospects is the highest in the group of "other" countries, including Argentina, Colombia, Thailand and Ukraine, and in the US (83% each), it is slightly lower in BRICS countries (76%), and non-EU OECD countries (78%). Thus, the data do not confirm the general assumption that researchers are feeling less confident in less developed countries.

6. Working conditions in current position

Researchers, particularly academic researchers, experience a highly competitive working environment. The "up-or-out" nature of academic research results in a high proportion of researchers dropping out of research careers. While the specific "the winner-takes-it-all" aspect of (academic) research might lead to undesired drop outs of highly talented researchers, competition among researchers can enhance scientific productivity and lead to new pioneering insights. However, this holds only 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 minority (Geuna - Shibayama, 2015[58]).

Research careers are terminated not only because of low levels of productivity. Donowitz et al., 2007[59], 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 careers (Landry – Amara - Rherrad, 2006[60]). 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 MORE3 Global survey, researchers are asked about the characteristics of their current employment and on 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.[61] Based on the analysis of these data by Janger & Nowotny (2016), the main working conditions are conceptualised and grouped in three categories in MORE3, 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.

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 8.1.

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58 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.

59 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.

60 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.

61 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.

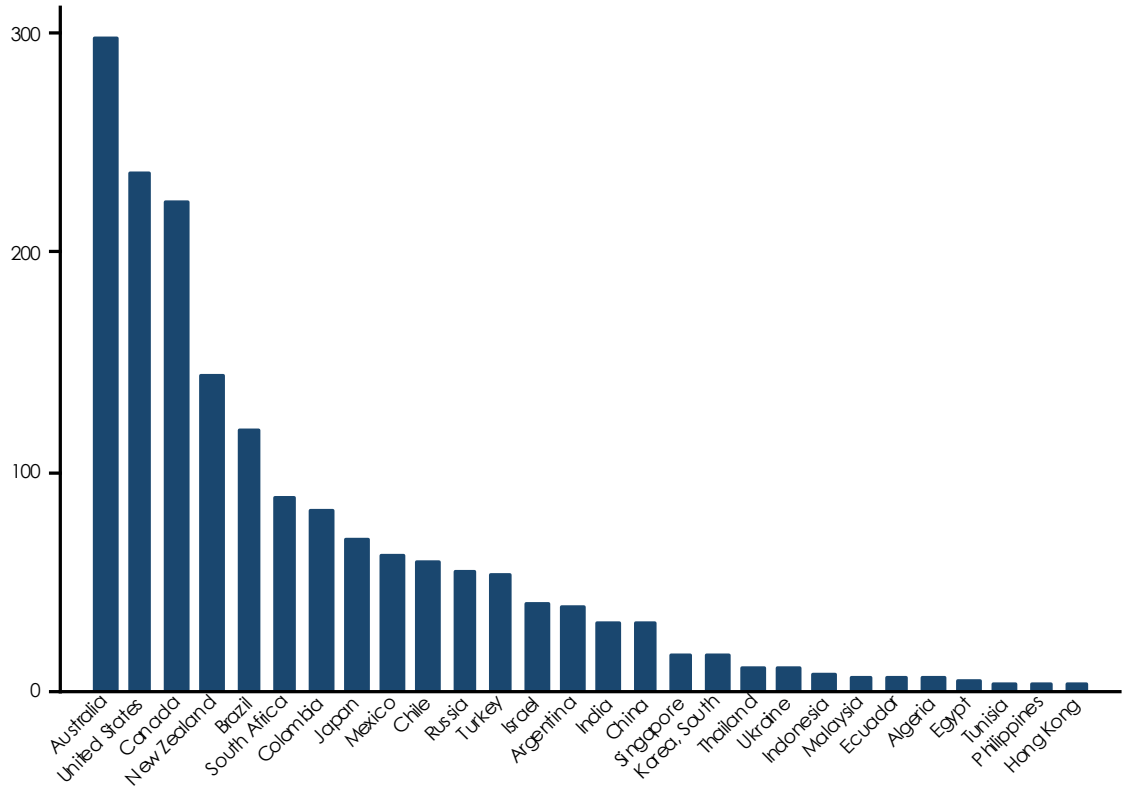
Box 4: Main research questions on working conditions

- 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?

6.1. Characteristics of employment and contractual situation

Most researchers who participated in the MORE3 Global survey are currently employed in Australia, the US and Canada, and a considerable share also work in New Zealand, Brazil and South Africa (see Figure 29). Therefore, some parts of the analyses might be driven to a certain extent by the working conditions of researchers in these countries. Of course, this non-uniform distribution of researchers across different employment countries has 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 again. Sometimes a distinction between certain groups of countries of employment is made in the following 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 tables in Annex 5.

Figure 29: Researchers' countries of employment



Source: MORE3 Global survey (2017)
Notes:
- Only countries where more than 2 researchers who participated in the MORE3 Global survey are employed
- Based on question 22: "Country of employment"
- (n=1,727)

Analogous to the MORE3 EU HE survey, the MORE3 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.

6.1.1. Length of employment

On average, researchers that participated in the MORE3 Global survey have been employed for 12 years (see Table 21).

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 the included TG1 researchers have been only employed for on average 7 years at their current position, TG4 researchers have been employed for 14 years on average. One reason for these differences could be based on the differences in the age structure of researchers of different target groups (see section 5). The share of young researchers is significantly higher in the group of European researchers currently working abroad (TG1) than in the group of non-mobile, non-EU researchers (TG4). In general, younger researchers are more often mobile than older researchers. In contrast to the relatively high shares of young European researchers currently working abroad (65% are younger than 44 years) the share of non-EU researchers who have never worked abroad and that are younger than 44 years is only 43%.

Table 21: Length of employment at current position (in years)

	TG1	TG2	TG3	TG4	Total
Employment length (in years)	7.4	13.0	11.4	13.8	11.9

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 21: "Employed since"

6.1.2. Contractual situation

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

Target groups: While the share of researchers with permanent or open-ended contracts is the lowest within the group of European researchers currently working outside Europe (51% of TG1 researchers), the share of researchers having fixed-term contracts in other target groups is partly twice as high (see Figure 118 in annex 7). 45% of TG1 researchers have fixed-term contracts in contrast to only 22% of non-EU researchers who have worked abroad but not in the EU (TG3).

Country of current employment: There are no large differences regarding the contractual situation of researchers between different country groups (see Figure 119 in annex 7). The US might be an exception, as in comparison to other (non-EU) country groups a higher share of researchers employed in the US have fixed-term contracts. 40% of researchers employed in the US have fixed-term contracts in contrast to approx. 30% of researchers in other country groups. This is not a result of different age structures. The age structure in the US is rather similar to the group of Anglo-Saxon and non-EU

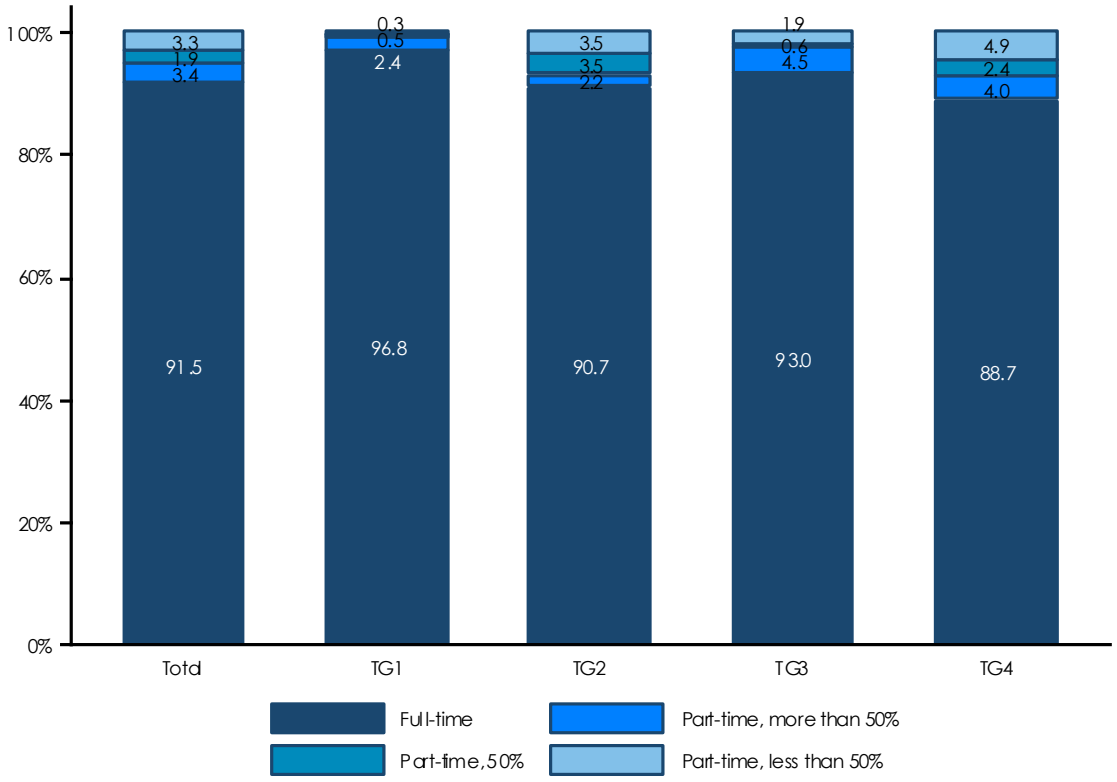
OECD countries. Between 45% (Anglo-Saxon) and 47% (US) of researchers are below 44 years old. In BRICS (57%) and other countries (61%) the shares of researchers younger than 44 years are even higher.

6.1.3. Type of position

The vast majority of researchers (91%) questioned in the MORE3 Global survey has a full-time position (see Figure 30).

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 30). The highest share of researchers working full-time is that in target group TG1 (97% 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).

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

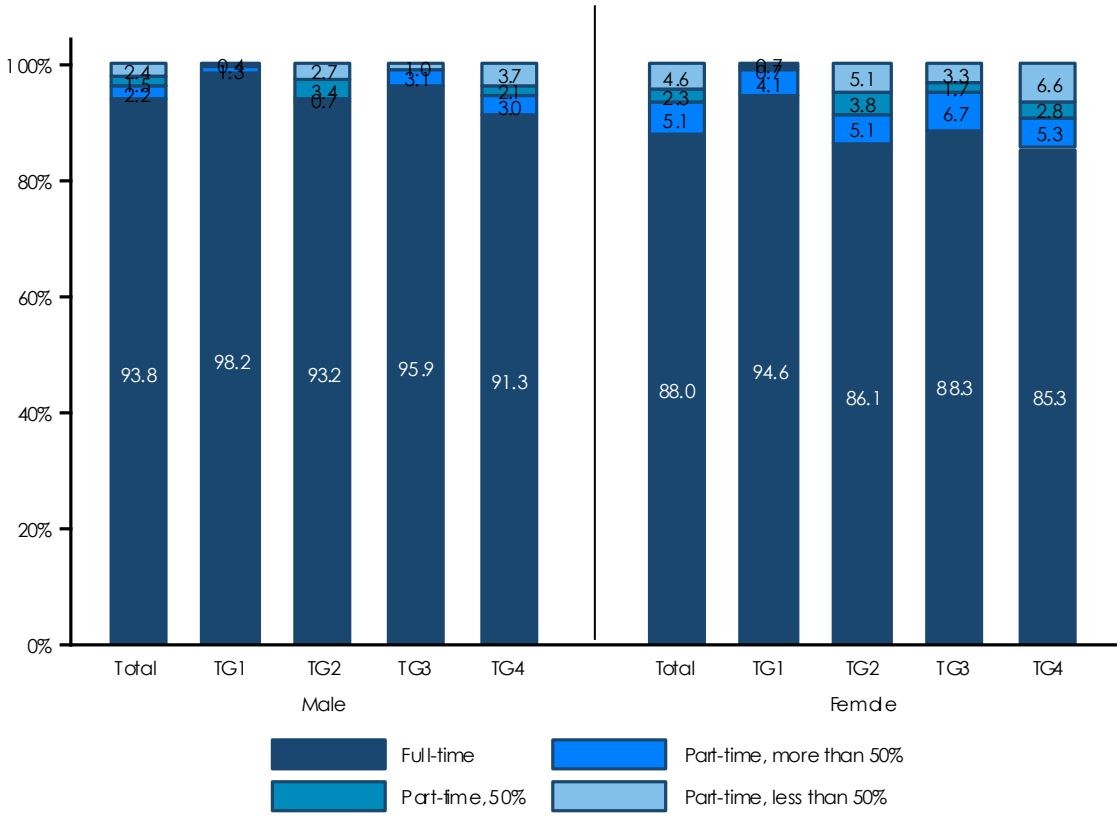


Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,513)
- TG1: EU researchers currently working outside the EU (n=375)
- TG2: Non-EU researchers who have worked in the EU in the past (n=226)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=157)
- TG4: Non-EU researchers who have never worked abroad (n=755)
- Based on question 24: "Type of position"

Gender and target groups: Similar to the MORE3 EU HE survey, in the MORE3 Global survey the share of female researchers working part-time (12%) is higher than the share of male researchers (6%); this also across all target groups (see Figure 31). With the exception of the group of European female researchers currently working outside the EU

(TG1) the groups of non-EU female researchers are rather homogeneous with respect to the type of position. The share of non-EU female researchers working full-time ranges from 85% (in TG4) to 88% (TG3) and is thus a little bit lower than the respective share of European female researchers currently working outside the EU (95%) or the shares of male researchers working full-time (ranging from between 91% and 98%).

Figure 31: Distribution of researchers by type of position, target groups and gender



Source: MORE3 Global survey (2017)
Notes:
- Based on question 24: "Type of position" and question 2 "What is your gender?"
- (n=1,513)

6.2. Remuneration packages

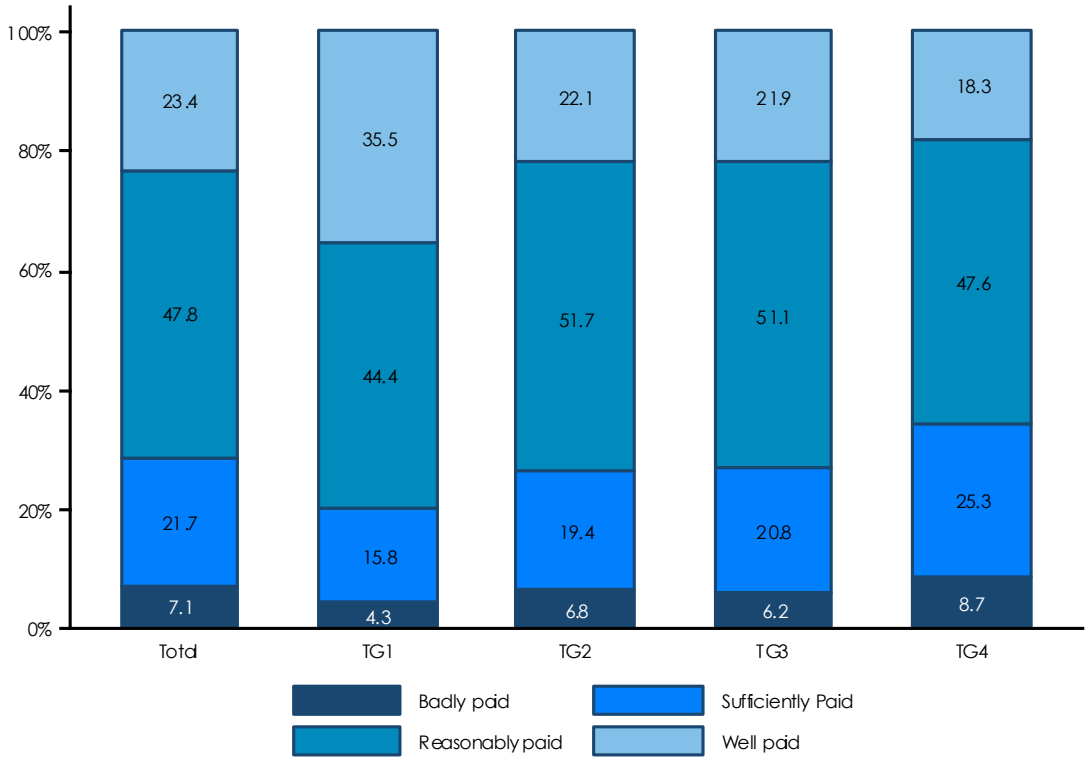
Researchers' working conditions are shaped, among other factors, by the terms of financial security and remuneration (Janger and Nowotny, 2016[62]). Therefore, similar to the MORE3 EU HE survey, some questions that address explicitly remuneration are included in the MORE3 Global survey.

In total, almost one in four researchers participating in the MORE3 Global survey feels well paid (23% of researchers), and half thinks that he or she is paid a reasonable salary (49% of researchers) (see Figure 32). This means that the share of researchers perceiving themselves as well or reasonably paid is rather similar to the respective share in the MORE3 EU HE (it was only 5 percentage points lower).

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

Target groups: Figure 32 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 (80% of TG1 researchers), it drops remarkably when looking at non-EU researchers who have never worked abroad (66% of TG4 researchers feel well or reasonably paid). In contrast, the share of researchers thinking that they are badly paid and are struggling to make ends meet is twice as large in the group of non-EU non-mobile researchers than in the group of EU researchers working abroad (9% of TG4 researchers in contrast to 4% of TG1 researchers). This result could be partly based on higher levels of risk aversion or a more conservative attitude in the group of non-mobile researchers.

Figure 32: Researchers' perception of remuneration by target group

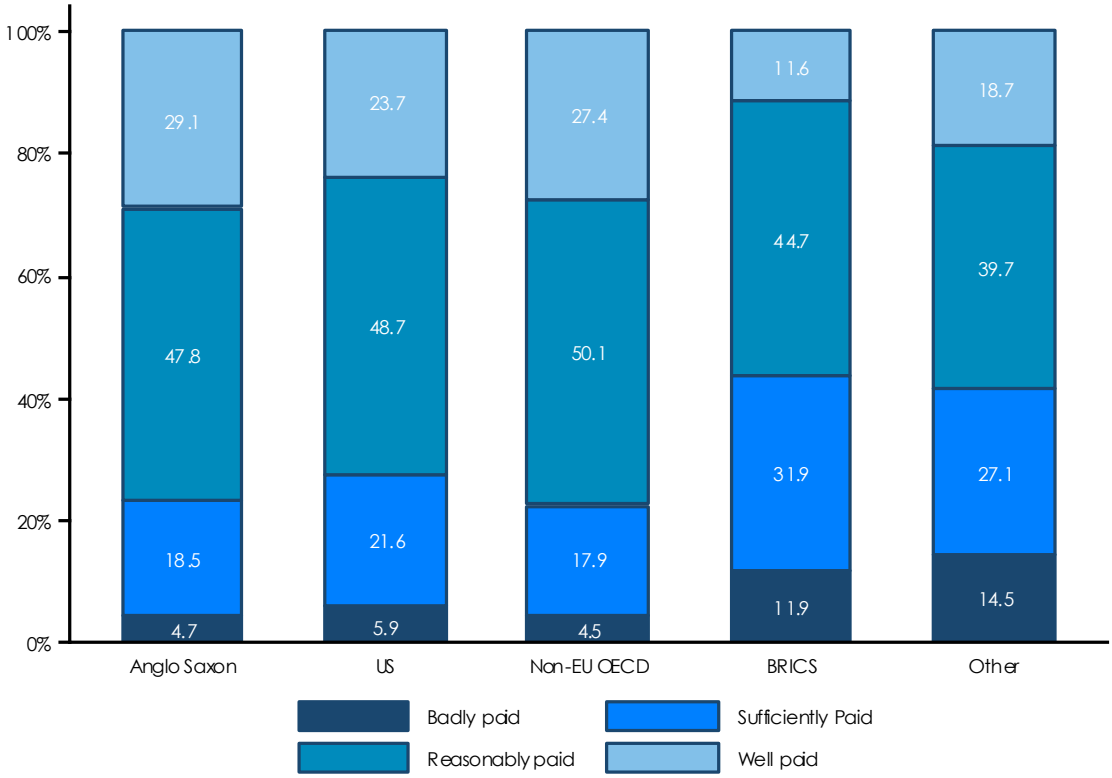


Source: MORE3 Global survey (2017)
Notes:

- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 27: "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 33 indicates some variations in researchers' perception of remuneration. In Anglo-Saxon countries and non-EU OECD countries the shares of researchers who feel badly paid and are struggling to make ends meet are particularly low (5%). Simultaneously, in those countries the shares of researchers feeling well paid are rather high at 29% (Anglo-Saxon) and 27% (Non-EU OECD). In contrast, the shares of researchers perceiving their remuneration as bad are rather high in BRICS nations (12%) and 'other' countries, including countries like Argentina, Colombia, Thailand and Ukraine (15%). Moreover, the share of researchers being employed in BRICS countries and feeling well-paid is the lowest among those country groups. Only 12% of researchers working in BRICS nations think that they are well-paid.

Figure 33: Researchers' perception of remuneration, by country group

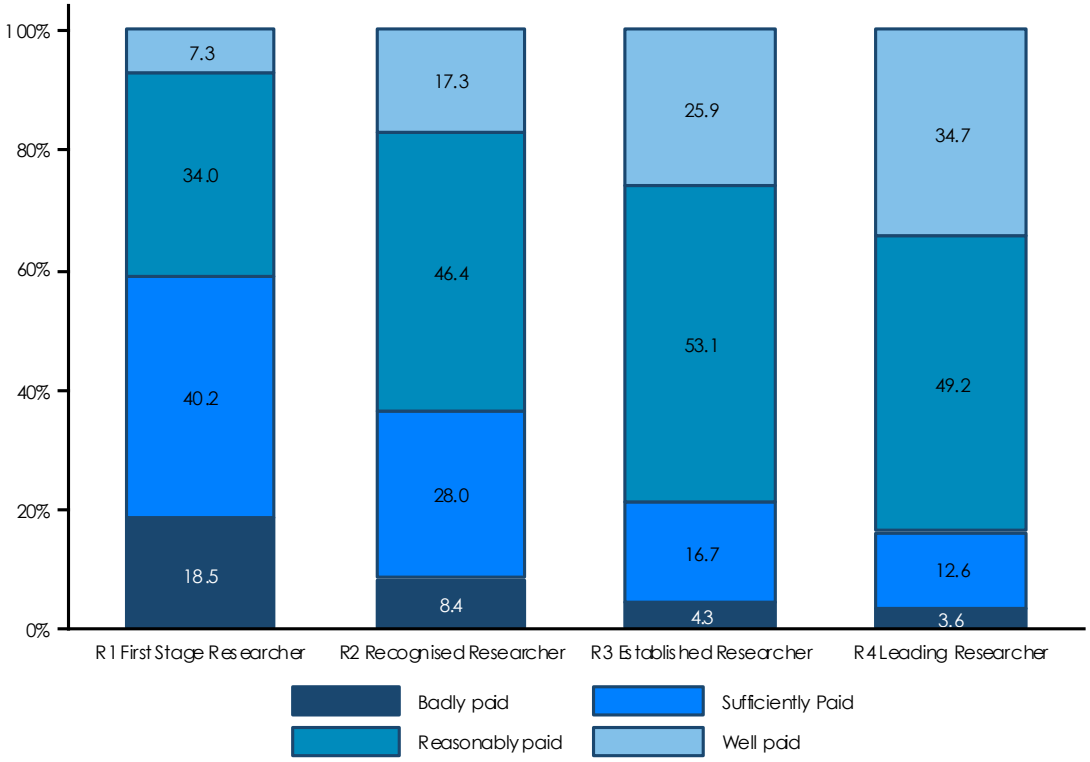


Source: MORE3 Global survey (2017)
Notes:
- Based on question 27: "How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)?I consider myself to be..."
- (n=1,727)

Gender: Female and male researchers perceive their remuneration rather similarly (see Figure 120 in annex 7). Small differences are observed regarding the share of researchers feeling that they are paid a reasonable salary and researchers who think that they are paid sufficiently to only make ends meet. A slightly higher share of male researchers feel that they are paid reasonably (51% of male researchers in contrast to 44% female researchers), while the share of female researchers feeling that they are paid sufficiently to only make ends meet is higher than the respective share of male researchers (24% of female researchers in contrast to 20% of male researchers).

Career stages: The distribution of researchers' perception of remuneration differs considerably between career stages (see Figure 34). While the share of researchers who feel badly paid is rather high in the group of first-stage researchers (19% of R1 researchers), within the group of leading researchers this share drops considerably (less than 4% of R4 researchers). Vice versa, the share of early stage researchers feeling well paid is rather low (7% of R1 researchers) in comparison to the group of leading researchers who feel well paid (35% of R4 researchers). Overall, with each higher career level, beginning from R1 and ending in R4, the shares of researchers rather 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 34: Researchers' perception of remuneration by career stages



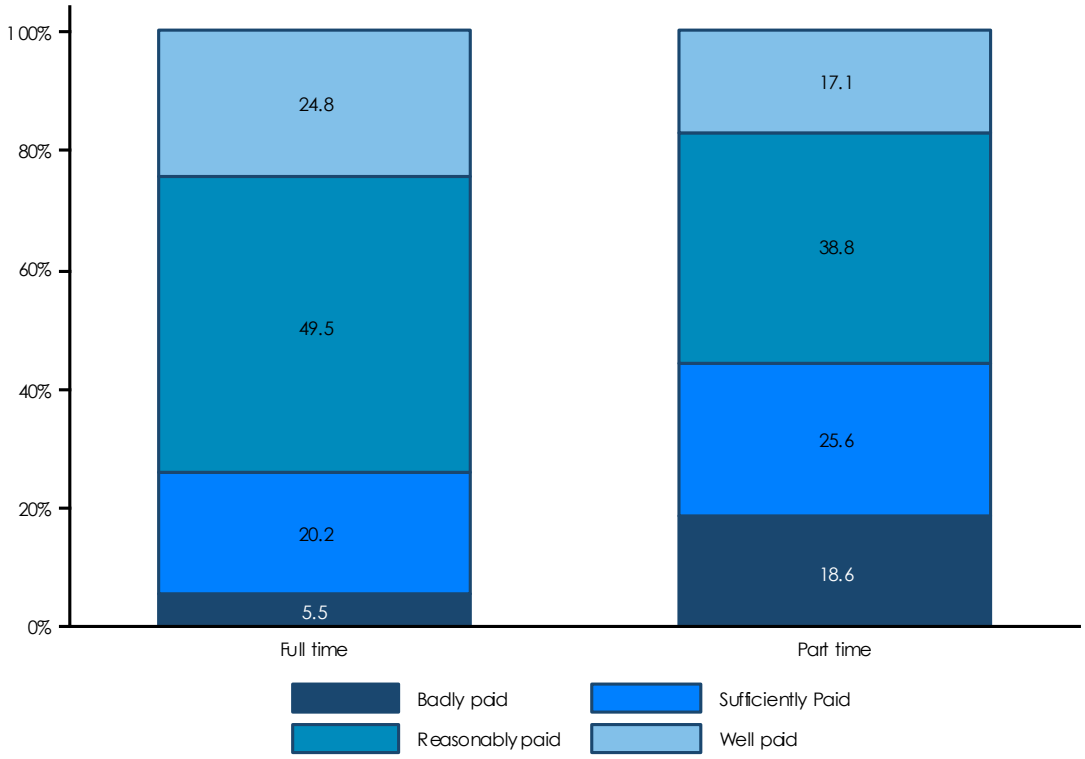
Source: MORE3 Global survey (2017)
Notes:
- Based on question 27: "How do you feel about your remuneration package (if you do not take into account a second income, or if applicable, the income of your partner)? I consider myself to be..." and question 10 "In which career stage would you currently situate yourself?"
- (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 differences in researchers' perception of remuneration. While only 27% of researchers working at one position feel badly paid or only sufficiently paid to make ends meet, 39% 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 121 in annex 8). 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 potentially less attractive remuneration in academia tends to force researchers to take up a second job (outside academia).

Type of position: Figure 35 clearly hints at differences in the perception of remuneration between researchers with different types of positions. 19% of part-time researchers feel badly paid. Among the group of part-time workers, the share who think that they are badly paid is particularly high amongst those employed with less than 50% working time (22%). This is in contrast to researchers with a full-time position, of which less than 6% think that they are badly paid. Vice versa, while 25% of researchers with full-time positions think that they are well-paid, only 17% of part-time researchers agree.

Figure 35: Researchers' perception of remuneration by type of position



Source: MORE3 Global survey (2017)
Notes:
- Only researcher who are not working in a dual position.
- Based on question 27: "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 24 "Type of position"
- (n=1,513)

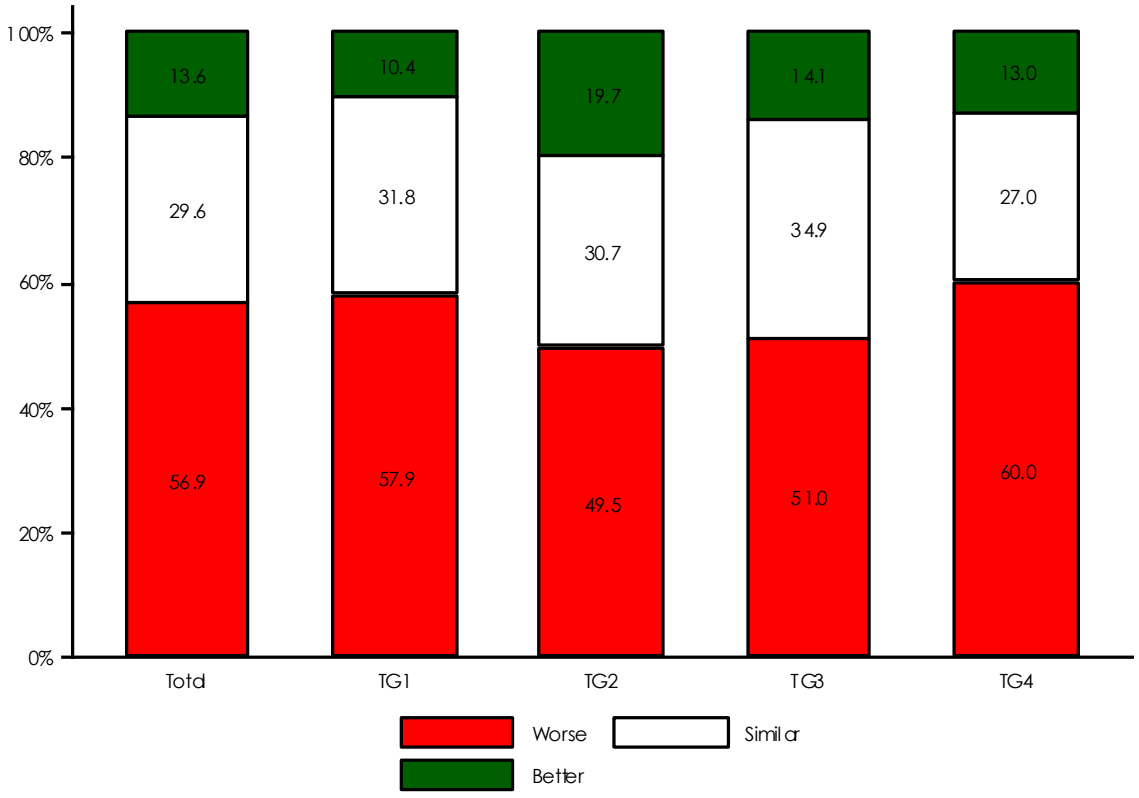
Contractual situation: In terms of researchers' contractual situation, differences with respect to their perception of remuneration can be observed as well. Figure 122 demonstrates that the group of researchers feeling well-paid is the largest among researchers with permanent contracts (28%), followed by researchers with fixed-term contracts (18%).

6.2.1. Researchers working in academia

Similar to the MORE3 EU HE survey, 57% of researchers working in the higher education sector feel more badly paid compared to people with comparable skills and experience working outside academia (see Figure 36). 30% of researchers feel there is little difference and only 14% of researchers perceive themselves as better paid than their non-academic counterparts.

Target group: The highest share of researchers feeling paid worse than people with comparable skills and experience outside academia can be found in the group of non-EU researchers who have never worked abroad (60% of TG4 researchers, see Figure 36). The group of non-EU researchers who have worked in the EU in the past show the lowest share those who feel more badly paid (50% of TG2 researchers) and the highest share of researchers that feel better paid than people outside academia (20% of TG2 researchers). Overall, about 30% think that remuneration packages within and outside academia are rather similar.

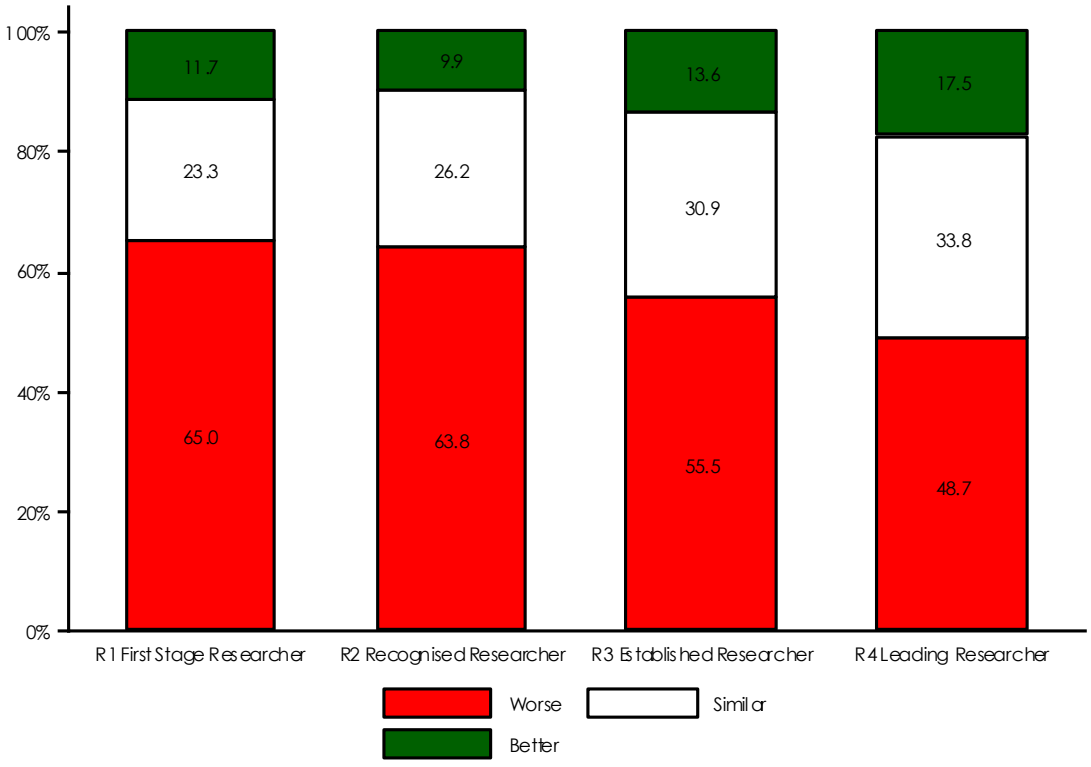
Figure 36: Perception of remuneration compared to outside academia by target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,512)
- TG1: EU researchers currently working outside the EU (n=361)
- TG2: Non-EU researchers who have worked in the EU in the past (n=236)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=164)
- TG4: Non-EU researchers who have never worked abroad (n=751)
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 29: "How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?"
- (n=1,394)

Career stage: Interestingly, researchers less often feel less well paid than their non-academic counterparts later in their career stage, a result in contrast to the MORE3 EU HE survey. While 49% of R4 and 56% of R3 researchers feel worse paid, the proportion of R1 researchers is 65% (see Figure 37). Conversely, in terms of the share of those researchers feeling better paid, the average increases from 12% in R1 to 18% in R4.

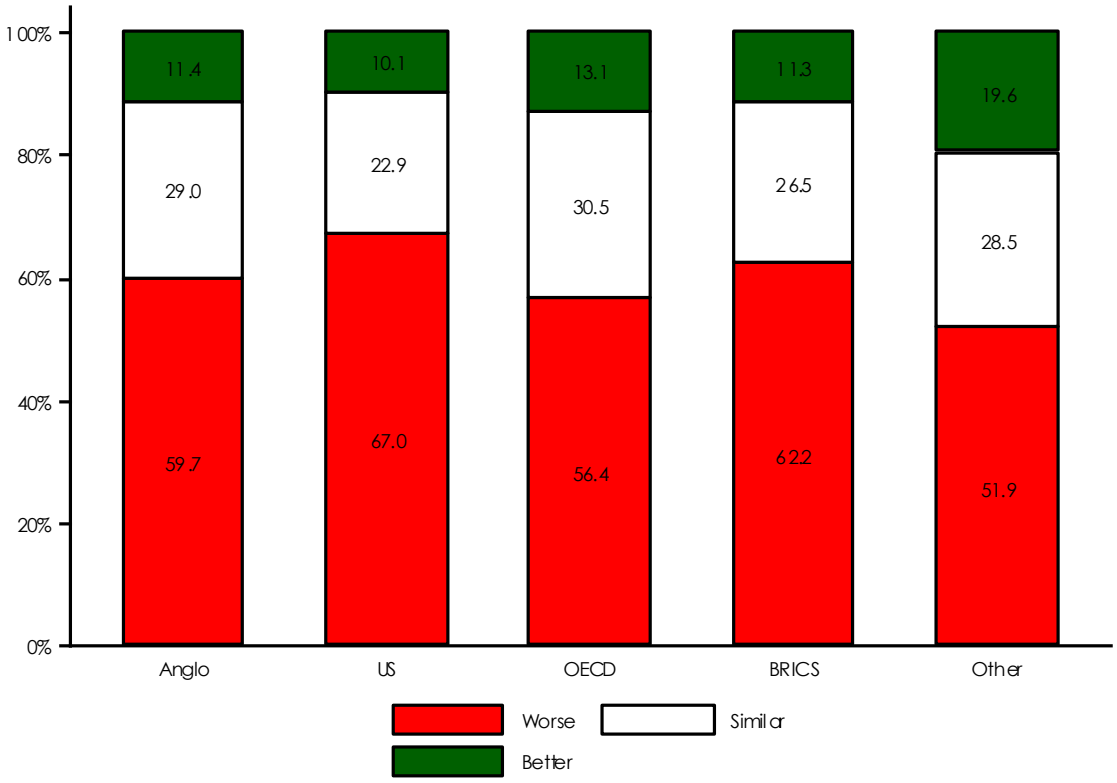
Figure 37: Perception of remuneration compared to outside academia by career stage



Source: MORE3 Global survey (2017)
Notes:
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 29: "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?"
- (n=1,394)

Country of current employment: Looking at researchers employed at different country groups gives a hint of small regional differences (see Figure 38). While the share of researchers feeling worse paid than their non-academic counterparts is the highest in the US (67%), it is the lowest in the group of 'other countries', including e.g. Argentina, Colombia, Thailand and Ukraine (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: Outside options are usually better in economically-developed countries.

Figure 38: Perception of remuneration compared to outside academia by country groups



Source: MORE3 Global survey (2017)
Notes:
- Only researchers whose main (or only) position is at a university or in the HEI sector.
- Based on question 29: "How would you compare your remuneration package in your higher education position to that of people with comparable skills and experience outside academia?"
- (n=1,394)

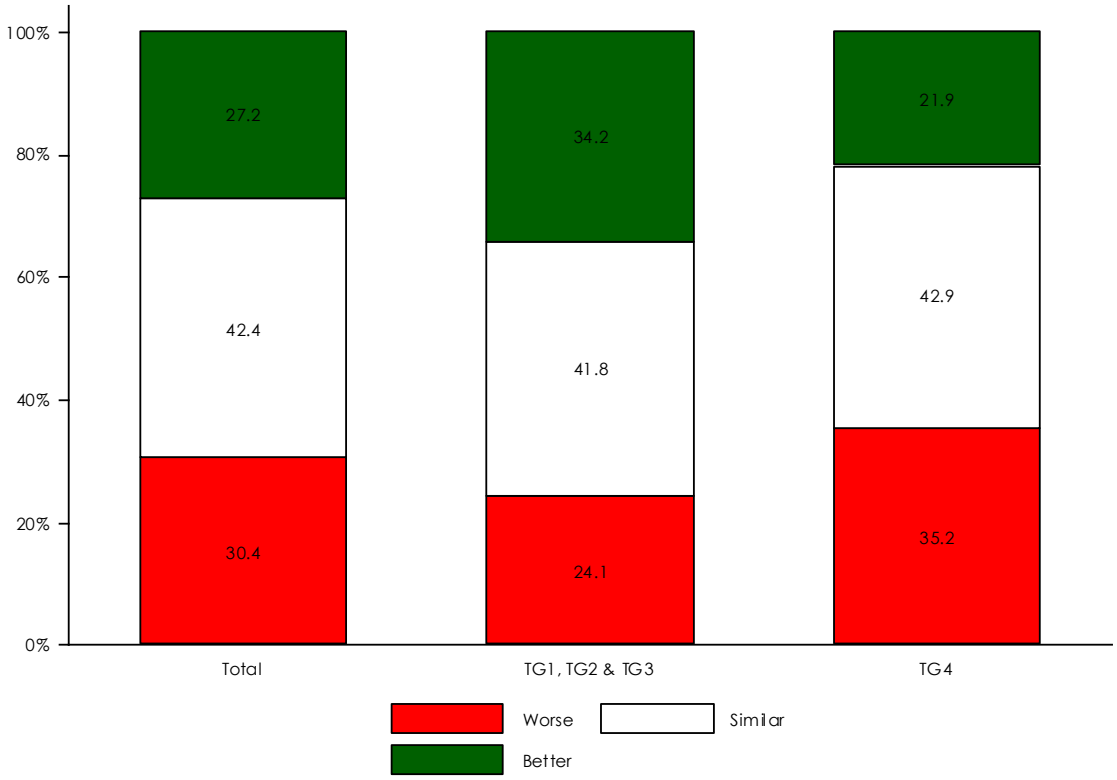
6.2.2. Researchers working outside academia

In contrast to the MORE3 EU HE survey, in the MORE3 Global survey researchers working outside academia are also included. 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 perception of researchers in academia reflects a general impression. Therefore, in the MORE3 Global survey researchers working outside academia are asked how they compare their remuneration package to that of people with comparable skills and experience with those working in academia. Figure 39 supports the results found above. From the perspective of researchers working outside academia, the proportion of researchers feeling worse paid and better paid are reversed: Only 30% of researchers working outside academia perceive their remuneration as worse than the remuneration of people working inside academia, while 42% think that remuneration is similar and 27% feel even better paid.

Target groups: Unfortunately, it is not possible to analyse single target groups separately, as the sample size is too small, particularly for target groups TG2 and TG3. Thus, we aggregate target groups TG1 to TG3 in order to analyse possible differences between mobile and non-mobile researchers. Overall, with respect to the perception of being worse paid than people in academia differences between the groups of non-mobile

researchers (TG4) and mobile researchers (TG1, TG2 and TG3) can be observed (see Figure 39). While 35% of non-mobile researchers perceive their remuneration as worse than that of their colleagues inside academia, only 24% of mobile researchers agree. The share of researchers thinking that they are paid rather similar salaries to their academic counterparts is equally large in both groups (between 42% and 43%). 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 mobile researchers (34%) than in the group of non-mobile researchers (22%).

Figure 39: Perception of remuneration compared to researchers in academia by target groups

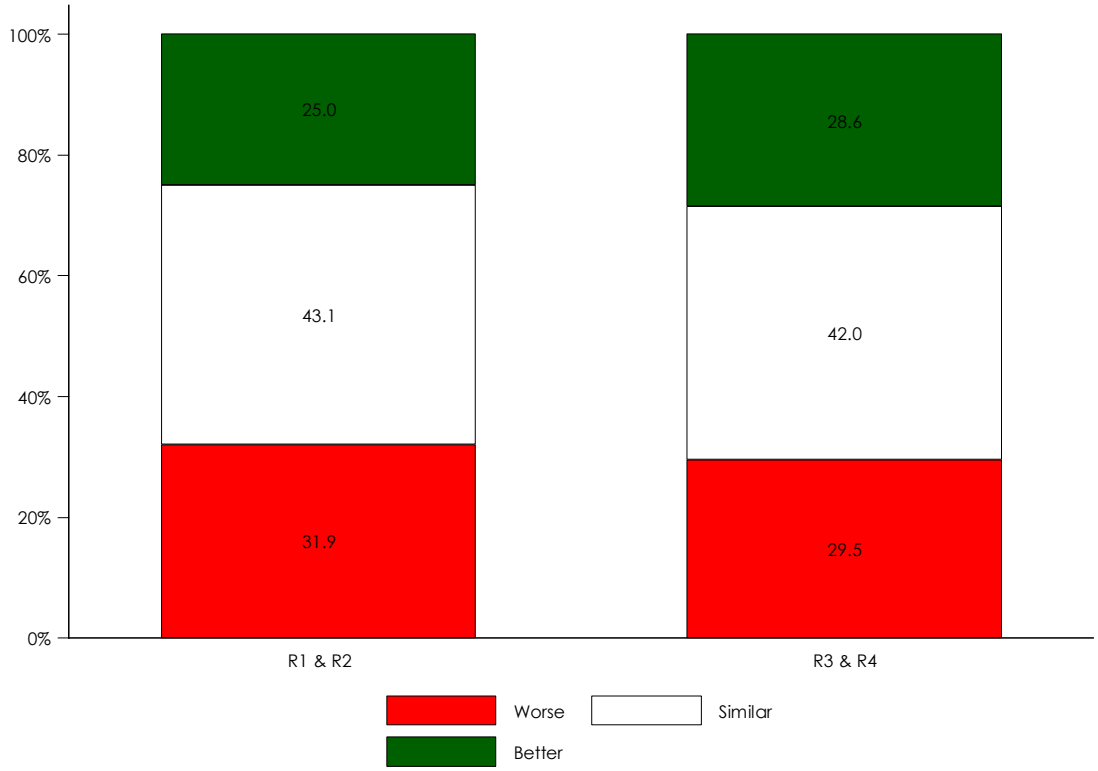


Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=184)
- TG1: EU researchers currently working outside the EU (n=44)
- TG2: Non-EU researchers who have worked in the EU in the past (n=22)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=13)
- TG4: Non-EU researchers who have never worked abroad (n=105)
- Only researchers whose main (or only) position is not at a university or in the HEI sector.
- Based on question 30: "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: Due to the small sample size of non-academic researchers in the MORE3 global survey it is not possible to distinguish between single career stages when analysing researchers' perception of remuneration compared to researchers inside academia. Therefore, we aggregated R1 and R2 researchers as well as R3 and R4 researchers. However, Figure 40 shows only very small differences between those two groups. 32% of R1 and R2 researchers and 30% of R3 and R4 researchers feel worse paid than their academic counterparts, while 25% of R1 and R2 researchers and 29% of

R3 and R4 researchers perceive their remuneration better than that of researchers with similar skills inside academia.

Figure 40: Perception of remuneration compared to researchers in academia by career stages



Source: MORE3 Global survey (2017)
Notes:
- Only researchers whose main (or only) position is not at a university or in the HEI sector.
- Based on question 30: "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=184)

7. Mobility, collaboration and networking

In the MORE3 Global survey, researchers were questioned about their mobility patterns including both international, intersectoral and interdisciplinary mobility. As the results of the survey are not based on a representative sample it is not possible to provide indicators on the share of foreign researchers in a certain country. Thus, this section contains all findings regarding mobility and collaboration of researchers currently working outside Europe. It focuses on the international mobility experience as a researcher after one has obtained the highest educational qualification (PhD or other). For researchers who are currently still working on a PhD, mostly R1 (doctoral), this concerns pre-PhD mobility. For R2 (post-doctoral), R3 (established) and R4 (leading) researchers this concerns post-PhD mobility.

The section is divided in four main sections:

- International mobility (section 7.1)
- Intersectoral mobility (section 7.2)
- Interdisciplinary mobility (section 7.3)
- International collaboration (section 7.4)

Box 5: Main research questions on international, intersectoral, interdisciplinary mobility and collaboration

International mobility
▶ 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
▶ 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
▶ 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
▶ 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?

7.1. 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 country (see Franzoni, 2012[63] and section 7.1.1.7 of this chapter) mainly because it is difficult to track individuals once they have become mobile. To overcome this difficulty, a number of studies have used bibliometric analysis to analyse the global mobility patterns of researchers and the consequences of mobility. One example is the GlobSci survey, which has collected information of research scientists in 16 countries and performed a cross-country analysis. The GlobSci survey highlighted the observation that mobile scientists are more likely to engage in international collaborations, and tend to "exhibit superior performances in international collaborations than natives"[64] with no prior experience of mobility[65].

In the MORE3 Global survey, a comprehensive approach was taken including 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 7.1.1)
- International short-term (< 3 months) mobility (section 7.1.2)
- Short travel for conferences, meetings and visits (section 7.1.3)
- Networking (section 7.1.4)

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

[64] Scellato, G., Franzoni, C., Stephan, P. Mobile scientists and international networks. No. w18613. National Bureau of Economic Research, 2012.

[65] The GlobSci project had some limitations: First, respondents were selected only from published articles – and, hence, younger researchers are less likely to be selected; and, second, it only covered some countries and some fields of science: for instance, the humanities and social sciences were not covered.

7.1.1. International long-term mobility of > 3 months

7.1.1.1. Mobility patterns

The table below provides an overview of the respondents and their mobility pattern. The sample consists of 417 EU researchers and 1,310 non-EU researchers.

Table 22: Number of respondents with > 3 month international mobility experience

	Less than ten years ago	More than ten years ago	Never	Total
EU researchers (TG1)	417	[66]	[67]	**417**
Mobile in the EU	*196*		/	
Mobile outside the EU	*417*		/	
Non-EU researchers (TG2 and TG3)	441	211	658	**1,310**
Mobile towards the EU only (TG2)	*201*		/	
Mobile towards EU and non-EU countries (TG2)	*62*			
Mobile towards non-Europe (TG3)	*178*		/	
Total	**858**	**211**	**658**	**1,727**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" and question 38 "In the past 10 years, have you moved for more than 3 months to work in: At least one European country – At least one non-European country.
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never been mobile (n=869)

858 of the 1,727 respondents indicated that they had been mobile (after gaining their highest educational qualification) for more than 3 months in the past 10 years.

- 417 of these 858 mobile researchers are EU researchers who currently work outside the EU (TG1).
- 441 of these 858 mobile researchers are non-EU researchers:
  - 263 non-EU researchers have been mobile towards the EU in the past (TG2)
  - 178 non-EU researchers have been not been mobile towards the EU, but to other non-EU countries (TG3)
    - 53% of these 178 non-EU researchers have been mobile towards the EU more than ten years ago[68].
- 869 non-EU researchers have not been mobile in the past ten years:
  - Of which 211 have been mobile more than 10 years ago
    - 79% of the 211 researchers have been mobile towards the EU more than ten years ago.[69]
  - Of which 658 have never been mobile (after obtaining their highest educational qualification)

[66] 81 responses were obtained by EU researchers who were mobile more than 10 years ago.
[67] 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).
[68] Based on question 69 "Have you been to Europe more than 10 years ago?"
[69] Based on question 69 "Have you been to Europe more than 10 years ago?"

7.1.1.1.1. International mobility pattern by nationality

More detailed Information on the current location of the researchers in the different target groups is provided below:

- The respondents with a European nationality and who are currently working abroad (TG1) are mainly located in Australia and in the United States, followed by Japan, Canada and New Zealand (Table 55 in annex 8). In terms of their country of origin, the largest share of researchers within this target group originates from the United Kingdom, followed by Italy, Germany and France (Table 56 in annex 8).
- The respondents with a non-EU nationality and previous experience of working in the EU (TG2) are mainly located in Australia, followed by Canada, Brazil and New Zealand. (Table 57 in annex 8).
- The respondents with a non-EU nationality but without previous working experience in the EU are mainly located in Australia followed by Canada and the United States (Table 58 in annex 8).

7.1.1.1.2. International mobility with change of employer

45% of the mobile researchers indicated that they have changed employer in one of their long-term international moves in the past ten years. A change of employer is sometimes also referred to as job-to-job mobility in the literature.

Target groups: When looking at the differences across target groups, the highest level of employer mobility is found amongst the EU researchers who are currently working outside the EU (TG1) (Table 23).

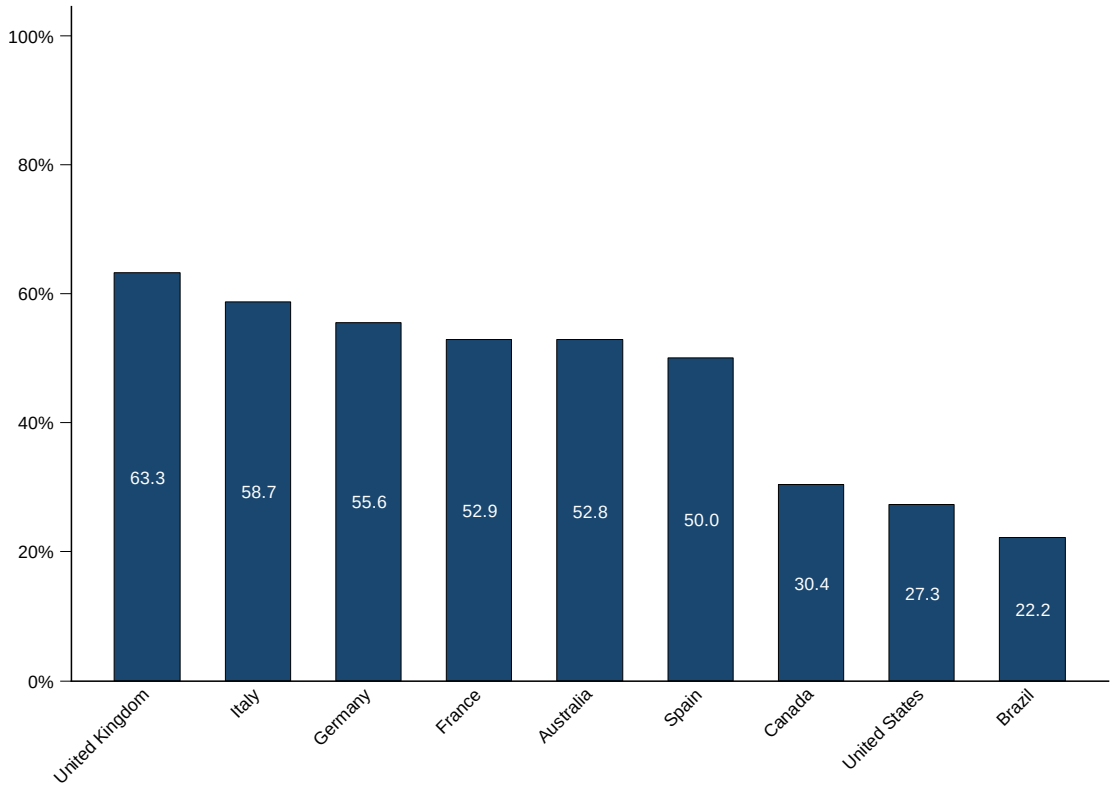
Country of citizenship: The same is observed in Figure 41, where employer mobility by country of citizenship is shown. Within the group of EU researchers who are currently working outside the EU (TG1), UK researchers are the ones that engage most frequently at least once in international mobility with a change of employer. Within the group of mobile non-EU researchers (TG2 and TG3), Australian researchers engage most frequently and at least once in international mobility with a change of employer. These findings should be taken with caution, since only the countries with more than 30 respondents have been considered for the analysis at the level of the country of citizenship.

Table 23: International mobility with change of employer

	Employer mobility
Total: Researchers currently working outside the EU	44.7%
TG1: EU researchers currently working outside the EU	58.4%
TG2: Non-EU researchers who have worked in the EU in the past	31.7%
TG3: Non-EU researchers who have worked abroad but not in the EU	37.3%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 45 "Did you change employer on this step?"
- (n =696)

Figure 41: International mobility with change of employer as share of > 3 month international mobility, in the past ten years, by country of citizenship.



Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" question 45 "Did you change employer in this step?" and question 5 "What is your country of citizenship?"
- (n =382)
- Only considers countries where 30 or more researchers have their citizenship.

7.1.1.2. Mobility flows and moves

In total, 1,245 moves were registered by the respondents in the survey: 645 were EU moves and 600 were non-EU moves (Table 24). A total of 1,080 moves entailed a change towards countries different than the country of citizenship.

Table 24: Overview of mobility flow

	EU moves	Non-EU moves	Total
TG1: EU researchers currently working outside the EU	273	297	**570**
TG2: Non-EU researchers who have worked in the EU in the past	372	103	**457**
TG3: Non-EU researchers who have worked abroad but not in the EU		200	**200**
Total	**645**	**600**	**1,245**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 39 "Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career.
- (n= 1,245)

Employer change: 36% of the moves (towards a country other than the country of citizenship) concerns a change of employer. The EU researchers currently working outside the EU most are the ones who have most frequently engaged in mobility with a change of employer (48%), followed by the non-EU researchers who have worked abroad but not in the EU (32%), and by the non-EU researchers who have worked in the EU in the past (26%). This might indicate that EU researchers abroad leave the EU more frequently to find a new job, whereas non-EU researchers might leave their countries more often for academic visits abroad.

Table 25: Overview of mobility flows with employer change

	No employer change	Employer change	Total
TG1: EU researchers currently working outside the EU	239 (52.3%)	218 (47.7%)	**457**
TG2: Non-EU researchers who have worked in the EU in the past	334 (73.9%)	118 (26.1%)	**452**
TG3: Non-EU researchers who have worked abroad but not in the EU	116 (67.8%)	55 (32.2%)	**171**
Total	**689 (63.8%)**	**391 (36.2%)**	**1,080**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 45 "Did you change employer in this step"?
- (n = 1,080)

For TG1 – EU researchers - the largest share of moves with employer change concerns moves towards non-EU countries ("non-EU moves"). The opposite can be observed for non-EU researchers (TG2): 75% of the 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 26: Overview of mobility flows with employer change : EU versus non-EU moves

	EU moves	Non-EU moves	Total
TG1: EU researchers currently working outside the EU	83 (38.1%)	135 (61.9%)	**218**
TG2: Non-EU researchers who have worked in the EU in the past	88 (74.5%)	30 (25.4%)	**118**
TG3: Non-EU researchers who have worked abroad but not in the EU	0	55 (100%)	**55**
Total	**171 (43.7%)**	**220 (56.3%)**	**391**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 45 "Did you change employer in this step"?
- (n = 1,080)

7.1.1.3. Destination countries

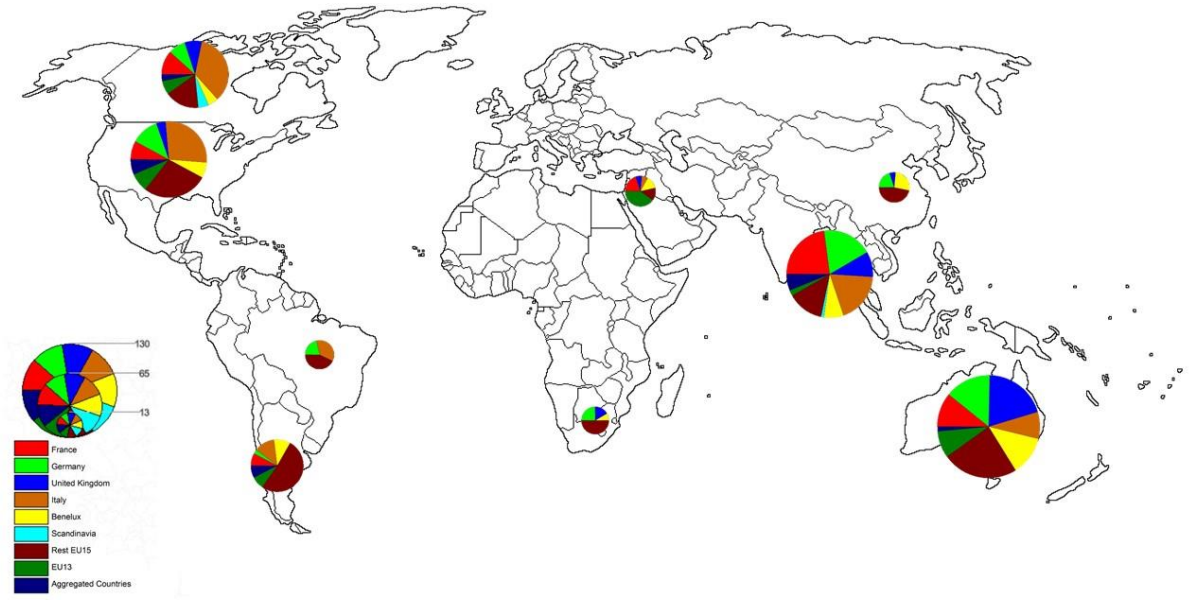
The US is the most popular destination country of the sample of researchers currently working outside the EU (16%). When international mobility is seen as an indicator of attractiveness, this underscores the perception of the US system as attractive (see section 8). In Europe, the United Kingdom (10%), Germany (9%) and France (8%) are the most popular destinations. This is in line with the most popular destination countries amongst researchers currently working in the EU of the MORE3 EU HEI survey. Below, a more detailed analysis of the destination countries of the different target groups is provided.

Mobility flows of EU researchers (TG1)

An overview of the current location of EU researchers working abroad in the sample is provided in Figure 42:

- The largest share of the respondents of EU researchers are currently working in Australia (19%) and US (17%), followed by Japan (14%) and Canada (13%).
- The main inflows in the US originate from Italy, Germany and France. The main inflows in Australia originate from the United Kingdom, Germany, Benelux and France.

Figure 42: Map of current location of EU researchers abroad



Source: MORE3 Global survey (2017)
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 following regions in the EU are applied: France, Germany, United Kingdom, Italy, Benelux, Scandinavia, EU13 and the rest of EU15.
- The following regions outside the EU are applied: US, Canada, Australia and New Zealand, China, Russia, rest of Asia, Middle East, Brazil, rest of South America, central America and Africa.
- (n = 457).

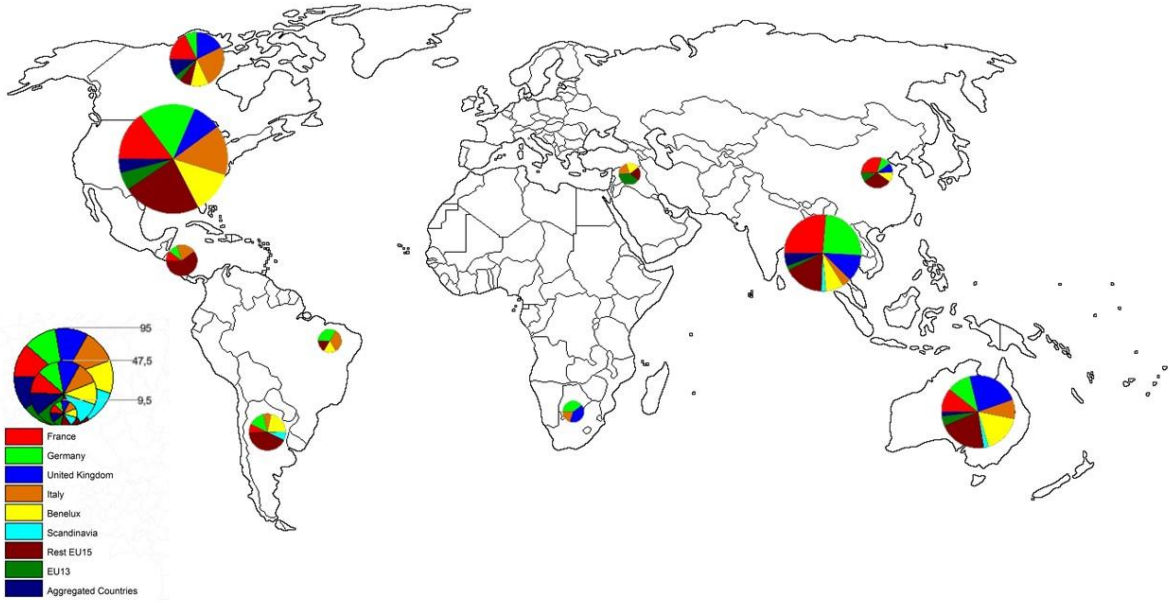
Of the EU researchers currently working abroad, 25% has only engaged in EU mobility before moving outside the EU (for their current employment), 47% has only engaged in non-EU mobility and 28% has engaged in both EU and non-EU mobility before.

A share of the EU researchers currently working outside the EU thus have undergone non-EU mobility previously. Some interesting observations from the mobility flows outside the EU can be drawn:

- About 45% of the moves outside the EU are towards the United States (35%) and Canada (10%);
- Australia and New Zealand also account for a large share of the moves (17%);

- Japan (11%) is by far the most popular destination in Asia, followed by Singapore (5%) and China (4%);
- Comparing regions/continents: North America (45%), Asia (23%) an Oceania (18%) account for the largest share of outward mobility moves while mobility towards South America (7%), Central America (4%) and Africa (2%) is more limited.

Figure 43: Map of mobility flows from the EU towards non-EU countries



Source: MORE3 Global survey (2017)
Notes:

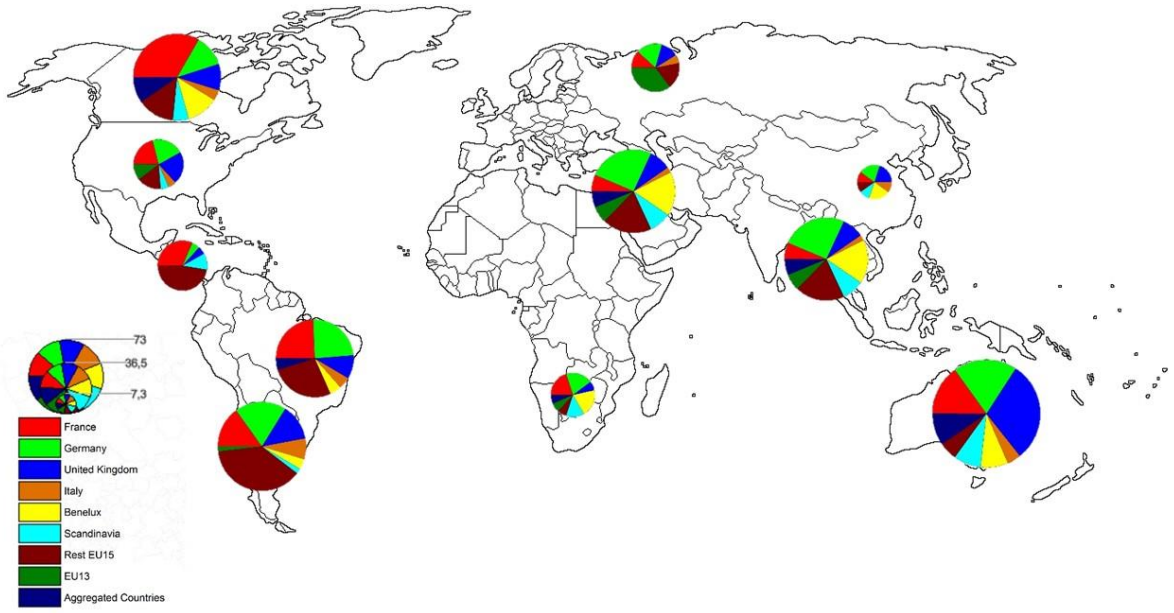
- Counts of moves from EU-countries towards non-EU countries by EU researchers who are currently working outside the EU.
- Based on question 39 "Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career.
- With "moves" defined as moves of three months or more during the last ten years to another country than the country of citizenship of the researcher.
- The following regions in the EU are applied: France, Germany, United Kingdom, Italy, Benelux, Scandinavia, EU13 and the rest of EU15
- The following regions outside the EU are applied: US, Canada, Australia and New Zealand, China, Russia, rest of Asia, Middle East, Brazil, rest of South America, central America and Africa
- (n = 273)
- Only flows of 3 moves or more are presented

Table 59 in annex 8 provides an overview of the mobility moves (40% of the total moves) within the EU of the EU researchers who currently work outside the EU. 52% of the researchers currently working outside the EU has engaged in EU mobility before. The majority of EU researchers has already been mobile towards the United Kingdom (25%), Germany (13%) and France (13%).

Mobility flows of non-EU researchers towards EU-destinations

Figure 44 provides an overview of the flows from non-EU researchers towards the EU. Germany was the most popular destination (15% of the EU moves) followed by France (14%), United Kingdom (13%) and Spain (10%).

Figure 44: Map of mobility flows from non-EU countries towards the EU



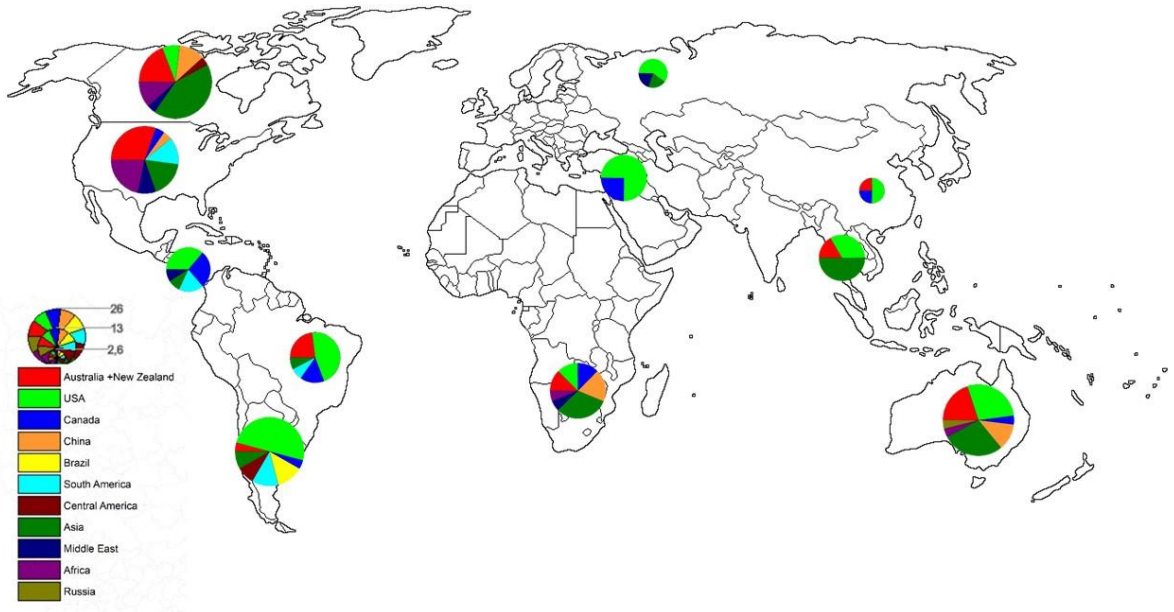
Source: MORE3 Global survey (2017)
Notes:

- 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 39 "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 in the EU are applied: France, Germany, United Kingdom, Italy, Benelux, Scandinavia, EU13 and the rest of EU15
- The following regions outside the EU are applied: US, Canada, Australia and New Zealand, China, Russia, rest of Asia, Middle East, Brazil, rest of South America, central America and Africa.
- (n = 372).
- Only flows of 3 moves or more are presented.

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

- The United States is an important destination country; 30% of the moves of non-EU researchers who have been mobile but not towards the EU was directed towards the US. The main regions of origin of these researchers were Australia and New Zealand, Asia and Africa.
- Also Canada and Australia and New Zealand are important destination countries; a large share of the researchers originate from Asia (incl. China).

Figure 45: Map of mobility flow from non-EU countries towards other non-EU countries



Source: MORE3 Global survey (2017)
Notes:
- Count of moves from non-EU countries to other non-EU by non-EU researchers who have been mobile but not towards the EU.
- Based on question 39 "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 in the EU are applied: France, Germany, United Kingdom, Italy, Benelux, Scandinavia, EU13 and the rest of EU15
- The following regions outside the EU are applied: US, Canada, Australia and New Zealand, China, Russia, rest of Asia, Middle East, Brazil, rest of South America, central America and Africa .
- (n = 171).
- Only flows of 3 moves or more are presented.

Table 27 provides an overview of the results of the GlobSci survey (2012)[70] with respect to countries where more than 10% of the workforce originates from a foreign country.

[70] Giuseppe Scellato, Chiara Franzoni, Paula Stephan Mobile Scientists and International Networks, NBER Working paper No. 18613, December 2012.

The data of the MORE3 Global survey confirms the following observations: A large share of inflow in Australia originates from the United Kingdom (12%) and in the UK a large share of inflow originates from Italy (12%).

Additional observations are:

- France is a destination country for researchers from Brazil (11%) and Canada (19%)
- Germany is a destination country for researchers from Australia (14%) and Brazil (11%)
- Spain is a destination country for researchers from Brazil (18%)
- The UK is a destination country for researchers from Australia (13%), Italy (12%) and Spain (12%)
- The United States is a destination country for researchers from Germany (9%), France (8%), Italy (8%) and Spain (8%).

It is important to interpret the results with care; about a quarter of the sample consists of EU-researchers who currently work outside the EU. This possibly explains that the findings of this MORE3 Global survey observe more mobility directed to or originating from the EU compared to the findings of the GlobSci survey in Table 27 below.

Table 27: Results of "foreign born scientists: mobility patterns for sixteen countries"

Country of work or study in 2011	Proportion in foreign country at 18 (%)	Countries supplying >= 10% of the workforce (%)
Australia	44.5%	UK (21.1%) China (12.5%)
Belgium	18.2%	Germany (15.2%) France (15.2%) Italy (13%)
Brazil	7.1%	Argentina (16%) France (14%) Colombia (12%) Peru (12%)
Canada	46.9%	UK (13.5%) US (13.5%) China (10.9%)
Denmark	21.8%	Germany (24.4%)
France	17.3%	Italy (13.8%)
Germany	23.2%	None
India	0.8%	Not computable
Italy	3%	France (13%) Germany (11.1%) Spain (11.1%)
Japan	5%	China (33.7%) South Korea (11.6%)
Netherlands	27.7%	Germany (14.6%) Italy (12.5%)
Spain	7.3%	Argentina (12.6%) France (10.3%) Italy (10.3%)
Sweden	37.6%	Germany (11.9%) Russian Fed. (10.2%)
Switzerland	56.7%	Germany (36.9%)
United Kingdom	32.9%	Germany (15.2%) Italy (10.4%)
United States	38.4%	China (16.9%) India (12.3%)

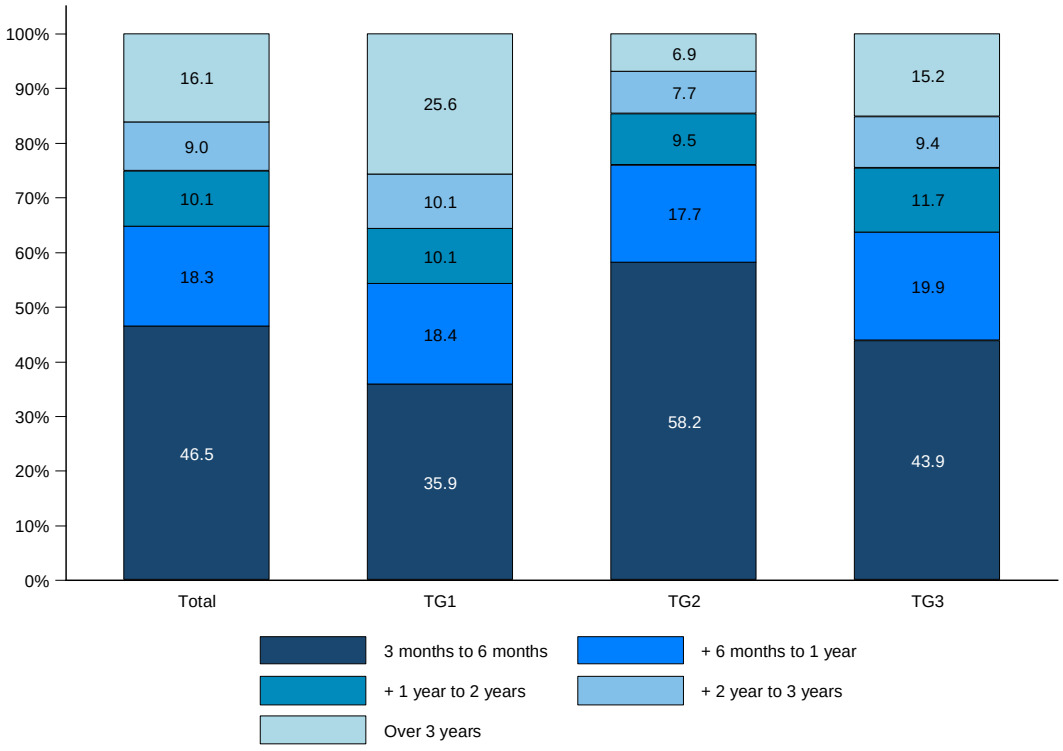
Source: Giuseppe Scellato, Chiara Franzoni, Paula Stephan. Mobile Scientists and International Networks, NBER Working paper No. 18613, December 2012

7.1.1.4. Duration of long-term mobility of more than three months

Figure 46 provides an overview of the duration of the moves of three months or more of researchers who currently work outside Europe. 47% of the moves lasted less than six months. The duration pattern of long-term moves is in the same line as the results of the MORE3 EU HE survey.

Target groups: For the non-EU researchers who have worked in the EU in the past ten years this share is 58% while it is 36% for the EU researchers who currently work outside Europe. This last group of researchers has the highest share of moves - which is over three years, compared to the other groups. 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 abroad intends to pursue an academic career abroad and does not just stay for academic exchange programmes.

Figure 46: Duration of moves



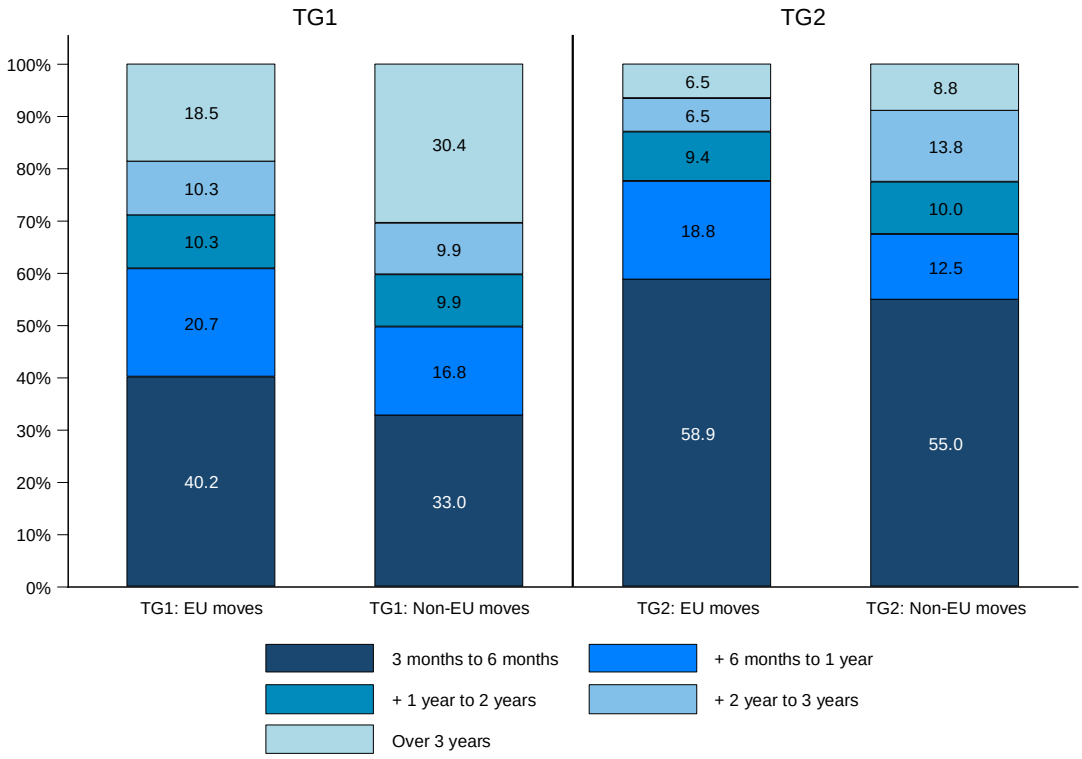
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,080)
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=171)
- Based on question 44 "What was the duration of each step"?
- Distribution of moves by target groups
- 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

Duration of EU and non-EU moves

When EU researchers (TG1) engage in moves outside the EU, the duration of this move is more frequently for more than one year (50%) than when they move inside the EU (39%).

Target groups: The duration of the moves of non-EU researchers who have been to the EU in the past is on average shorter. The pattern between EU and non-EU moves is very similar.

Figure 47: Duration of EU- and non-EU-moves



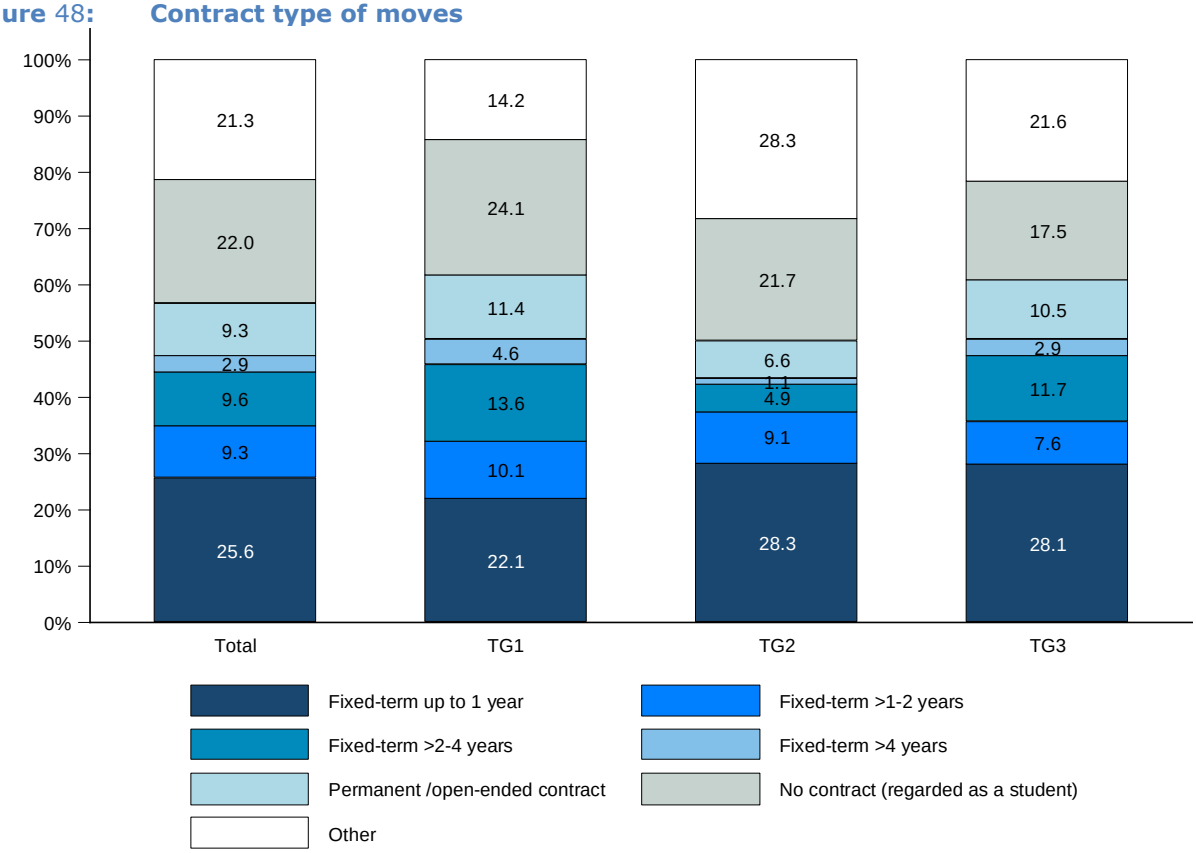
Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- Based on question 44 "What was the duration of each step"?
- Distribution of moves
- With "moves" defined as moves of three months or more in the last ten years to another country than the country of citizenship of the researcher

7.1.1.5. Contract type of long-term mobility of more than three months

About 47% of the moves concern fixed-term contracts (of which about half are fixed term contracts up to one year. 9% of the moves concern permanent/open contracts and 22% indicated that they have no contract. This is in line with the results of the MORE3 EU HEI survey, where the largest share of moves also concerned fixed-term contracts.

Career stages: Of the respondents who indicated that they do not have a contract; 26% are R1, 36% R2, 29% R3 and 8% R4.

Figure 48: Contract type of moves



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,080)
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=171)
- Based on question 46 "What was the type of contract in each step?"
- Distribution of moves by target groups
- 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

Contract duration: When cross-analysing the contract type and the duration of the moves (see Table 28), it is clear the majority of the moves without a contract (82%) concern shorter-term moves of less than one year. 63% of the moves with permanent/open-ended contracts concerns moves of over one year.

Table 28: Contract type versus duration of moves

	Fixed-term contract	Permanent/ open-ended contract	No contract	Other
3 months to 6 months	32.0%	26.0%	63.4%	70.0%
+ 6 months to 1 year	18.0%	11.0%	18.9%	21.7%
+ 1 year to 2 year	14.8%	8.0%	5.9%	4.8%
+ 2 year to 3 year	13.7%	13.0%	5.0%	0.9%
+ 3 year	21.5%	42.0%	6.7%	2.6%
Total	100%	100%	100%	100%

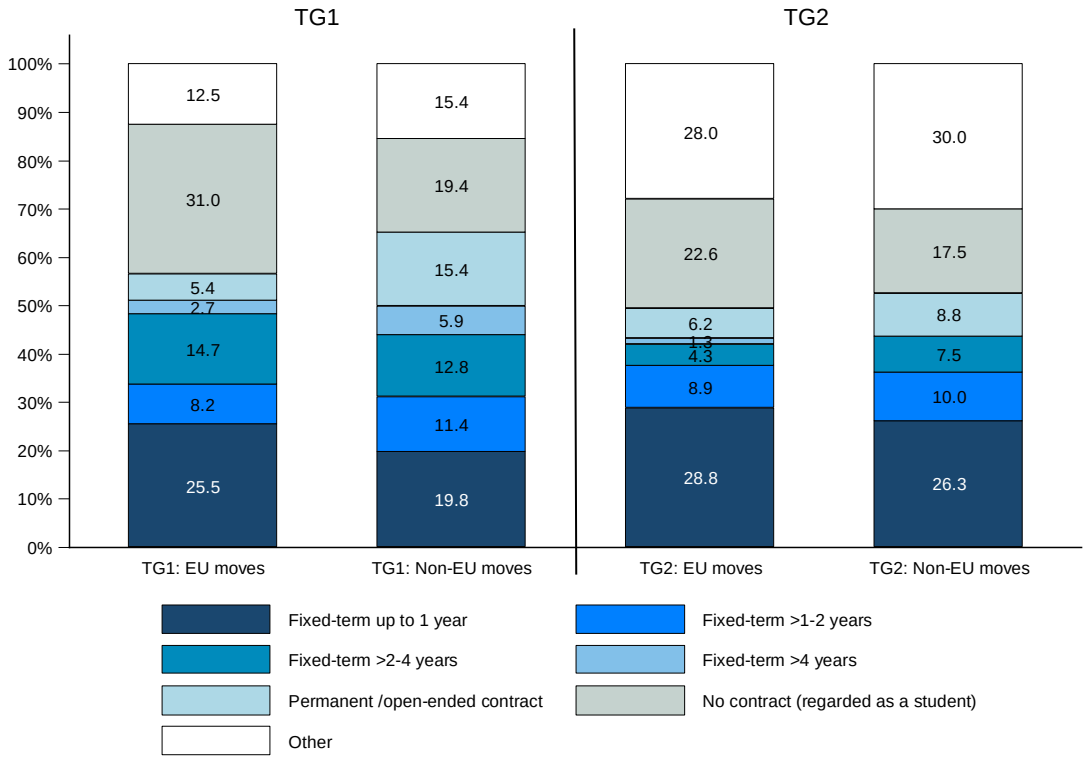
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,080)
- Based on question 46 "What was the type of contract in each step?" and question 44 "What was the duration of each step"?

Contract type of EU- and non-EU-moves

EU researchers who are mobile inside the EU frequently engage in mobility without a contract (31%); about 5% engage in mobility with a permanent contract and 50% with a fixed-term contract. When engaging in mobility towards non-EU countries, the share of permanent contracts (19%) is higher than compared to EU moves. The share of fixed-term contracts is similar (about 50%). Moves without a contract are less common for non-EU moves (19%) than for EU moves (31%).

Target groups: For non-EU researchers (TG2) the types of contracts between EU and non-EU moves is rather similar. Non-EU researchers slightly more frequently engage in a move without contract when it concerns EU moves than when it concerns non-EU moves (5 percentage points difference).

Figure 49: Frequency of EU- and non-EU-moves



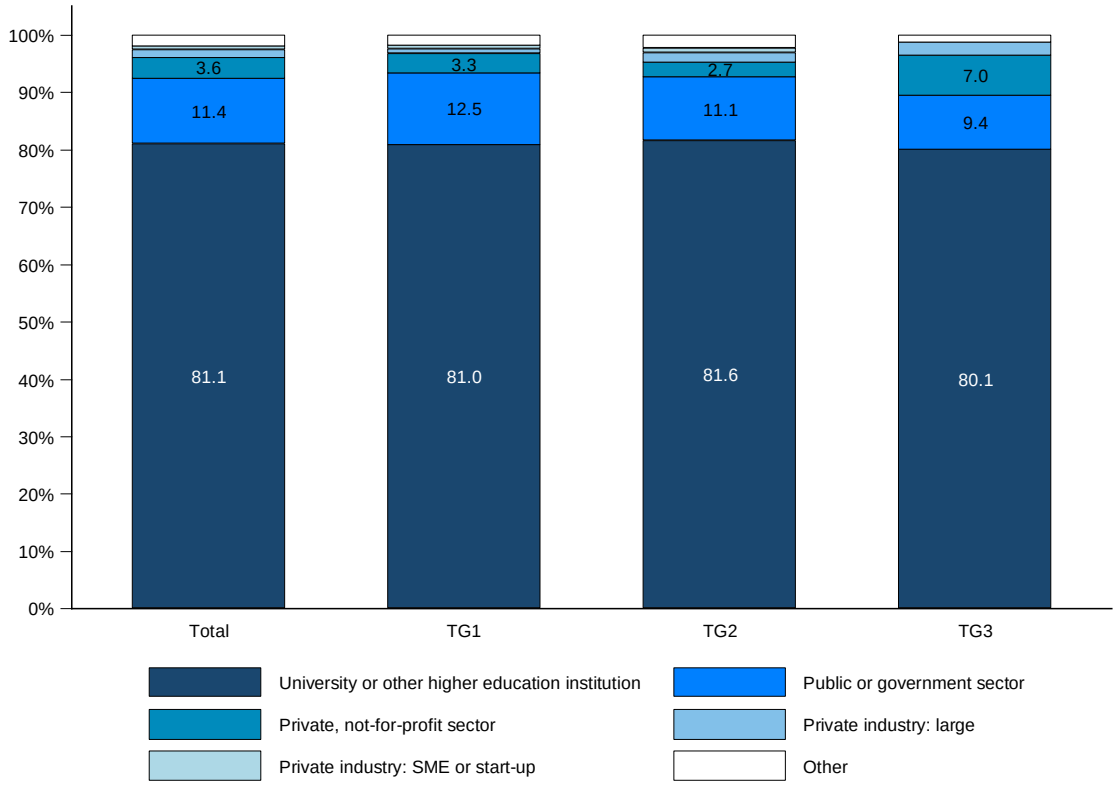
Source: MORE3 Global Survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- Based on question 46 "What was the type of contract in each step?"
- Distribution of moves
- With "moves" defined as moves of three months or more in the last ten years to another country than the country of citizenship of the researcher

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

The main sector of employment of the different moves is university or other higher education institutes. This is very similar across the different target groups (> 80%). 11% of the international moves are related to moves towards a public or government sector.

Target groups: Researchers who have been abroad but not towards the EU (TG3) engage more frequently in mobility towards the private (not-for-profit) sector (7%) compared than the other target groups (2-3%).

Figure 50: Destination sector of moves



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,080)
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- TG3: Non-EU researchers who have worked abroad, but not in the EU (n=171)
- Based on question 47 "What was the destination sector?"
- Distribution of moves by target groups (n = 1,080)
- 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

Contract type: Comparing across sectors, the share of permanent contracts is highest when moves are towards the private sector (18%) and the share of fixed-term contracts is highest when moves are towards the public or government sector (53%).

Table 29: Destination sector versus contract type

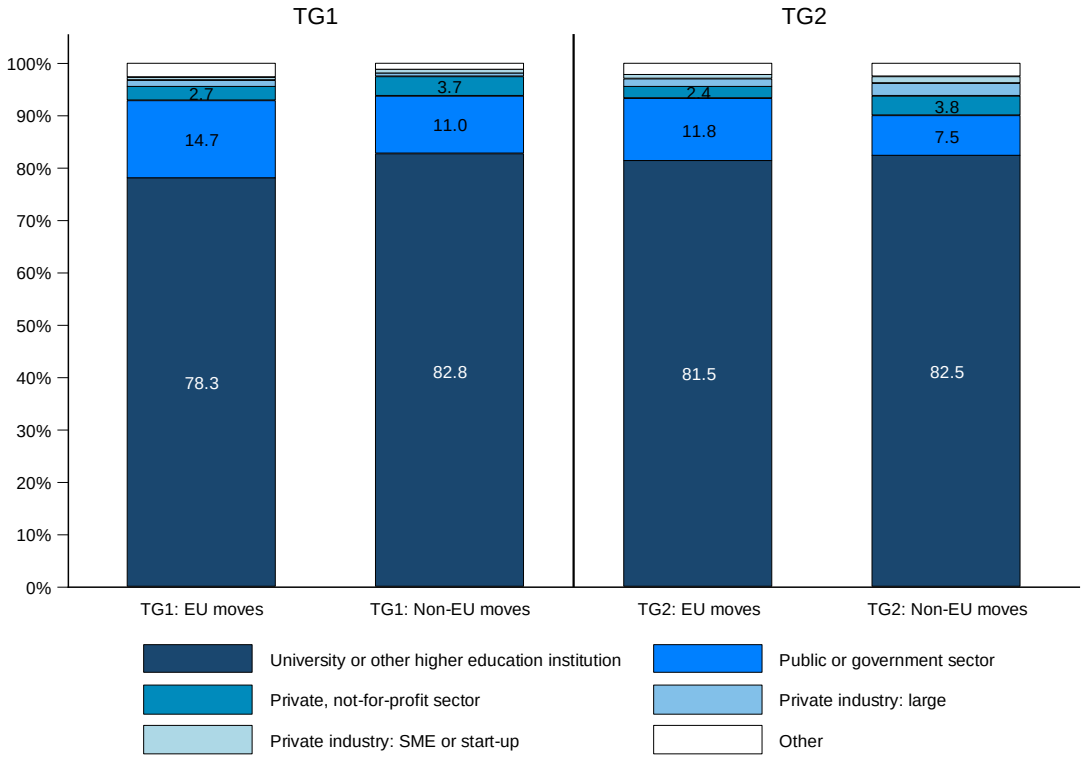
	University or other HEI	Public or government sector	Private sector	Other
Fixed-term contracts	47.3%	52.8%	47.5%	20%
Permanent contracts	9.4%	4.9%	18.0%	5.0%
No contract	21.3%	25.2%	18.0%	45.0%
Other	22.0%	17.1%	16.4%	30.0%
Total	**100%**	**100%**	**100%**	**100%**

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,080)
- Based on question 47 "What was the destination sector?" and question 46 "What was the type of contract in each step?"

Destination of EU and non-EU moves

Moves inside or towards the EU more frequently concern moves towards the public or government sectors than moves outside the EU - this for both TG1 and TG2.

Figure 51: Destination of EU- and non-EU-moves



Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=457)
- TG2: Non-EU researchers who have worked in the EU in the past (n=452)
- Based on question 47 "What was the destination sector?"
- Distribution of moves
- 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

7.1.1.7. Estimation of EU researchers currently working outside Europe

In the following, the estimation of the number of EU researchers in a series of non-EU countries will be provided: US, Canada, Japan, Australia, New Zealand and Chile[71]. The Global survey is not representative and therefore the estimation cannot be based on the survey results, but requires the use of secondary data instead.

This chapter first presents the relevant data available. Next, the methodology and all necessary assumptions related to our approach are highlighted. Third, some of the most important limitations in the estimation of the number of EU researchers are discussed. Next, the results are provided, first with some insights on the number of EU28

[71] No estimates are provided for China, India and Brazil as consistent data sources are not available for these countries.

researchers in some selected countries and of EU28 doctoral candidates abroad (the most complete sources are available for this career stage) before we present our estimations of the number of EU researchers abroad in selected countries.

Data and descriptive statistics on EU-born researchers abroad

Given that the data on EU researchers outside the EU is typically incomplete and scarce, the method followed for the estimation is based on a triangulation of sources. Official statistics are complemented with the input from the national contacts, such as Euraxess Links or national research organisations.

In the first place, all available evidence on the number of EU researchers in these countries have been gathered through a careful and time-consuming research activity, including both publicly accessible data-bases, data which have been specifically requested from otherwise not publicly accessible data-bases, and information from contacts in the relevant countries. An extensive list of all data sources that have been screened is provided in Table 63 (in annex 9). Unfortunately, in spite of the considerable amount of time invested to gather all the evidence there is, the data available are limited. Data on (doctoral) students tend to be more readily available for many countries, however, in a lot of cases no information about the country of origin is provided such that EU-born students could not be identified. For instance, the largest source of data on doctorate holders in the US, the Survey of Doctorate Recipients of the National Science Foundation (NSF), only provides data on citizens from Europe, but not on the specific country of origin (nor does it indicate how many doctorate recipients are EU citizens). Moreover, for a number of countries data on foreign labour force could not be used as either information about the type of occupation or information on the coutry of origin is missing. The US is the country for which more and better data are available. However, even in the US, the stock of EU-born researchers and its development over time have to be estimated. The only exception regarding data availability is Japan, for which data on the stock of EU-born researchers from 2006 to 2013 are available and thus, need not to be estimated.[72]

Other types of sources can also present partial insights on the number of EU researchers outside Europe. This is the case, for instance, for diploma equivalence records, ORCID ID[73] or patent records. However, the uneven prevalence of these sources across countries and fields of science entails that the evidence they can provide is too partial to be robustly applied for the estimation of the number of EU researchers.

Methodology

To estimate the stock of EU-born researchers in different countries, the approach of MORE2 has been followed, but the procedure was refined and at least one rather strong assumption could be eliminated. The step-wise approach is based on:

1. Data of EU-born research doctorate recipients in the US with definite commitments for research positions in the US after graduation, provided by the Survey of Earned Doctorates (SED). SED is a census of all researcher doctorate recipients from US institutions,[74] which provides yearly information on the foreign doctorate recipients' countries of birth since 1957. To calculate a proxy for the yearly stock of EU-born researchers in the US, the number of doctorate recipients who stated that they have "definite commitments for a research position in the US after graduation" from 1962 to 2011 were used.

[72] Source of the Japan data: http://www.moj.go.jp/housei/toukei/toukei_ichiran_touroku.html
[73] ORCID provides an identifier for individuals to use with their name as they engage in research, scholarship, and innovation activities http://orcid.org/
[74] https://www.nsf.gov/statistics/srvydoctorates/#tabs-2&micro

In order to calculate the stocks of EU-born researchers in the US based on these flow data we need to make an assumption regarding the length of researcher careers. How long will a doctorate recipient with commitment for a research position stay in research? When will she/he retire? Analogous to MORE2 we assumed a lower, baseline and upper bound of the length of a postdoctoral career: the lower bound was defined to be 25 years, the baseline assumption is 30 years and the upper bound of the length of researcher careers is 35 years. Using this assumption allows for calculating a rather good proxy for the stock of EU-born researchers between 1986/1991/1996 (depending on the length of research careers) and 2011.

It should be noted that we explicitly and implicitly made two major assumptions: First, the length of research careers is assumed to be 25, 30 or 35 years. Second, in using this as a proxy for the stock of EU-born researchers in the US we implicitly assumed that the number of outflows (EU citizens moving away from US) and inflows of EU-born researchers are equal. This assumption is needed as we do not have any data covering migration flows of postdoctoral EU researchers in and out of the US.

2. In a second step we gathered data on the stock of EU-born HRST (human resources in science and technology) working abroad for as many countries as possible. Overall, OECD data on the stock of EU-born HRST working in the US, Canada, Australia, New Zealand and Chile were available for 2010/11.[75]
3. Next, the information gathered in 1) and 2) are combined. Since we do not have any equivalent information on EU-born researchers in other countries but the US, we calculate the proportion of EU-born researchers in the US to the EU-born stock of HRST in the US and assume that this ratio is the same in all other countries where data on EU-born HRST were available. As a result, stocks of EU-born researchers in the US, Canada, Australia, New Zealand and Chile for the year 2011 can be derived. However, the rather strong 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 four countries in 2011 cannot be bypassed.
4. Finally, based on these five stocks of EU-born researchers we use data on EU-born doctoral students to update the yearly stocks of EU-born researchers to the latest available year. The procedure is based on the assumption that every year one-fifth of EU-born doctoral students finishes their studies. A typical PhD programme takes 5 years, with differences between fields and universities.[76]

   Among this group of doctoral recipients some leave their host countries and the rest either stays in research or starts working in another position. Therefore, we need two additional assumptions regarding the stay rates in the host country and the stay rates in research. For both stay rates lower and upper bounds are assumed based on the literature. Table 64 in the Annex provides a short overview of different sources (literature, surveys, etc.) concentrating on stay rates of foreign labour forces in host countries as well as on stay rates of graduates in research. In addition, the stay rate in the US is assumed to be higher than in other countries as the US provides a more attractive (research) evironment than any other country. The following stay rates are assumed:

   - Stay rates in host country (lower and upper bound respectively): 50% - 75% (US) and 40% - 65% (CAN, AUS, NZL, CHL)
   - Stay rates in research (lower and upper bound respectively): 40% - 60%

[75] http://www.oecd.org/els/mig/dioc.htm
[76] http://www.gradschoolhub.com/faqs/what-is-the-average-time-to-obtain-a-ph-d/

Following this procedure allows one to estimate the stocks of EU-born researchers for five countries: the US, Canada, Australia, New Zealand and Chile. In addition, we have the data on the stock of EU-born researchers working in Japan. Thus, in total stocks of EU-born researchers in six countries (five estimated and one observed) can be presented.

However, the estimation of the number of EU researchers outside Europe presents several limitations. Official statistics, gathered in country sources or in supranational sources (e.g. OECD), do not usually apply the same definition of researcher as the one used in the MORE3 study. The different classifications make it difficult to compare data from various data sources. For instance, the used stocks of EU-born HRST are based on different classifications of occupations. Data of EU-born work force of three countries (Canada, Australia and Chile) are based on the ISCO classification. Here we follow the OECD and use the subgroups 'Professionals' and 'Technicians' to define the stock of EU-born HRST. However, other countries, like New Zealand or the US, provide data on foreign labour force based on a national classification of occupation. The lack of harmonisation between sources also makes cross-country comparison difficult.

As listed above, a number of assumptions are necessary to estimate the stock of EU-born researchers. And even when using these assumptions data coverage is too limited to include more than five countries. After all, those five countries are rather heterogeneous and one crucial assumption is the equality of the shares of EU-born researchers in the stock of EU-born HRST in all countries included.

In comparison with MORE2, however, the procedure applied allows for more heterogeneity between the included countries. First, because we abstain from assuming equal growth rates of the stocks of EU-born researchers in all countries included over a period of 11 years and second, by using instead doctoral student enrolment data - which are different for every country - we allow for much more variation between countries.

However, it should also be noted that we rely on researcher stocks as a result of doctoral students, both for the calculation of the proxy for the stock of EU-born researchers in the US and for updating the estimated yearly stocks of EU-born researchers by EU-born doctoral students. We cannot capture researchers who move after their PhD, hence, we need to assume that inflows and outflows of EU-born (postdoctoral) researchers are equal.

Results

Regarding the total number of researchers, in accordance with previous studies (the GlobalSCI survey or the Careers of Doctoral Holders study), we expect the largest group of EU28 researchers to work in the US. It is one of the countries with a higher number of researchers in HEI, and the MORE3 HE and Global survey also indicate that the US is a preferred non-EU destination for EU researchers (see section 7.1.1.2).

Table 30 reflects a first overview of the number of EU28 doctoral candidates in the last column. This overview is based on OECD data. The table shows the total number of graduates in ISCED levels 5 to 8, the share of doctoral students from EU28 countries enrolled in these same ISCED levels, and the resulting number of EU28 doctoral students. The estimation of EU28 doctoral students is based on two main assumptions:

- First, we assume that the share of foreign students among enrolled students equals the share of foreign students among graduates.
- Second, and most important, we assume that EU28 students are distributed uniformly across ISCED levels.

This estimation and the underlying data does not include European doctoral students doing short-term or long-term stays in these countries since they are not considered - neither being graduated nor enrolled in these countries.

In addition, it is important to indicate that for the R2, R3 and R4 researchers there is no such detailed large-scale information available.

Table 30: Number of EU28 doctoral students in each country in 2014

Country	Total number of graduates (ISCED2011 levels 5 to 8)	Share of EU28 students enrolled in tertiary education (ISCED2011 levels 5 to 8)	Total number EU students ISCED 2011 levels 5 -8	*Estimation of EU doctoral or equivalent level (ISCED2011 level 8)*
Australia	422.842	3%	11417	**227**
Israel	75.058	18%	13585	**280**
Japan	980.726	2%	23537	**385**
Korea	611.512	1%	3669	**78**
New Zealand	70.055	4%	3012	**61**
Turkey	733.237	6%	46927	**289**
United States	3.813.956	7%	251721	**4452**

Source: OECD.Stat

We now turn to the proper estimation of the stock of EU researchers working abroad. We follow the four steps of the methodology outlined in the methodology section, gathering the data on EU doctoral researchers in the US and on HRST in selected countries. From this we get a ratio, which we use to calculate stocks of researchers in non-US countries in the base year. Using growth rates of doctoral researchers, we update the researcher stocks to more recent years. Using literature-based corridors for the country and research stay rates, we arrive at a range of estimates for the years 2010-2014 (Table 31**Error! Reference source not found.**). Consistent with our expectations, and with the attractiveness as well as the size of the US, the highest number of EU researchers can be found in the US. Canada and Australia also receive relatively large numbers of EU researchers, consistent with motives to move for EU researchers, and the attractiveness of the Canadian and Australian higher education system. By comparison with the number of EU researchers working abroad as shown in MORE2, the numbers for the US in MORE3 show a plausible increase. The numbers for 2011 for Australia and Canada are higher in MORE2 than in MORE3. This is related to the change of methodology, in that we now don not assume equal growth rates of the stocks of EU-born researchers in all countries included. Second, by using instead doctoral student enrolment data - which are different for every country - we allow for much more variation between countries. Overall, the number of EU researchers abroad seems limited when compared with the total number of EU HEI researchers according to Eurostat (headcount: 1.78 million in 2014, full-time equivalent 0.9 million). However, due to excellence-based recruitment criteria of top institutions in the US, but also in other OECD economies such as Canada and Australia, the small number of researchers may be disproportionately scientifically productive. It is well-known that scientific output at an individual level is extremely highly skewed, with few individuals in each fields contributing a large share of the most highly-cited publications.[77]

[77] Also known as Lotka's law, see Stephan, Paula E. "The economics of science." *Handbook of the economics of innovation* 1 (2010): 217-273.

Table 31: Estimated stock of EU28 born researchers in selected countries in three different simulation scenarios in the period 2010-2014

	2010			2014		
	Lower bound	Baseline	Upper bound	Lower bound	Baseline	Upper bound
United States	13,515	14,700	15,896	16,458	19,483	22,518
Canada	4,288	4,664	5,044	4,463	4,964	5,469
Japan		1,603			1,717	
Australia	3,995	4,345	4,699	4,213	4,720	5,230
New Zealand	760	827	894	839	962	1,085
Chile	53	57	62	54	59	65

Source: Own calculations based on National Science Foundation, National Center for Science and Engineering Statistics, NSF/NIH/EDUSDA/NEH/NASA Survey of Earned Doctorates – special tabluation (July 2013); OECD and Ministry of Justice in Japan
Note:
- Canada: 2013 instead of 2014

7.1.2. Short-term international mobility

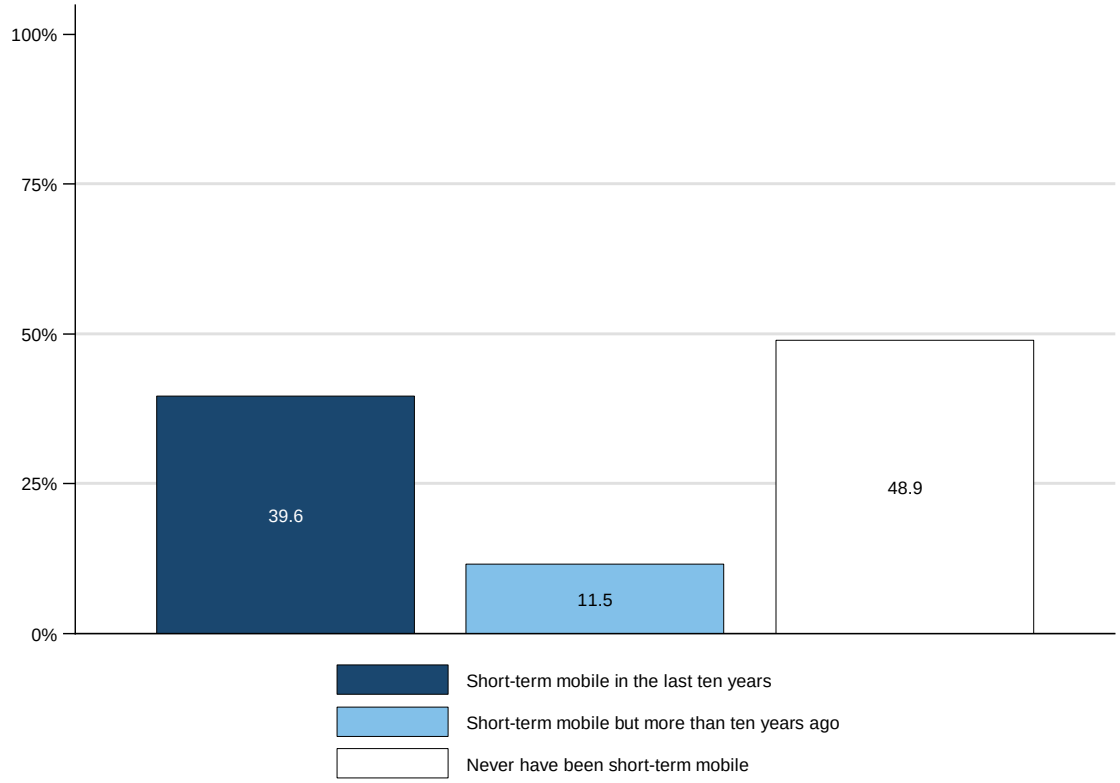
Next to the moves of more than three months, the MORE3 Global survey, similar to the MORE3 EU HE survey, also covered shorter-term moves (i.e. of less than three months). In this section the main findings in terms of short-term mobility are presented; a distinction is made between short-term mobility less than ten years ago and more than ten years ago.

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 (see Figure 52). This share is similar to the one found among researchers working in the EU: the MORE3 EU HEI survey 37% of the researchers working in the EU have moved for less than three months in the last ten years.

Interestingly, researchers working outside the EU (this survey) and in the EU (MORE3 EU HE survey) display a similar level of short-term mobility done in the past: 12% indicated that they were mobile for less than 3 months but that this was more than 10 years ago.

In total, about 51% indicate that they have experienced short-term mobility (towards a country different than were they obtained their PhD or highest degree) at some point, while the other 49% of the sample has never engaged in this type of mobility (Figure 52). These findings are in line with the MORE3 EU HE survey.

Figure 52: Short-term mobility (stock)



Source: MORE3 Global survey (2017)
Notes:
- Based on question 79 "How would you typify your experience with short term mobility (of less than 3 months at a time)?"
- (n= 1,727)

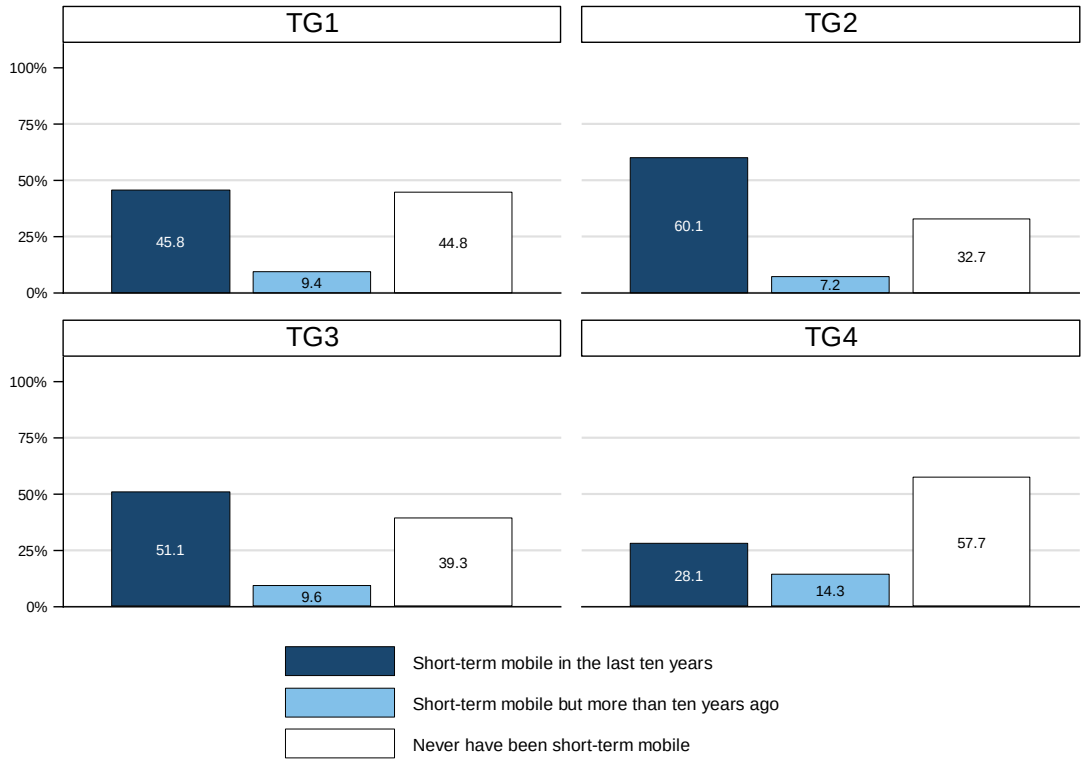
Gender: Women tend to be less short-term mobile (in the last ten years) than men (37% versus 41% respectively). This difference is also consistent with the results of the MORE3 EU HEI Survey.

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: 29% among R1; 35% among R2; 40% among R3 and 49% among R4.

Target groups: There are however, important differences across target groups (see Figure 53). The share of non-mobile researchers reaches 58% among non-EU researchers that have not worked for more than 3 months in another country (TG4). Conversely, the lowest share is observed among non-EU researchers that have worked in an EU country (TG2).

Interestingly, EU researchers working abroad are less likely to move for short-term periods compared to mobile non-EU researchers: 46% of EU researchers (TG1) have done so compared to 60% of non-EU researchers having worked in EU countries (TG2) and to 51% of non-EU researchers that have worked in third countries but never in the EU (TG3).

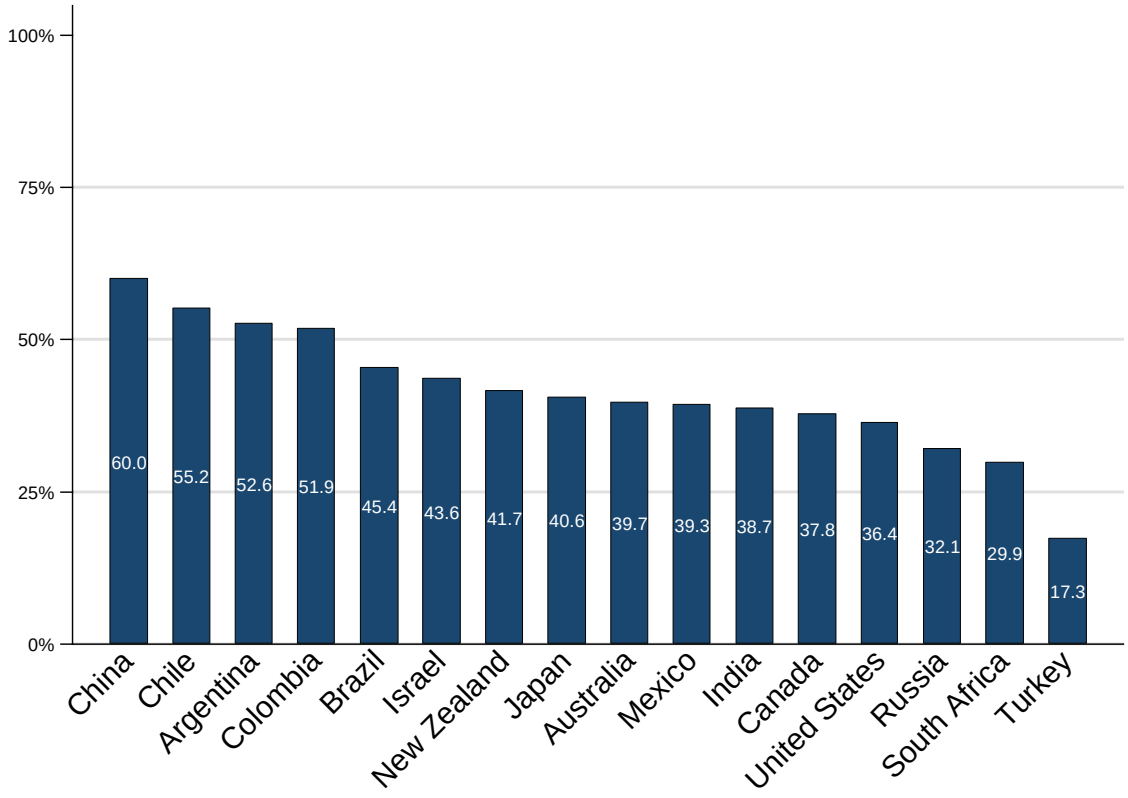
Figure 53: Short-term mobility per target group



Source: MORE3 Global survey (2017)
- TG1: EU researchers currently working outside the EU (n= 417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 79 "How would you typify your experience with short-term mobility (of less than 3 months at a time)?"
- (n= 1,727)

Country of current employment: When looking at the share of researchers that have been short-term mobile in the last ten years per country where they are currently employed, interesting differences emerge. Figure 54 shows only those countries for which there are more than 30 respondents in the sample. Although these shares should be interpreted with caution due to the methodological limitations of the survey (see section 4 of this report), this figure shows that Anglo-Saxon countries tend to have lower shares of short-term mobile researchers than other countries, most notably the larger South American and Asian countries, such as Chile, Argentina, Brazil, or Mexico; and China, or Japan).

Figure 54: Short-term mobility in the last ten years across countries



Source: 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 are displayed in the figure.
- Based on question 79 "How would you typify your experience with short-term mobility (of less than 3 months at a time)?"
- (n=1,727)

7.1.3. Short travel for conferences, meetings and visits

In the MORE3 Global survey (similar to findings in the MORE3 EU HE survey), researchers were asked about the type of "short-term" work-related international travel they have undertaken during their research career; conferences/visits, study visits/research visits and fieldwork and/or meetings with supervisors/partners/collaborators. An overview of each of these episodes of international travel is provided below. More detailed information and figures is included in Annex 8.

The most frequent type of short-term move among researchers working outside Europe refers to attending conferences (72%), followed by the moves to meet with supervisors, colleagues or partners (45%) and those related to study visits (41%)[78].

[78] These shares reflect those researchers doing these types of moves often or sometimes.

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 patterns of types of short-term moves.
- When looking at the frequency of the moves, EU researchers working abroad (TG1) stand out due to their higher shares of frequent moves to attend conferences, and to meet with supervisors, partners, and/or collaborators. This indicates that EU researchers are in a comparatively good position with respect to their international exposure and links.
- 15% of EU researchers working outside Europe (TG1) state that they have never gone to another country to have meetings with supervisors, partners, and/or collaborators. This share is similar to that of non-European mobile researchers who also have never done so (TG2 and TG3).
- Non-European researchers that have never been mobile (TG4) are less likely to undertake this type of short-term international travel than the rest of the researchers.

7.1.4. Networking and remaining connected with Europe

Results of the GlobSci survey (Scellato et al. 2012)[79] indicate that mobile scientists are more likely to establish international links and have links with a larger number of countries than natives with no prior experience of mobility. In order to obtain insights into networking activities and international links, the MORE3 Global survey included questions on the types of 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 had previously worked in Europe (TG2).

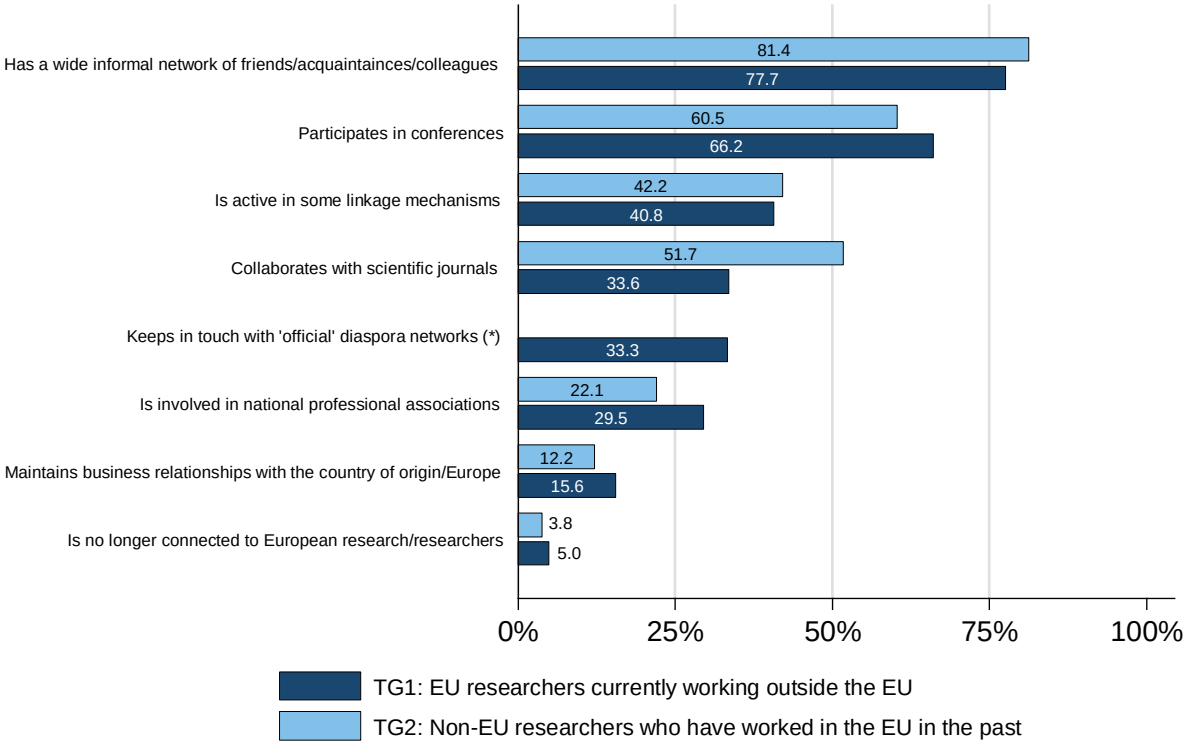
Overall, the results indicate that the most frequent connections maintained with Europe are: having a wide informal network of friends/acquaintances/colleagues and participation in conferences.

Target groups: Figure 55 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. The most notable differences relate to the collaboration with scientific journals in Europe where the share is 18 percentage points higher among this group of non-EU researchers compared to their EU counterparts. This finding might be related to the fact that their stay in Europe encourages them to publish their work in scientific publications offered by European publishers - e.g. Taylor & Francis, Elsevier or other international publishers based in the EU, national-level publications specific to each field of science, or publications related to research associations at European level, to name but a few. It may also be linked to differences in scientific productivity.

Relevant, although smaller differences can also be found in the responses to the item asking about participation in conferences (6 percentage points higher among EU researchers). EU researchers are also more likely to be involved in national professional associations (7 percentage points higher than in TG2).

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

Figure 55: Network with Europe



Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- (*) Note: the item on "official" diaspora networks was only asked to EU researchers currently working abroad.
- Based on questions 52 "Please indicate below the type of connections you still maintain with Europe", and question 65 "Please indicate below the type of connections you still maintain with European research/researchers"

7.2. Intersectoral mobility

This section discusses the levels of intersectoral mobility found among researchers working outside Europe. Mobility between different research sectors, such as between the academic and industrial sector – or others, such as not-for-profit – is crucial for the exchange of ideas, for 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.

The problem according to the ESF[80] is that the difficulties of producing highly-ranked scientific publications in applied industrial research often hinders the return to the academic sector, as academic employers or peer reviewers for grant applications usually look out for high quality publications as a decision criterion. The difficulties in returning to the academic sector after working in industry are said to be an important barrier for researchers wanting to engage in this type of mobility. Other intersectoral mobility

[80] See footnote 10.

barriers include different research cultures and salary levels as well as the limited awareness of researchers regarding career opportunities outside academia. The literature finds that work experience inside and outside academia is connected to scientific recognition in the United States, but is less influential in Europe[81]. In the same vein, earlier research[82] has shown that Europe displays a lower share of researchers working in industry than other countries, such as Japan or the US. This section of the report shows the main figures and trends related to this type of mobility among researchers currently working outside the EU.

7.2.1. Stock

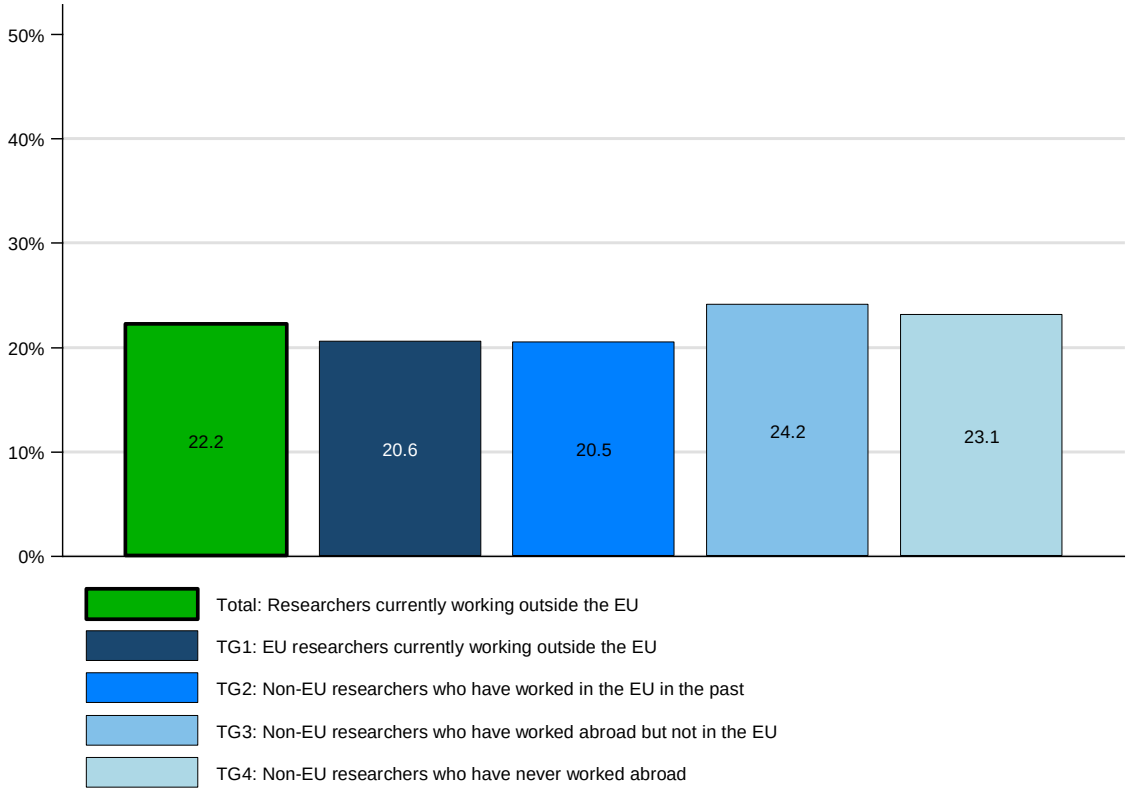
The survey questioned researchers about the sectors in which they currently work (as researchers) and on whether they have worked in a different sector in the last ten years. 22% of the sample of researchers currently working outside the EU indicate that they have been intersectorally mobile (regardless of the sector they work in). There are no large differences across the four main groups on this dimension (see Figure 127 in annex 8).

Target groups: Figure 56 displays the levels of intersectoral mobility among researchers currently working in Higher Education Institutions across target groups. Overall, roughly one out of five researchers working outside the EU has some type of intersectoral mobility experience, but EU researchers display lower shares of intersectoral mobility than the rest of the target groups. This may be linked to the EU researchers abroad being at an earlier stage of their career where success is judged by an academic publication record rather than intersectoral mobility. Note that the perception of intersectoral mobility as a positive factor for recruitment and career progression is roughly similar across target groups.

[81] Youtie, J., Rogers, J., Heinze, T., Shapira, P., Tang, L., "Career-based influences on scientific recognition in the United States and Europe: Longitudinal evidence from curriculum vitae data", Research Policy, 2013, 42(8), pp. 1341–1355.

[82] Vandevelde, K. (2014). Intersectoral Mobility. Report from the 2014 ERAC mutual learning workshop on Human Resources and Mobility.

Figure 56: Intersectoral mobility in the last ten years: researchers currently working in Higher Education Institutions



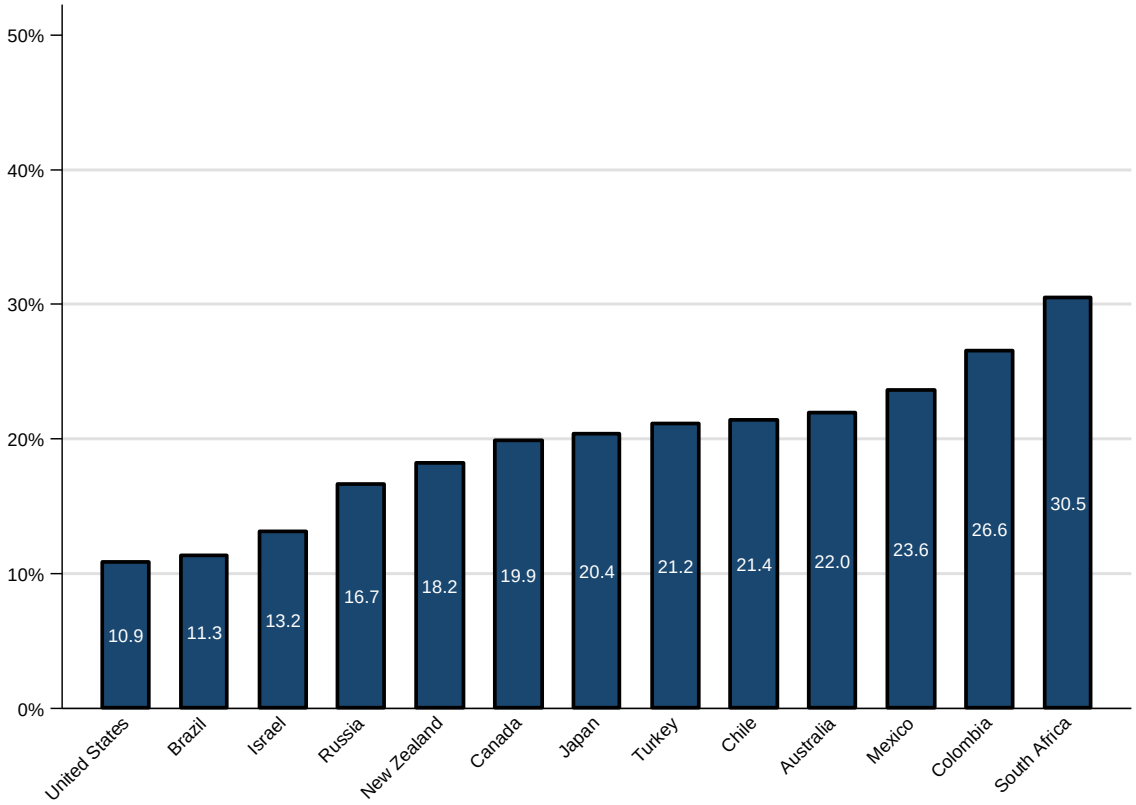
Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- Based on Question 17 "What is your current sector of employment as a researcher?", Question 18 "You are currently in dual position whereby you are employed in more than one institution/organisation 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 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?"
- (n=1,512).

Gender: With respect to other dimensions of interest, the survey results indicate that there are no significant differences on the extent to which women and men currently working in HEI have an intersectoral mobility experience: 19% 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 57 shows the share of researchers that have been intersectoral mobile in the last ten years in a series of countries. The shares range between 31% in South Africa to 11% in the US. Regarding the latter, US-based researchers working in Engineering and Technology show higher-than-average shares of intersectoral mobility (31% vs 21% in the overall sample). However, in the other fields of science, 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 of researchers working in the Natural Sciences: US-based researchers working in this discipline display much lower shares of intersectoral mobility than the general population of researchers working outside Europe: 6% vs 16% respectively. It is interesting to note that the differences across countries seem not to be related to the type of HEI system, nor to the level of economic development. The number of researchers in each country and its link to the difficulties to obtain tenure and/or the availability of positions in the private sector can be some of the factors explaining these

differences. However, this analysis should be taken with caution since only those countries with more than 30 respondents have been taken into account and our sample is not representative.

Figure 57: Intersectoral mobility in the last ten years: across countries



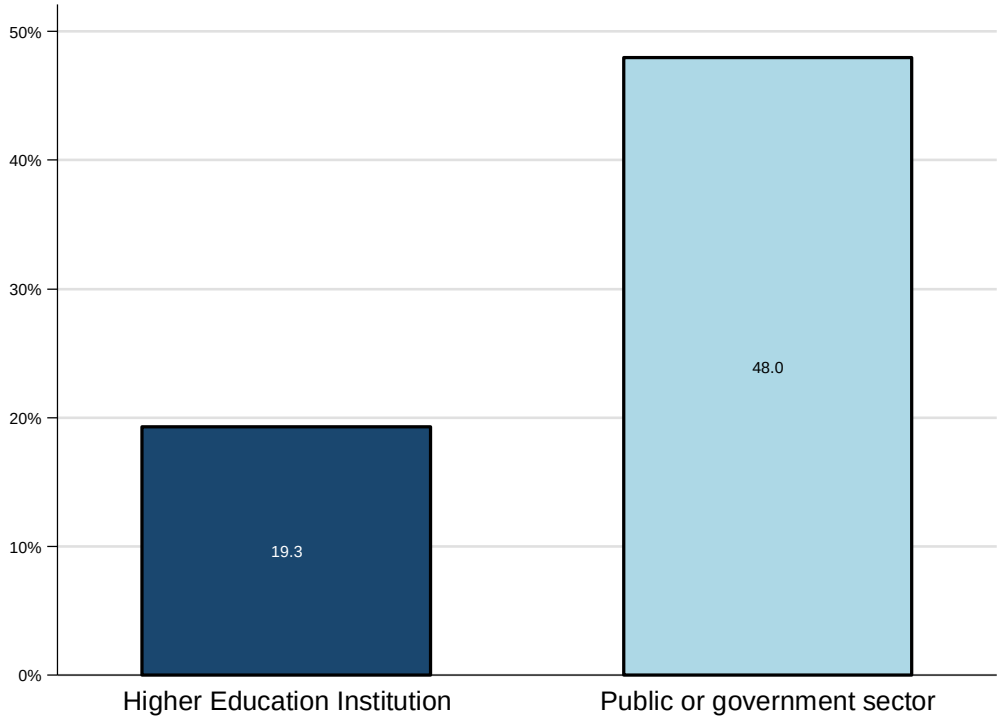
Source: MORE3 Global survey (2017)
Notes:

- The country of reference is the country of current employment.
- Based on Question 17 "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 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?"
- (n = 1,363)
- Only considers countries where 30 or more researchers are currently employed.

7.2.2. Flows and moves

Type of sector: The survey also provides information on the levels of intersectoral mobility across sectors. Figure 58 shows the share of researchers working in Higher Education Institutions and in the public sector that have previously worked in a different sector[83]. This figure shows that there are very large differences across the two sectors. Whereas nearly half of the researchers working in the public sector have previously worked in a different sector, only 19% of the researchers in the Higher Education Institutions has 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 at a higher education institution (62%). This is specially the case when one looks into the first stages of researchers' careers, 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.

Figure 58: Intersectoral mobility by type of sector



Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- Based on Question 17 "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 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?"
- (n=1,635: 1,512 researchers are currently employed in Higher Education Institutions, and 123 in the public or government sector). Results for other sectors (large companies, SMEs or not-

[83] 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).

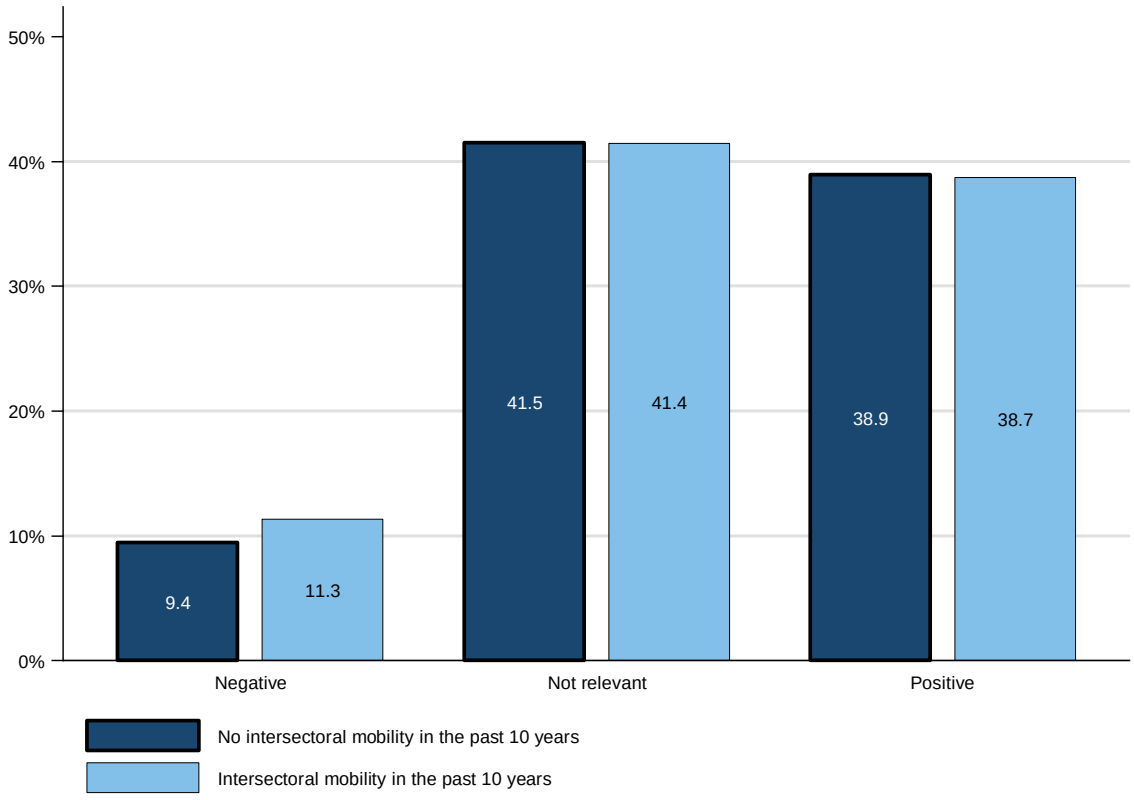
for-profit organisations) are not reported because the number of observations is smaller or equal to 30 respondents.

7.2.3. Effects

The survey included questions on the perception of intersectoral mobility as a positive factor for recruitment among those researchers currently employed in Higher Education Institutions. A detailed analysis is undertaken in section 5.3.2. It is interesting to note that having an intersectoral mobility experience (or not) is unrelated to the perception of it being a positive or negative factor for recruitment (see Figure 59).

Similar findings are observed when analysing perceptions about the consequences of intersectoral mobility on career progression (see also section 5.4.2): there are no significant differences between researchers that have been mobile and those that have not (see Figure 60). 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.

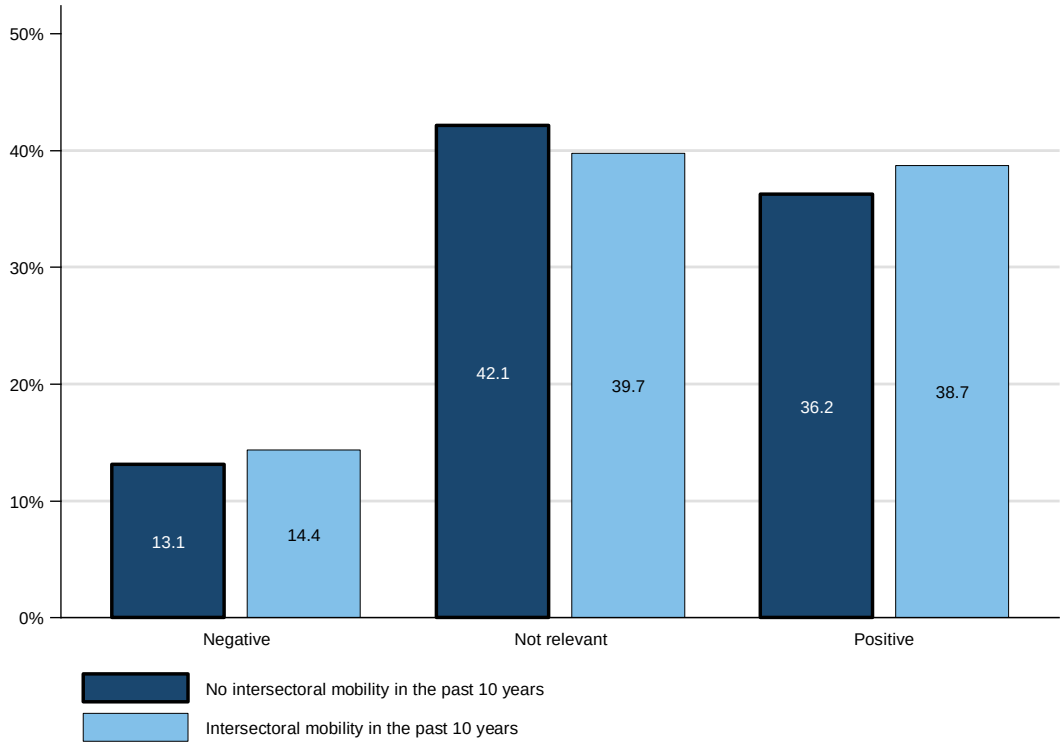
Figure 59: Perception of the effect of intersectoral mobility on recruitment in home institution



Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- Based on Question 17 "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), Question 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?", and Question 33 "In your experience, would you say

that the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=1,512).

Figure 60: Perception of the effect of intersectoral mobility on career progression in home institution



Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- Based on Question 17 "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), Question 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?", and Question 34 "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=1,512).

7.3. Interdisciplinary mobility

This section discusses the levels of interdisciplinary mobility of researchers working outside Europe. Interdisciplinary is often seen as a key driver of research breakthroughs.[84] The growing importance of knowledge economies today is related to an increase in interactions between disciplines. Although there are various definitions of interdisciplinarity,[85] 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. In addition, interdisciplinary mobility has been related to the strengthening of certain skills that are becoming increasingly important. Examples of these skills are those related to the capacity to effectively communicate beyond the frontiers of one´s own field, to having an entrepreneurial mindset[86] and a greater capacity to adapt to changing environments.

However, there are often barriers that can hinder this type of mobility. One of them refers to the fact that disciplinary affiliation might have a positive impact on scientific recognition[87]: If a researcher does not publish and collaborate in a defined discipline, they are likely to be penalised in terms of scientific impact[88]. This does not happen everywhere to the same extent, since it is related to both education and university organisation. In the US, for instance, students and researchers enjoy more freedom to engage with different disciplines, while in Europe, academic networks are structured around disciplines and tend to reflect hierarchical work relationships.

This type of mobility is, together with international and intersectoral mobility, one of the cornerstones of European science policy and programmes (e.g. the Marie Skłodowska-Curie actions[89] or the European Research Council granting schemes[90]), although it tends to receive less attention than the other two main types of mobility (intersectoral and international mobility). In spite of this, as it is shown below, researchers consider this type of move as being a more positive factor for recruitment or career progression than intersectoral mobility.

7.3.1. Stock

Approximately a third of the respondents declare to have switched to another (sub)field of research during their career.

Target groups: There might be differences across countries regarding the classifications of disciplines and subdisciplines. However, when looking into overall figures per target group, it can be observed that the four target groups present similar levels of

[84] 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.

[85] 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.

[86] The State of the Innovation Union 2011 report: http://ec.europa.eu/research/innovation-union/pdf/state-of-the-union/2013/state_of_the_innovation_union_report_2013.pdf

[87] Youtie, J., Rogers, J., Heinze, T., Shapira, P., Tang, L., "Career-based influences on scientific recognition in the United States and Europe: Longitudinal evidence from curriculum vitae data", Research Policy, 2013, 42(8), pp. 1341–1355.
Van Rijnsoever, Frank J., and Laurens K. Hessels. "Factors associated with disciplinary and interdisciplinary research collaboration." Research policy 40.3 (2011): 463-472.

[88] Rhoten, D., Parker, A. "Risks and rewards of an interdisciplinary research path." Science 306.5704 (2004): 2046-2046.

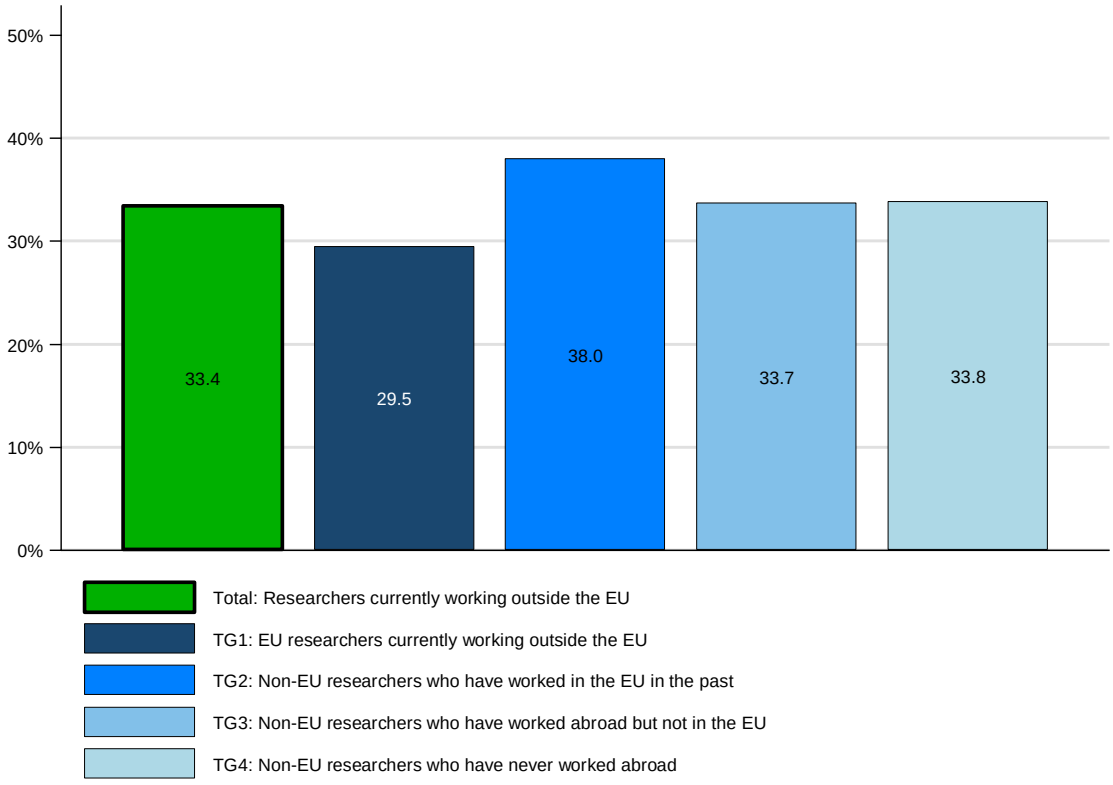
[89] COMMISSION (DG RTD). 2012. Marie Curie Actions- Where Innovation Science becomes success. Available: http://ec.europa.eu/research/mariecurieactions/documents/documentation/publications/eu-marie-curie-actions-fellowships-innovative-science-becomes-success-publication_en.pdf

[90] 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

interdisciplinary mobility, the largest difference being the one between EU researchers (TG1) and non-EU researchers having worked previously in the EU (TG2) (8 percentage points).

Gender: The results of the MORE3 Global survey reveal the existence of small gender differences in this dimension: 32% of men and 35% of women have been interdisciplinarily mobile. In the MORE3 EU HEI survey, the level of interdisciplinary mobility was similar (34%) but without differences across gender groups.

Figure 61: Interdisciplinary mobility



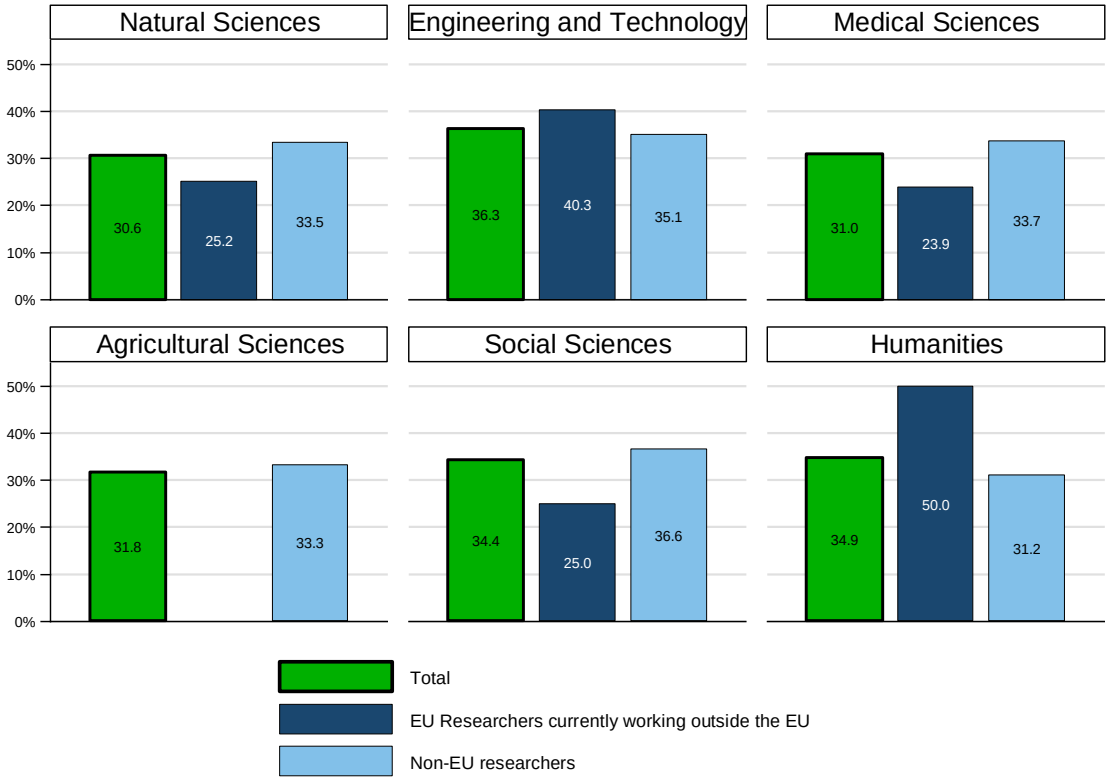
Source: MORE3 Global survey (2017)
Notes:
- Based on question 9 "Did you switch to another (sub)field of research during your career?"
- (n=1,727)

7.3.2. Flows and moves

In spite of the homogeneity displayed across target groups with respect to their levels of intersectoral mobility, more significant differences emerge when looking at the question from the perspective of disciplines and countries. With respect to the former, Figure 62 shows the differences between EU and non-EU researchers across disciplines. Researchers employed in Engineering and Technology tend to be more interdisciplinarily mobile (36%) than researchers working in other disciplines, followed by researchers in the Social Sciences (34%). 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. This finding is consistent with the results of the MORE3 EU HEI survey.

EU versus non-EU researchers: Figure 62 shows that EU researchers are more likely to be more interdisciplinarily mobile than non-EU researchers in Engineering and Technology (7 percentage points) and in the Humanities (7 percentage points). Conversely, non-EU researchers display larger shares of interdisciplinary mobility than EU researchers in the Medical Sciences (9 percentage points), Natural Sciences (8 percentage points), and the Social Sciences (7 percentage points).

Figure 62: Interdisciplinary mobility across disciplines and origins



Source: MORE3 Global survey (2017)
Notes:
- (*) The figure for 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?"
- (n=1,727)

7.3.3. 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 no large differences between those that have an interdisciplinary mobility experience and those that have not. In general, interdisciplinary mobility is seen as a positive factor for recruitment in the researchers´ home institution (56%) (Figure 127 in annex 8). In comparison with the results of the MORE3 EU HEI survey (74%), this factor seems to be more positively perceived among researchers working in Europe.

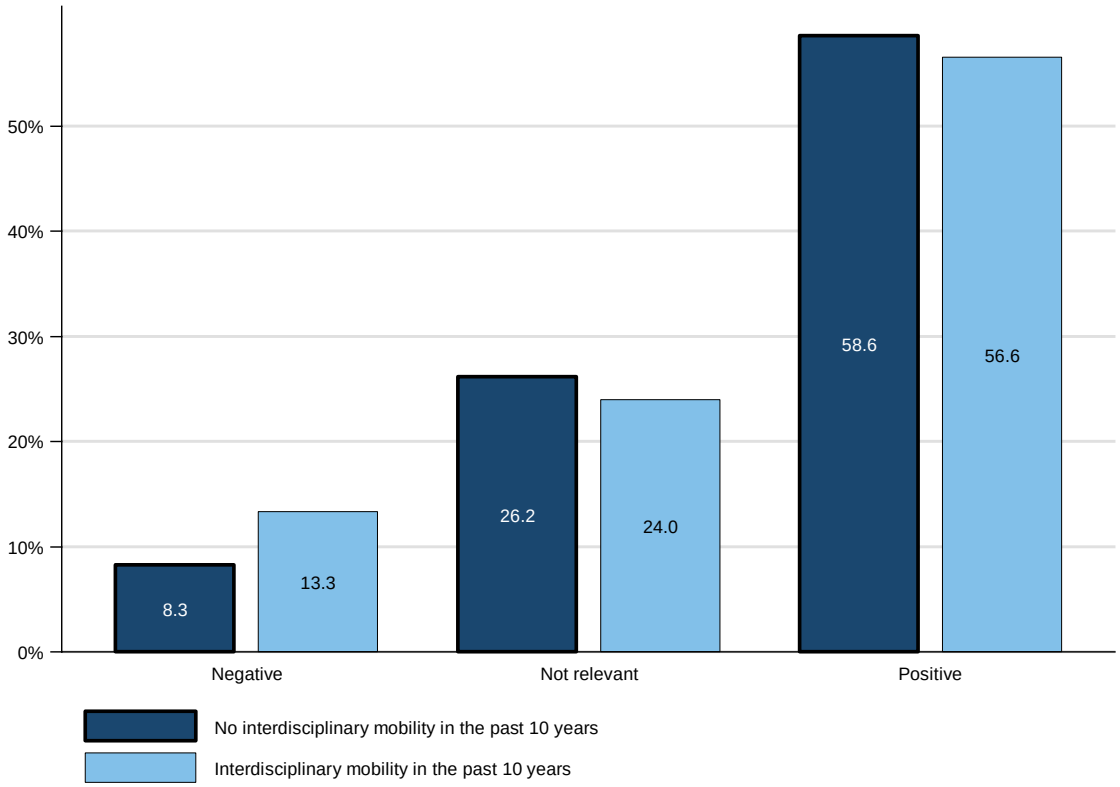
Target group: Figure 63 shows that 56% of those that have been interdisciplinary mobile and 59% of those that have not share this opinion. However, researchers that have been mobile in the past tend to have a slightly less sanguine opinion on the effects

of this type of move on recruitment: 13% consider that moves across disciplines are perceived as negative versus 8% of those that have not been mobile.

A similar picture arises when considering researchers´ perceptions with respect to the impact of interdisciplinary mobility on career progression (see Figure 64). Researchers that do not have an interdisciplinary mobility experience tend to have a slightly more positive view on the impact it can have on career progression: 57% of those without this type of mobility experience versus 54% of the researchers that have worked in other disciplines.

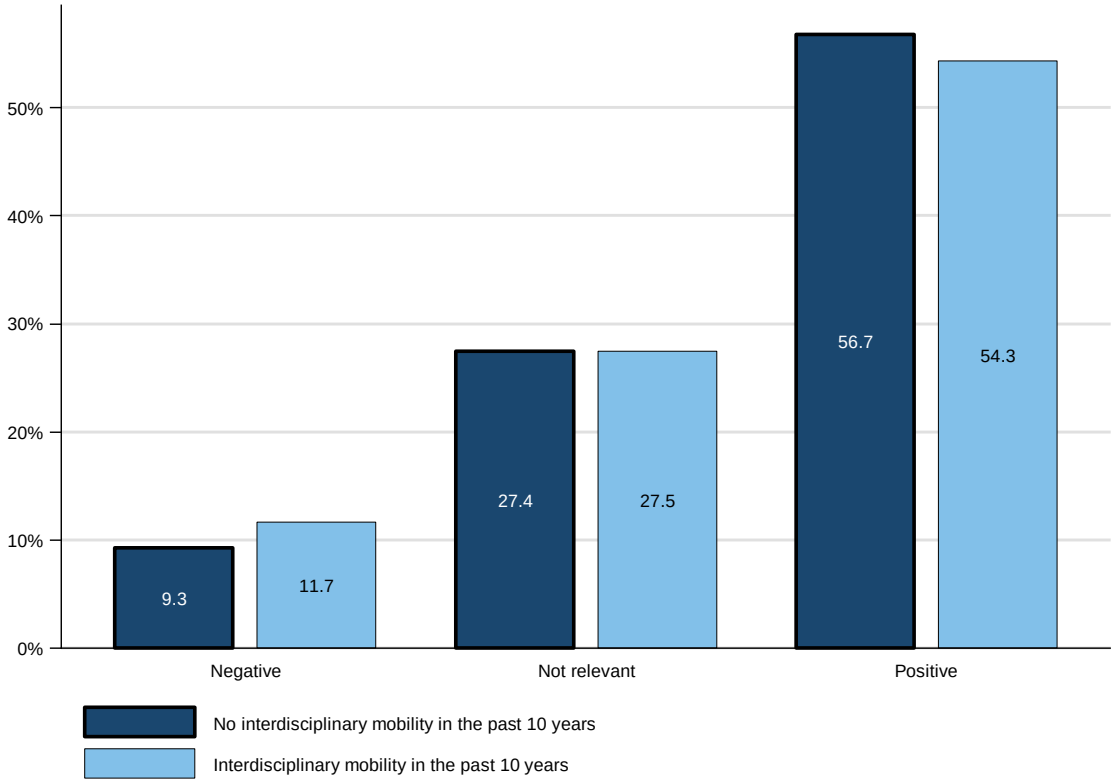
Further research should investigate the extent to which this positive perception is held by researchers across different career stages and which are the disciplines where interdisciplinary mobility is being perceived as a more negative or positive factor for career progression and recruitment. The limitations of this survey prevents one from extracting meaningful conclusions to these questions, but the findings suggest that these are avenues worth investigating.

Figure 63: Perception of the effect of interdisciplinary mobility on recruitment in home institution



Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- 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 33 "In your experience, would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=1,512).

Figure 64: Perception of the effect of interdisciplinary mobility on career progression in home institution



Source: MORE3 Global survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- 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 34 "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=1,512)

7.4. 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 the countries´ human capital and can have a positive effect on the quality of the research produced and the levels of innovation. Previous research[91] has highlighted some of the most oft-cited reasons to collaborate: having access to expertise and new research techniques[92]; access to research equipment; better opportunities to access grants; increase productivity or even for fun[93]. In spite of

[91] Beaver, D., 2001. Reflections on scientific collaboration (and its study): past, present and future. Scientometrics 52, 365–377.
Bozeman, B., Corley, E. "Scientists' collaboration strategies: implications for scientific and technical human capital." Research policy 33.4 (2004): 599-616.
[92] Katz, J.S., Martin, B.R., 1997. What is research collaboration? Research Policy 26, 1–18.
[93] Thorsteinsdottir, O., 2000. External research collaboration in two small science systems. Scientometrics 49, 145–160.

these incentives to collaborate, there are important differences across the types of collaboration that researchers are more inclined to engage with. It is important to note that this survey has focused on only one dimension of collaboration; that is, that carried out by researchers who have been internationally mobile in the past ten years.

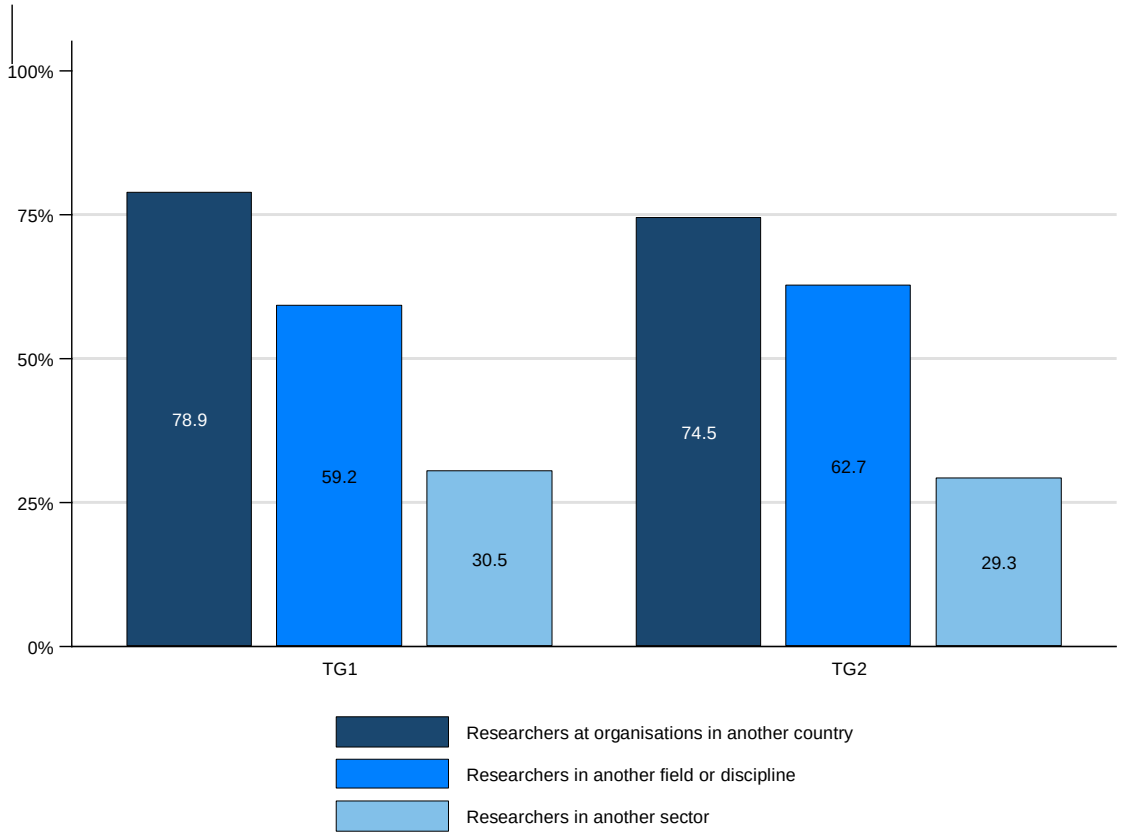
Figure 65 shows the most frequent types of collaborations among EU researchers working abroad (TG1) and among non-EU researchers having a previous working experience in Europe (TG2). This figure shows how the patterns of international and intersectoral collaboration are very similar across both groups: 70% of researchers collaborate with organisations located in another country, and nearly one out of three does so with organisations from another sector. The difference between the two target groups appears to be slightly larger when refering to collaborations with another field or discipline: 63% of the non-EU researchers having worked in the EU before have done this type of collaboration versus 59% of the EU researchers.

Gender: Significant gender differences emerge when comparing the two target groups. Although in general, women tend to undertake these types of collaboration 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, gender differences reach 14 percentage points in the levels of international collaboration and 7 percentage points for intersectoral collaboration. Among European researchers (TG1) the differences are more reduced: 5 percentage points to 2 percentage points for international and intersectoral collaboration respectively (see Table 60 in annex 8).

Country of current employment: When analysing the patterns of collaboration across countries (see Figure 128 in annex), BRICS countries tend to display lower levels of interdisciplinary, international and intersectoral collaboration than other countries. Interdisciplinary collaboration in BRICS (8%) is much less common than in Anglo-Saxon countries or non-EU OECD countries (17% respectively). There is a similar difference with respect to international collaboration, where 11% of the researchers working in BRICS claim to do this type of collaboration compared to 23% among Anglo-Saxon countries or a similar share in non-EU OECD countries.

Country of current employment: Intersectoral collaboration is the least frequent in most of the countries. BRICS show the lowest shares of this type of collaboration on average (3%). Researchers having engaged in intersectoral collaboration constitute around 10% of the researchers in Anglo-Saxon countries, in the US and in non-EU OECD countries.

Figure 65: Types of collaboration

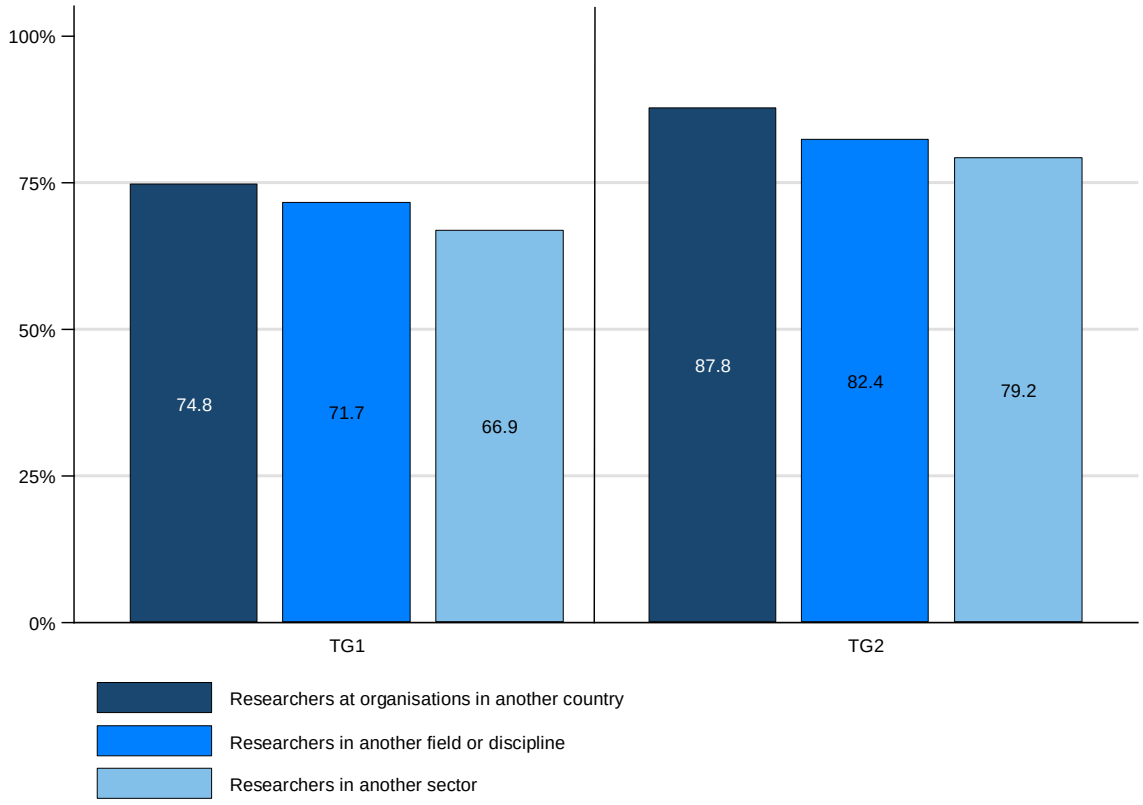


Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- Based on question 57 and question 68 "Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?"
- (n=680: 417 in TG1, 263 in TG2)

Collaboration as result of previous mobility experience: The findings (Figure 66) show that there are larger differences in this area than those related to the intensity of collaboration between EU researchers and non-EU researchers having had previous working experience in Europe. International, intersectoral, and interdisciplinary collaboration are related to a previous mobility experience to a larger extent among non-EU researchers having worked in Europe (TG2) than among EU researchers (TG1)[94]. The differences between the two target groups across the three types of collaboration are very similar: they range from 13 percentage points for international collaboration to 11 percentage points for interdisciplinary collaboration.

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

Figure 66: Collaborations as a result of a mobility experience



Source: MORE3 Global -survey (2017)
Notes:

- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- (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 57 and question 68 "Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?"

8. Attractiveness of ERA

When knowledge is the principal factor behind competitive advantage and when there is increasing competition for the best talents, the attractiveness of research areas is crucial for sustainable and dynamic knowledge economies. The analysis performed in the MORE2 study provides a clear picture of what drives attractiveness among researchers in academia (Janger - Nowotny, 2016; Janger - Strauss - Campbell, 2013[95]). 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 for scientific productivity:
  - Research organisation at working unit level (research and financial autonomy);
  - Balance between teaching, administrative tasks, and research;
  - Availability of funding (including research infrastructure);
  - Quality of peers.

Career perspectives are cross-cutting working conditions, as they influence both financial conditions and scientific knowledge production. 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. To this end, cooperating with industry or commercialising own research results can be added as influencing attractiveness.

Attractiveness is hence a result of the structure of career paths and the quality of working conditions (analysed in sections 5 and 6). International, intersectoral or interdisciplinary mobility may be driven by perceptions of varying attractiveness. In turn, mobility indicators (see section 7), e.g. in terms of which countries researchers choose for their international mobility experience, can also be interpreted as indicators of attractiveness. Based on the MORE 3 Global survey analysed in this report, we can thus provide evidence on how researchers perceive attractiveness in a global setting. The corresponding research questions are listed in the box below.

Box 6: 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 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 EU?
- What factors influence their decision to stay or leave?

[95] Janger, J., Strauss, A., Campbell, D., (2013) Academic careers: a cross-country perspective, WWWforEurope; Janger, J., Nowotny, K., "Job choice in academia". *Research Policy* 45, Nr. 8 (Oktober 2016): 1672–83. doi:10.1016/j.respol.2016.05.001.

- What are factors hindering researchers to return to the EU?
- What problems do they 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?

We use the following information from the survey to provide evidence for these research questions:

- Perception of attractiveness of current research position (section 8.1);
- Direct comparison of research systems (section 8.2);
- Comparison of barriers,motives and effects for mobility (section 8.3).
- Interest to work in the EU (section 8.4)
- Analysis of the EU-level policy instruments Euraxess and EU research funding (section 8.5).

Two dimensions are important in the analysis: the target groups and country of current employment. For the latter, the responses of the survey 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 4.3.3 for more detail). A more precise comparison (i.e. by countries) is not possible for most countries given the too low observation numbers. The US was singled out because of its excellent research universities which manage to attract talented researchers from all over the world.[96]

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 differentiation between country groups. Moreover, the variation between target groups that is 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, 22% 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 Australia (23%) and Canada (12%). With these shares, TG1 is more represented in these countries than other target groups. While TG1 makes up 24% of the total number of respondents, 39% of the respondents who are currently employed in the US are TG1. In the groups of researchers working in the non-EU OECD and Anglo-Saxon countries 29% 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 are biased by the non-uniform distribution of EU researchers who participated in the survey across different countries of employment.

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

8.1. Attractiveness based on perception of satisfaction in current research position

Section 6.2 focused on researchers' perception 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 a position in research. Researchers decide between jobs in research not only based on remuneration and other material well-being related issues such as social security, but also on job characteristics which influence the scientific productivity of researchers.

In order to disentangle the various factors, we group the different aspects of researchers' satisfaction with their current job in terms of:

- Non-science related working conditions that affect the attractiveness of researcher careers or the decision between 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 research autonomy;
- Career and mobility perspectives.

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 first useful to determine which regions at a global scale offer more or less attractive jobs; the results can also be compared with the MORE3 EU HE 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 what follows, each aspect will be discussed in more detail according to this structure. First, Figure 67 gives an overview of the averages for working conditions based on this structure:

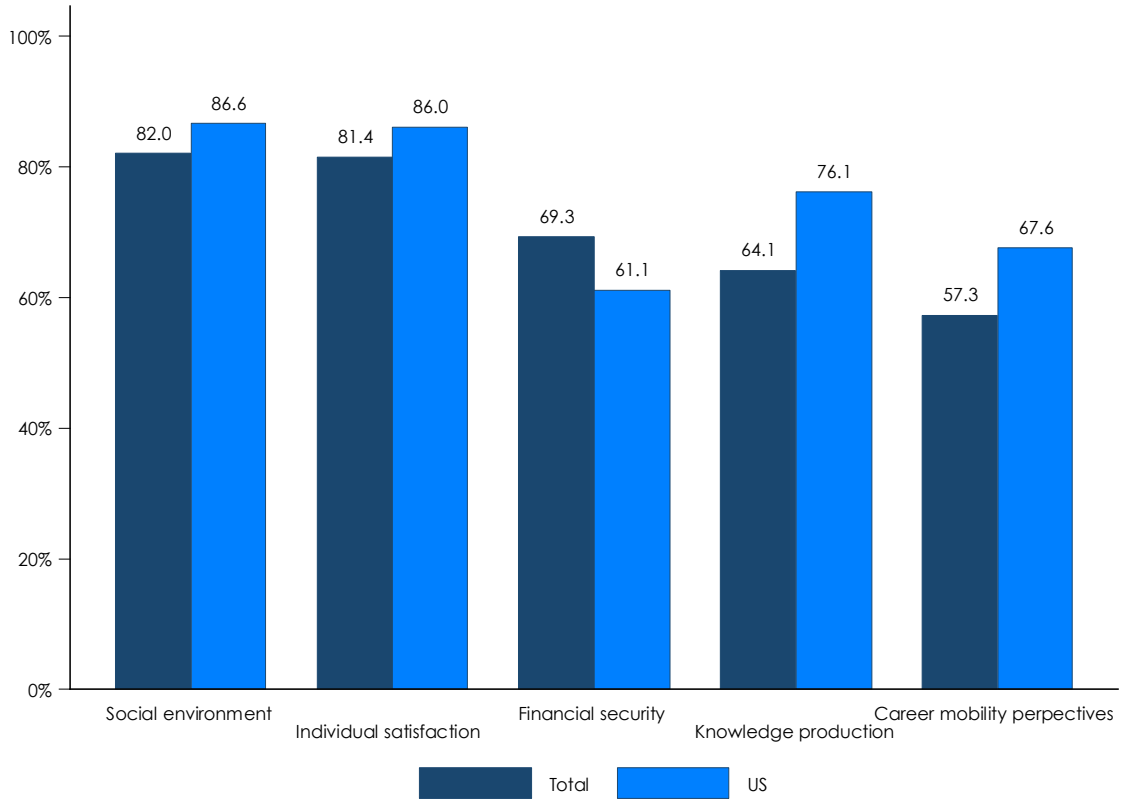
- **Non-science related working conditions** that affect the attractiveness of researcher careers or the decision between jobs:
  - Perceived working conditions affecting extrinsic pecuniary motivations is shown by **financial security** (average of job security, pension plan and social security);
  - Social working conditions are shown by **social environment and recognition** (social status, reputation of employer, contribution to society);
  - Content-specific working conditions are shown by **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 **research funding** and access to facilities (financial support for research);
  - Satisfaction with working with leading scientists and the perceived quality of education and training (**intellectual support**);

- Satisfaction with the **balance** between research and teaching as well as with **research autonomy**;

- **Career as well as 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 (82%) and perceiving satisfaction in their current job (81%) is rated highly, the share of researchers that are satisfied with career and mobility perspectives (driven by career perspectives) are at the lower end (57%). This is in line with the results of the MORE3 HE EU survey and illustrates 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 doing that research is much lower (in particular for funding). Moreover, researchers employed in the US are particularly satisfied. The shares of satisfied researchers currently working in the US is above average by 5 to 15 percentage points. The only exception is satisfaction with financial security, which is lower than the average share (total: 69%, US: 61%).

Figure 67: Satisfaction with working conditions in current position



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,483-1,705)

Various target groups are rather homogeneous with respect to their satisfaction with working conditions (Table 32). Overall, among mobile EU researchers (TG1) are the highest shares of satisfied researchers, especially regarding career mobility perspectives and knowledge production. As most of TG1 researchers are currently working in Australia, the US and Canada, the quality of research systems in those countries, particular in the US, are reflected in the answering pattern.

Table 32: Satisfaction with working conditions in current positions by target group

	TG1	TG2	TG3	TG4
Career mobility perspectives	65.5%	55.1%	57.6%	53.9%
Financial security	69.2%	70.6%	72.5%	68.3%
Individual satisfaction	84.5%	78.6%	79.6%	81.2%
Knowledge production	72.3%	63.8%	64.1%	60.2%
Social environment	86.0%	79.5%	79.3%	81.4%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=162-869)

8.1.1. Non-science related working conditions

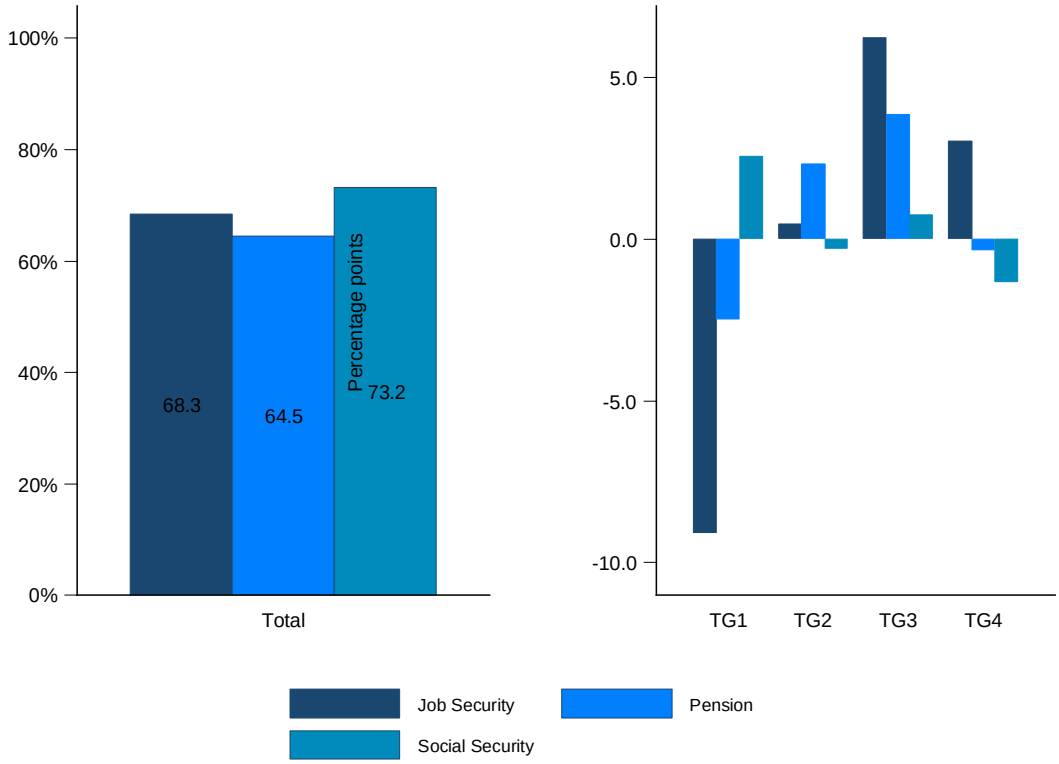
Non-science related working conditions might not directly affect the quality and quantity of research output, but they certainly affect the attractiveness of researcher careers. Based on the MORE3 Global survey questionnaire, non-science related working conditions include aspects regarding financial security (job security, pension plan and social security), 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 are analysed in detail in the sections below.

8.1.1.1. Job and social security

Overall, 73% of researchers are satisfied with social security and other benefits associated with their current position and 68% of researchers are satisfied with job security at their institution (see Figure 68, left panel). A share of 65% is satisfied with the pension plan at their current research position.

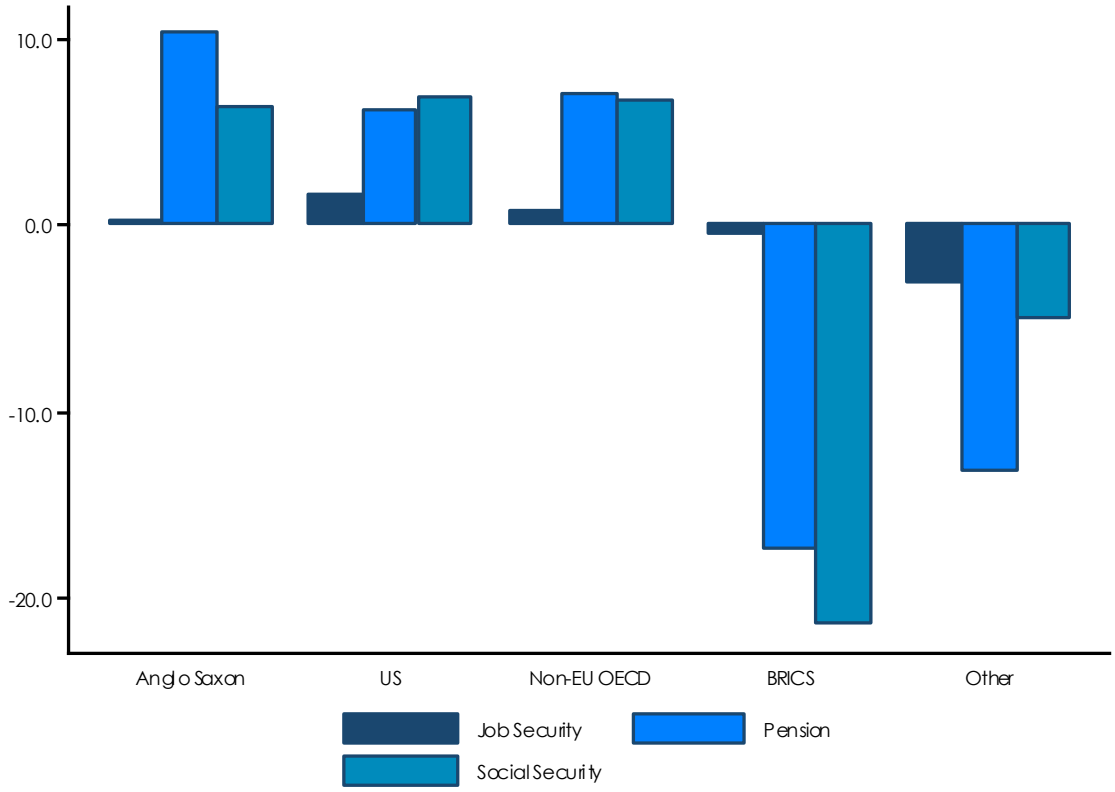
Target groups: Differentiating between target groups reveals only small differences in terms of satisfaction with social security. It ranges between 76% of EU researchers currently working abroad (TG1) that are satisfied with social security and 72% of satisfied non-EU researchers, who have never been mobile (TG4). The range between the highest (68% of TG3 researchers) and the lowest (62% of TG1 researchers) share of researchers satisfied with their pension plan is with 6 percentage points only marginally larger (see Figure 68, right panel). The difference between the highest share of researchers satisfied with job security at their current position (75% of TG3 researchers) and the lowest share (59% of TG1 researchers) is 16 percentage points. In comparison to the other target groups, the share of researchers satisfied with social security is highest in the group of EU researchers working abroad (TG1). In terms of job security and pension plans, however, this group shows the lowest shares of contented researchers.

Figure 68: Individual satisfaction with job and social security attributes total (left panel) and differences between target groups (right panel)



Country of current employment: In terms of job security, a low variance between different country groups is observed (see Figure 69). The highest share of researchers feeling satisfied with job security is employed in the US, while the lowest share is located in the category 'other' countries, including e.g. Argentina, Colombia, Thailand and Ukraine. 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 social security is particularly large, with only 52% of satisfied researchers in BRICS nations and 80% of satisfied researchers in (non-EU) OECD countries. Similarly, only 47% of researchers employed in BRICS countries are satisfied with their pension plans, while 75% of researchers in Anglo-Saxon countries feel content. In general, researchers working in BRICS nations are substantially less often satisfied with their pension and social security than in other country groups, while the differences between the Anglo-Saxon and OECD countries is less obvious. This obviously mirrors differences in economic development.

Figure 69: Differences in individual satisfaction with job and social security attributes between country groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,614/1,509/1,593)
- TG1: EU researchers currently working outside the EU (n=395/371/396)
- TG2: Non-EU researchers who have worked in the EU in the past (n=250/238/240)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=169/161/165)
- TG4: Non-EU researchers who have never worked abroad (n=800/739/792)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,614/1,509/1593)

8.1.1.2. Social environment and recognition

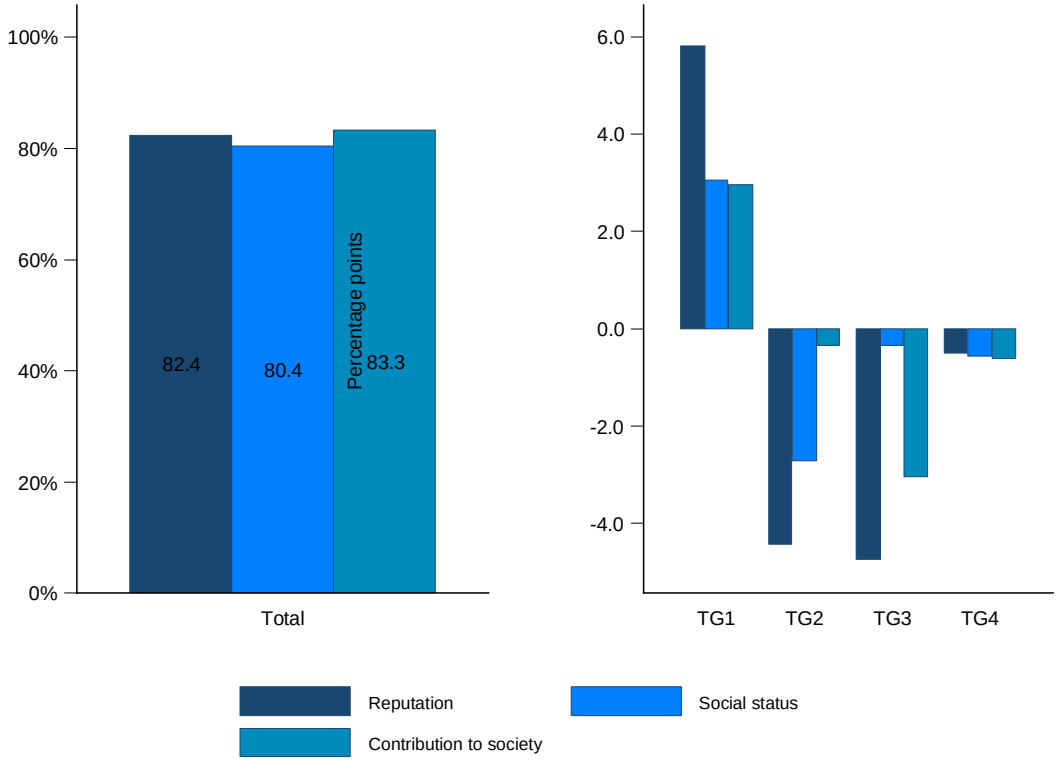
In this section, we look into satisfaction with aspects of social environment and recognition, as part of the non-science related working conditions. They include contribution to society, social status and reputation of the current employer.

Overall, 82% of researchers who participated in the MORE3 Global survey are satisfied with the reputation of their employer, 80% of researchers are satisfied with the social status associated with their position as researchers and 83% are contented with their contribution to society (see Figure 70, left panel). In comparison with the MORE3 EU HE survey, those shares are only slightly lower (6 to 7 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 social environment and recognition, EU researchers currently working abroad (TG1) show the highest shares of satisfied researchers (see Figure 70, right panel). The difference between European researchers working abroad and other groups is particularly large when looking at the shares of researchers satisfied with reputation and

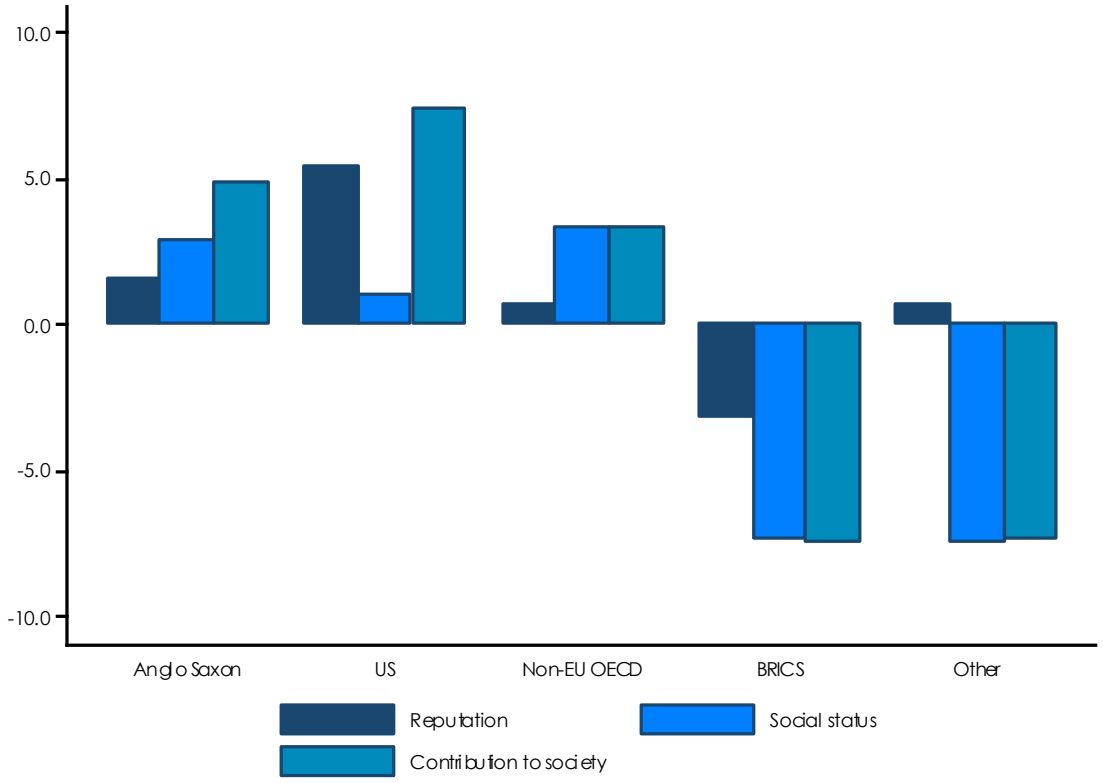
social status. However, these results are partly driven by the composition of the sample in terms of country of current employment (see section 5): the highest shares of TG1 researchers are found in the US and non-EU OECD countries.

Figure 70: Individual satisfaction with social environment: total (left panel) and differences between target groups (right panel)



Country of current employment: Figure 71 shows the deviation of country group averages from the total average in percentage points. The results indicate that in non-EU OECD and Anglo-Saxon countries, but in particular in the US, the shares of researchers being satisfied with their contribution to society is larger than average. Researchers employed in the US are also much more likely to be satisfied with their reputation than researchers in other country groups. Interestingly, although above average, the share of researchers satisfied with the social status is not particularly high in the US in comparison to other country groups. 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.

Figure 71: Differences in individual satisfaction with social environment between country groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,667/1,635/1,665)
- TG1: EU researchers currently working outside the EU (n=406/398/393)
- TG2: Non-EU researchers who have worked in the EU in the past (n=249/246/252)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=174/170/172)
- TG4: Non-EU researchers who have never worked abroad (n=838/821/848)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,667/1,635/1,665)

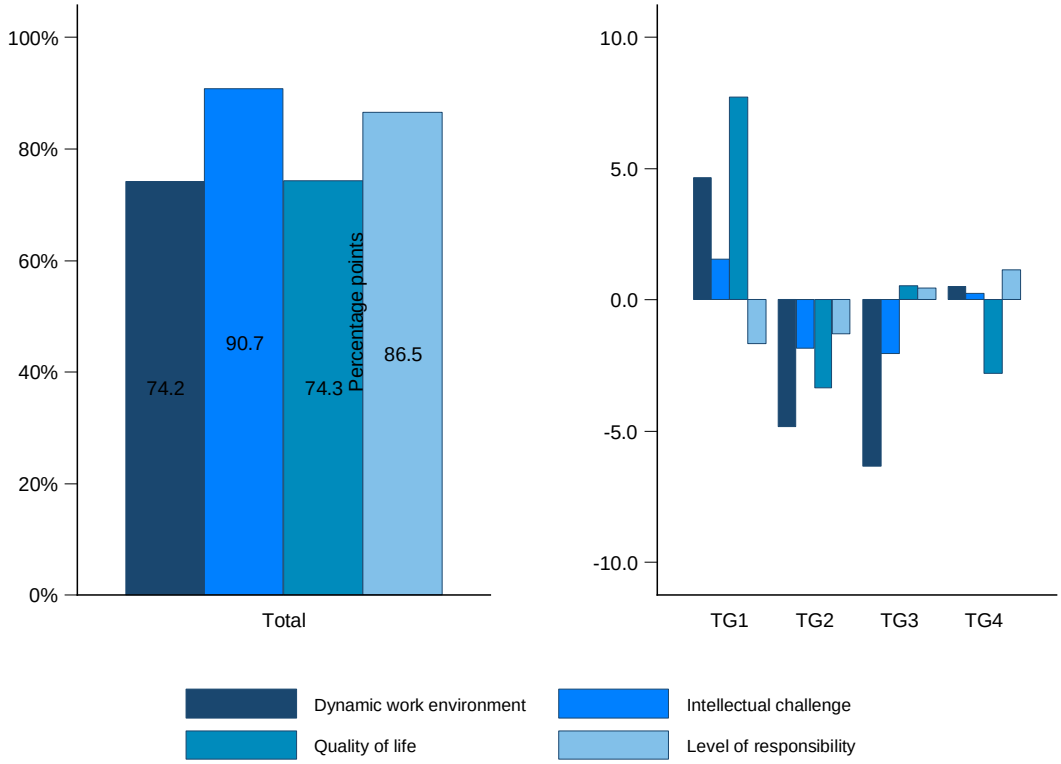
8.1.1.3. Individual satisfaction at work

Analogous to the MORE3 EU HE survey, the satisfaction with intellectual challenge, dynamic work environment, level of responsibility or quality of life are analysed as 'individual satisfaction at work' as part of the non-science working conditions. Overall, a vast majority of 91% of the respondents are satisfied with the intellectual challenge at work; 87% with the level of responsibility; 74% with the dynamic work environment; and 74% with the quality of life (see Figure 72, left panel). Again, these shares are all lower than the shares of researchers who are satisfied with the respective aspects in the MORE3 EU HE survey, however, the pattern stays the same. The approval rates are the highest for intellectual challenge and level of responsibility at researchers' working positions, and are a little lower in terms of quality of life and dynamic work environment.

Target groups: Similar to the result on aspects regarding social environment and recognition, the shares of researchers who are satisfied with intellectual challenges, dynamic work environment and quality of life are highest among EU researchers currently working abroad (TG1). 92% of TG1 researchers are satisfied with the

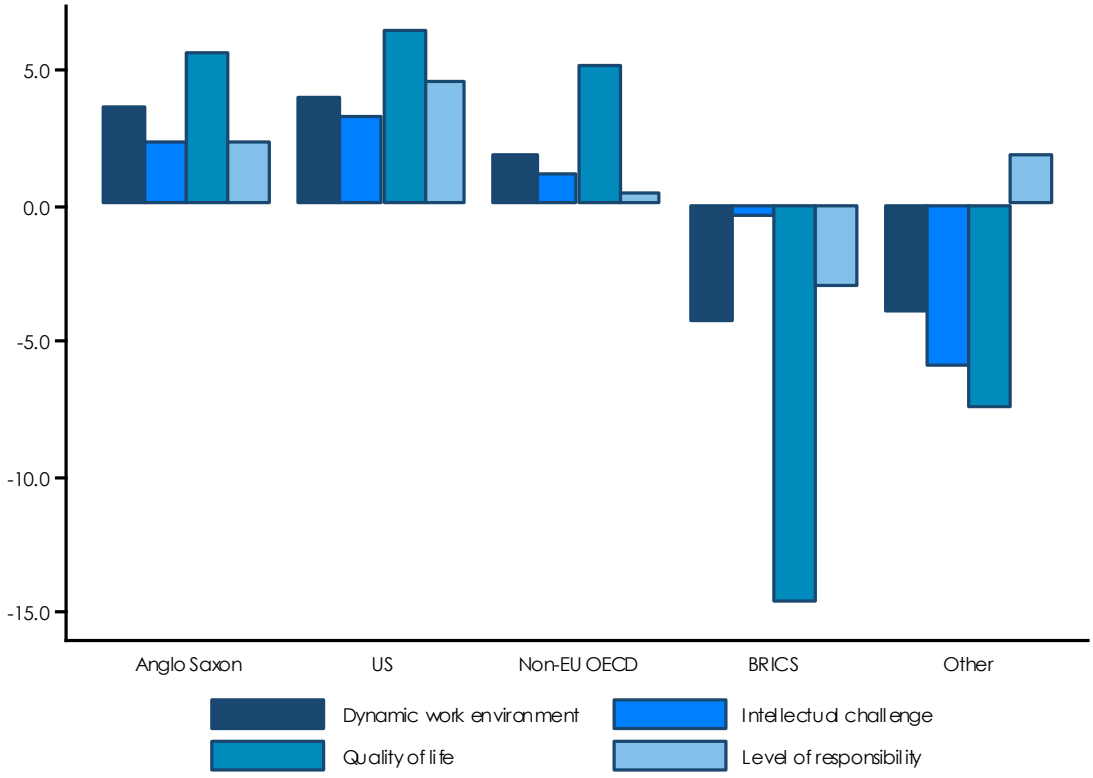
intellectual challenge at work, 79% with their dynamic work environment and 82% with their life quality (see Figure 72, right panel). Only with respect to the level of responsibility does this target group show the lowest shares of researchers who are satisfied. However, the ranges between the highest and the lowest shares of satisfied respondents are marginal.

Figure 72: Individual satisfaction at work: total (left panel) and differences between target groups (right panel)



Country of current employment: Figure 73 indicates a number of differences between groups of countries, similar to the differences above. While more developed countries, such as the OECD and Anglo-Saxon countries, and the US in particular, show above-average shares of satisfied researchers in all used categories of satisfaction at work, the BRICS and other nations are especially below-average with respect to satisfaction with quality of life and dynamic work environment. The shares of satisfied researchers employed in countries of the category 'Other', which includes e.g. Argentina, Colombia, Thailand and Ukraine, 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 intellectual challenge at their current positions.

Figure 73: Differences in individual satisfaction at work between country groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,670/1,705/1,690/1,687)
- TG1: EU researchers currently working outside the EU (n=411/414/412/414)
- TG2: Non-EU researchers who have worked in the EU in the past (n=251/260/258/256)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=174/177/175/176)
- TG4: Non-EU researchers who have never worked abroad (n=834/854/845/841)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,670/1,705/1,690/1,687)

8.1.2. 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 like 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 research autonomy are essential for improving the performance of the existing scientific staff and establishing a stock of promising junior scientists.

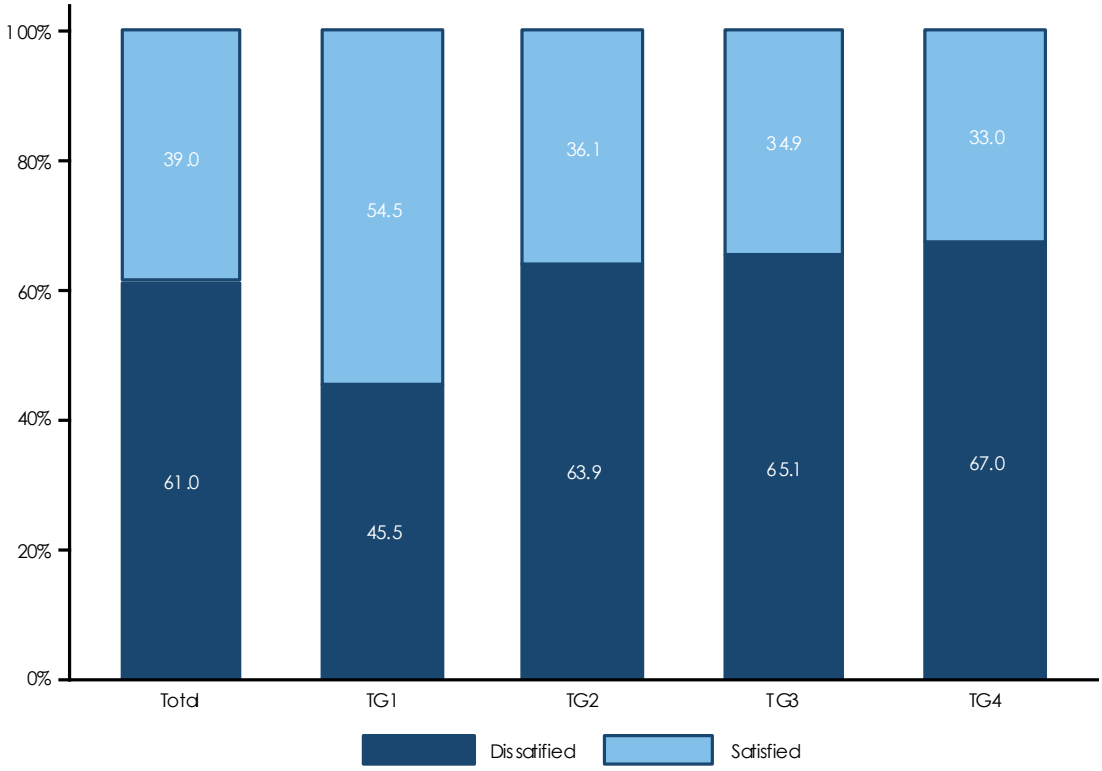
8.1.2.1. Research funding

Overall, the majority of researchers (61%) who participated in the MORE3 Global survey are dissatisfied with the availability of research funding, only 39% of researchers feel content with their funding situation (see Figure 74).

Target groups: With the exception of target group TG1 this is still true after breaking down the sample into different target groups. Only among the EU researchers currently

working abroad, the majority (55% of TG1 researchers) are satisfied with the availability of research funding.

Figure 74: Individual satisfaction with research funding, by target groups

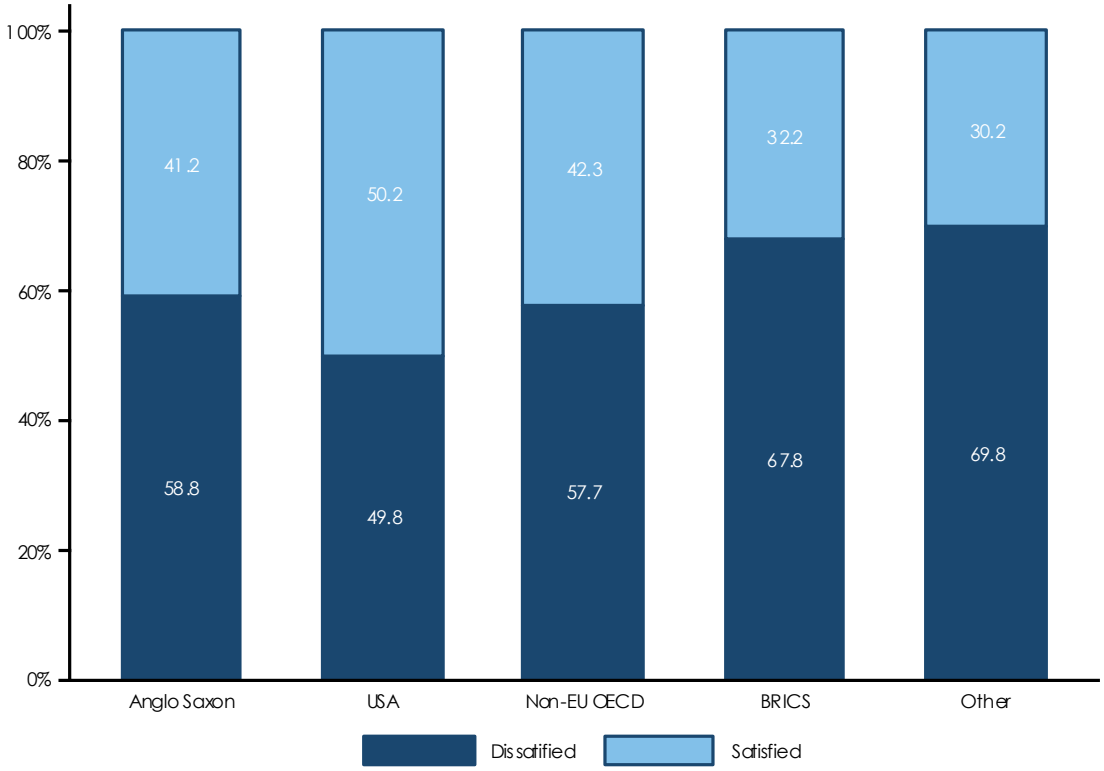


Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,649)
- TG1: EU researchers currently working outside the EU (n=409)
- TG2: Non-EU researchers who have worked in the EU in the past (n=249)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=169)
- TG4: Non-EU researchers who have never worked abroad (n=822)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,649)

Country of current employment: Figure 75 shows the differences in terms of researchers' satisfaction with research funding between country groups of current employment. The largest share of researchers that feels satisfied with the availability of research funding is employed in the US (50%). In all other country groups the majority of researchers is dissatisfied with their funding situation, in particular in BRICS nations and 'other' countries, including Argentina, Colombia, Thailand and Ukraine (68% and 70% of researchers are dissatisfied respectively). This is, again, in line with the pattern observed above of a close association between level of 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, e.g. of Chinese researchers moving to the US.[97]

Figure 75: Individual satisfaction with research funding, by country groups

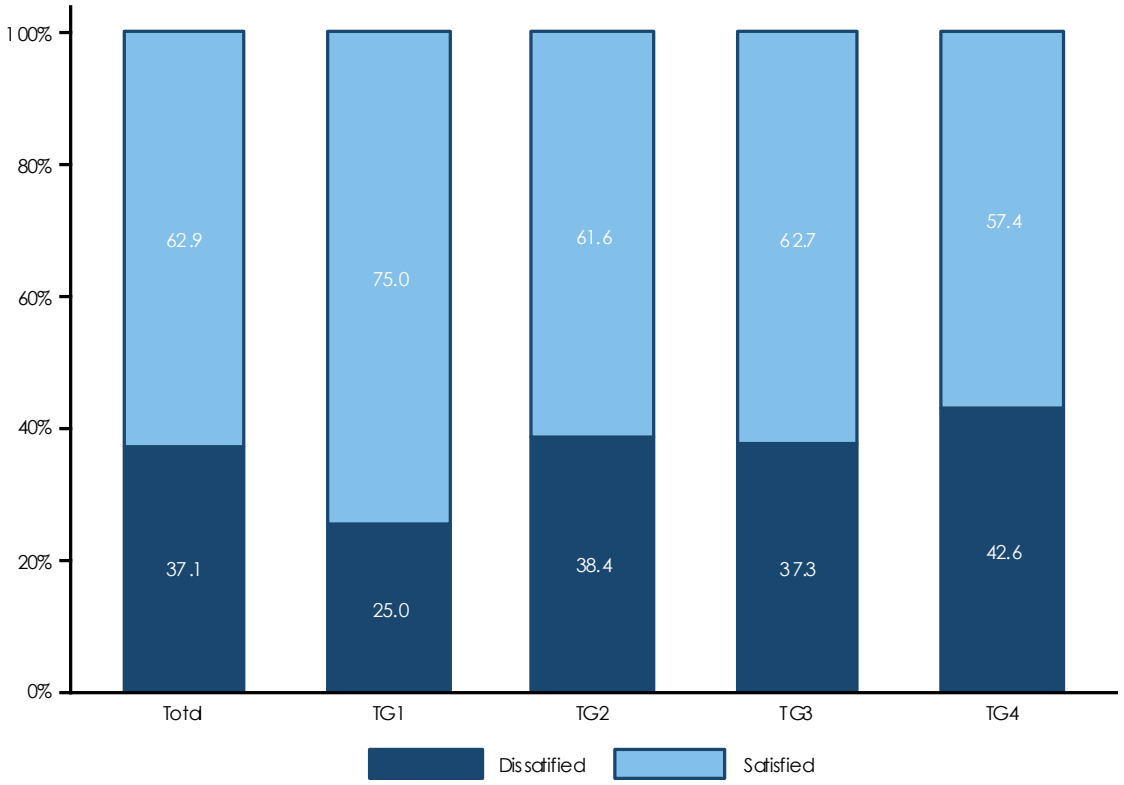


Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,649)

Target groups: Similar to researchers' satisfaction with research funding, differences between target groups are apparent when looking at the share of researchers satisfied with the research infrastructure in their current job, particularly for target group TG1. The group of EU researchers currently working outside Europe seems to be more satisfied with their given supply than their non-EU research colleagues (see Figure 76). A majority of 75% of TG1 researchers feel satisfied with their access to research facilities and equipment, in contrast to only 57% of non-EU researchers who have never been mobile (TG4). The difference between satisfied TG1 researchers and the sample average of researchers satisfied with research infrastructure (63% of researchers) is thus 12 percentage points.

[97] Docquier, Frédéric, und Hillel Rapoport. „Documenting the Brain Drain of" La crème de la Crème". Three Case-Studies on International Migration at the Upper Tail of the Education Distribution". Jahrbucher fur Nationalokonomie und Statistik 229, Nr. 6 (2009): 679–705.Hunter, Rosalind S., Andrew J. Oswald, and Bruce G. Charlton. 'The Elite Brain Drain*'. The Economic Journal 119, no. 538 (2009).

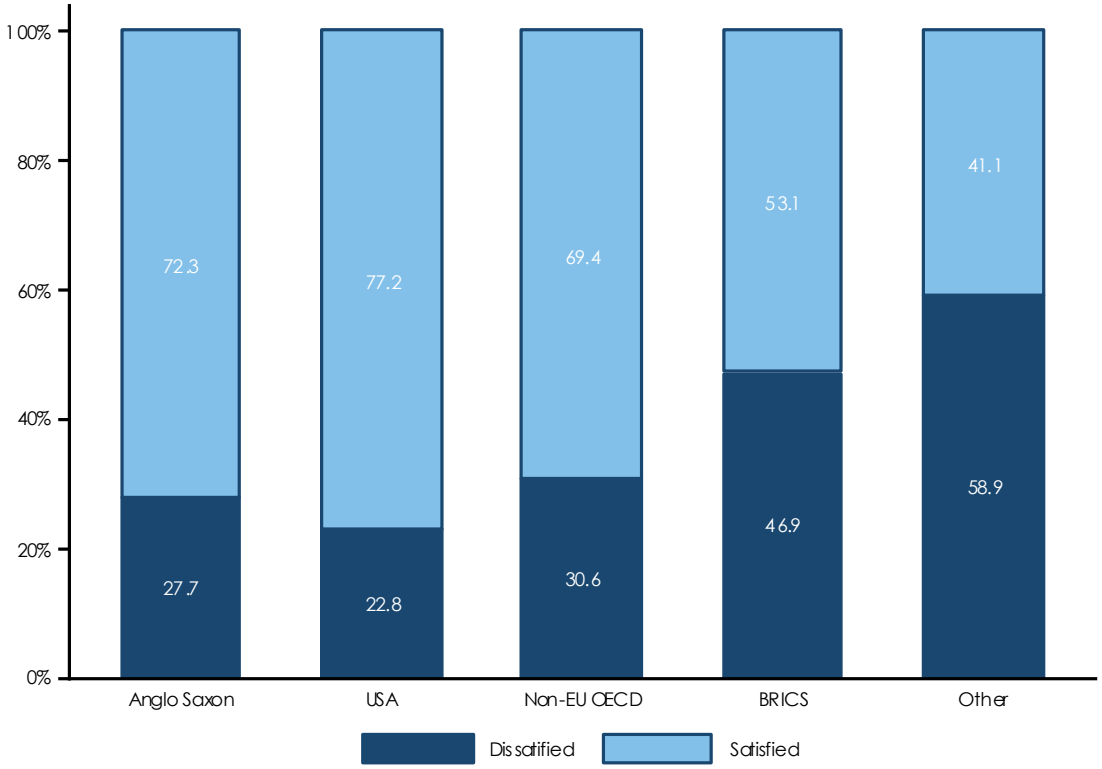
Figure 76: Individual satisfaction with research facilities and equipment, by target group



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,649)
- TG1: EU researchers currently working outside the EU (n=409)
- TG2: Non-EU researchers who have worked in the EU in the past (n=249)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=169)
- TG4: Non-EU researchers who have never worked abroad (n=822)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,649)

Country of current employment: In comparison to research funding, the range between the highest and the lowest shares of researchers satisfied with their access to research facilities and equipment is equally high when looking at different country groups. While nearly eight out of ten researchers employed in the US feel content with research facilities (77%), only half of the researchers being employed in BRICS countries (53%) would agree (see Figure 77). The share of researchers dissatisfied with research facilities is even higher (59%) in countries of the category 'other' (e.g. Argentina, Colombia, Thailand and Ukraine). Hardly any differences are observed between Anglo-Saxon and (non-EU) OECD countries.

Figure 77: Individual satisfaction with research facilities and equipment, by country groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,632)

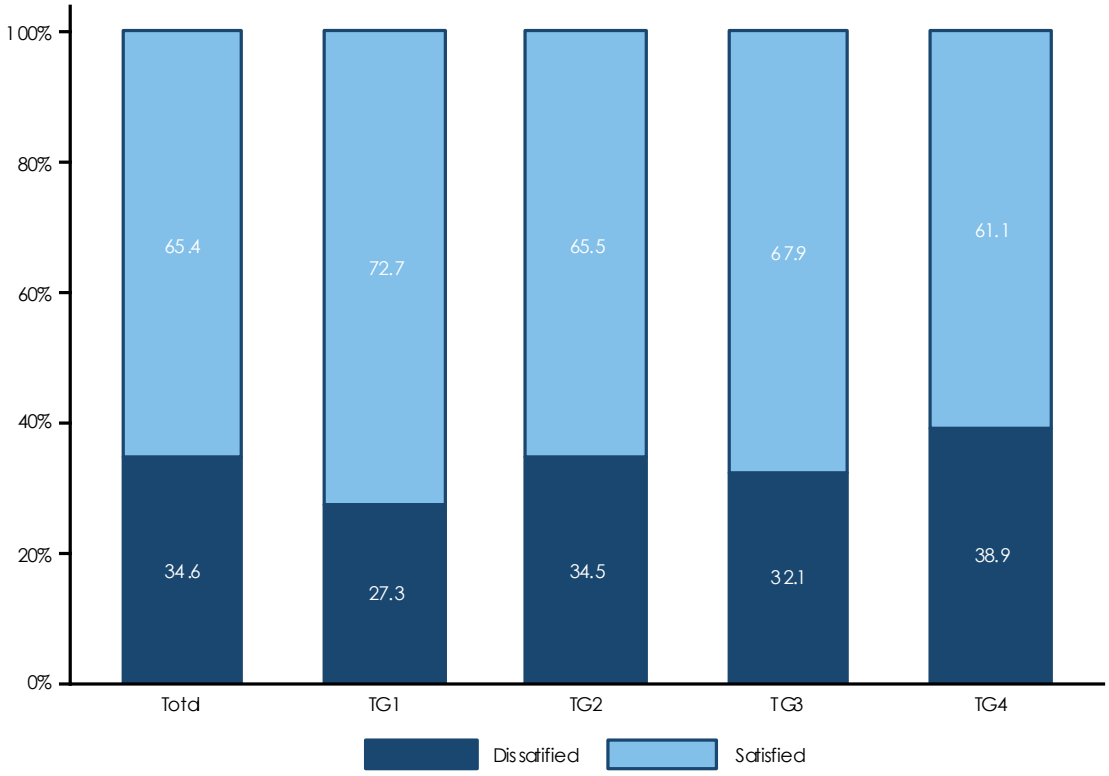
8.1.2.2. *Intellectual support*

This section relates to researchers' satisfaction with collaboration with leading scientists and with quality of education and training. First, 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, in particular in relation to supporting measures for mobile scientists (Jonkers – Tijssen, 2008)[98].

Target groups: Also in the MORE3 Global survey the share of non-EU researchers who have never been mobile in the past (TG4) and who are dissatisfied because of the lack of opportunities to cooperate with other leading scientists, is the highest (see Figure 78). Four out of ten TG4 researchers (39%) are dissatisfied with the opportunity to work with leading researchers. In contrast, not even a third of the EU researchers currently working abroad (27%) would agree. The vast majority of EU researchers working outside the EU (73% of TG1 researchers) is satisfied with their cooperation possibilities. In total, 35% of researchers who participated in the MORE3 Global survey are dissatisfied with their opportunities to work with leading scientists.

[98] Jonkers, Koen, and Robert Tijssen. "Chinese researchers returning home: Impacts of international mobility on research collaboration and scientific productivity." Scientometrics 77.2 (2008): 309-333.

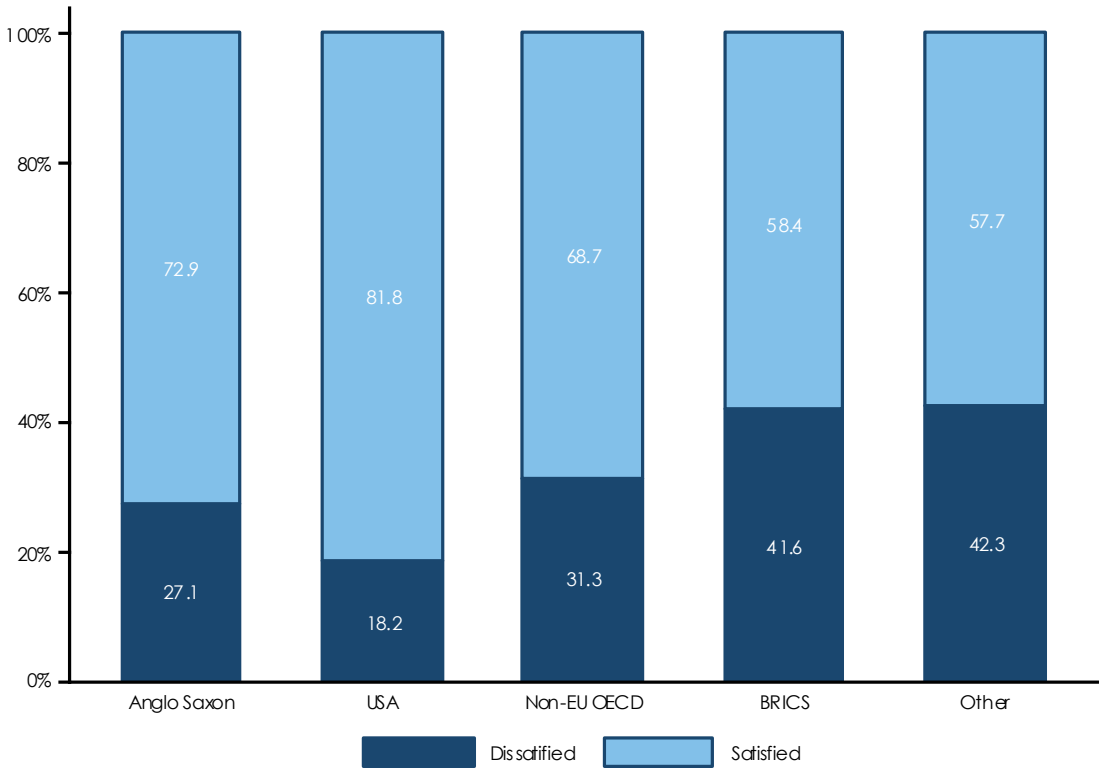
Figure 78: Individual satisfaction with collaboration with leading scientists, by target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,579)
- TG1: EU researchers currently working outside the EU (n=399)
- TG2: Non-EU researchers who have worked in the EU in the past (n=252)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=162)
- TG4: Non-EU researchers who have never worked abroad (n=766)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,579)

Country of country employment: Again, when differentiating between county groups the exceptional position of the US is apparent (see Figure 79). Only 18% of researchers employed in the US felt dissatisfied with opportunities to work with leading researchers, while in BRICS nations 42% of researchers feel dissatisfied. Similar to researchers' satisfaction with research facilities, differences in the shares of satisfied researchers between Anglo-Saxon and non-EU OECD countries are small.

Figure 79: Individual satisfaction with collaboration with leading scientists, by country groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,579)

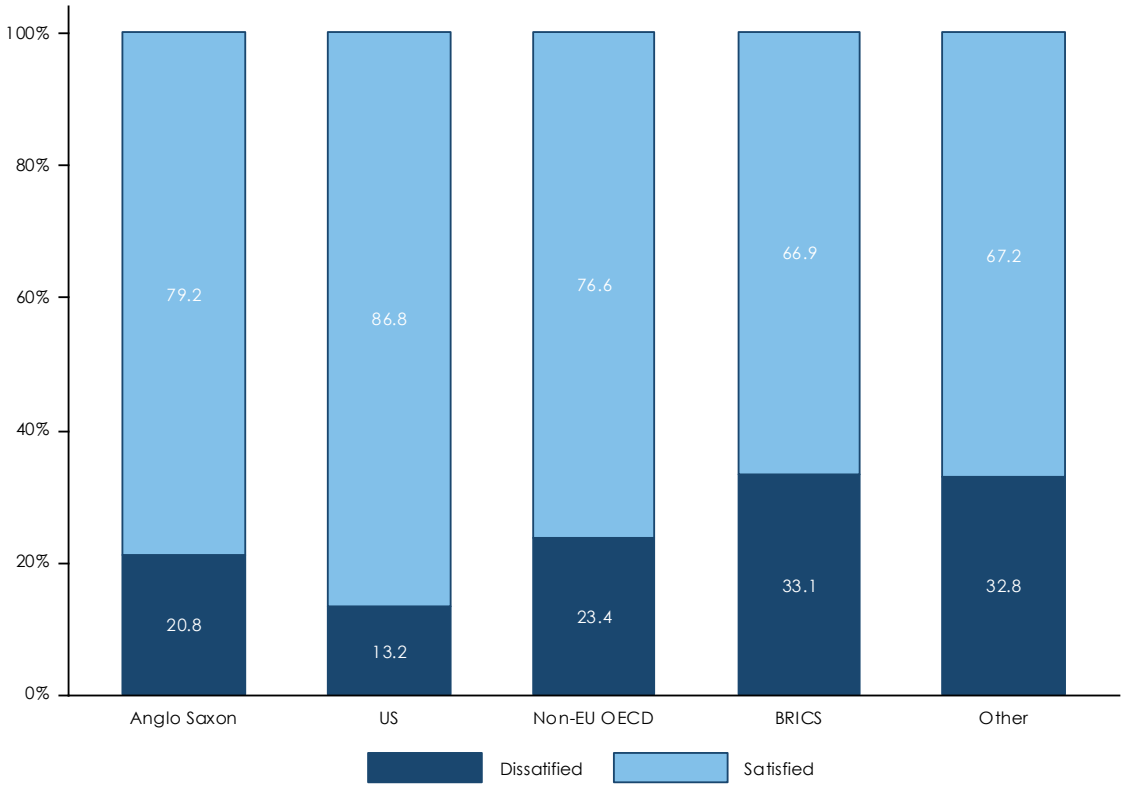
We now turn to the second item of this group, satisfaction with quality of education and training. Among all target groups, the level of contentment with the quality of training and education is generally higher than with collaboration with leading experts. In total, 74% of researchers are satisfied with the quality of training and education at their institute (see Figure 80). In comparison with the MORE3 EU HE survey, however, the share of satisfied researchers is lower (by 12 percentage points).

Target groups: Comparing different target groups reveals no considerable differences: 29% of non-EU researchers who have not worked in the EU, but in other non-EU countries (TG3) and 27% non-EU researchers who have never worked abroad (TG4) are dissatisfied with the quality of training and education. 26% of EU researchers currently working outside the EU (TG1) and 24% of non-EU researchers who have worked in the EU in the past (TG2) are also dissatisfied.

Country of current employment: In contrast, differences between country groups are more pronounced (see Figure 80). The highest shares of dissatisfied researchers (33% respectively) are employed in the BRICS nations and in the country group 'other' (e.g. Argentina, Colombia, Thailand and Ukraine), while the lowest share of dissatisfied researchers is again located in the US (13%). This result is in line with international university rankings that regularly place universities in the US in top positions. Research universities in the US are not only in the vanguard according to composite rankings (including several aspects like research, citations, 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[99]). The US-American higher education system is overall very heterogeneous, with very low quality institutions alongside top institutions. Our results seem to reflect respondents working at top or at least high-quality institutions, as international mobility to low-quality institutions is probably low. Interestingly, the share of researchers dissatisfied with training and education is by 8 percentage points higher in the group of Anglo-Saxon countries, of which the US is part (21%).

Figure 80: Individual satisfaction with quality of training and education, by country groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,612)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,612)

[99] https://www.timeshighereducation.com/world-university-rankings

8.1.2.3. 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 is granted to researchers as it clearly affects the extent to which a researcher can dedicate her time to her own research subject at hand.

Research and teaching are often seen as symbiotic and hard to separate. Teaching activities are essential for the scientific knowledge production for a number of reasons: recruitment of talented young scientists, transmission of 'taste for science' and enrichment of the current research and researchers' basic stock of knowledge (Marsh - Hattie, 2002, Roach - Sauermann, 2010)[100]. However, teaching also ties resources to time that otherwise could be used to pursue research activities and the individual level of teaching load and quality often has less impact on research career advancements than academic publications. Literature indicates that a moderate teaching load is likely to be the most attractive for researchers (Robertson - Bond, 2001, and Janger - Nowotny, 2016)[101].

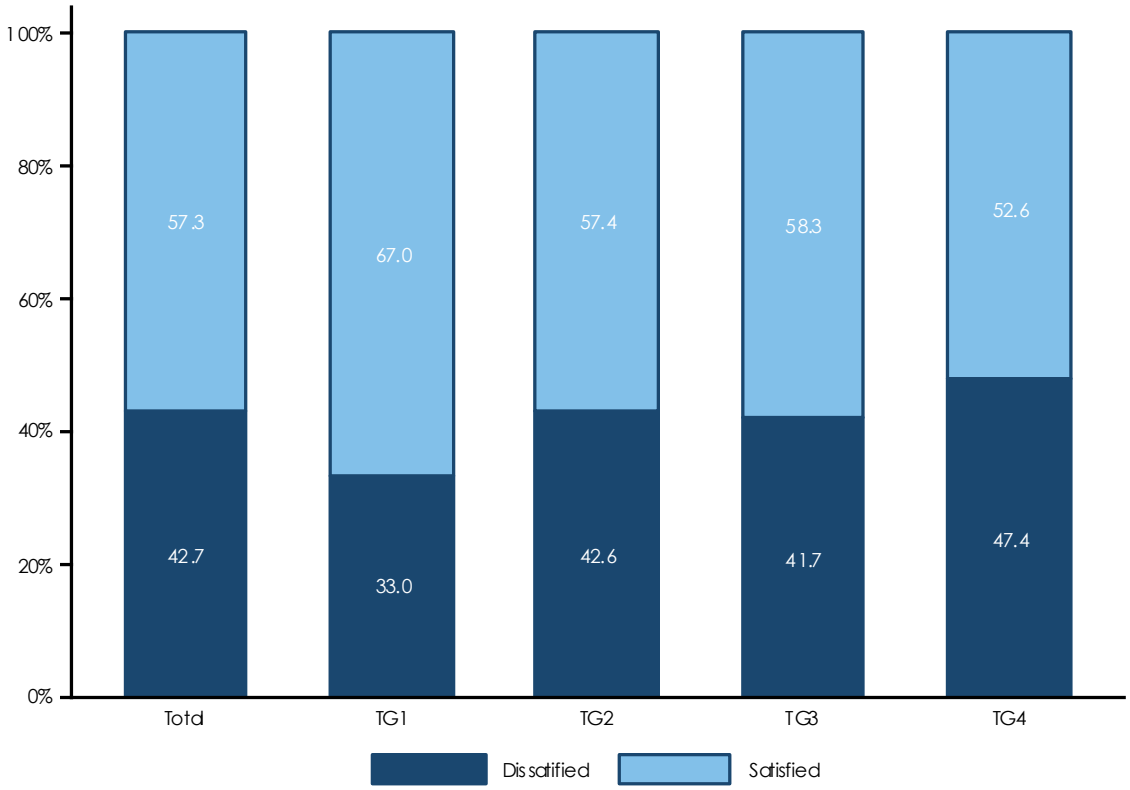
In total, only 57% of researchers who participated in the MORE3 Global survey are satisfied with the balance between teaching and research time at their current position (see Figure 81). In comparison to the MORE3 EU HE survey, that means that the share of content global researchers is 10 percentage points lower than that of EU-based researchers.

Target groups: However, looking at the different target groups reveals that EU researchers currently working outside Europe show a considerably higher share of satisfied researchers than other groups. 67% of TG1 researchers are satisfied with the balance between teaching and research, while only 53% of non-EU researchers who have never been mobile (TG4) would agree. This could imply that mobile researchers are in a better position to pick jobs associated with a more favorable teaching load. To a lesser extent, language barriers could be another explanation for lower teaching loads of incoming researchers. However, the establishment of a causal relationship based on the given data is not possible.

[100] 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.

[101] 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.

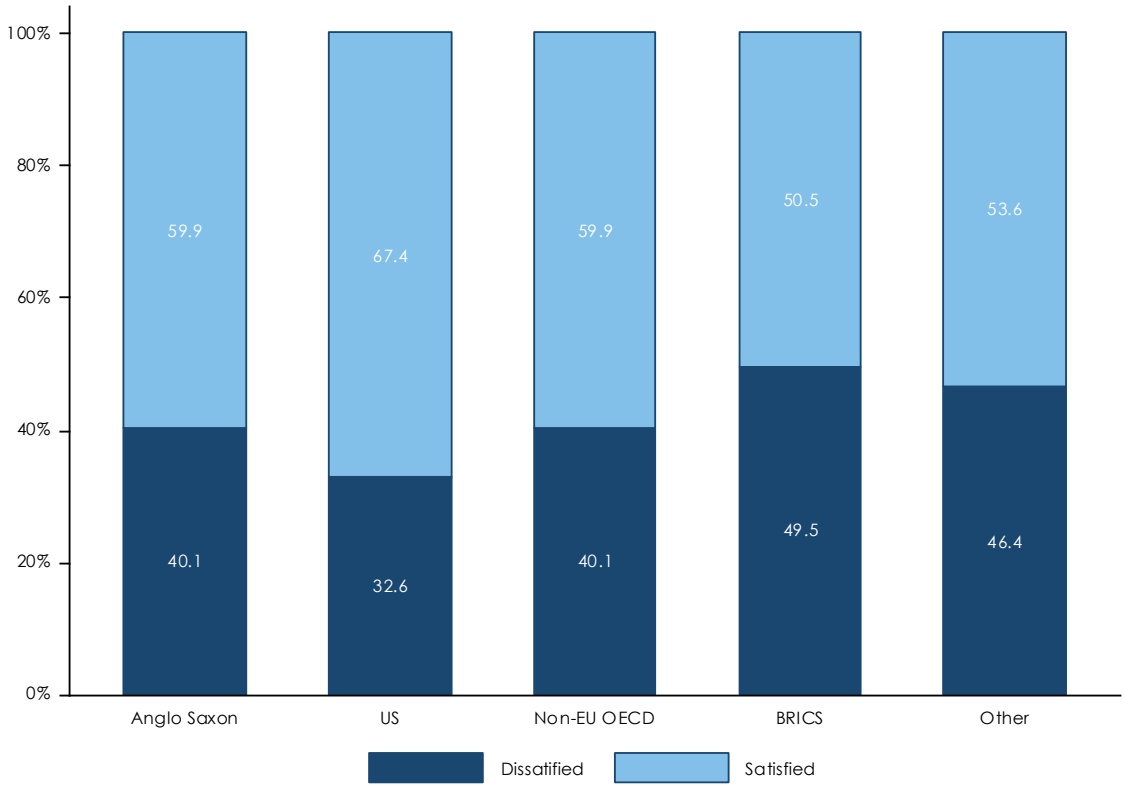
Figure 81: Individual satisfaction with balance between teaching and research time, by target groups



Source: MORE3 Global Survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,483)
- TG1: EU researchers currently working outside the EU (n=345)
- TG2: Non-EU researchers who have worked in the EU in the past (n=237)
- 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=738)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,483)

Country of current employment: Figure 82 indicates differences between country groups of employment. In particular, the share of dissatisfied researchers employed in BRICS countries, but also in the groups 'other' and 'Anglo-Saxon', are rather high at 50%, 46% and 42% respectively. Again, researchers employed in the US are contrasting. Only every third researcher (33%) 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 the US.

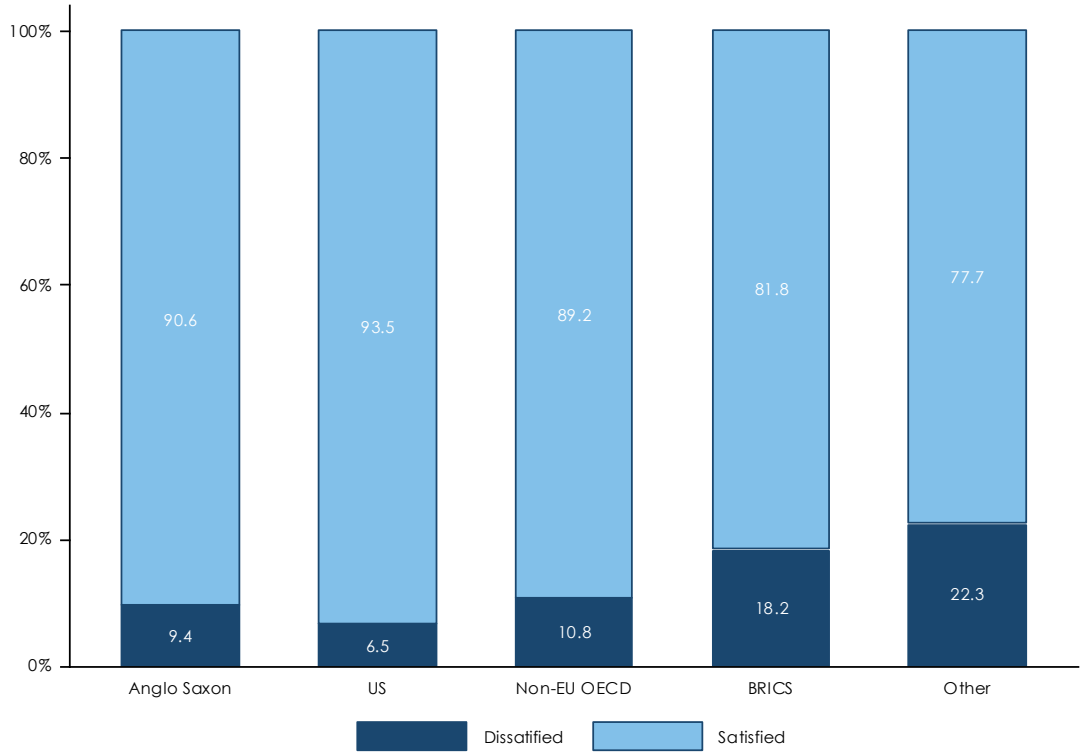
Figure 82: Individual satisfaction with balance between teaching and research time, by country groups



Source: MORE3 Global Survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,483)

Country of current employment: The range between the highest and the lowest share of researchers satisfied with their research autonomy is higher when comparing different country groups (see Figure 83). In line with the results above, the highest share of satisfied researchers is again employed in the US (94%), while the lowest share of researchers satisfied with research autonomy can be found in 'other' (e.g. Argentina, Colombia, Thailand and Ukraine) and BRICS countries (78% and 82% respectively). In the middle, in terms of research autonomy, the Anglo-Saxon and (non-EU) OECD show equally high levels of satisfied researchers (90% and 89%).

Figure 83: Individual satisfaction with research autonomy, by country groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,686)

8.1.3. Career and mobility perspectives as working conditions

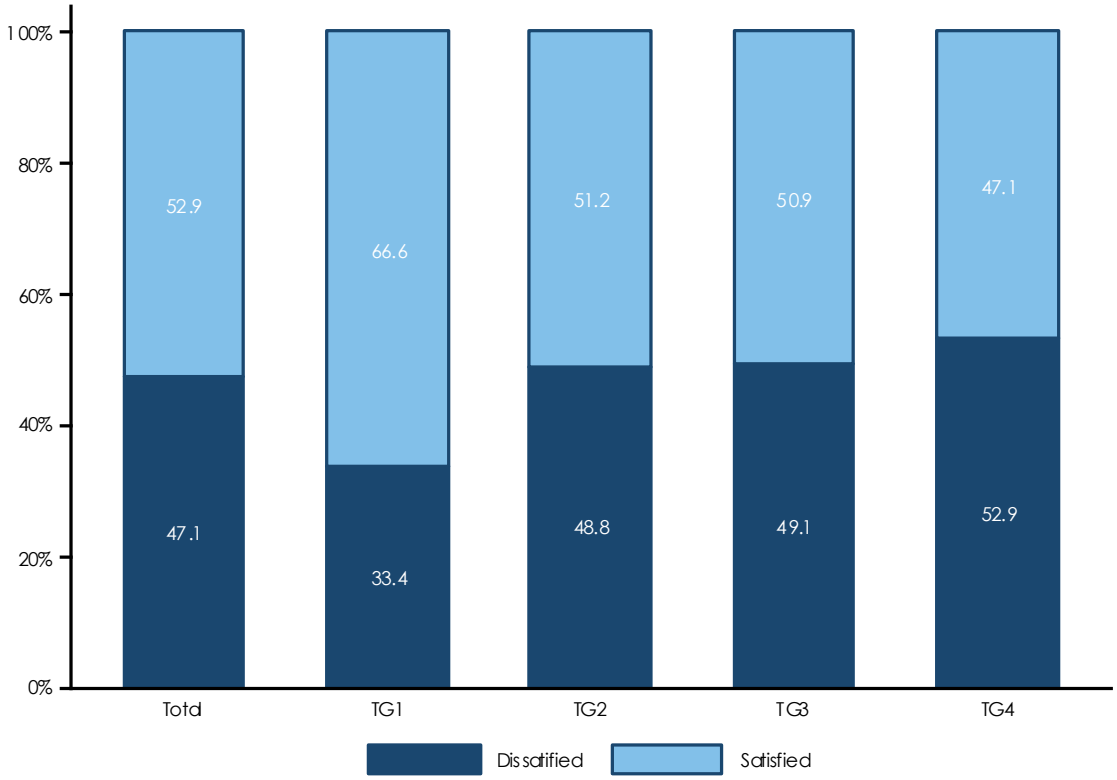
Analogous to the MORE3 EU HE survey, we treat career perspectives as a cross-cutting issue as they matter for both scientific knowledge production and for perspectives of job security and financial security. The analysis of the MORE3 EU HE survey indicates that mobility perspectives and collaboration patterns are interrelated, and as a result mobility perspectives also affect scientific knowledge production.

In general, the share of researchers that is satisfied with their mobility perspectives is only moderately large. Only 53% of all researchers who participated in the MORE3 Global survey feel content with their mobility perspectives (see Figure 84). This share is 20 percentage points lower than the share of EU28 researchers satisfied with their mobility perspective in the MORE3 EU HE survey (73%).

Target groups: However, comparing different target groups shows that the share of EU researchers currently working abroad (TG1) that are satisfied with their mobility perspectives is – although still lower than the EU28 average- much higher (67% of TG1 researchers) than the average share of the Global survey. Interestingly, the group with the highest share of researchers dissatisfied with their mobility perspectives is the group of non-EU researchers who have never been mobile (47% of TG4 researchers). This result raises the question as to whether researchers who have never been mobile abstained from doing so because of their lack of will or because of the lack of opportunities. Later in this section various factors acting as barriers to mobility are

discussed, revealing that in the group of non-mobile researchers (TG4) problems related to obtaining funds for research and mobility are mentioned most often.

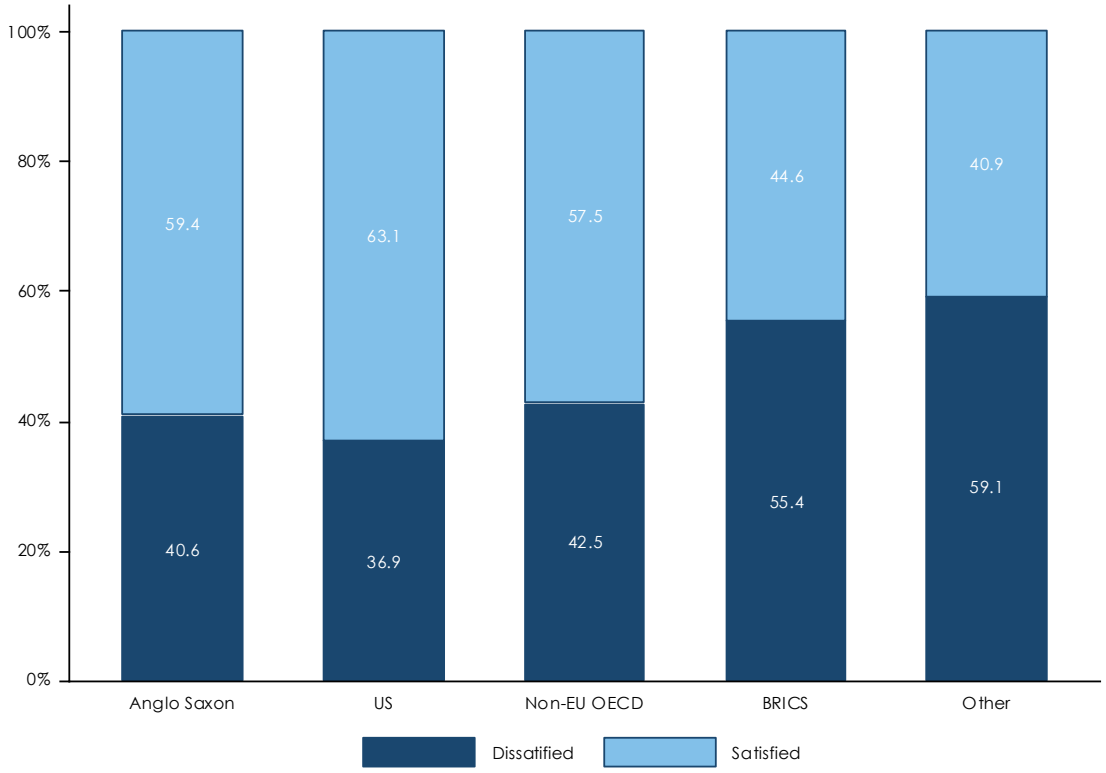
Figure 84: Individual satisfaction with mobility perspectives, by target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,564)
- TG1: EU researchers currently working outside the EU (n=380)
- TG2: Non-EU researchers who have worked in the EU in the past (n=242)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=161)
- TG4: Non-EU researchers who have never worked abroad (n=781)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,564)

Country of current employment: Figure 77 indicates considerable differences between country groups of employment. The range between the highest share of researchers satisfied with their mobility perspectives (63% of researchers employed in the US) and the lowest share (41% of researchers in 'other' countries) is more than 20 percentage points. Also the share of satisfied researchers employed in BRICS countries (45%) is in comparison considerably lower.

Figure 85: Individual satisfaction with mobility perspectives, by country groups

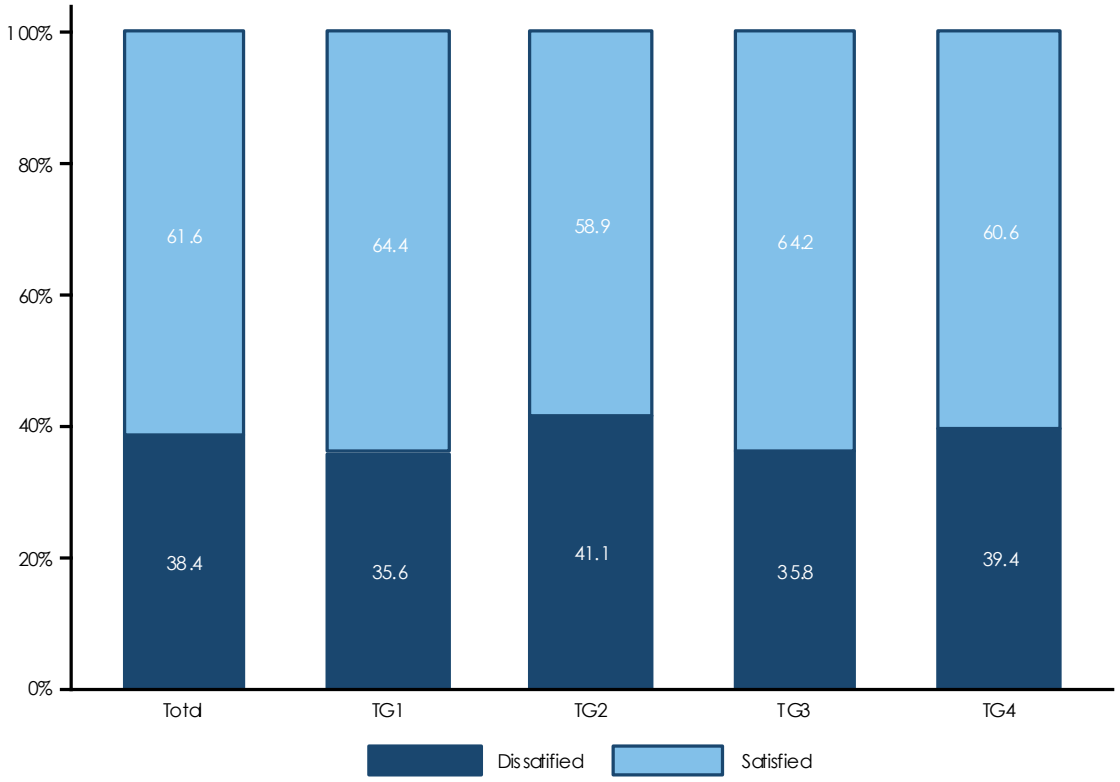


Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,564)

The results on career perspectives are similar to those on mobility perspectives. Overall, 62% of researchers who participated in the MORE3 Global survey feel satisfied with their current career perspectives (see Figure 86).

Target groups: The highest share of researchers satisfied with respect to career perspectives can be found in the group of EU researchers currently working abroad (64% of TG1 researchers), while the lowest share is located in the target of non-EU researchers who have worked in the EU in the past (59% of TG2 researchers).

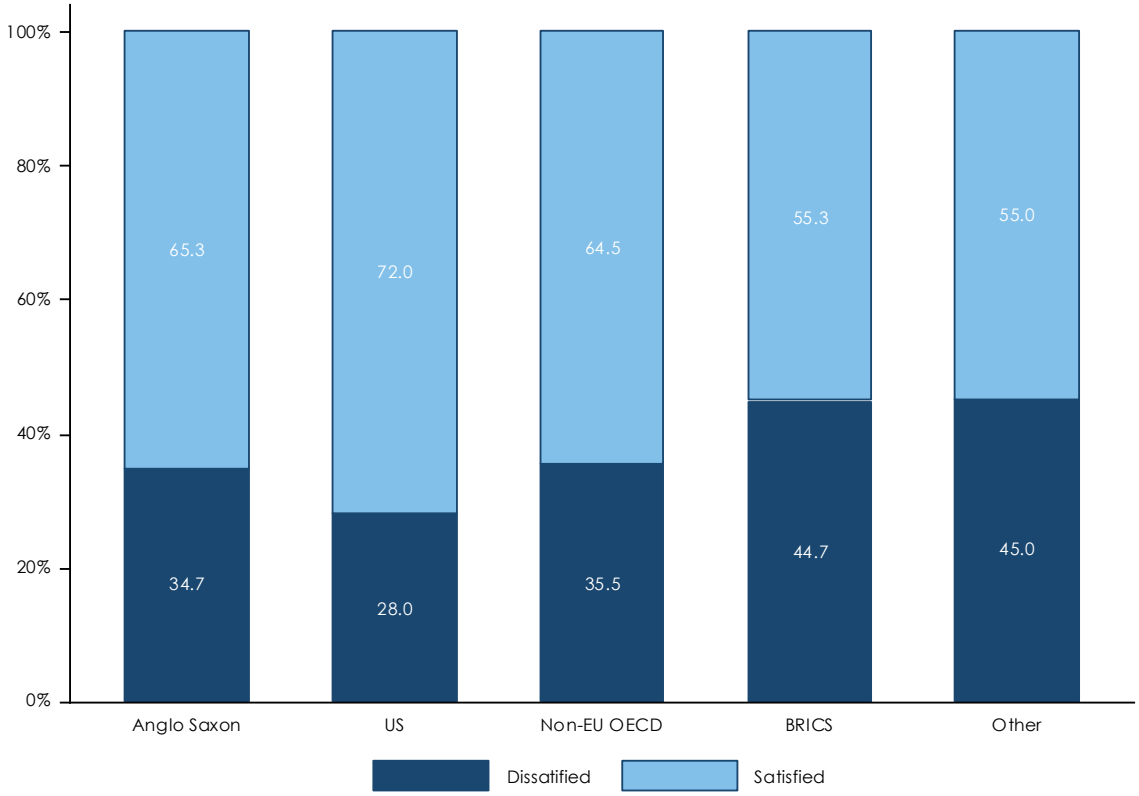
Figure 86: Individual satisfaction with career perspectives, by target groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,611)
- TG1: EU researchers currently working outside the EU (n=404)
- TG2: Non-EU researchers who have worked in the EU in the past (n=248)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=162)
- TG4: Non-EU researchers who have never worked abroad (n=797)
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,611)

Country of current employment: Differences between country groups of employment are only slightly smaller than in comparison to the satisfaction with mobility perspectives (see Figure 87). The lowest shares of researchers satisfied with their career perspectives are employed in BRICS and 'other' countries (55% respectively), while the highest share is located in the US (72%). Again, differences between Anglo-Saxon and (non-EU) OECD countries are negligible.

Figure 87: Individual satisfaction with career perspectives, by country groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,611)

8.2. Attractiveness based on direct comparison between research systems

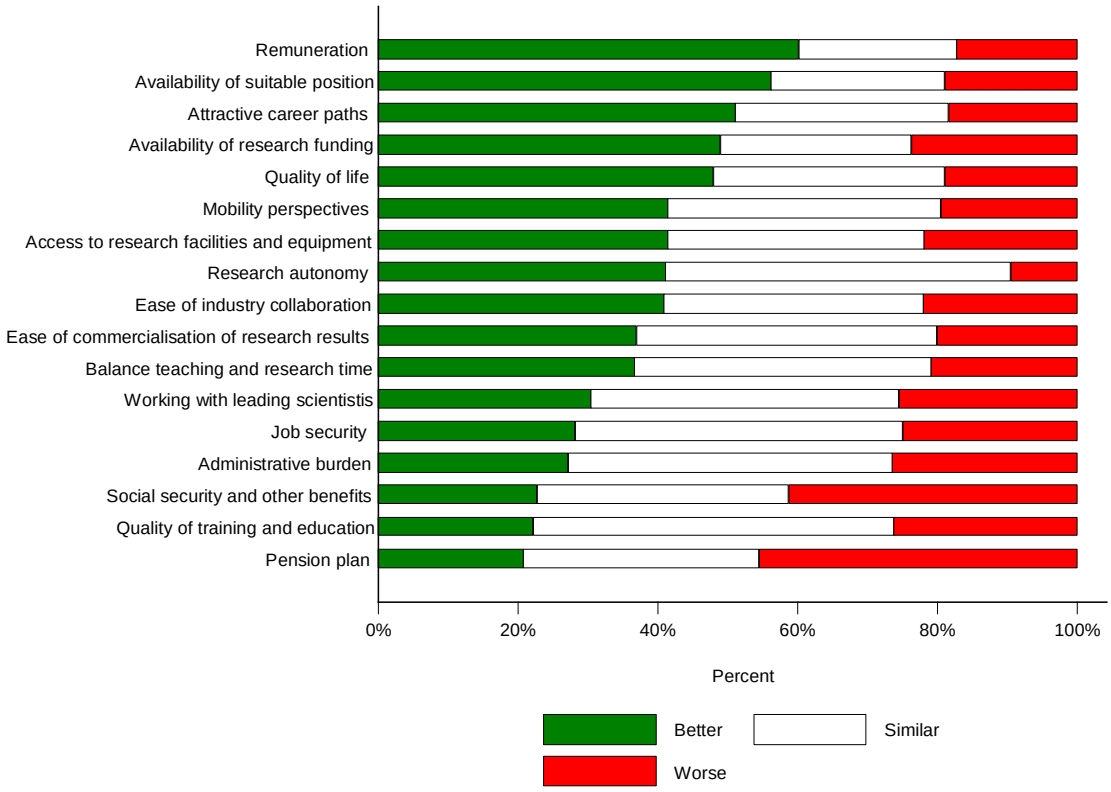
In this subsection, we analyse the information gained from the directly targeted questions 50 and 60 of the MORE3 Global survey which compare a number of aspects of the research system outside and inside the EU. Researchers eligible to respond to these questions are those who have knowledge of at least one EU and non-EU system:

- Researchers with EU citizenship who currently work abroad (TG1) (Figure 88);
- Non-EU Researchers who have been mobile to the EU (TG2) (Figure 89).

Overall, whether researchers in the target groups for direct comparison of 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 about pension plan and social security in Europe compared to their current employment outside Europe, but also about the quality of education and training. TG2 researchers deem all aspects better in the EU than in their current position outside the EU.

Figure 88: Comparative perspective of working outside the EU versus working inside the EU (TG1; better refers to better outside the EU)

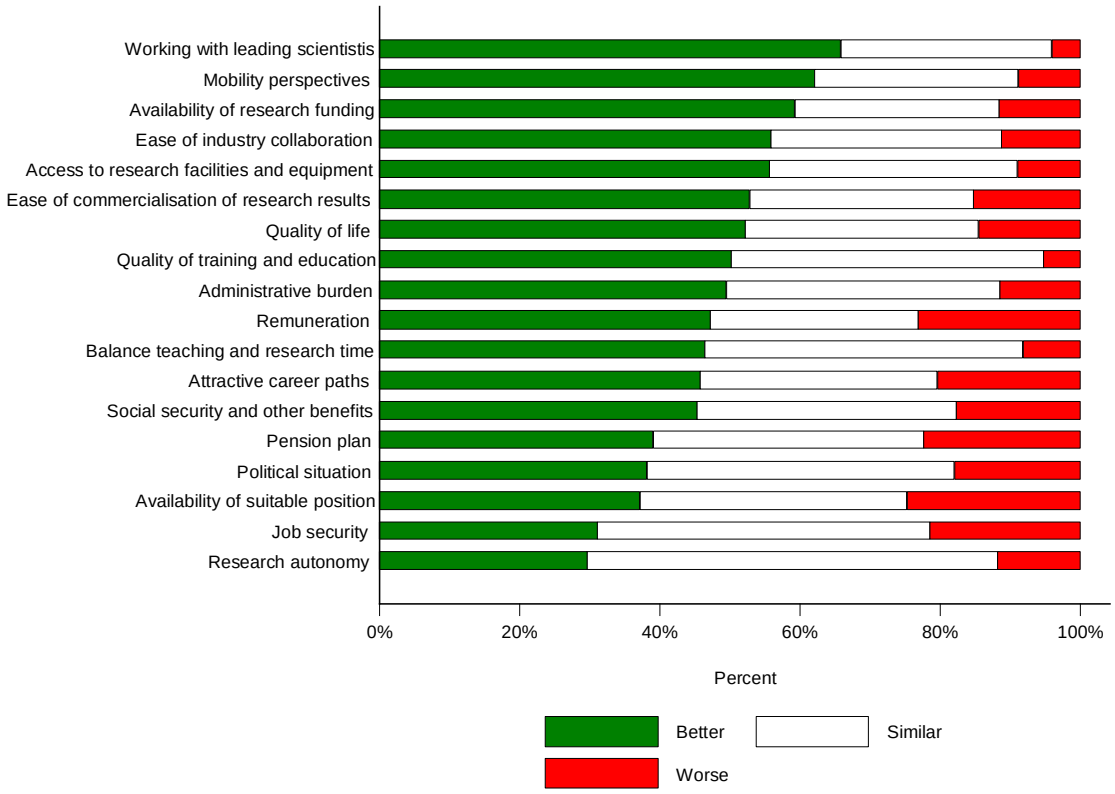


Source: MORE3 Global survey (2017)

Notes:

- Based on question 50: "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."
- (n=417)

Figure 89: Comparative perspective of working in the EU versus working outside the EU (TG2; better refers to better in the EU)



Source: MORE3 Global survey (2017)

Notes:

- Based on question 60: "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=263).

Figure 90 contrasts the share of respondents assessing the EU research system as more attractive against the share of researchers who assess it as less attractive. The graph contains 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 more detailed categories:

1) "Remuneration and other material factors" includes remuneration, social security and other benefits, quality of life, job security, an pension plan;
2) "Conditions for scientific knowledge production" includes availability of research funding, access to research facilities and equipment, working with leading scientists, research autonomy, administrative burden, and balance between teaching and research time;
3) "Engagement with industry" includes 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.

In case of the non-EU researchers in TG2, an additional item was added to question 60 in terms of:

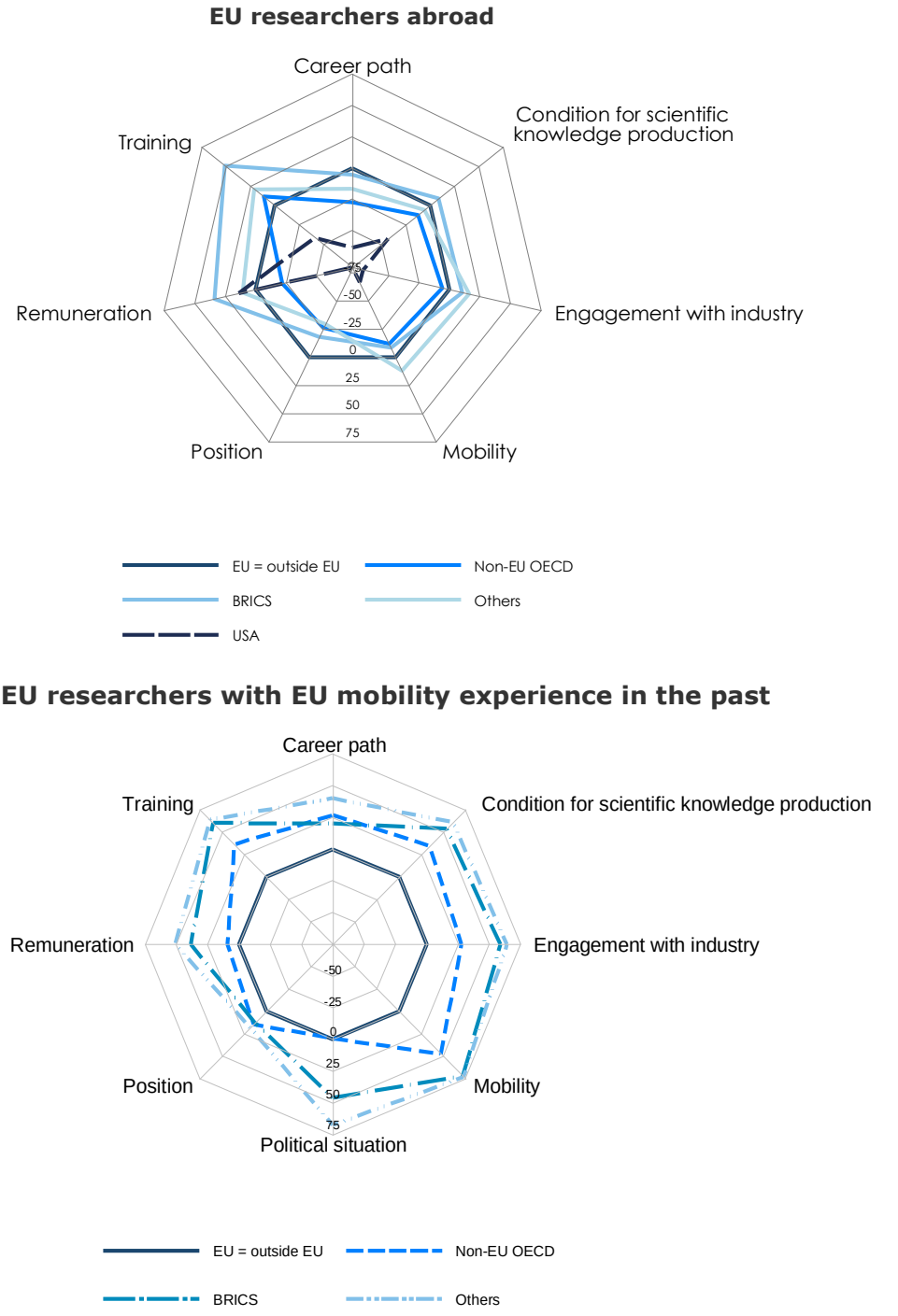
8) the political situation.

Figure 131 and Figure 132 in annex 9 include all the individual categories; Table 33 below

Figure 90 provides all the data for the figure.

As in the previous analyses in this chapter, the responses of the survey 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 17 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 research.

Figure 90: Comparison between working outside the EU and working inside the EU as a researcher



Source: MORE3 Global survey (2017)
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 50: "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 60: "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 ..."
- (top graph/left half of the table: n=415, bottom graph/right half of the table: n=261)

Table 33: Comparison between working outside the EU and working inside the EU as a researcher: full set of data of the figure above; negative numbers indicate higher share of researchers who think that it is better outside the EU than inside.

	EU researchers abroad				Non-EU researchers mobile to the EU		
	USA	Non-EU OECD	BRICS	Others	Non-EU OECD	BRICS	Others
Career path	-63.6	-27.2	-5.4	-16.7	26.7	20.0	40.0
Condition for scientific knowledge production	-42.9	-12.1	8.8	-5.6	34.5	53.8	60.9
Administrative burden	-26.2	6.1	16.7	-12.0	37.6	38.0	54.5
Autonomy	-50.0	-29.2	-18.4	-12.5	13.2	29.3	24.3
Facilities	-55.1	-16.3	15.4	17.4	33.6	63.8	78.4
Working with leading scientist	-66.7	4.9	52.6	29.2	52.1	83.9	84.2
Research funding	-51.2	-19.6	-10.8	-20.8	41.5	54.9	72.2
Teaching	-8.1	-18.6	-2.9	-34.8	28.8	53.1	51.5
Engagement with industry	-70.6	-5.5	10.5	16.3	27.9	59.0	64.2
Commercialisation of results	-71.4	-4.3	21.1	21.4	20.6	56.1	59.3
Industry	-69.8	-6.7	0.0	11.1	35.2	61.9	69.2
Mobility	-66.3	-11.6	-8.6	12.0	47.3	72.0	72.7
Position	-79.5	-26.0	-17.9	-29.2	14.4	12.8	18.2
Remuneration	13.9	-22.2	33.8	10.7	9.0	38.4	50.9
Remuneration	-64.8	-47.4	28.2	-40.0	3.9	57.4	54.8
Social security	57.8	-2.5	51.4	28.0	16.7	33.3	51.7
Pension	48.2	4.9	65.7	64.0	6.8	23.7	44.0
Job security	11.6	-12.7	8.3	21.7	-2.1	14.6	39.3
Quality of life	16.7	-53.4	15.4	-20.0	19.9	63.0	64.9
Training	-41.2	11.4	51.4	20.8	36.2	60.4	63.9
Political situation	-	-	-	-	-0.8	45.8	67.7

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 education and training. At a detailed level (table above) there are also slightly positive shares for administrative burden, working with leading scientists and pension plan.

The results for the US in the top panel (based on 91 respondents) are particularly striking, as all shares with the exception of "remuneration and other material factors" are negative, indicating that EU researchers working in the US right now perceive the US to be far better across the categories, including the quality of education and training. Among conditions for scientific knowledge production, a detailed look at all the categories (cf. Table 33 or Figure 131 and Figure 132 in the annex) 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 MORE3 EU HE survey and is also in line with existing research. This literature contains more anecdotal evidence from interviews with mobile researchers who are generally positive about the quality of undergraduate training and education in EU countries (bearing in mind EU heterogeneity), but who then find better working conditions for a 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).[102] It is also in line with several bibliometric studies on mobility and scientific performance, which both find asymmetric mobility of talented scientists to the US and better scientific performance at the aggregate level in nearly all scientific fields, even if there are of course excellent researcher groups in the EU.[103]

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. Within the group "remuneration and other material factors", the EU is perceived to be better than the US in social security, quality of life, job security and pension plan. This contrasts the very negative value in "remuneration", i.e. the US is perceived to pay much better salaries than EU countries.[104]

Again, this confirms the picture from the MORE3 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 reasons[105]. 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 8.3).

Turning asymmetric international mobility into symmetric mobility among researchers will hence require an improvement of factors which influence scientific productivity, such as attractive career paths, research funding and research autonomy, in addition to ensuring more generally the availability of suitable positions. Even if these factors could be improved quickly, it would 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, so that national programmes to attract senior researchers back to Europe may be limited in their effectiveness (cf. for example the FiDiPro Finland

[102] 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.

[103] 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.

[104] As the EU survey has shown, the results need to be interpreted against the background of substantial heterogeneity between EU Member States.

[105] 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.

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 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 which, in the US, is under pressure.[106] 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 (the BRICS and the other countries) in the top panel, 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. The EU is generally assessed as worse with regard to the attractiveness of career paths and the availability of positions. Researchers who are currently working in the BRICS see conditions for scientific knowledge production as better in the EU and mobility perspectives as worse in the EU, while it is the other way round for researchers currently working in other countries (non-EU non-OECD countries). 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 very different picture, in that the EU is perceived to be better than the non-EU countries of the OECD, with the exception of the political situation, where shares of "better" and "worse" are in the balance and, at the detailed level, job security. The share of researchers who see something as better in the EU is particularly high for working with leading scientists, research funding and mobility perspectives. The number of researchers who are currently working in the US is too small for consideration as a separate group.

In contrast with EU researchers who are currently working in the BRICS and in other countries, non-EU researchers currently working there and who have been to the EU in the past, perceive the EU to be better across all categories. They perceive the EU as being even "more" better than for researchers now working in non-EU OECD countries. This is plausible, as higher education institutions in economically advanced countries are likely to offer more attractive conditions for research.

Contrasting the two target groups by country of employment hence leads to a mixed picture for the perception of the attractiveness of the EU. If the EU wants to become a leading player in science, then the perception of the differences between the US and the EU clearly points to the need for further efforts at increasing the attractiveness of the EU. However, by comparison with researchers from non-EU OECD countries in total, the picture is more mixed, with EU researchers 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, with some exceptions among EU researchers abroad (research funding, facilities, autonomy, time balance teaching research).

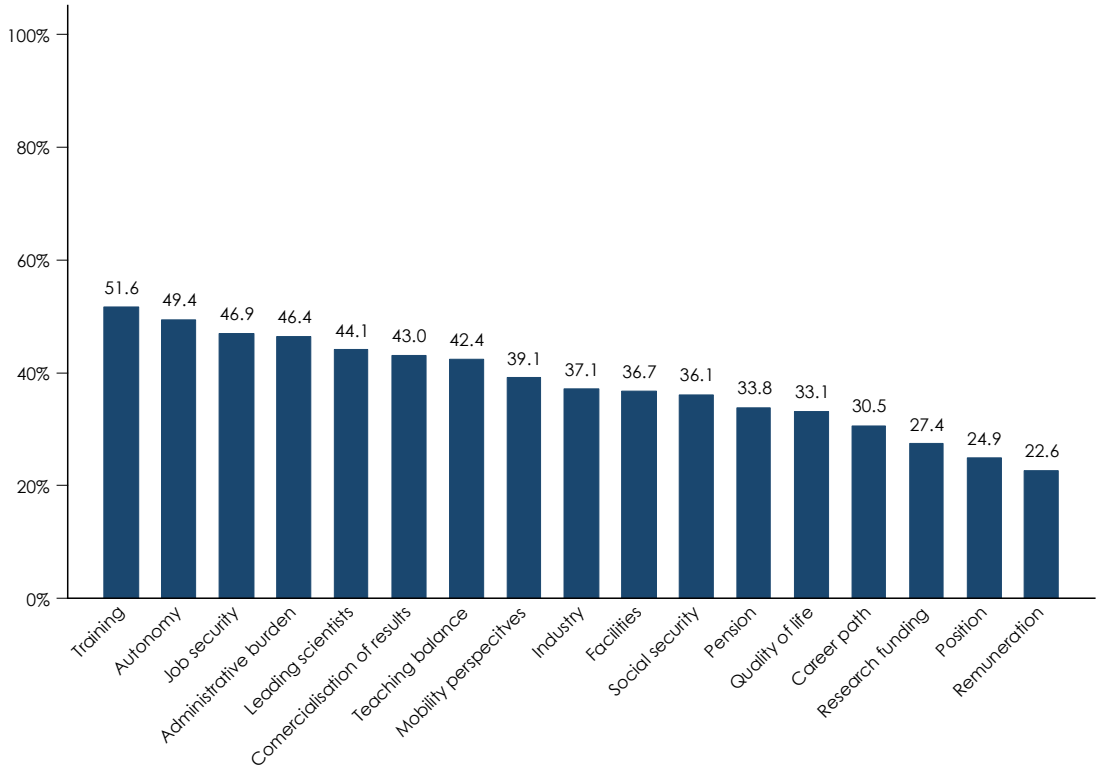
The figures above do not show the share of researchers who responded that similarities existed inside and outside the EU. For reference, the next two figures (Figure 109 and Figure 110) provide these shares across all countries of current employment for the EU researchers working abroad (TG1) and for non-EU researchers who worked in the EU in the past (TG2). The picture is similar as above though, in that similarity is perceived to

[106] See Stephan, P., The economics of science, 2012.

be low (i.e., a majority of respondents perceives conditions better or worse) among EU researchers for items such as remuneration, the availability of positions, research funding, the attractiveness of career paths (categories were the EU was perceived to be worse on balance). For items such as quality of life, pension plan and social security, the EU was perceived to be better on balance. For the quality of training and education, research autonomy, job security and the administrative burden, almost half of respondents indicate that they are similar between the EU and their current country of employment.

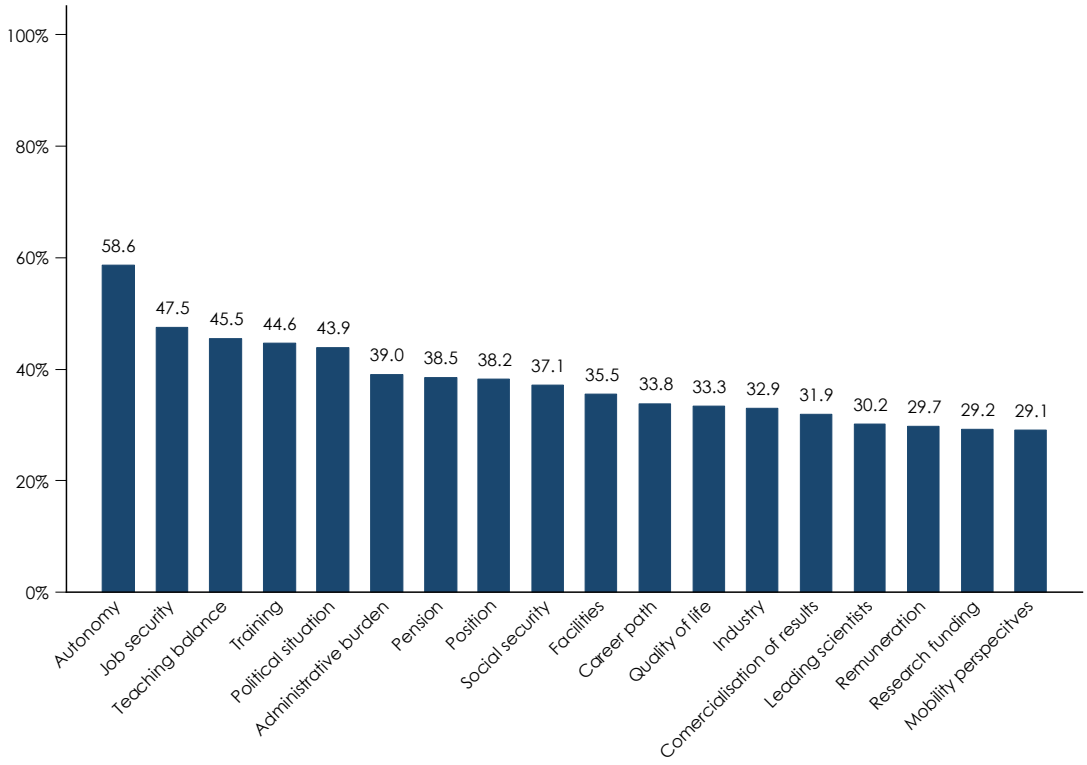
The perception of non-EU researchers having worked in the EU in the past (TG2) is diverse (low level of 'similar') also for research funding and remuneration, but in addition to mobility perspectives, the ease of collaborating with industry or commercialising research results and the quality of life. A high share of respondents finds research autonomy, job security and the quality of education and training similar, and in addition the balance between teaching and research.

Figure 91: Comparison between working outside the EU and working inside the EU as an EU researcher abroad, factors which were perceived as similar



Source: MORE3 Global survey (2017)
Notes:
- Only EU researchers who work outside the EU (TG1).
- Based on question 50: "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."
- (n= 230-408)

Figure 92: 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: MORE3 Global survey (2017)
Notes:
- Only non-EU researchers who have been mobile to the EU (TG2).
- Based on question 60: "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= 138-256)

8.3. Motives, barriers and effects

Motives for mobility indirectly shed light on attractiveness in a comparative perspective, particularly if mobility is not generally motivated by a lack of opportunity in the home country (cf. section 8.3.1.1). While motives for mobility reflect the expectations of a researcher towards the research system he or she is going to move to, effects of mobility mirror outcomes of the mobility experience and can be seen as a kind of reality check for the expectations associated with mobility, e.g. whether expectations are met by actual conditions for knowledge production. Finally, barriers to mobility are relevant when non-EU researchers would be interested in principle to move to the EU because they think that it is an attractive location for a research career, but various hurdles for mobility prevent them from doing so. This provides additional insight for policy-relevant analysis in terms of how to make it easier for non-EU researchers to come and work in the EU.

8.3.1. Motives

Both mobile EU (TG1) and non-EU researchers (TG2 and TG3) were questioned about the degree of freedom in their decision to become mobile and the factors that were perceived as drivers/motives for moving. Similar to the MORE3 EU HE survey, the MORE3 Global survey includes questions on their escape, expected and exchange mobility, their motives for mobility in general, the main motives for mobility per move (with or without changing employer). The results are discussed in more detail below.

8.3.1.1. Escape, expected and exchange mobility

Similar to the MORE3 HE survey, the Global survey directly asked mobile researchers about the degree of freedom they had in their decision to become mobile (for an overview of the definitions linked to the question in the MORE3 Global survey, see Table 34 below).

Table 34: Escape, expected and exchange mobility

- Escape mobility occurs when a researcher is 'pushed' away from his or her environment because of 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.
  - Felt forced to move because there were no options for a research career in home country;
  - Felt forced to move because international mobility is a requirement for career progression.
- The term expected mobility is used for those researchers for whom mobility is perceived as a 'natural' step in a research career but don't feel obliged to move.
  - Chose to move to improve working conditions;
  - 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.
  - Chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange.

About one third of the respondents (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). About 28% indicated that they felt forced to move (escape mobility) and 25% that they chose to move as a 'natural' step in a research career (expected mobility) (see Table 35). About 15% of the respondents indicated that 'another' situation was applicable to their decision to move. The majority of respondents (58%) did indicate that they chose to move.

Target group: EU researchers who currently work outside the EU (TG1) were specifically questioned about their decision to work outside the EU. 37% engaged in escape mobility, where the largest majority (33 percentage points) felt forced to move because there were no options for a research career in their home country. 22% of the mobility concerned expected mobility and 22% chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange (exchange mobility). From the results we derive that EU researchers work abroad much more because they had to do so in order to continue their career. By contrast, non-EU researchers came to the EU for networking and knowledge exchange, presumably then returning back to their old employer to continue their career there (see also section 7.1.1). Moves from a non-EU country to a non-EU country (TG3) are more characterised by a quest for improving working conditions.

The same question was asked to the non-EU researchers who have worked in the EU in the past (TG2) about this EU work experience. Half of the researchers indicated that they chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange (exchange mobility). About 14% felt forced to move to the EU (escape mobility) and 10% engaged in expected mobility.

Non-EU researchers who were mobile in the past but not towards the EU (TG3) most frequently engage in expected mobility (32%), followed by escape mobility (25%) and exchange mobility (25%).

Table 35: Escape, expected and exchange mobility

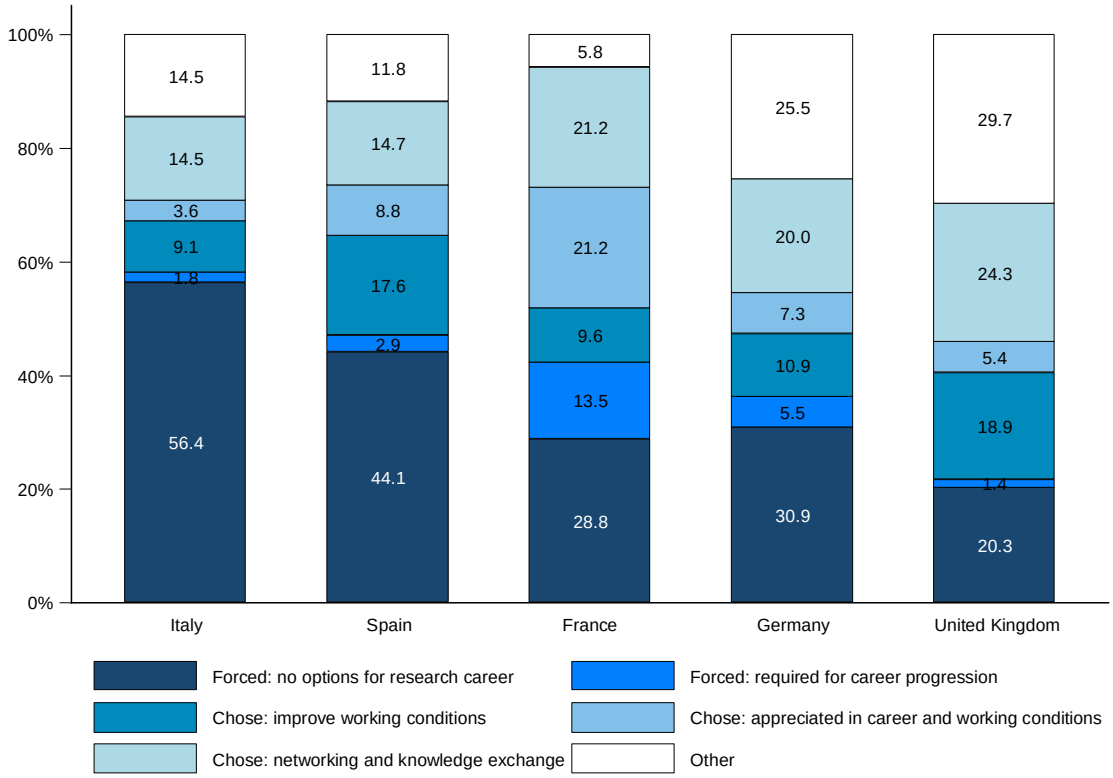
	Total	Move outside the EU TG1	Move to the EU TG2	Move to a non-EU country TG3
	N=777	N=461	N=263	N=53
Forced: no options for research career	22.4%	33.1%	6.1%	18.9%
Forced: required for career progression	5.6%	4.3%	7.6%	5.7%
Chose: improve working conditions	12.6%	12.5%	9.9%	26.4%
Chose: appreciated in career and working conditions	12.4%	9.8%	17.9%	5.7%
Chose: networking and knowledge exchange	32.6%	22.3%	50.6%	24.5%
Other	14.5%	18%	8%	18.9%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 49, 59 and 75: "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

Country of citizenship TG1: Figure 93 provides more insights on motives for mobility by country of citizenship. For TG1, only Italy, Spain, France, German and the United Kingdom are considered for this analysis, as the other countries have very low response rates. The results show that, among those countries, the highest shares of forced mobility of EU researchers who currently work outside the EU are found among the Italian and Spanish respondents (approx. 56% and 44%). The lowest share of forced mobility (approx. 20%) are observed amongst the UK researchers who currently work outside Europe. This is consistent with the analysis in the MORE3 EU Survey and other studies, which point to structural issues such as (lack of) available positions and funding in the Italian and Spanish research systems, and to the attractiveness of the UK system[107].

[107] See also Janger, J., Strauss, A., Campbell, D. „Academic careers: a cross-country perspective". WWWforEurope Working Paper Series 37 (2013).

Figure 93: Escape, expected and exchange mobility, by country of citizenship (TG1)

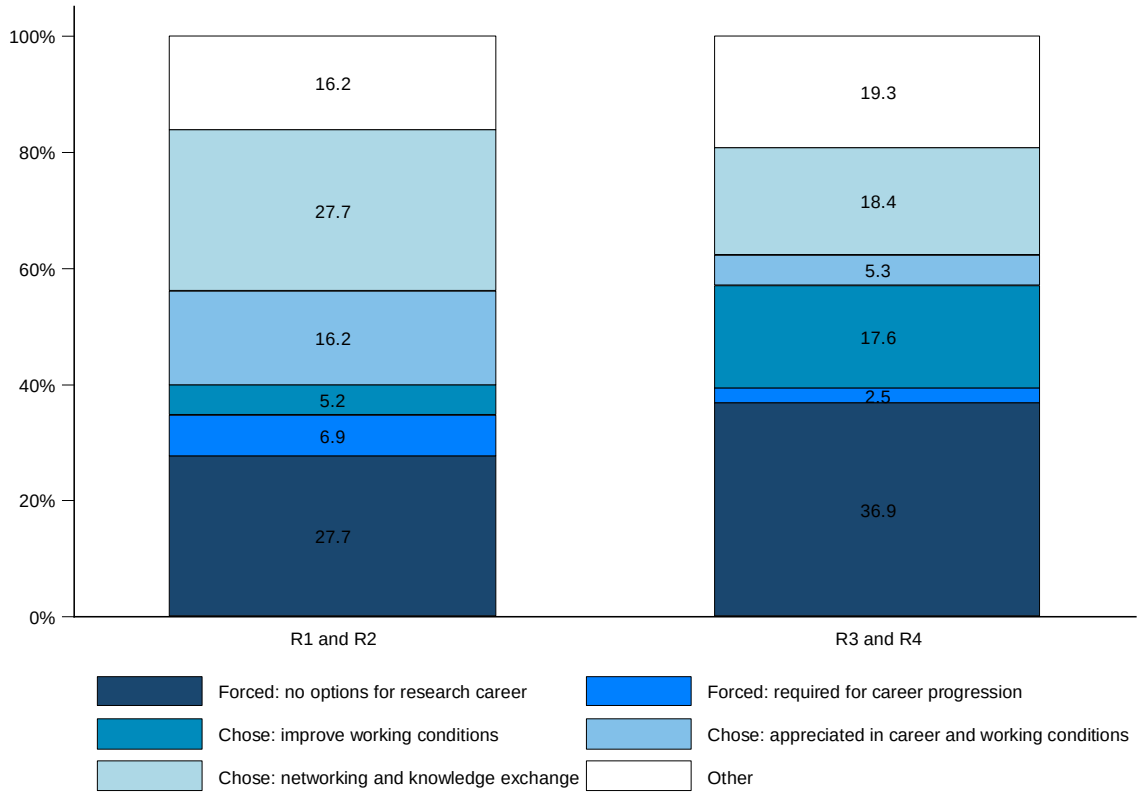


Source: MORE3 Global survey (2017)
Notes:

- Based on question 49: "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 observations are excluded.
- (n=270).

Career stage TG1: Figure 94 provides more insights in escape, expected and exchange mobility of EU researchers with respect to their move outside the EU. R3 and R4 researchers indicate more frequently than R1 and R2 researchers that in their decision to move/work outside the EU they felt forced. On the contrary, the choice to move outside the EU to improve working conditions is higher amongst R3 and R4 researchers.

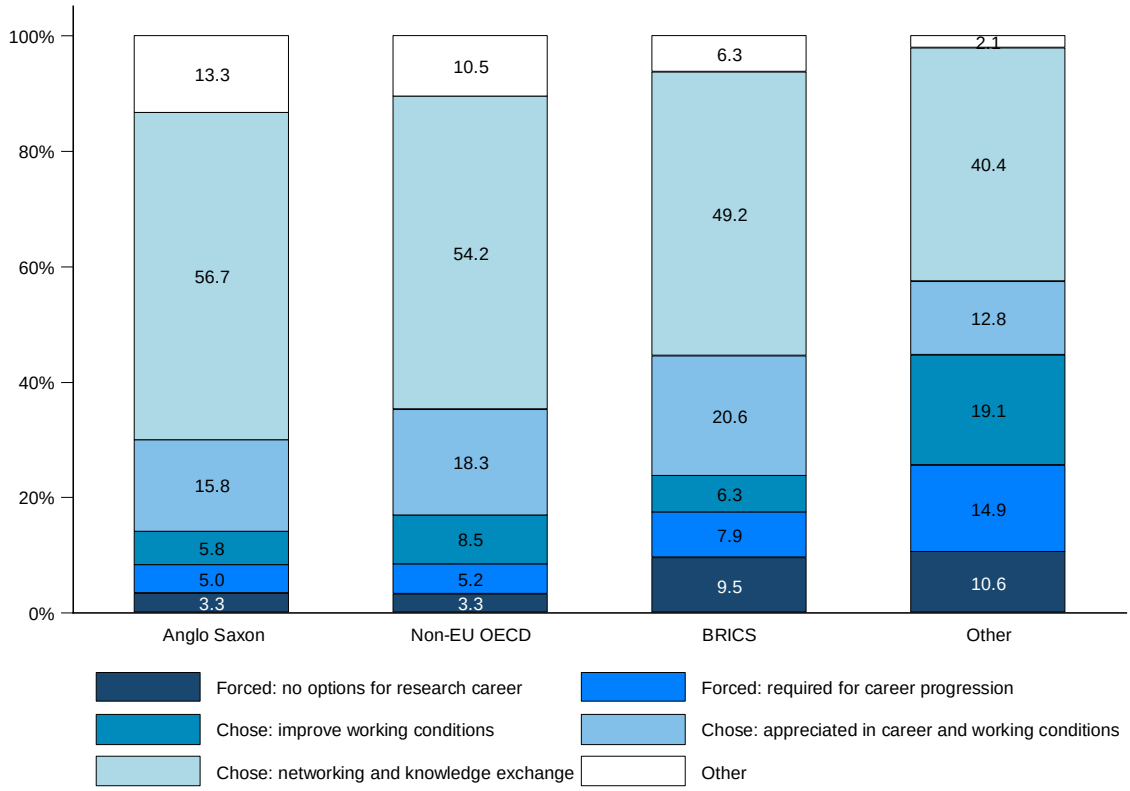
Figure 94: Escape, expected and exchange mobility, by careerstage



Source: MORE3 Global survey (2017)
Notes:
- Based on question 59: "Which of the following situation would you say is most applicable to your decision to move/work towards Europe and question 10 "In which carer 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.
- (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 the EU. The forced mobility amongst researchers from the Anglo-Saxon countries and non-EU OECD towards the EU is lower (less than 10%) compared to the forced mobility amongst researchers from BRICS-countries and others. The exchange mobility with respect to improving working conditions is highest amongst researchers from other countries (19%) and the exchange mobility for networking and knowledge exchange is highest amongst Anglo-Saxon researchers and researchers from non-EU OECD countries (respectively 57% and 54%).

Figure 95: Escape, expected and exchange mobility, by country of citizenship (TG2)



Source: MORE3 Global survey (2017)
Notes:
- Based on question 59: "Which of the following situation would you say is most applicable to your decision to move/work towards Europe.
- (n = 1,727)
- (Anglo-Saxon n = 120; Non-EU OECD n = 153 ; BRICS n = 63; Other n = 47)

8.3.1.2. Motives for > 3 month mobility: towards the EU and outside the EU

In this section, the importance of researchers' motives in their decision to move to/work outside the EU for TG1 and to move to/work in the EU in the past for TG2 will be presented. The table under Figure 96 shows the shares of researchers who identify each of the motives as being important for their move to respectively a non-EU country, an EU country, and a third country (other than their country of citizenship). Note that the MORE3 Global survey asked twice for motives: once the respondents could choose several motives out of a comprehensive list of motives, a second time they were asked to single out the main motive (this at the level of the last three moves done in the past ten years). This subsection presents the results from the first question and can be interpreted as indicating how frequent specific motives are for mobility. Career progression is overall perceived as the most frequent motive for mobility; this is in line with the results of the MORE3 EU HE survey and the results of the GlobSci survey (2012[108]) which indicate that opportunity to improve the future research career prospects is a frequent factor influencing emigration. It is also in line with the MORE2 evidence that

[108] C. Franzoni, G. Scellato, P. Stephan. Foreign Born Scientists: Mobility Patterns for Sixteen countries. Nature Biotechnology, 30(12): 1250-1253.

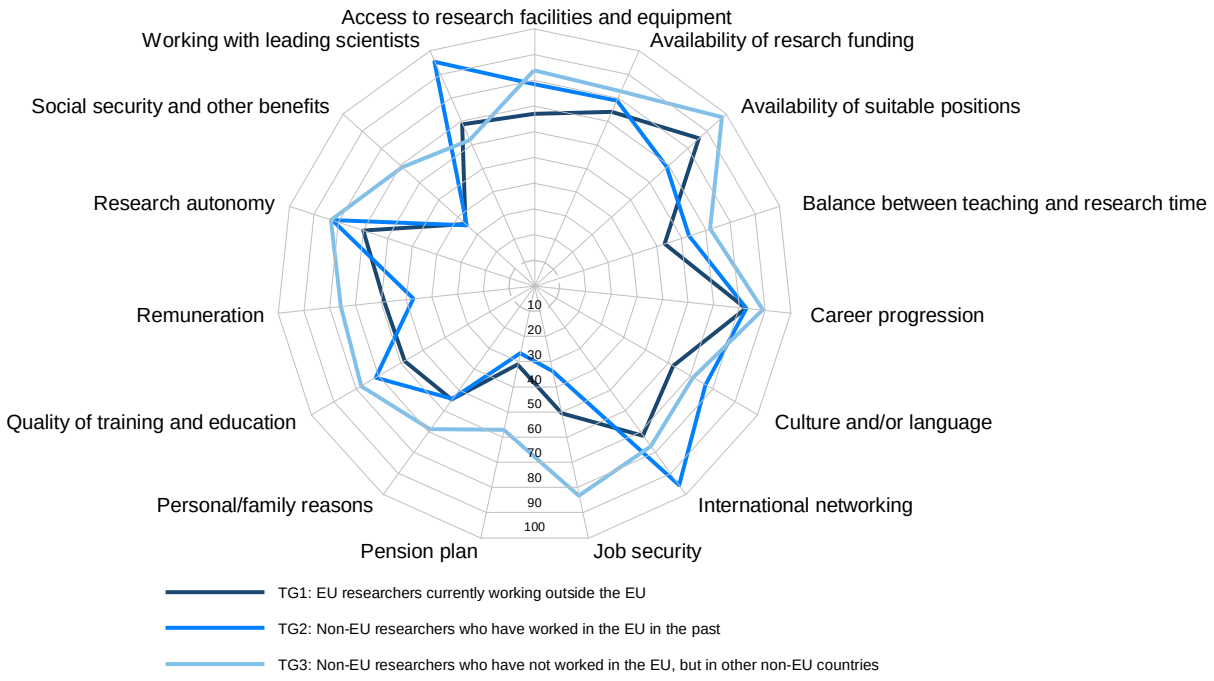
an attractive career path (a tenure-track position) is the most important factor for job choice among early stage researchers.[109]

The results indicate that the most frequent motives for EU researchers to move outside the EU are the availability of a suitable position (86%) and career progression (83%). The most frequent motives for non-EU researchers to move to the EU are working with leading scientists (95%) and career progression (83%).

Target groups: Both pension plan and social security and other benefits are perceived as least frequent factors in the researchers' decision to move outside the EU (TG1) and to the EU (TG2). Job security is also only rarely perceived as very important in the decision of non-EU researchers for their move towards the EU (34%)

For researchers who have worked abroad but not in the EU (TG3), their most frequent motive to move to the "third country" was availability of suitable positions (98%); career progression (89%); access to research and facilities (84%); availability of research funding (83%) and research autonomy (83%). Factors such as pension plan (58%), social security and other benefits (69%) and job security (83%) (which are perceived as less important by TG1 and TG2 researchers) are indicated less frequently as being more important for TG3 researchers.

Figure 96: Frequency of motives to move



[109] Janger, J., Nowotny, K. "Job choice in academia". Research Policy 45, Nr. 8 (Oktober 2016): 1672–83.

Motives	TG1: European working abroad Motives to work outside Europe N=461	TG2: Non-Europeans mobile to Europe Motives to work in Europe in the past N=263	TG3: Non-Europeans mobile, but not to Europe Motives to work outside Europe N=53
Access to research facilities and equipment	66.8%	78.3%	83.7%
Availability of research funding	74.1%	78.9%	82.6%
Availability of suitable positions	85.9%	69.2%	98%
Balance between teaching and research time	53.2%	63.1%	71.7%
Career progression	82.5%	82.7%	89.4%
Culture and/or language	62.2%	76.9%	71.1%
International networking	71.8%	95.7%	77.1%
Job security	50.7%	33.9%	83.3%
Pension plan	31.2%	26.7%	57.1%
Personal/family reasons	54.5%	54.3%	68.9%
Quality of training and education	58.2%	71.1%	77.8%
Remuneration	58.5%	47.2%	75.6%
Research autonomy	69.8%	82.6%	83%
Social security and other benefits	36%	35.3%	69%
Working with leading scientists	68.7%	95.2%	61.9%

Source: MORE3 Global survey (2017)
Notes:

- Based on question 48 "Were the following factors important in your decision to move/work outside Europe?"; question 58 "Were the following factors important in your decision to move/work in Europe in the past"?; question 74 "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.

Country of current employment: An overview of the motives for EU researchers to move/work outside the EU by country of current employment is provided in Table 36. The most frequent motives of EU researchers to move to Anglo-Saxon countries, non-EU OECD countries, BRICS countries and other countries are the availability of research funding (86%) and career progression (84%). Additional motives for moving to the US are working with leading scientists (89%); availability of research funding (87%); availability of research facilities and equipment (84%) and international networking (82%). The US stands out with respect to factors influencing scientific knowledge production. Researchers move there to boost their career. It will be interesting to compare this to the effects of working in the US (section 8.3.3.). Interestingly, remuneration is not a main motive, although the US is said to provide very competitive salaries. This is in line with MORE2 evidence that researchers are willing to trade off salary against better conditions for research[110].

[110] Janger, J., Nowotny, K. "Job choice in academia". Research Policy 45, Nr. 8 (October 2016): 1672–83.

Table 36: Motives for moving/working outside the EU (TG1), by country

Motives	Anglo Saxon N=288	US N=91	Non-EU OECD N=350	BRICS N=40	Other N=27
Availability of suitable positions	86.3%	88.5%	86.2%	85.7%	81%
Career progression	83.5%	91.1%	81.6%	84.8%	91.3%
Availability of research funding	76%	87.2%	74.7%	74.3%	65%
International networking	71.9%	81.8%	71.5%	73.5%	73.9%
Research autonomy	72%	74.7%	69.1%	78.4%	65.2%
Working with leading scientists	73.8%	88.8%	72.3%	47.1%	47.6%
Access to research facilities and equipment	67.8%	83.7%	68.7%	63.9%	40%
Culture and/or language	60.1%	58.8%	62.1%	69.7%	52.2%
Remuneration	57.6%	56.6%	58.1%	60%	63.2%
Quality of training and education	63.3%	78.6%	60.6%	40.6%	50%
Personal/family reasons	50%	36.8%	53.1%	54.5%	73.9%
Balance between teaching and research time	53.4%	43.3%	52.5%	57.6%	55.6%
Job security	52%	50%	49.8%	60.6%	47.4%
Social security and other benefits	35.9%	32.1%	36.8%	31.3%	31.6%
Pension plan	32.1%	31.9%	32%	29%	22.2%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 48 "Where the following factors important in your decision to move/work outside Europe?"
- (n = 417)
- Green coloured cells indicate the items with the higher shares.
- Red coloured cells indicate the items that have the lowest shares.

Country of citizenship: An overview of the motives to move/work in the EU by country/region of citizenship is provided in Table 37. For researchers from each country group, their most frequent motives to move to the EU are international networking and working with leading scientists. For researchers from BRICS and other countries the access to research facilities and equipment (resp. 89% and 84%) is a frequently indicated motive. Career progression is a frequently indicated motive for researchers from non-EU OECD and other countries (resp. 82% and 92%). This picture is encouraging, as it means that non-EU researchers do come to the EU to improve their research output, as they are motivated by factors related to scientific knowledge production, in addition to driving factors such as job and social security which are more traditional EU advantages (see MORE3 EU HE Survey). An exception are researchers from other emerging or developing countries (group "Other" in the table below).

Table 37: Motives for moving/working in the EU (TG2), by country of citizenship

	Anglo-Saxon (n = 127)	Non-EU OECD (n = 164)	BRICS (n = 59)	Other (n = 40)
International networking	95.2%	95%	96.6%	97.4%
Working with leading scientists	91.6%	94.2%	98.3%	94.9%
Career progression	76.6%	81.7%	79.2%	91.7%
Research autonomy	79.3%	82.5%	81.5%	84.6%
Availability of research funding	71.2%	76.2%	83%	83.8%
Access to research facilities and equipment	68.8%	73.1%	88.7%	83.8%
Culture and/or language	73.5%	77.3%	77.4%	74.4%
Quality of training and education	57.8%	62.8%	78.6%	89.7%
Availability of suitable positions	74.3%	74.4%	53.1%	71.9%
Balance between teaching and research time	60%	66.1%	58.8%	58.1%
Personal/family reasons	61.7%	57.5%	50%	46.7%
Remuneration	44.6%	46.7%	41.9%	55.9%
Social security and other benefits	27.7%	31.9%	37.5%	45.2%
Job security	25.6%	32.4%	26.3%	50%
Pension plan	23.8%	25%	21.6%	40.7%
Political	9.2%	19.1%	25%	38.7%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 58 "Where the following factors important in your decision to move/work in Europe?"
- (n =263)
- Green coloured cells indicate the items with the higher shares.
- Red coloured cells indicate the items that have the lowest shares.

8.3.1.3. Motives for > 3 months mobility: main motives per move

Next to the question to indicate all motives for mobility towards the EU and outside the EU, the MORE3 Global survey also contained a question for researchers to indicate the main motive for each of the international > 3 months moves, as outlined above, to single out one main motive. This forces respondents to identify the deciding factor for their mobility experience.

The top 3 of motives for > 3 months mobility constitutes working with leading scientists (28%), career progression (12%) and international networking (11%). The three least common motives are job security (1%), remuneration (1%) and balance between teaching and research time (1%). No large differences are observed between EU moves and non-EU moves. Working with leading scientists and access to research facilities and equipment are slightly more important for EU moves than for non-EU moves (approx. 4 percentage points difference). Again, this is consistent with earlier evidence that people move because of career reasons, because they want to improve their conditions for research (for knowledge production), and much less for non-research related issues such as remuneration or quality of life[111].

[111] C. Franzoni, G. Scellato and P. Stephan. Foreign-born scientists: mobility patterns for 16 countries. Nature biotechnology, 30(12): 1250-1253, 2012); Janger, J., Nowotny, K. „Job choice in academia". Research Policy 45, Nr. 8 (October 2016): 1672–83.

Table 38: Importance of motives for > 3 month international mobility, main motive per move

	Total	EU-moves	Non-EU moves
	(n = 1,080)	(n = 556)	(n = 524)
Working with leading scientists	27.7%	29.5%	25.8%
Career progression	12.2%	11.3%	13.2%
International networking	10.6%	11.9%	9.4%
Research autonomy	7.9%	7.6%	8.2%
Availability of a suitable position	7.6%	6.8%	8.4%
Availability of research funding	7.5%	7.9%	7.1%
Access to research facilities and equipment	6.3%	8.3%	4.1%
Quality of training and education	4.5%	5.4%	3.6%
Personal/family reason	4.4%	3.4%	5.5%
Culture and/or language	2.0%	1.8%	2.3%
Balance between teaching and research time	1.3%	0.5%	2.1%
Remuneration	0.9%	0.2%	1.7%
Job security	0.7%	0.5%	1%

Source: MORE3 Global survey (2017)
Notes:
- Distribution of moves by target groups (n = 1,080)
- Based on question 45 "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

8.3.1.4. 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 employer change). Large differences can be observed for career progression and the availability of suitable positions, which are more important when engaging in a move with employer change (resp. 14 and 16 percentage points difference). 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 abroad) (Ackers, 2005)[112]. Working with leading scientists and international networking are more important motives for engaging in a move without employer change (22 percentage point difference).

In line with literature (e.g. Ackers, 2005), the results of the MORE3 Global survey do not indicate employer mobility (in research) to achieve greater economic rewards: The survey results indicate that remuneration is even less the main motive for a particular move with employer change than for a move without employer change.

[112] Ackers, L. (2005). Moving people and knowledge: scientific mobility in the European Unkion. Internatnioal migration, vol 45 (5), pp 99.-131.

Table 39: Importance of motives for > 3 month international mobility, main motive per move

Share of moves for which the motive was indicated as the main one			
	Total	No employer change	Employer change
	(n = 1,080)	(n = 689)	(n = 391)
Career progression	27.7%	7.1%	21.2%
Availability of a suitable position	12.2%	1.9%	17.6%
Working with leading scientists	10.6%	35.7%	13.6%
Personal/family reason	7.9%	1.6%	9.5%
Availability of research funding	7.6%	7.1%	8.2%
Quality of training and education	7.5%	3.2%	6.9%
Research autonomy	6.3%	9%	5.9%
International networking	4.5%	13.5%	5.6%
Access to research facilities and equipment	4.4%	8.7%	2%
Culture and/or language	2.0%	2%	2%
Job security	1.3%	0.3%	1.5%
Balance between teaching and research time	0.9%	1.3%	1.3%
Remuneration	0.7%	1.2%	0.5%

Source: MORE3 Global survey (2017)
Notes:
- Distribution of moves by target groups (n = 1,080)
- Based on question 45 "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

Destination: Distinguishing between EU and non-EU moves with employer change does not reveal a lot of differences (Table 40). Quality of training and education (5.4 percentage points) and international networking (4.6 percentage points) are slightly more frequently indicated as motives for EU moves than for non-EU moves, while research autonomy is slightly more frequently indicated as important for non-EU moves versus EU moves (4.6 percentage points).

Table 40: Importance of motives for > 3 month international mobility, main motive per move for moves with employer change

Share of moves for which the motive was indicated as the main one			
	Total	EU moves	Non-EU moves
	(n = 391)	(n = 171)	(n = 220)
Career progression	21.2%	21.1%	21.4%
Availability of a suitable position	17.6%	17.5%	17.7%
Working with leading scientists	13.6%	12.8%	14.1%
Personal/family reason	9.5%	7.6%	10.9%
Availability of research funding	8.2%	8.2%	8.2%
Quality of training and education	6.9%	9.9%	4.5%
Research autonomy	5.9%	3.5%	7.7%
International networking	5.6%	8.2%	3.6%
Access to research facilities and equipment	2%	3.5%	0.9%
Culture and/or language	2%	1.2%	2.7%
Job security	1.5%	0.6%	2.3%
Balance between teaching and research time	1.3%	1.2%	1.4%
Remuneration	0.5%	0	0.9%

Source: MORE3 Global survey (2017)
Notes:
- Distribution of moves by target groups (n = 391)
- Based on question 45 "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

8.3.2. Barriers for mobility

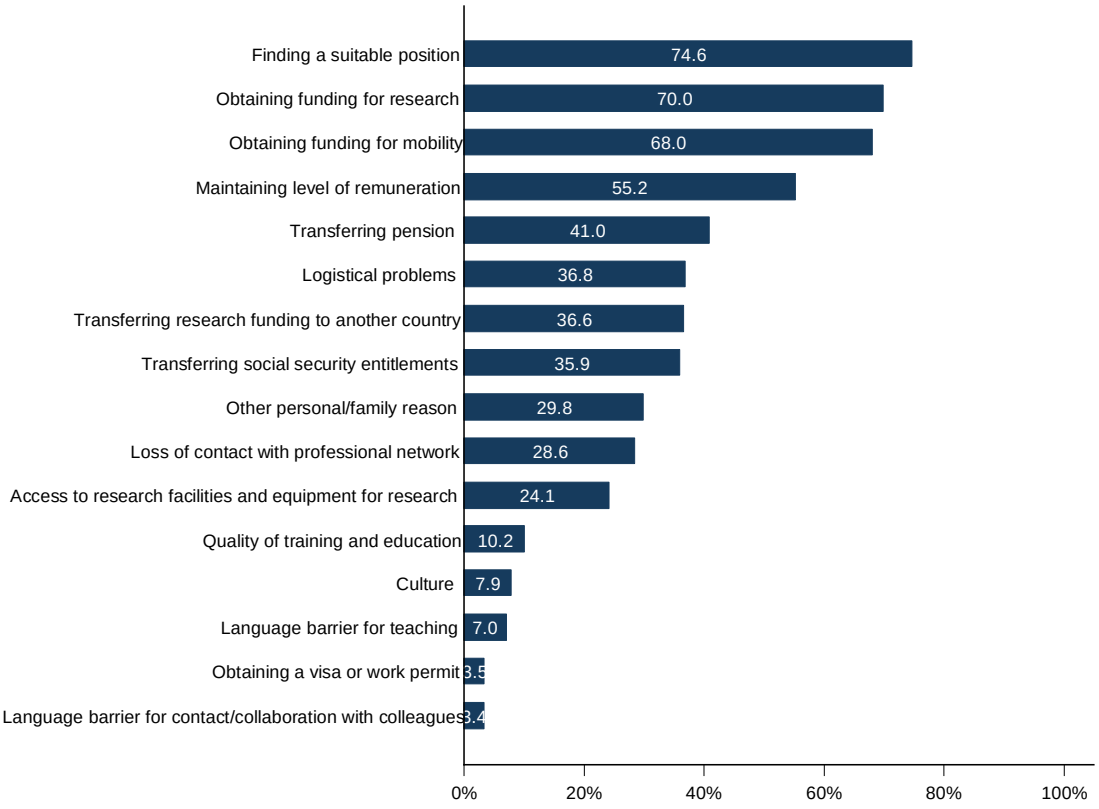
Both EU and non-EU researchers working in non-EU countries were questioned in the MORE3 Global survey about their willingness to return or to come to Europe and the factors that were perceived as hindering this move. The survey included questions on the barriers that have been experienced by those having come to Europe before or that are actively trying 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 are not currently trying).

8.3.2.1. Experienced barriers for mobility

63% of EU researchers working abroad claim not to be interested in moving back to Europe in the next 12 months. The rest of the researchers are divided between those that are considering a return to Europe (18%) and those that are undecided (19%).

Among those that are considering a return to Europe (TG1), the majority state that they have taken concrete steps to do so (77%). The main barriers that this group of researchers has found are job-related (Figure 97): 75% declare that they have experienced difficulties finding a suitable job position, 70% obtaining funding for research, and 68% obtaining funding for mobility.

Figure 97: Experienced difficulties in the efforts to come back to Europe for European researchers living abroad (TG1)



Source: MORE3 Global survey (2017)
Notes:
- Based on question 55 "Have you faced any of the following difficulties in your efforts to move back to Europe?"
- (n = 417)

Among the non-EU researchers that have worked in the EU before (TG2), the main difficulties experienced in that move to the EU seem to be different (Figure 98. For these researchers, the most frequent barriers are logistical problems (39%), transferring social security entitlements (36%) and transferring the pension (34%). Note that this group was much more engaged in exchange mobility and in international mobility without an employer change.

Figure 98: Experienced difficulties in the efforts to come back to Europe for non-European researchers having worked in Europe in the past (TG2)

Source: MORE3 Global survey (2017)
Notes:
- Based on question 62 "Have you faced any of the following difficulties in your move to Europe?
- (n = 263)

8.3.2.2. Expected hindering factors for mobility

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 or not having considered it at all.

Target groups: Figure 99 and Table 41 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 is the difficulty to obtain funding for research (80%), to transfer social security entitlements (78 %) and pensions (78%), and to find a suitable position (77%). Obtaining funding for research (82%) and for mobility (80%) are the most frequently mentioned barriers by the researchers that have never been mobile, but concerns about the difficulties of transferring social security entitlements (77%) and pensions (75%) are also widespread.

Figure 99: Expected difficulties to come to Europe for non-EU researchers who have never worked in Europe before

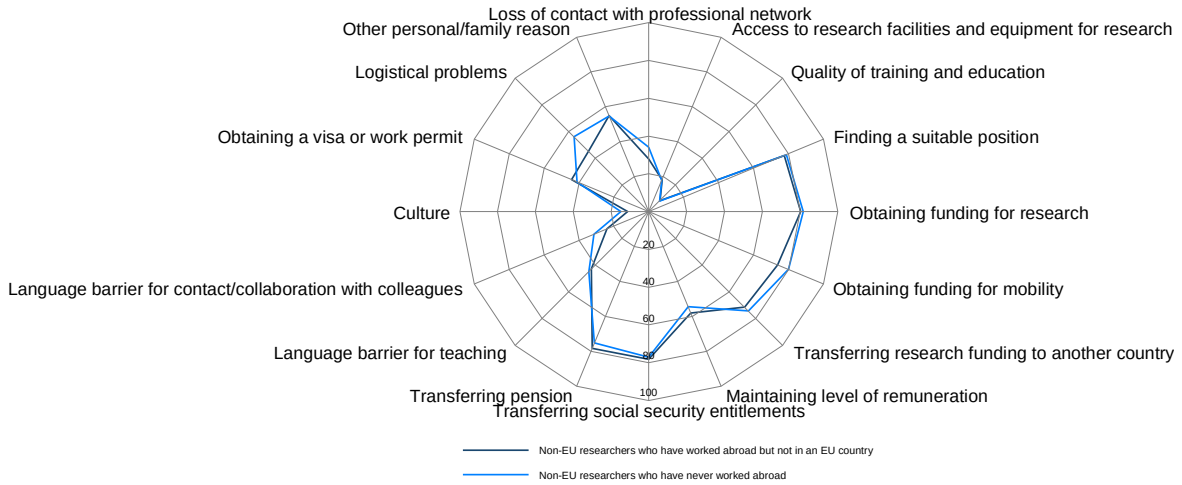


Table 41: Expected difficulties to come to Europe for non-EU researchers who have never worked in Europe before

	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
Obtaining funding for research	80.3%	81.8%
Transferring pension	78.3%	75.1%
Transferring social security entitlements	78.1%	77.1%
Finding a suitable position	77.4%	78.8%
Obtaining funding for mobility	73.7%	79.9%
Transferring research funding to another country	71.6%	74.5%
Maintaining level of remuneration	58.1%	54.5%
Other personal/family reason	55%	54.7%
Logistical problems	45.2%	56.0%
Obtaining a visa or work permit	44.2%	41.1%
Language barrier for teaching	42.9%	44.9%
Loss of contact with professional network	27.9%	34.2%
Language barrier for contact/collaboration with colleagues	24%	31.4%
Access to research facilities and equipment for research	18.2%	17.9%
Culture	11.3%	14.7%
Quality of training and education	8.4%	8%

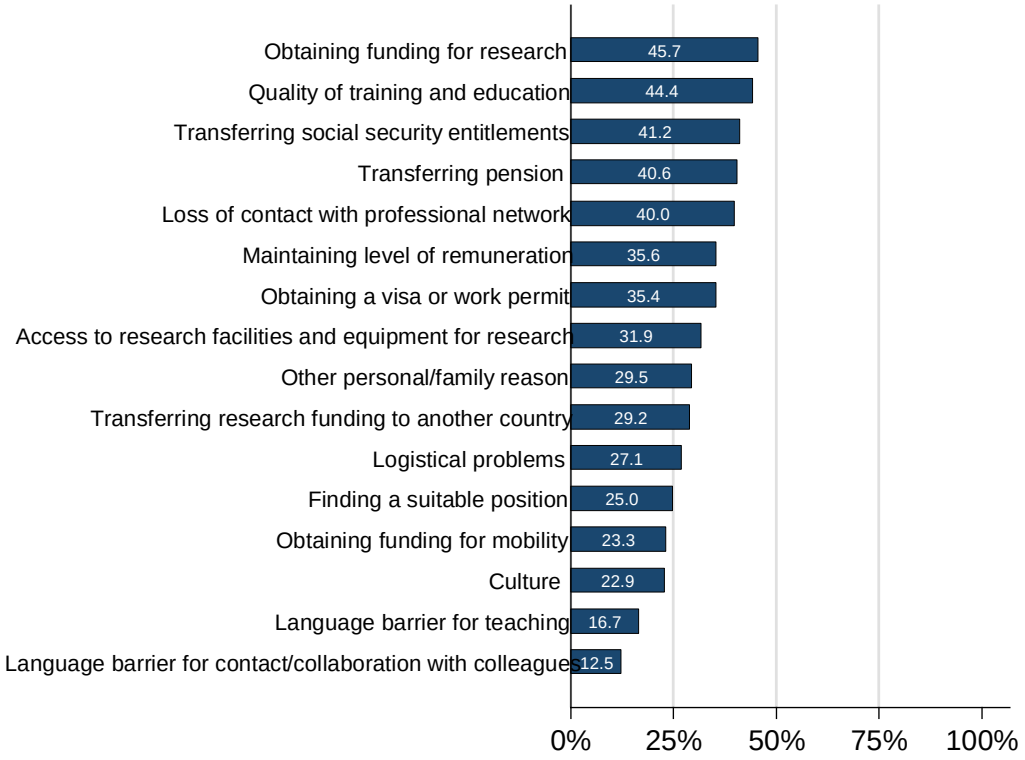
Source: MORE3 Global survey (2017)
Notes:
- Based on question 72 "Do you think it would be easy or difficult to deal with the following factors if you would like to work in Europe in the future?"
- (n = 178; n = 869)

8.3.2.3. 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 MORE3 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.[113] Although the list of countries is very heterogeneous it is interesting to note that most of the researchers working in these countries declare that they are willing to stay or that they would have liked to stay in the country (89%).

Figure 100 illustrates the main barriers experienced by these researchers in their move to the selected countries. Except for the quality of training and education (44%), the other three most frequently mentioned barriers coincide with the most frequently found barriers for researchers moving or having moved to Europe. These barriers are: the difficulties to obtain funding for research (46%) and to transfer social security entitlements (41%) and pensions (41%). The number of responses to the individual countries is too low to perform a more detailed cross-country comparison.

Figure 100: Experienced barriers to move to selected countries



Source: MORE3 Global survey (2017)
Notes:
- Based on question 77 "Have you faced any of the following difficulties in your move to?"
- (n = 53)

[113] Brazil, Singapore, Turkey, Canada, Malaysia, Israel, China, Indonesia, India, Thailand, Japan, United States, Australia, New Zealand, Argentina, Chili, Mexico, and South Africa.

8.3.3. Effects of mobility

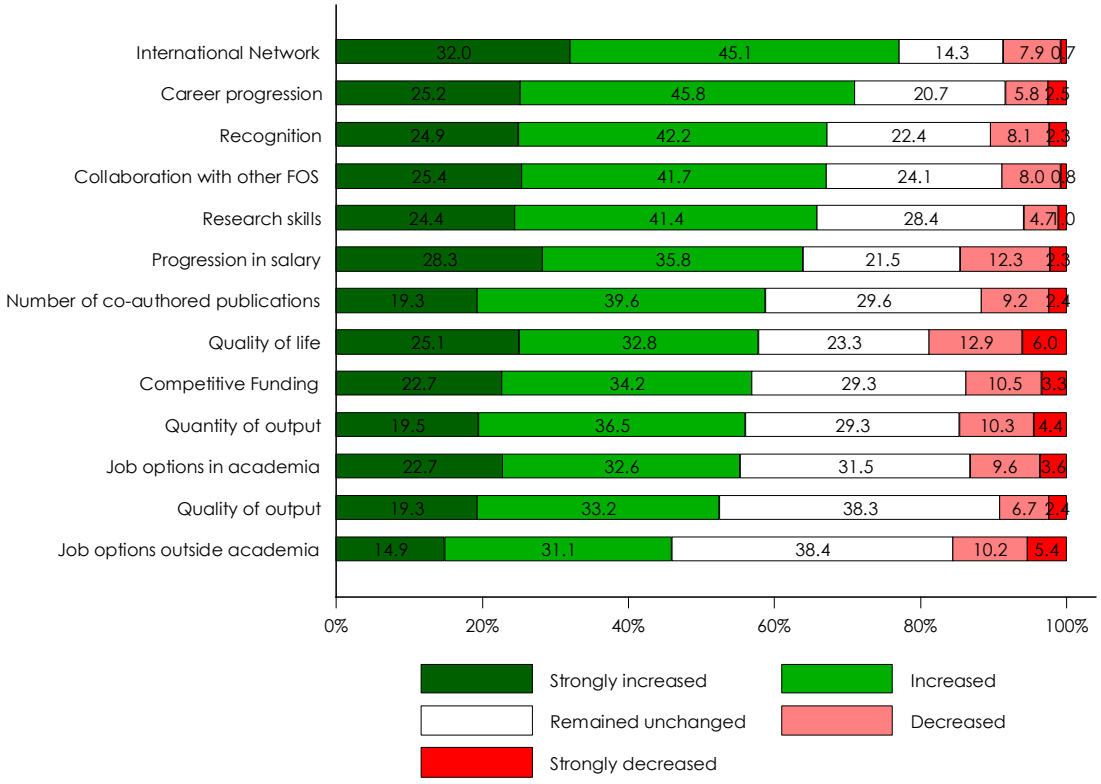
The next subsection shows effects of mobility, or rather stays abroad, for the group of EU researchers currently working outside Europe (TG1), the group of non-EU researchers who worked in the EU in the past (TG2) and the group of non-EU researchers who worked in a different country than their current country of employment, but not in the EU (TG3).

Effects were asked along a variety of categories, including scientific output (quality and quantity of publications); co-authored publications; more input-related items such as ability to obtain research funding; gaining advanced research skills; interdisciplinary collaboration; network 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.

8.3.3.1. EU researchers abroad (TG1)

Overall, for EU researchers abroad (TG1), a majority has experienced positive effects in all of these categories, with the most negative effect being quality of life for 19% of respondents (Figure 101). Consistent with motivations for mobility (see section 8.3.1.2), the biggest effects are observed in terms of gaining an international network (77%) and recognition in the research community (67%) with overall career progression in between (71%). The effects of the stay abroad on scientific output or on job options was less marked, but still positive.

Figure 101: Effects of stay abroad for EU researchers



Source: MORE3 Global survey (2017)
Notes:
- Only EU researchers who work outside the EU (TG1).
- Based on question 51: "Please indicate below how your stay outside Europe has influenced the following factors"
- (n= 315-406)

Country of current employment: Grouped by current country of employment (Table 42), it is striking that across all categories, with the exception of quality of life, EU researchers who work in the US report much more increased effects than their counterparts in other countries. This indicates that the EU researchers in the US work in excellent research institutions. Differences with the effects reported from staying in other countries than the US are highest for obtaining competitive research funding, job options in and outside academia, quality of scientific output and recognition in the research community. This means that researchers who have been to or are in the US report that their stay in the US has led to higher research funding, better job options, higher scientific output and more recognition in the research community. Interestingly, for quality of life, the effects are unchanged in the US but more positive in other countries where EU researchers work. The effects of staying abroad hence confirm the results of the preceding direct comparison between research systems (section 8.2), where the US stood out by comparison with the EU, and confirms the research-related motives of moving to the US (section 8.3.1).

Table 42: Effects of stay abroad for EU researchers, grouped by country of employment

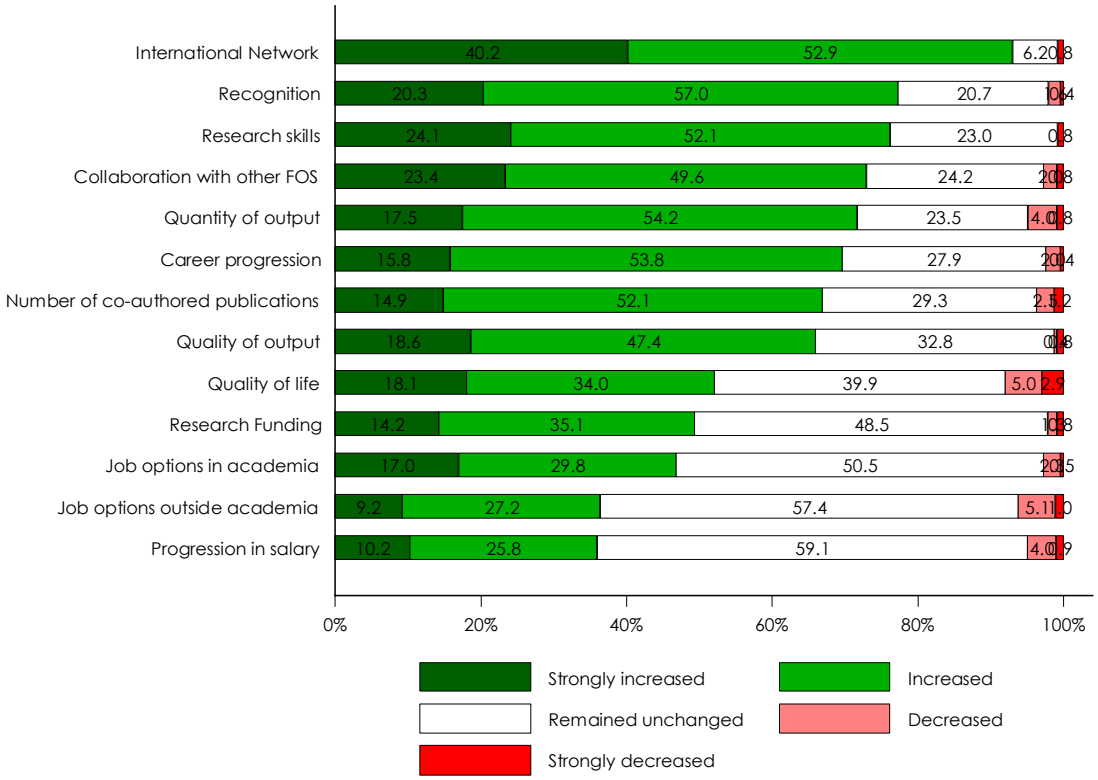
	Anglo Saxon	USA	Non-EU OECD	BRICS
Job options in academia	0.72	1.01	0.67	0.39
Career progression	0.97	1.16	0.91	0.60
Collaboration with other FOS	0.95	1.14	0.87	0.58
Competitive Funding	0.70	1.02	0.66	0.49
Number of co-authored publications	0.76	0.89	0.70	0.23
International Network	1.09	1.33	1.06	0.63
Job options outside academia	0.53	0.93	0.40	0.42
Quality of life	0.75	0.05	0.67	0.18
Quality of output	0.73	1.02	0.68	0.14
Quantity of output	0.69	0.79	0.60	0.31
Recognition	0.96	1.29	0.87	0.42
Research skills	0.96	1.20	0.91	0.36
Progression in salary	0.89	0.97	0.86	-0.03

Source: 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 51: "Please indicate below how your stay outside Europe has influenced the following factors"
- (n= 315-406)

8.3.3.2. 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 abroad, with overall fewer respondents indicating negative effects than with the group of EU researchers, but also with more effects where a majority of respondents perceived no change (job options and salary progression; Figure 102). Most strongly increased categories are similar to the group of EU researchers: network effects (international contacts and recognition in the research community), research skills and collaboration with other sub(fields) of research. By contrast, overall career progression has seen a more modest boost in comparison with the group of EU researchers. The categories that received overall 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, research funding and the quality of scientific output.

Figure 102: Effects of stay in the EU for non-EU researchers



Source: MORE3 Global survey (2017)
Notes:
- Only non-EU researchers who have been mobile to the EU.
- Based on question 61: "Please indicate below how your stay in Europe has influenced the following factors."
- (n= 195-259)

Country of current employment: Table 43 again differentiates respondents by their current country of employment. Overall, effects of a stay in Europe are mostly more positive for researchers who now work in emerging countries (BRICS or other countries). In terms of attractiveness of the EU, this can again be interpreted in the sense that researchers currently working in a BRICs country benefit more from a stay in the EU than those from advanced countries. Although it would also make sense to investigate effects by EU country of stay, there are too few observations for Northern and Eastern European countries and no significant differences between the non-EU researchers who stayed in a Southern or Western European country.

Table 43: Effects of stay abroad for non-EU researchers, grouped by current country of employment

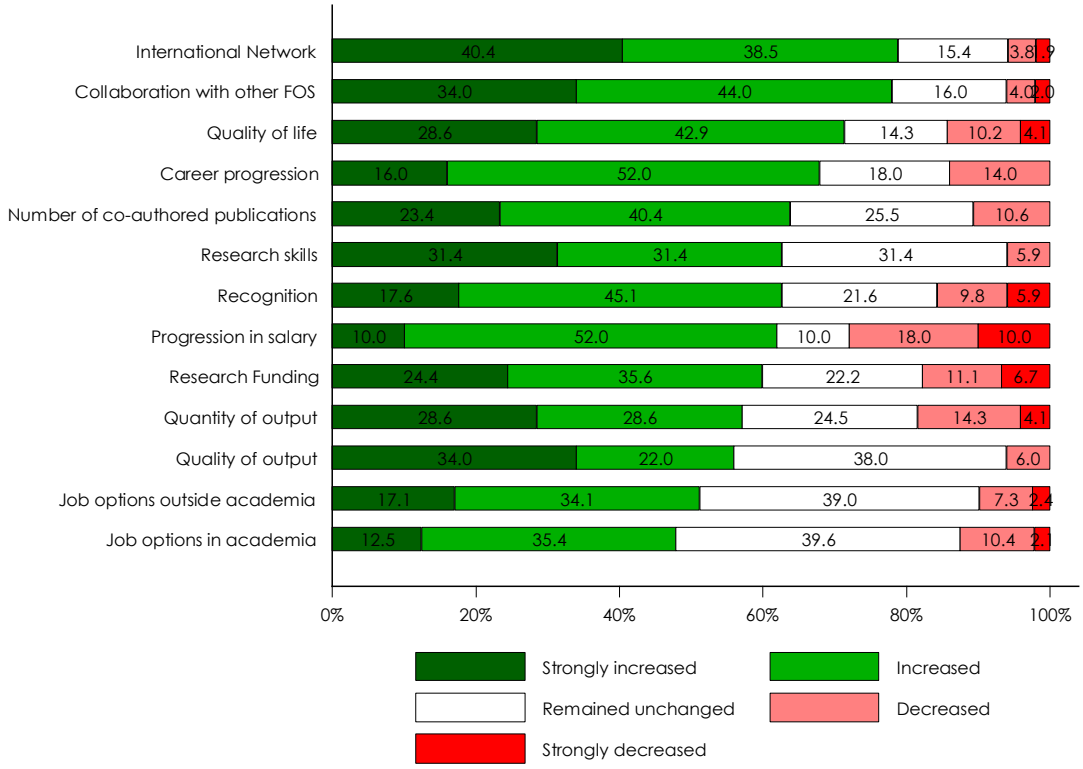
	Anglo Saxon	Non-EU OECD	BRICS	Other
Job options in academia	0.42	0.53	0.59	0.94
Career progression	0.68	0.77	0.85	1.03
Collaboration with other FOS	0.76	0.82	1.22	0.95
Number of co-authored publications	0.69	0.71	0.91	0.82
International Network	1.29	1.26	1.48	1.30
Job options outside academia	0.23	0.29	0.43	0.70
Quality of life	0.37	0.52	0.75	0.68
Quality of output	0.70	0.75	0.96	0.95
Quantity of output	0.74	0.77	0.98	0.89
Recognition	0.92	0.90	1.00	1.13
Research Funding	0.45	0.50	0.73	0.91
Research skills	0.84	0.90	1.18	1.10
Progression in salary	0.16	0.27	0.48	0.81

Source: 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 61: "Please indicate below how your stay in Europe has influenced the following factors."
- (n= 195-259)

8.3.3.3. Non-EU researchers who were mobile in a non-EU country (TG3)

Finally, we look at the group of non-EU researchers who were mobile for more than three months in a non-EU country (TG3). This is a smaller group of 53 respondents, so we present only Figure 103 with the total. Similar to other researcher groups and consistent with both motives of researchers (section 8.3.1) and the MORE3 EU HE survey, the biggest effects are observed for the network of international contacts and collaboration with other researchers, but also for overall career progression and quality of life. Job options and quantity or quality of output are again at the bottom of the effects most strongly affected by the stay abroad. While on average a majority of respondents reports increased effects, for this group of non-EU researchers there is a higher share of respondents reporting reduced effects, such as with respect to salary progression (28% report that the stay abroad has negatively influenced salary progression).

Figure 103: Effects of long-term stay in a non-EU country for non-EU researchers



Source: MORE3 Global survey (2017)
Notes:
- Only non-EU researchers who have been long-term mobile to a non-EU country.
- Based on question 76: "Please indicate below how your stay in … has influenced the following factors."
- (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 8.2, EU researchers who work in the US report higher effects across the board, with the exception of quality of life. By contrast, a stay in Europe affects more positively researchers currently working in less advanced countries.

8.4. Interest to work in Europe

8.4.1. European researchers (TG1): return mobility

Of the EU researchers who are currently working outside the EU, 20% indicated that they are interested to move back to the EU in the coming 12 months, and 18% indicated that they do not know.

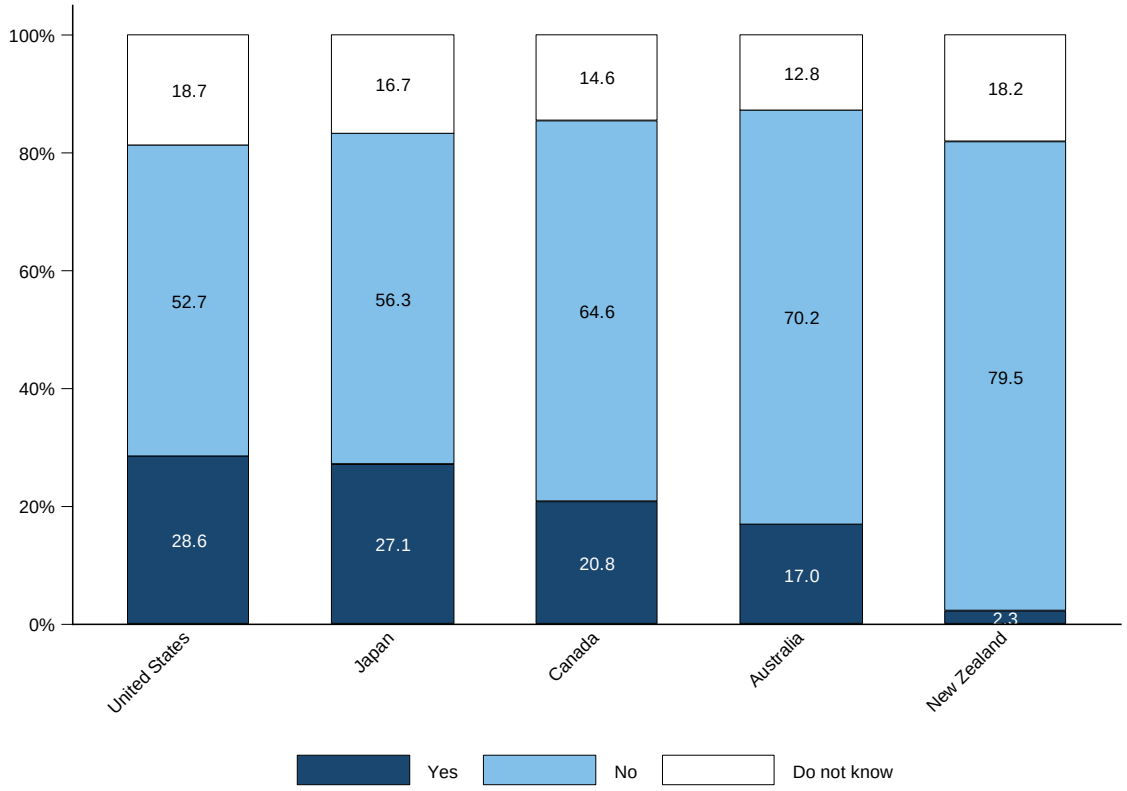
Career stage: Interest in moving back to the EU is highest amongst R1 (28%) and R2 (36%) as compared to R3 (11%) and R4 (10%) researchers. This is in line with other studies, which show that when researchers become established at an institution, they are

less likely to move.[114] 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 8.5).

Of the 20% of researchers who indicated that they are considering moving back to Europe in the coming 12 months, 79% (or 15 percentage points) have also undertaken concrete steps in order to return to Europe.

Country of current employment: Between 20% and 30% of the EU researchers currently located in United States, Japan and Canada indicated that they are considering moving back to the EU in the next 12 months (only countries with more than 30 observations are considered in the analysis).

Figure 104: Return mobility of EU researchers who currently work abroad, by country



Source: MORE3 Global survey (2017)
Notes:
- Based on question 53 "Are you considering moving back to Europe in the coming 12 months" and question 22 "What is your country of current employment".
- (n = 325).

Country of citizenship: When comparing UK, German, French and Italian researchers currently working outside the EU, we observe that UK researchers are the least inclined to return to the EU in the coming 12 months (7%) compared to Germany (26%), France (25%) and Italy (22%).

[114] E.g. Laudel, G., "Migration currents among the scientific elite", Minerva, 2005, 43(4), pp. 377–395.

Contract type: The share of EU researchers currently working outside the EU who are considering to move back to the EU in the coming 12 months is, not surprisingly, higher amongst the researchers with a fixed-term contract (28%) than the ones with a permanent/open contract (10%).

Motives for mobility: 20% of the EU researchers currently working outside the EU who felt forced to move indicated that they are considering to move back to the EU in the coming 12 months. The interest to return to the EU is lower amongst researchers who chose to move to improve their working conditions (8%) and higher for those who chose to move because international mobility – though not required – will be appreciated in their career and working conditions (34%) and for the opportunities international mobility offers in terms of networking and knowledge exchange (27%).

8.4.2. Non-EU researchers who have worked in the EU in the past (TG2): interest to work in Europe

Of the non-EU researchers who have worked in the EU in the past, 77% would have liked to stay in Europe as a researcher[115].

92% of the non-EU researchers who have worked in the EU in the past are interested in working in the EU in the future.[116] 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% would also recommend working in the EU as a researcher to other colleagues[117].

Career stage: Interest in working in the EU in the future is highest amongst first-stage researchers (R1) and lowest amongst leading researchers (R4), confirming the picture of a higher willingness to be mobile during early career stages.

Contract type: The share of non-EU researchers who have worked in the EU in the past and who are interested to work in the EU is slightly higher amongst the researchers with a fixed-term contract (94%) than the ones with a permanent/open contract (91%).

Motives for mobility: 97% of the non-EU researchers who worked in the EU in the past and who felt forced to move to the EU, indicated that they would be interested to work as a researchers in the EU 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. The interest to work in the EU is lower amongst researchers who indicated that they chose to move to the EU for opportunities international mobility offers in terms of networking and knowledge exchange (90%).

8.4.3. 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 working experience in the EU, 85% would be interested in working in Europe in the future[118]. Among the latter, four out of ten researchers (42%) have also recently investigated the possibility of working as a researcher in Europe[119].

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[115] Based on question 63 "Would you have liked to stay in Europe in as a researcher?"
[116] Based on question 66 "Would you be interested to work in Europe as a researcher in the future?"
[117] Based on question 67 "Would you recommend working as a researcher in Europe to other colleagues?"
[118] Based on question 70 "Would you be interested to work in Europe as a researcher in the future?"
[119] Based on question 71 "Have you recently investigated the possibility of working as a researcher in Europe?"

8.4.4. Non-EU researchers who have never worked abroad (TG4): interest to work in Europe

83% of the researchers that had been mobile over 10 years ago indicated that they would be interested to work in Europe as a researcher in the future[120]. In addition, 37% of the researchers who indicated that they would be interested in doing so have also recently investigated the possibility of working as a researcher in Europe[121].

Despite their lack of past mobility experiences, 89% of the non-mobile researchers indicated that they would be interested to work as a researcher in Europe in the future[122]. In addition, 37% of the researchers who indicated this interest have also recently investigated the possibility of working as a researcher in Europe[123]. Overall, this points in principle to high levels of interest in the EU 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 the EU as a researchers in the future amongst non-EU researchers who have never worked abroad (TG4) is highest amongst R1 and R2 researchers (93-94%) and lowest amongst R4 researchers (80%). R1 and R2 researchers also more frequently investigated the possibilities of working as a researcher in the EU (45% and 36%) compared to R4 researchers (24%).

8.5. Improving the attractiveness of the EU as a destination for researchers: policies

Improving the attractiveness of the EU as a destination for researchers hinges on many factors, as outlined in sections 8.1-8.3 and also in the report on the MORE3 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 overall attractive conditions for research, or scientific knowledge production, which make researchers choose the EU as a location for their research because it will foster their career and advance their research agenda. Among these 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 these 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.

8.5.1. 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 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

[120] Based on question 70 "Would you be interested to work in Europe as a researcher in the future?"
[121] Based on question 71 "Have you recently investigated the possibility of working as a researcher in Europe?"
[122] Based on question 70 "Would you be interested to work in Europe as a researcher in the future?"
[123] Based on question 71 "Have you recently investigated the possibility of working as a researcher in Europe?"

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 44 synthesises the various questions in the survey which the different researcher groups were asked on the role of the availability of positions and of (research and mobility) funding:

- as a main motive to move (section 1 in the table below);
- as an important factor in outward mobility decisions (section 2);
- as a barrier to mobility (back to Europe for the EU researchers, to the EU for the non-EU researchers) (section 3) and
- as a factor for leaving the EU (the non-EU researchers who were mobile to the EU) (section 4).

The evidence from the MORE3 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 do not exist, people interested in international mobility will struggle to become mobile; their main motivation to become mobile is however only in a minority of cases (12% for positions, 10% for funding; see section 1 of the table below) related to funding and the availability of positions. The main motivation across all groups is, rather, related to working with leading scientists, career progression as well as international networking (section 2in the table below) (see also section 8.3.1.4 on main motives of mobility).

The availability of funding and positions are thus major enablers as stated, as many researchers cite them as being among the most important factors for or barriers to mobility (section 3 Table 44). The exception to this pattern are non-EU researchers who were mobile to the EU (TG2) or other countries (TG3) (questions 62 and 77 in section 4) who were asked about their actual mobility. The low share of researchers that considers this a barrier in their mobility indicates that they had secured a position or funding before they came to the EU or the other countries, as is natural (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 issue (questions 55 and 56; note that question 56 concerns only 15 researchers for the two answering options funding). Mobility of TG2 researchers was also more related to exchange mobility and international mobility without employer change, where issues of funding and availability of positions play a much less important role. 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 44: Role played by the availability of positions and funding for mobility decision across the different researcher groups

	Availability of suitable position as a...		Availability of research funding as a...	
1	**...main motive for mobility** (Question 45)	11.6%	**...main motive for mobility** (Question 45)	9.9%
2	**...important decision factor for outward mobility**		**...important decision factor for outward mobility**	
	TG1 (Question 48)	85.9%	TG1 (Question 48)	74.1%
	TG2 (Question 58)	69.2%	TG2 (Question 58)	78.9%
	TG3 (Question 74)	98.0%	TG3 (Question 74)	82.6%
3	**...barrier to future mobility**		**...barrier to future mobility**	
	TG1 Moving back to Europe (Question 55)	74.6%	TG1 Moving back to Europe (Question 55 - Research funding)	70.0%
			TG1 Moving back to Europe (Question 55 - Mobility funding)	68.0%
	TG1 Moving back to Europe (Question 56)	100.0 %	TG1 Moving back to Europe (Question 56)	93.3%
	TG3 & TG4 Moving to Europe (Question 72)	57.2%	TG3 & TG4 Moving to Europe (Question 72 - Research funding)	55.2%
			TG3 & TG4 Moving to Europe (Question 72 - Mobility funding)	53.5%
4	**...barrier to past/actual mobility**		**...barrier to past/actual mobility**	
	TG2 Moving to Europe (Question 62)	23.9%	TG2 Moving to Europe (Question 62 - Research funding)	27.4%
			TG2 Moving to Europe (Question 62 - Mobility funding)	26.5%
	TG3 Moving to a non-EU Country (Question 77)	25.0%	TG3 Moving to a non-EU Country (Question 77 - Research funding)	45.7%
			TG3 Moving to a non-EU Country (Question 77 - Mobility funding)	23.3%
5			**...decision for leaving the EU** TG2 (Question 64)	19.0%

Source: MORE3 Global survey (2017)
Notes:
- Based on questions indicated in table.
- (n=15-1,023)

This implies that EU funding and Euraxess 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 8.2 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 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.

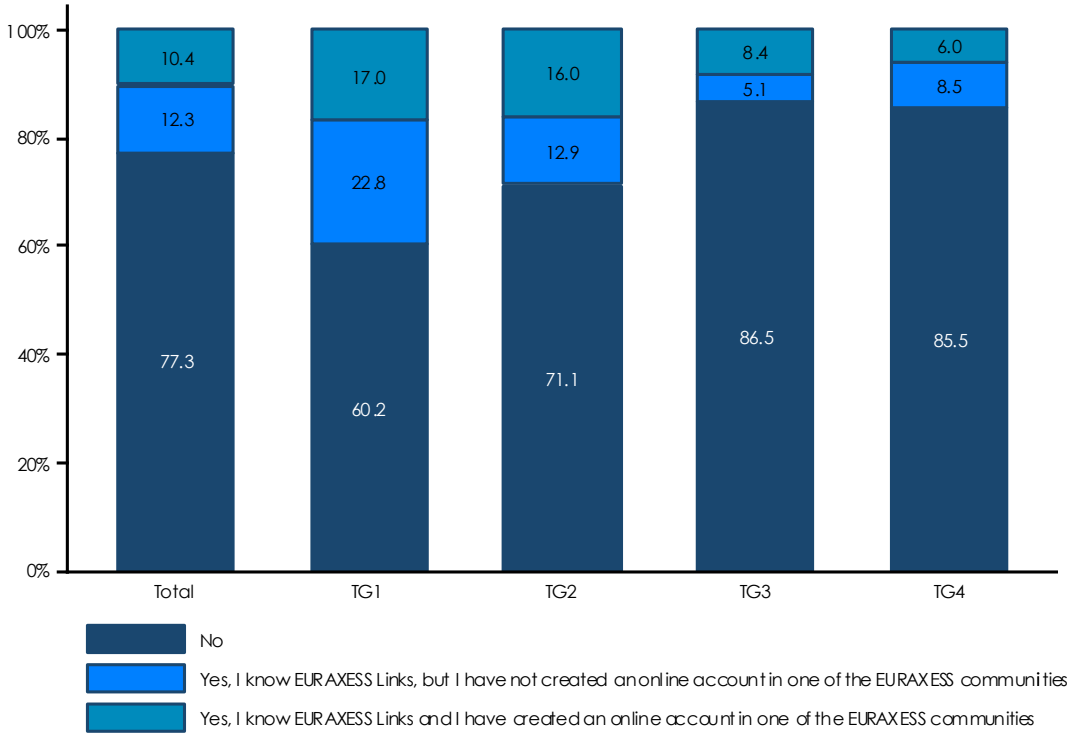
In the next section we will examine in detail the answers to the questions in the MORE3 Global survey on Euraxess and on EU funding, also relating awareness of Euraxess and knowledge of EU funding to the role that the availability of funding and positions plays for mobility decisions as evidenced above.

8.5.2. EU policies: Euraxess and (EU) funding

8.5.2.1. Awareness of Euraxess

Target groups: Figure 105 reports shares of researchers who know or don't know Euraxess Links, and among those who know Euraxess, whether they have created an online account or not. It clearly 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). Awareness of Euraxess reaches 29-40% of the researchers in these two groups. 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 much lower at around 14%. In total, Euraxess awareness is higher among researchers working outside Europe (23%) than working inside (see MORE3 EU HE survey, 16%), although the samples cannot readily be compared. Nevertheless, Euraxess seems to be known equally well among researchers working outside the EU as among researchers inside the EU.

Figure 105: Awareness of Euraxess across researcher groups

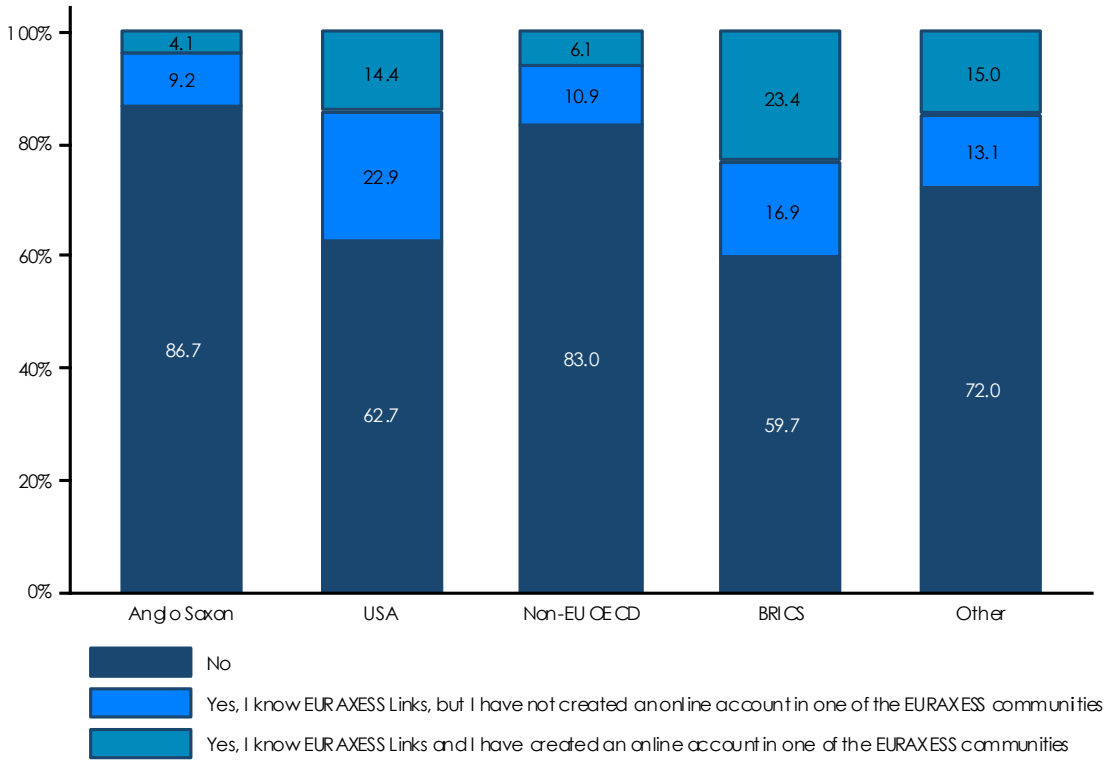


Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 81: "Do you know Euraxess Links?"

Country of current employment: Figure 106 shows that awareness of Euraxess Links is higher in the US, in the BRICS countries and in other countries. This may be because more EU or non-EU researchers who have been mobile to the EU are working there, but also because in some countries awareness of Euraxess Links is higher, e.g. in China the

awareness is 90% among the 30 respondents. This may be linked to the sampling strategy, as Euraxess Links officers were also invited to advertise and distribute the MORE3 Global survey. As it may be interesting for policy purposes, we provide the full list of countries with Euraxess Links awareness in the annex (Table 62).

Figure 106: Awareness of Euraxess by country of employment of researchers



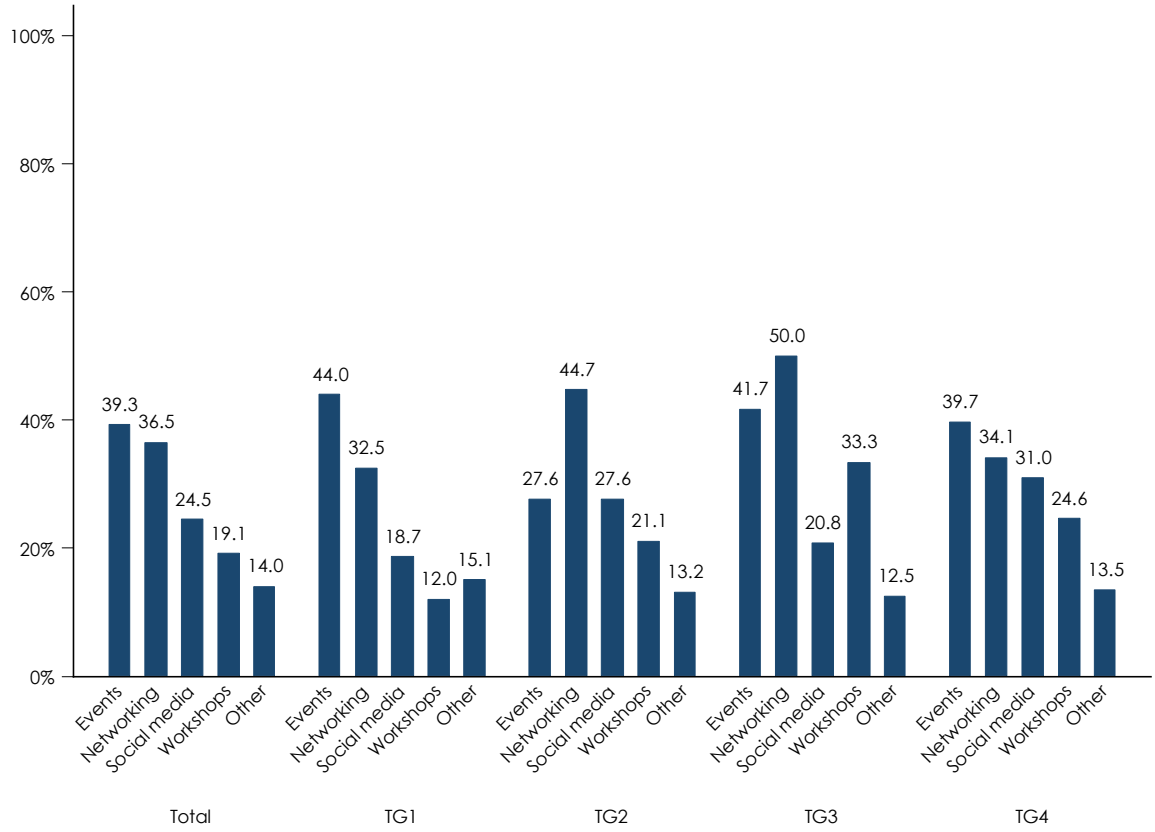
Source: MORE3 Global survey (2017)
Nots:
- Based on question 81: "Do you know Euraxess Links?"
- (n=1,727)

Figure 107 shows the mode by which researchers became aware of Euraxess Links, with the options events, networking, social media, workshops and other available.

Target groups: In total, events and networking dominate over social media and workshops, with the latter more prominent in the group of non-EU researchers who worked in a different non-EU country (TG3) and social media in the group of researchers who have never been mobile (TG4). Note that the number of respondents in TG3 is only 24.

Country of current employment: Grouped by country of employment, there are no major differences between e.g. the BRICS countries or the non-EU OECD countries.

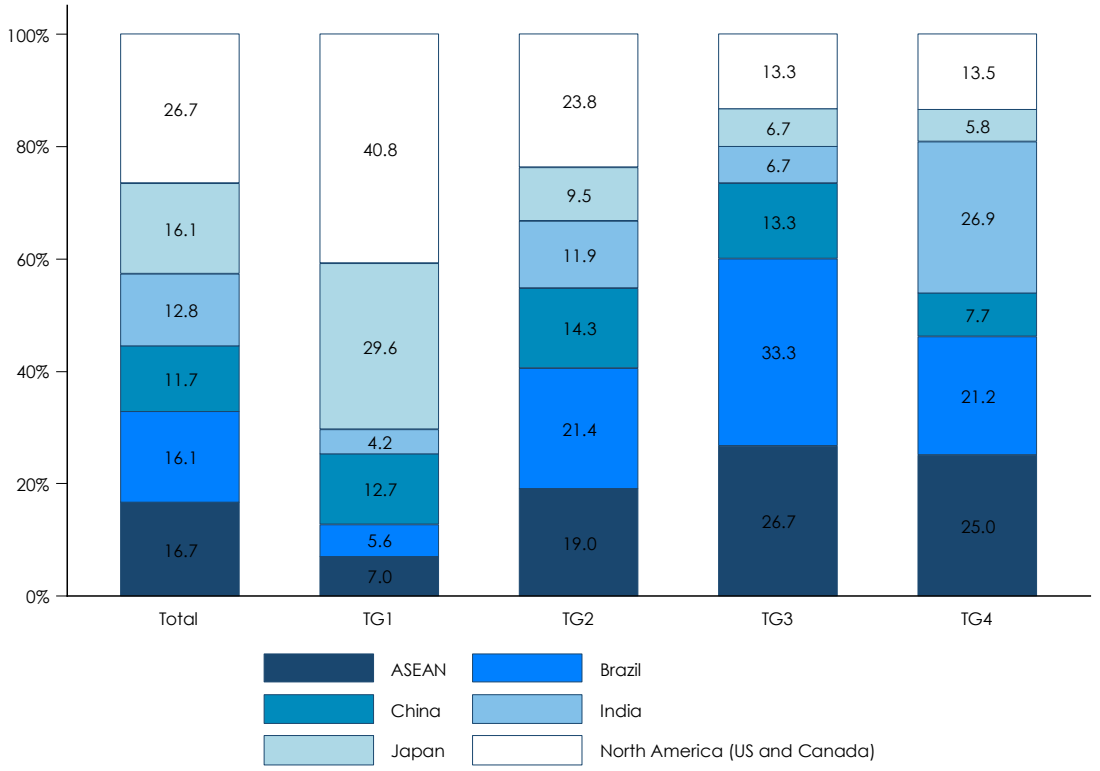
Figure 107: How researchers became aware of Euraxess Links



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=392)
- TG1: EU researchers currently working outside the EU (n=166)
- 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=24)
- TG4: Non-EU researchers who have never worked abroad (n=126)
- Based on question 82: "How did you get to know Euraxess Links?"

Among the researchers who did open a Euraxess online account, the most common geographical regions in our sample are North America (27%), Japan, Brazil and ASEAN (all similar at around 16%), as well as China and India (at about 12-13%).

Figure 108: How researchers became aware of Euraxess Links, by target group and geographic location



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=180)
- TG1: EU researchers currently working outside the EU (n=71)
- TG2: Non-EU researchers who have worked in the EU in the past (n=42)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=15)
- TG4: Non-EU researchers who have never worked abroad (n=52)
- Based on question 83: "In which Euraxess community have you created an online account?"

In terms of who actually used Euraxess Links, Table 45 indicates that very few researchers (39) actually applied for a position through a vacancy on the Euraxess website, at even much lower levels than reported for researchers working inside the EU (16%, although the samples are difficult to compare). Less than one quarter (9 researchers in the total sample) actually managed to obtain a position through this application.

Table 45: Use of Euraxess Links for applying for a position in % of total (left-hand panel), and in % of applications (right-hand panel)

	Applied for a position: (n = 1,727)		If you have applied: (n = 39)
	No	Yes	Obtained a position
TG1	96.9%	3.1%	7.7%
TG2	95.1%	4.9%	46.2%
TG3	97.2%	2.8%	20%
TG4	99.1%	0.9%	12.5%
Total	97.7%	2.3%	23.1%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 84: "Have you ever applied for a position through a vacancy on the Euraxess portal?" and question 85: "Have you ever obtained a position through a vacancy advertised on the Euraxess portal?"
- (n=1,727/39)

Table 46 shows shares of researchers who know about Euraxess Links by the role played by the availability of a position for funding (relating back to Table 44). If shares are higher than in Figure 105, Euraxess is better known among researchers who consider the availability of positions as important for outward or return mobility. We gather that the majority EU researchers that do consider moving back to Europe (60% vs 58%[124]) and that see the availability of a position as a barrier to mobility back to Europe (64% and 71%[125]) know about Euraxess Links. In general, awareness is much higher for those EU researchers considering to move back[126] at close to 60% than awareness among TG1 (40%). Awareness is also higher among TG2 researchers citing the availability of positions as important for mobility (e.g., in Figure 105 only 19% of TG2 researchers are aware of Euraxess, comparing with 32% in questions 58 and 62). 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 an important factor or barrier for mobility is about equal as in total TG3 at approx. 15%; so that there may be potential to increase the awareness for 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.

[124] Questions 53 and 54 in the MORE3 Global survey.
[125] Questions 55 and 56 in the MORE3 Global survey.
[126] Questions 53 and 54 in the MORE3 Global survey.

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 vs. awareness among all respondents

Availability of suitable position as a...		Awareness of Euraxess among all respondents (Question 81)
...main motive for mobility (Question 45)	26.8%	22.7%
...important decision factor for outward mobility		
TG 1 (Question 48)	42.5%	39.8%
TG 2 (Question 58)	32.4%	28.9%
TG 3 (Question 74)	14.6%	13.5%
...barrier to future mobility		
TG 1 (Question 55)	63.8%	39.8%
TG 1 (Question 56)	70.6%	39.8%
TG 3 & TG 4 (Question 72)	12.6%	
...barrier to past/actual mobility		
TG 2 (Question 62)	32.7%	28.9%
TG 3 (Question 77)	25.0%	13.5%
TG1: Considering moving back to Europe (Question 53)	60.2%	39.8%
TG1: Undertaken concrete steps in order to return to Europe (Question 54)	57.6%	39.8%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 81: "Do you know Euraxess Links?" and questions indicated in the table. Note that the cross-section of question 81 and 56 is only 17, of question 81 and 77 is only 12 respondents.
- (n=12-334)

8.5.2.2. Participation in and awareness of/interest in EU funding

In the next section, we turn to (research and mobility) funding. The first question in the MORE3 Global survey related to whether respondents obtained different types of funding, including EU funding (EU Framework Programme Funding or Horizon 2020, ERC or MSCA). Table 47 reveals that while a majority of researchers has obtained funding from national sources through a competitive process (by way of proposal) and a significant share has also received industry funding, the various EU funding instruments are much less frequently used. This is however not surprising, as by definition all of the researchers present in the figure work outside the EU.

The share of "no funding" in the group of researchers which was never internationally mobile (TG4) indicates that funding does play a role for mobility, either in that more able researchers may be better at obtaining funding for their research and move due to this funding, or in that funding is simply a pre-requisite for mobility.

Table 47: Types of funding obtained by researchers in the four groups

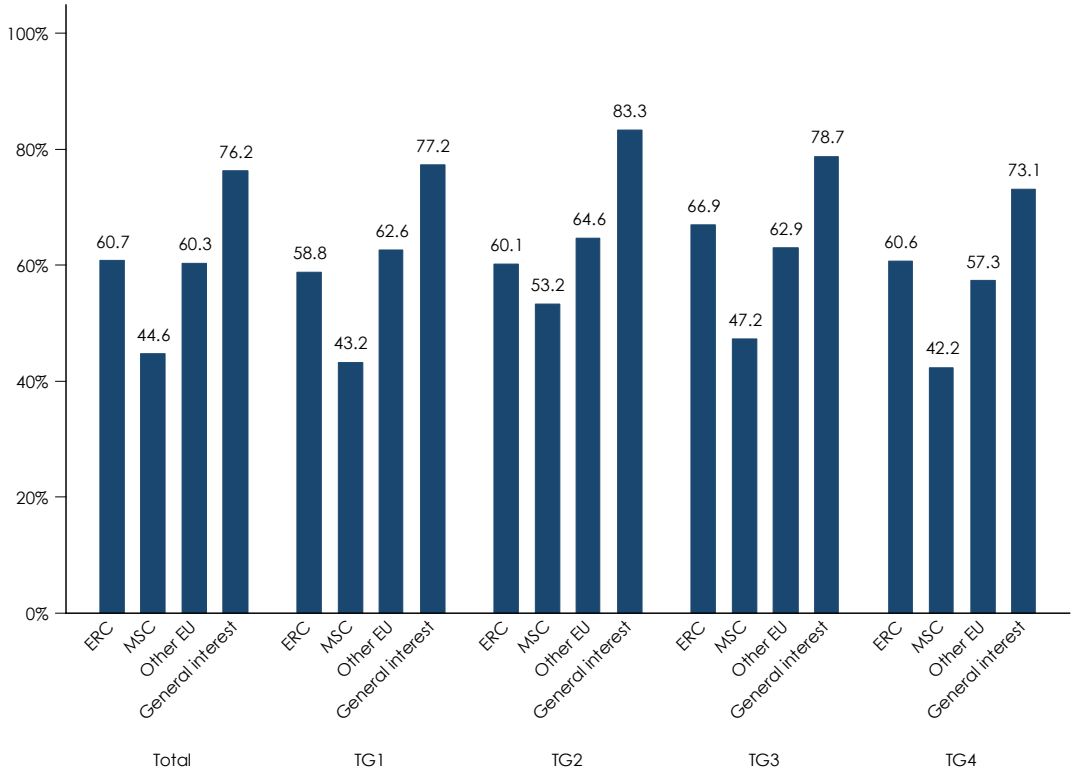
	ERC	Marie Sklodowska-Curie Action	Industry funding	National (public) competitive funding	Other EU funding (eg. H2020)	No funding
TG1	0.96	7.19	23.98	66.67	7.43	26.14
TG2	0.76	5.70	24.33	62.74	5.70	29.28
TG3	0.56	3.93	17.42	64.04	3.37	33.15
TG4	1.38	0.69	23.01	54.32	2.53	39.24
Total	1.10	3.36	22.87	59.58	4.28	33.93

Source: MORE3 Global survey (2017)
Notes:
- Based on question 86: "Have you obtained competitive funding for basic research from one or more of the following sources?"
- (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 instruments ERC and Horizon2020 or framework programme-type funding. General interest in EU funding is even higher at 76%.

Target groups: By group of researchers, interest is high even for the non-mobile (TG4), indicating the potential of EU funding to foster collaboration and mobility (as funding can in general only be obtained for non-EU researchers by collaboration with EU researchers).

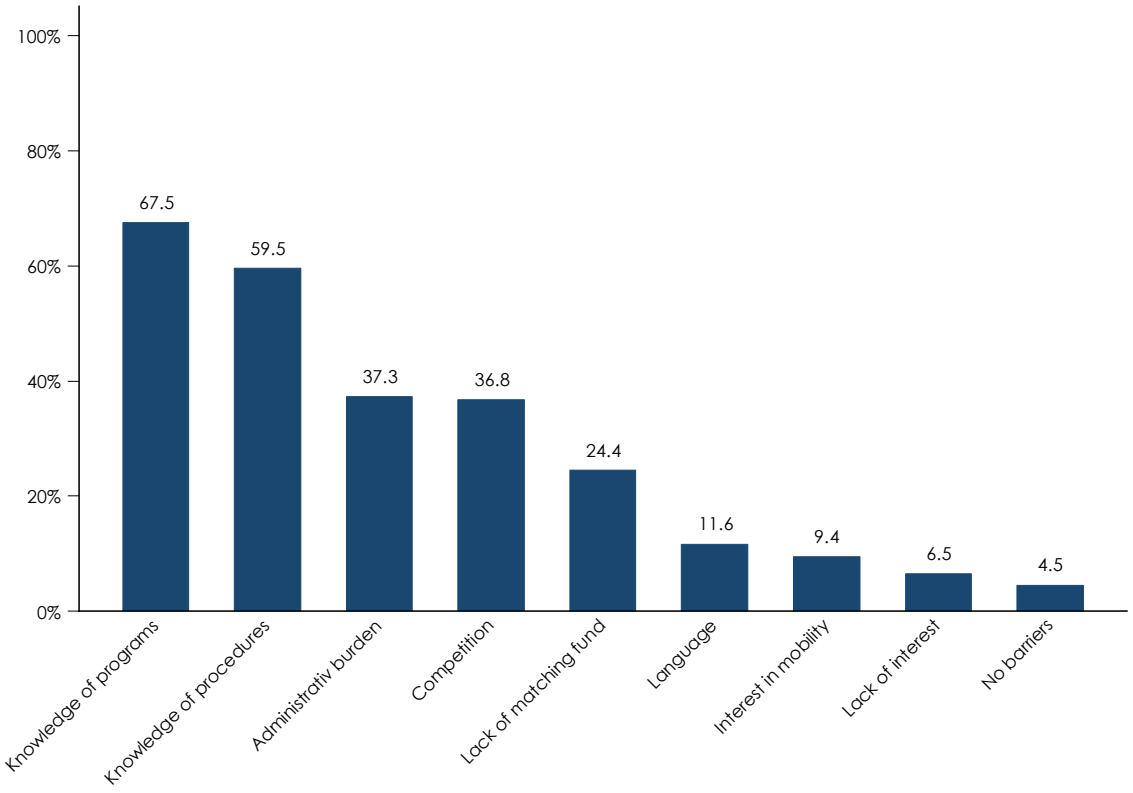
Figure 109: Interest in applying for EU funding across researcher groups



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n= 1,727)
- TG1: EU researchers currently working outside the EU (n= 417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 87: "Are you interested in applying for (other) EU funding in the future?

Given such high interest in applying for EU funding, the question of the most important barriers to accessing EU research funding is of particular relevance. Figure 110 shows that these barriers relate mainly to lack of knowledge about the instruments and the procedures for applying for EU funding. As a consequence – given that two thirds of respondents don't know about EU funding – the other barriers are much less relevant. These barriers could become more relevant if researchers knew more about funding opportunities and effectively tried applying for the funding.

Figure 110: Barriers for applying for EU funding



Source: MORE3 Global survey (2017)
Notes:
- Based on question 88: "What are the main barriers for applying for EU funding?
- (n=1,727)

Target groups: By groups of researchers, it is not surprising that researchers with EU exposure (TG1 and 2) are less likely to cite lack of knowledge of 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 burden much more as a barrier than the three other groups. By contrast, researchers who were never mobile (TG4) much more frequently cite language as being as a barrier than do the 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	37.3%	49.6%	38.8%	36.5%	31.1%
Competition	36.8%	39.3%	40.3%	33.1%	35.2%
Lack of interest to be mobile	9.4%	6.0%	5.3%	6.2%	13.0%
Lack of interest	6.5%	5.0%	3.4%	6.2%	8.2%
Lack of knowledge of programs	67.5%	58.8%	59.7%	77.5%	71.9%
Lack of knowledge of the procedure	59.5%	46.8%	53.6%	68%	65.7%
Lack of matching fund	24.4%	20.9%	26.2%	22.5%	26%
Language	11.6%	1.0%	6.8%	10.7%	18.3%
No barriers	4.5%	5.3%	5.3%	3.4%	4.0%

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 88: "What are the main barriers for applying for EU funding?

We now want to consider how this lack of knowledge about EU funding programmes relates to the importance of funding as a factor for or barrier to mobility (Table 44). This helps in understanding the potential role of EU instruments for overcoming barriers to mobility or increasing the attractiveness of the EU. 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. Among those who see funding as a main motive for moving, the lack of knowledge is indeed somewhat lower at 60% compared with lack of knowledge across all researchers (68%). Moreover, lack of knowledge is also somewhat lower in EU researchers intending or considering moving back to the EU (50 resp. 57% vs. 59%), as well as in non-EU researchers asked about a potential move to the EU (65 resp. 67% vs. 78 and 72%). Among non-EU researchers who indicated that lack of funding was a reason to leave the EU, the share of researchers with a lack of knowledge is lower by 6 percentage points than for group 2 in general.[127] However, the lack of knowledge is higher among non-EU researchers indicating that funding was a barrier to past or actual mobility.

Overall, these differences are lower than registered for the awareness of Euraxess Links (an instrument addressing the availability of positions, e.g. awareness of Euraxess Links among EU researchers indicating 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 is secured or when the position does not bring funding with it. This is supported by the analysis of barriers to mobility in section 8.3.2., where availability of positions is more often cited as a barrier.

[127] Note that questions 56 and 77 are based on 14, 10 and 21 respondents, so should be interpreted with care.

Table 49: Lack of knowledge of EU funding among researchers who indicated that funding was an important factor or barrier to mobility vs. lack of knowledge among all respondents

Availability of research funding as a...		Lack of knowledge of programs
...main motive for mobility (Question 45)	60.0%	67.5%
...important decision factor for outward mobility		
TG 1 (Question 48)	56.6%	58.8%
TG 2 (Question 58)	57.2%	59.7%
TG 3 (Question 74)	89.5%	77.5%
...barrier to future mobility		
TG 1 Moving back to Europe (Question 55 – Research funding)	48.6%	58.8%
TG 1 Moving back to Europe (Question 55 – Mobility funding)	50.0%	58.8%
TG 1 Moving back to Europe (Question 56)	57.1%	58.8%
TG 3 & TG 4 Moving to Europe (Question 72 – Research funding)	64.8%	77.5% resp. 71.9%
TG 3 & TG 4 Moving to Europe (Question 72 – Mobility funding)	67.3%	77.5% resp. 71.9%
...barrier to past/actual mobility		
TG 2 Moving to Europe (Question 62 – Research funding)	69.5%	59.7%
TG 2 Moving to Europe (Question 62 - Mobility funding)	69.0%	59.7%
TG 3 Moving to a non-EU Country (Question 77 - Research funding)	81.0%	77.5%
TG 3 Moving to a non-EU Country (Question 77 - Mobility funding)	100.0%	77.5%
...decision for leaving the EU		
TG 2 (Question 64)	54.0%	59.7%
TG1: Considering moving back to Europe (Question 53)	53.0%	67.5%
TG1: Undertaken concrete steps in order to return to Europe (Question 54)	53.0%	67.5%

Source: MORE3 Global survey (2017)
Notes:
- Based on question 88: "What are the main barriers for applying for EU funding?" and the questions indicated in the table.
- (n=10-281)
- Note that questions 56 and 77 are below 30 respondents, so should be interpreted with caution.

Overall, this analysis of EU funding and Euraxess Links as EU instruments to foster the attractiveness of ERA 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 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) (see section 8.3.1.). However, EU and national research policies should also aim at increasing the attractiveness of ERA for researchers from well-working systems, who can self-choose mobility. Research funding is also one of those conditions enabling scientific knowledge production but it does not rank as high as a main 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 among researchers.

9. Summary of main findings

Below, an overview is provided of the main findings of this 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 will need to be interpreted with care. However, the findings exhibit in general a high consistency with previous research.

9.1. Profile characteristics – sociodemographic information and dual positions

GENDER IMBALANCES, IN PARTICULAR ACROSS CAREER STAGES AND IN TECHNOLOGICAL FIELDS

40% of the sample of researchers working outside the EU are women. Among leading researchers, female representation is clearly smaller (R4: 28%) than at the first career stage (R1: 51%). In technological fields in particular, gender imbalance appear; only 23% of researchers in the field of Engineering and Technology are female.

DUAL POSITIONS ARE RARE, UNIVERSITY OR HIGHER EDUCATION INSTITUTIONS ARE OFTEN PRIMARY EMPLOYER

12% of the sample of researchers currently working outside the EU are employed in more than one institution or organisation. Dual positions between high education institutions and non-HEI are even rarer (7%). A university or a HEI is the primary employment position for most of those in the sample that are employed in a dual position.

9.2. Education and training: PhD studies

PHD REMAINS THE MAIN POINT OF ENTRY INTO RESEARCH CAREERS: 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 (80%) or is currently enrolled in a PhD program (14%). The total shares of researchers having obtained a PhD or being currently enrolled in PhD programs range from 90% (non-mobile researchers; TG4) to 99% in the group of EU researchers working abroad (TG1). In our sample, about 75% of researchers have obtained or will obtain their PhD in an OECD-country. 19% have obtained or will obtain their PhD from an emerging country, such as a BRICS country or a different country from Asia, South America or Africa. More than half obtained or will obtain their PhD from an Anglo-Saxon country, while 27% graduated or will be graduating from an EU country (including the three associated countries Iceland, Norway and Switzerland). The shares of PhD holders among researchers in our sample are higher in developed OECD economies than in emerging countries. By contrast, while overall joint degrees are rare (8%), they are more common in the emerging countries (14% in BRICS and 20% in 'other' countries).

STRUCTURED PHD-STUDIES PARTICULARLY COMMONPLACE IN THE US

In the US, 82% of PhD students surveyed were embedded in supervisory committees or doctoral schools, against 46% in the EU and 37% in the BRICS countries. In our sample, only 10% of researchers in the US did their PhD following the more traditional model where PhD-students are supervised by a single researcher, against 55% in the BRICS, 44% in the EU and 33% in the non-EU-OECD.

TRANSFERABLE SKILLS ARE WIDESPREAD, BUT DIFFERENT COUNTRIES EMPHASISE DIFFERENT SKILLS

In our sample, on average 93% respond 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 (88%) or skills related to creative thinking, decision making and communication (67%-71%). More general work management-related skills, such as time and project management, as well as the ability to teamwork, come behind at around 50%. Skills related to engaging with other areas of society and business, such as collaboration with citizens (24%), entrepreneurship (9%) or intellectual property rights (12%), are least frequently received by the researchers in our sample, in line with the MORE3 EU HE survey.

By country of graduation, collaboration with citizens and governments is much less a feature in PhD studies in the EU (14%) than in either non-EU-OECD countries (28%) or in the BRICS countries (28%). Training on communication and presentation skills is near omni-present in the US PhDs in the sample, while they reach only 50% in other countries and 68% in the EU. A similar picture can be seen for training on decision-making skills, where the US also leads. Interestingly, entrepreneurship is a skill that is mostly taught in PhD studies of other countries, most notably in emerging or developing countries from Asia, South America and Africa.

Ethics is less taught in the EU and in other countries (around 28%) than in non-EU-OECD countries (56%). Proposal and grant writing is more frequently taught in the US (57%) than in the EU (42%), as is teamwork (65 vs 47%), creative thinking (88 vs 68%) and time management (71% vs. 48%).

9.3. Career Paths

THE SHARES OF RESEARCHERS AGREEING THAT RECRUITMENT IS TRANSPARENT, PUBLICLY ADVERTISED AND MERIT-BASED ARE THE HIGHEST AMONG THOSE CURRENTLY WORKING IN THE US (AS COMPARED TO OTHER NON-EU REGIONS)

The majority of researchers who participated in the MORE3 Global survey agreed that job vacancies are sufficiently externally and publicly advertised (67%), and that recruitment processes are sufficiently transparent (62%) and merit-based (66%). In comparison with other country groups, the shares of researchers perceiving recruitment sufficiently publicly advertised (81%), transparent (74%) and merit-based (72%) are the highest in the US. Of course, researchers´ perception of recruitment processes in their home institution also depends on the type of contract they have. The share of researchers with permanent contracts that perceive recruitment sufficiently merit-based (70%) and that perceive it is transparent (66%) is higher than the share of researchers with fixed-term contracts (60% and 54% respectively).

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 THE US (AS COMPARED TO OTHER NON-EU REGIONS)

Researchers' perception with respect to the regulation and determinants of career progression show a similar pattern as compared to the MORE3 EU HE survey, but are lower on average. Career paths are considered transparent by 61% of researchers, but slightly less merit-based (57%). As with recruitment, there is little variation between target groups in the perception of whether career paths are clear and transparent for researchers, but larger differences between country groups and between different types of contract are observed. 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 among researchers currently working in the US (67%), while in BRICS countries only 50% of researchers agree. While 63% of researchers with

permanent contracts think that obtaining a tenured contract is based on merit only, in the group of researchers with fixed-term contracts this share is only 45%.

INTERNATIONAL AND INTERDISCIPLINARY MOBILITY IS PERCEIVED AS BEING IMPORTANT FOR RECRUITMENT, WHILE INTERSECTORAL MOBILITY IS LAGGING BEHIND

The ranking of factors perceived as being important for recruitment is similar, as in the MORE3 EU HE survey. While 73% of researchers perceive international mobility as a positive factor for recruitment and 62% of researchers agree with respect to interdisciplinary mobility experiences, only 43% of the sample of researchers perceive intersectoral mobility experiences to the private sector to be a positive factor for recruitment. International mobility is the factor with the highest shares of researchers perceiving it as positive for recruitment in comparison to other factors across all target groups and career stages (between 70% and 81%). The largest difference between target groups can be observed with respect to transferable skills: while more than two-thirds of EU researchers working abroad think that it is important (71%), only about half of the non-mobile non-EU researcher agrees (55%).

INTERNATIONAL EXPERIENCES AND ALTERNATIVE FORMS OF RESEARCH OUTPUT ARE POSITIVELY PERCEIVED FOR BOTH CAREER PROGRESSION AND RECRUITMENT; INTERSECTORAL MOBILITY LESS SO

69% of the sample of researchers perceive international mobility experiences and 67% perceive alternative forms of research output as positive factors for career progression. As for recruitment, intersectoral mobility is less important in this respect: only 40% of researchers agree with intersectoral mobility experiences being a positive factor for career progression (in a sample of mainly HEI-based researchers). Overall, differences between target groups are rather small.

In terms of skills perceived as important for career progression, the results are also similar to the MORE3 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 (57%) and dealing with IPR (53%) 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, entrepreneutship, ethics and IPR than other target groups, but emphasise people and time management, proposal and grant writing, networking and communication skills instead.

THE SHARE OF RESEARCHERS THAT LACK CONFIDENCE ABOUT THEIR FUTURE CAREER PROSPECTS IS THE 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, 79% of the researchers in the sample feel very confident (27%) or somewhat confident (52%) about the future prospects for their research careers. Only 4% of researchers report that they very much lack confidence about the prospects. Non-EU researchers who have worked abroad but not in the EU (TG3) show the highest shares of (very) confident researchers (85%) with respect to their future career prospects. The share of confident researchers is lower among EU researchers currently working abroad (75% of TG1), which is in part explained by the on average younger age of researchers in this group.

9.4. Working conditions

91% OF THE SURVEYED RESEARCHERS HAVE A FULL-TIME POSITION AND ARE 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 (6%) 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: 7 years) and non-EU researchers who have never worked abroad (TG4: 14 years). However, these differences could be based on the different age structure of the different target groups. We observe a relatively high share of younger researchers in TG1 (65% are younger than 44 years) while the share of younger researchers in TG4 is lower (43% are younger than 44 years).

Another explanation might be rooted in differences with respect to the contractual situation of researchers. The share of researchers with permanent or open-ended contracts is the lowest within the group of European researchers currently working outside Europe (51% of TG1), while in comparison to the other target groups the share of researchers having fixed-term contracts is twice as high. Except for the US, which shows a relatively high share (40%) of fixed-term contracts, no large differences in the contractual situation of researchers across different (non-EU) country groups are found.

ALMOST ONE IN FOUR RESEARCHERS FEELS WELL PAID (23%), AND HALF OF THE RESEARCHERS THINK THAT THEY ARE PAID A REASONABLE SALARY (49%)

The share of researchers feeling well or reasonably paid is the highest among EU researchers currently working abroad (80% of TG1, compared to 72% in total), and it is considerably lower among the non-mobile non-EU researchers (66% 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 (31%) and non-EU OECD countries (27%). Female and male researchers perceive their remuneration rather similarly, but it is likely that the data understate the true wage gap as female and male perceptions of identical salary levels are known to deviate systematically.

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 (35% of R4). Overall, researchers in higher career stages tend to be more satisfied with their remuneration - this is likely to reflect pay schemes based on seniority. Moreover, the shares of researchers feeling well-paid with full-time positions (25%) and with permanent contracts (28%) are higher than the shares of part-time researchers (17%) and researchers with fixed-term contracts (18%) who feel well-paid. In line with this result, more researchers working at one position only feel well paid or reasonably paid than researchers having a dual position.

COMPARISON WITH NON-ACADEMIC POSITION: 57% OF RESEARCHERS WORKING IN ACADEMIA FEEL THEY ARE PAID WORSE IN ACADEMIA

On average, 57% 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 worked in the EU in the past (TG2).

Moreover, researchers feel less often 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 65%. Although perception, this may reflect an actual wage gap in early stages, which dissolves in later stages. The finding can 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 the highest in the US (67%) (as compared to other non-EU regions). This result could be based on a higher number and more lucrative research opportunities in the industry sector offered in the US. However, further research would be needed to confirm this.

THE PERSPECTIVE OF RESEARCHERS WORKING OUTSIDE ACADEMIA CONFIRMS THE PATTERN: 30% FEEL THEY ARE PAID WORSE OUTSIDE ACADEMIA

Only 30% of researchers working outside academia perceive their remuneration to be worse than the remuneration of people working inside academia, while 27% feel better paid. Some heterogeneity between target groups is observed: 35% of non-mobile non-EU researchers (TG4) perceive their remuneration to be worse than that of their colleagues inside academia, and only 24% of mobile researchers (TG1, TG2 and TG3) agree. Vice versa, the shares of researchers thinking that they are better paid than researchers with similar skills inside academia is higher in the group of mobile researchers. There are no remarkable differences between career stages.

9.5. Mobility and collaboration

9.5.1. International long term mobility (>3 month)

THE US IS THE MOST POPULAR DESTINATION COUNTRY, FOLLOWED BY GERMANY AND FRANCE (IN LINE WITH MORE3 EU HE SURVEY)

Half of the EU researchers who are currently working outside the EU (TG1) have been long-term mobile in the EU before. By far the most popular EU-destination was the United Kingdom, followed by Germany and France.

The most popular EU-destinations for non-EU researchers (TG2) are Germany, France, United Kingdom and Spain .

For non-EU researchers who have been mobile but not towards the EU (TG3), the United States , Australia , Canada , Japan and China are the most popular destinations.

45% 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

59% of the EU researchers currently working outside the EU (TG1) have moved and changed employer at the same time at least once in the past ten years. About half of all the moves of TG1 concerns a move with employer change. Moves with employer changes are more common when it concerns mobility outside the EU (62%).

32% of the non-EU researchers who have worked in the EU in the past (TG2) have engaged in international mobility with a change of employer at least once in the past ten years. About one quarter of all the moves of TG2 researchers concern mobility with employer change: it is therefore half as frequent as among TG1 researchers. Moves with employer changes are more common when they concerns mobility towards the EU (75%).

DURATION OF MOBILITY: MOVES WITH A DURATION OF BETWEEN 3 TO 6 MONTHS ARE MOST COMMON

Almost half of the moves concern mobility between 3 to 6 months, while 16% have a duration of over 3 years.

When EU researchers (TG1) engage in moves outside the EU, the duration of this move is usually longer (50% last for more than one year) than when they move inside the EU

(39%). The duration of the moves to the EU of non-EU researchers who have been to the EU in the past (TG2) is on average shorter.

CONTRACT TYPE: FIXED-TERM CONTRACTS ARE MOST COMMON

About 47% of the moves involve fixed-term contracts (of which about half are fixed-term contracts lasting up to one year). 9% of the moves concern permanent/open contracts and 22% indicated to have no contract.

EU researchers who are currently mobile outside the EU frequently engage in mobility without a contract (31%) (this might indicate that they are engaging in a research stay abroad, but remain employed at their home institution). About 5% undertake mobility with a permanent contract and 50% with a fixed-term contract. When engaging in mobility towards non-EU countries, the share of permanent contracts (19%) is higher than compared to EU moves, consistent with the pattern of longer stays found above.

DESTINATION SECTOR: MAIN SECTOR OF EMPLOYMENT IS BY FAR A UNIVERSITY OR HIGHER EDUCATION INSTITUTE

The main sector of employment of the different moves is university or other higher education institutes (81%). This is very similar across the different target groups (> 80%). 11% of the international moves are related to moves towards the public or government sector.

In their long–term moves, researchers who have been abroad but not towards the EU (TG3) engage more frequently in intersectoral mobility, most notably towards the private (not-for-profit) sector (7%) compared to the other target groups (2-3%).

9.5.2. Retention and return potential

1/5 OF THE EU RESEARCHERS ARE INTERESTED IN RETURNING TO THE EU

20% of the EU researchers currently working outside the EU are interested in returning to the EU 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 the EU in the coming 12 months (7%) compared to German (26%), French (25%) and Italian researchers (22%). An interest in returning to the EU is highest amongst early stage R1 and R2 researchers.

POSITIVE EXPERIENCE OF NON-EU RESEARCHERS WITH RESPECT TO THEIR MOBILITY TO THE EU

77% 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. 92% are also interested in working in the EU in the future. This interest in working in the EU in the future is highest amongst first stage researchers (R1) and lowest amongst leading researchers (R4).

96% of the non-EU researchers who have been to the EU in the past (TG2) would recommend working in the EU as a researcher to other colleagues.

9.5.3. Interest to work in the EU

NON-EU RESEARCHERS HAVE HIGH LEVELS OF INTEREST IN WORKING IN THE EU

85% of the non-EU researchers with no working experience in the EU (TG3) would be interested to work in the EU in the future. 42% of these interested researchers have also recently investigated the possibility of working as a researcher in Europe.

83% of the researchers that had been mobile more than 10 years ago indicated that they would be interested to work in Europe as a researcher in the future. In addition, 37% of the researchers which indicated that they would be interested in doing so have also recently investigated the possibility of working as a researcher in Europe.

Interestingly, also among the non-mobile non-EU researchers (TG4) 89% indicated that they would be interested to work as a researcher in Europe in the future. In addition, 37% of the researchers that indicated this interest 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 in particular barriers for mobility further sheds light on what hinders this potential to be fully deployed.

9.5.4. International short-term mobility (<3 month)

NON-EU RESEARCHERS WHO HAVE BEEN TO THE EU IN THE PAST ARE MORE FREQUENTLY ENGAGED IN SHORT-TERM MOBILITY THAN ARE RESEARCHERS IN OTHER TARGET GROUPS

The share of non-EU researchers who have been to the EU in the past (TG2) and has been short-term mobile in the last ten years (60%) is higher than both that of EU researchers working abroad (TG1; 46%) and non-EU researchers that have never been in Europe before (TG3; 51%). This is the case for all the types of short-term mobility included in the survey – conferences, study visits, and meetings with supervisors, partners or collaborators.

LOWER SHORT-TERM MOBILITY OF RESEARCHERS CURRENTLY WORKING IN THE US, AUSTRALIA AND CANADA

When looking at the difference between countries (of employment), it is observed that researchers working in non-European Anglo-Saxon countries (US, Australia, Canada) tend to be less frequently short-term mobile compared to researchers working in the included South American and Asian countries. This difference might be related to the fact that foreign researchers usually display a lower likelihood of being short-term mobile than those working in their home country. Indeed, the share of foreign researchers tends to be higher in Anglo-Saxon countries compared to other world regions.

9.5.5. European network

A VAST MAJORITY OF RESEARCHERS CONTINUE TO MAINTAIN CONNECTIONS WITH THE EU AFTER LEAVING THE EU, WITH IN PARTICULAR A STRONG CONNECTION WITH EU-BASED SCIENTIFIC JOURNALS FOR NON-EU RESEARCHERS WHO HAVE BEEN TO THE EU

In general, EU researchers abroad (TG1) and non-EU researchers who have been to the EU (TG2) maintain strong connections with the EU through informal networks; participation in conferences; linkage mechanisms; collaboration with scientific journals; contacts with official diaspora networks etc. One of the largest differences between EU researchers (TG1) and non-EU researchers (TG2) is found in the share of researchers that collaborate with scientific journals in Europe: the share is 20 percentage points higher among non-EU researchers (TG2). This finding might be related to the fact that their stay in Europe encourages them to publish their work in scientific publications offered by European publishers (e.g. Taylor & Francis, Elsevier, or other international publishers based in the EU).

9.5.6. Intersectoral mobility

ABOUT 20% OF THE SAMPLE OF RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU HAS ENGAGED IN INTERSECTORAL MOBILITY

No large differences in intersectoral mobility between the different target groups are observed. Beyond higher education institutions, the sector that attracts most researchers is the public sector. Four out of ten researchers consider that this type of mobility is

neither relevant for recruitment nor for career progression, regardless of whether they have been intersectorally mobile in the past.

9.5.7. 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 is higher in the field of Engineering and Technology 36% compared to the total of 33%

Within this field the EU researchers currently working outside the EU (TG1) in the sample are more interdisciplinary mobile than the non-EU researchers (TG2, TG3 and TG4). Conversely, non-EU researchers display lower shares of interdisciplinary mobility than EU researchers abroad in other fields like the Medical Sciences, Natural Sciences and the Social Sciences.

Interdisciplinary mobility is considered as a positive factor for recruitment and for career progression by nearly six out of ten researchers. However, those with interdisciplinary experience tend to have a slightly less positive view of the effects of this type of mobility than those that have never worked in other disciplines before.

9.6. Attractiveness of the ERA

The attractiveness of the ERA is a result of the structure of career paths and the quality of working conditions. International or intersectoral mobility may be driven by the extent to which researchers consider other countries and sectors attractive. Mobility indicators, e.g. in terms of which countries researchers choose for their international mobility experience, can therefore also be interpreted as indicators of attractiveness. 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. Among these non-EU countries, the analysis differentiated where possible by non-EU OECD country, the BRICS and other emerging countries, as well as by the US and Anglo-Saxon countries.

INDIVIDUAL SATISFACTION WITH RESEARCH JOBS IS HIGH, BUT SATISFACTION WITH DOING THAT RESEARCH IS LOWER

Looking at non-science related working conditions in the current research employment outside Europe (e.g. job and social security, social environment and recognition or researchers' satisfaction at work), 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 the US are particularly satisfied. The shares of satisfied researchers currently working in the US is above average in every category but financial security.

SATISFACTION WITH WORKING CONDITIONS IS HIGHER IN MORE DEVELOPED COUNTRIES

More developed countries show above-average shares of satisfied researchers in all used categories of satisfaction at work. This is the case for the OECD and Anglo-Saxon countries, and the US in particular. The BRICS and other nations are especially below-average with respect to satisfaction with quality of life and dynamic work environment.

Researchers employed in the US are particularly satisfied with their reputation and contribution to society and their level of responsibility. Moreover, in the US the share of satisfied researchers regarding research funding, intellectual support, balance between research and teaching and career and mobility perspectives is the highest compared to other non-EU country groups. This is in line with the fact that research universities in the US are in the vanguard according to various composite rankings, including several aspects like research, citations and teaching. It should be noted, however, that the US-American higher education system is overall very heterogeneous and the degree of difference with other countries/regions can be in part due to bias in the sample towards the better ranked HEI in the US.

REGARDING MOST ASPECTS OF WORKING CONDITIONS, THE SHARE OF SATISFIED RESEARCHERS IS THE HIGHEST IN THE GROUP OF EU RESEARCHERS WORKING ABROAD

The share of satisfied researchers regarding different aspects of social environment and satisfaction at work is the highest in the group of EU researchers working abroad (TG1). Similarly, EU researchers currently working abroad have the highest shares of researchers satisfied with research funding, facilities and equipment and collaboration with leading scientists as well as time balance and research autonomy. The same pattern is found in terms of career and mobility perspectives. Although the share of satisfied researchers in terms of social security is highest in the group of EU researchers working abroad (TG1), in terms of job security and pension plans, this group shows the lowest shares of satisfied researchers. In terms of training and education no remarkable variance between target groups is found.

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

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. 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; working with leading scientists and pension plan.

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 and the availability of positions. EU researchers who are currently working in the BRICS see conditions for scientific knowledge production as better in the EU and mobility perspectives as worse in the EU, while it is the other way round for EU researchers currently working in other countries (non-EU OECD ones). A higher share of researchers from both country groups (non-EU OECD and BRICS) however 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 political situation, where shares of "better" and "worse" are in balance, as well as job security. The share of researchers who see something as better in the EU is particularly high for 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.

EU Researchers working in the US perceive the US to be particularly attractive

The comparison with the US is particularly striking among the EU researchers currently working abroad (TG1), as all shares - with the exception of remuneration and other material factors - are negative. This indicates that EU researchers currently working in the US perceive the US to be better across all categories, even including the quality of education and training. Among conditions for scientific knowledge production, 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. The ease of commercialisation of research results or collaboration 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.

With respect to social security, job security and pension plan EU researchers abroad (TG1) perceive the EU to be better than the US. This does not apply to remuneration, however, which is negatively valued, i.e. the US is perceived to pay much better salaries than EU countries (one does has to take into account heterogeneity in the EU). This confirms the picture from the MORE3 EU HE survey. After graduation, talented EU researchers seem to perceive better working conditions for a career in science in the US, e.g. possibly 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).

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 and social security. 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. independence, working with leading scientists and attractive career paths), while they move back rather for personal or family reasons. This is further confirmed in the analysis of motives to move in this survey (cf. infra). 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, or as attractors of researchers, 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 positive framework with positive conditions for scientific knowledge production.

AMONG THE EU RESEARCHERS CURRENTLY WORKING OUTSIDE THE EU, 37% FELT FORCED TO MOVE (ESCAPE MOBILITY) OUTSIDE THE EU

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. 37% of the EU researchers abroad (TG1) described their mobility experiences as a form of "escape mobility" when moving outside the EU (where the largest majority felt forced to move because there were no options for a research career in their home country). 22% of the mobility concerned expected mobility (necessary for career purposes) and 22% 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 50% ENGAGED IN EXCHANGE MOBILITY (WHEN MOVING TO THE EU)

50% of the non-EU researchers moved to the EU (TG2) to engage in exchange mobility, i.e. for the opportunities international mobility offers in terms of networking and knowledge exchange. About 14% felt forced to move to the EU (escape mobility) and 10% engaged in expected mobility.

The escape mobility amongst researchers from the Anglo-Saxon countries and non-EU OECD towards the EU is lower (less than 10%) compared to the escape mobility amongst researchers from BRICS-countries and others. The expected mobility with respect to improving working conditions is highest amongst researchers from other countries (19%) while the exchange mobility for networking and knowledge exchange is highest amongst Anglo-Saxon researchers and researchers from non-EU OECD countries (respectively 57% and 54%). 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).

CAREER PROGRESSION IS OVERALL THE MOST FREQUENT MOTIVE FOR MOBILITY BOTH TOWARDS THE EU AND OUTSIDE THE EU

The most frequently indicated motives for EU researchers to move outside the EU are the availability of a suitable position (86%) and career progression (83%). The main motives for non-EU researchers to move to the EU are working with leading scientists (95%) and career progression (83%).

Consistent with existing literature, pension plan, social security and other benefits are indicated least frequently as factors in the researchers' decision to move outside the EU (among TG1 researchers) and to the EU (among TG2 researchers). Job security is not perceived either as very important in the decision of non-EU researchers for their move towards the EU (34%).

CAREER PROGRESSION AND AVAILABILITY OF SUITABLE POSITIONS ARE MORE IMPORTANT FOR MOVES THAT ENTAIL A CHANGE OF EMPLOYER, WHILE WORKING WITH LEADING SCIENTISTS AND INTERNATIONAL NETWORKING ARE MORE IMPORTANT FOR MOVES THAT DO NOT ENTAIL A CHANGE OF EMPLOYER

DIFFICULTIES TO FIND A JOB POSITION, TO OBTAIN FUNDING FOR MOBILITY AND FUNDING FOR RESEARCH ARE HINDERING RETURN MOBILITY

EU researchers willing to return seem to perceive more barriers to do so than non-EU researchers experienced in their move to Europe (TG2).

The return of EU researchers to the EU seems to be hindered above all by the difficulties in finding a job position (74%), and to obtain funding for mobility (73%) and for research (72%). Non-EU researchers were hindered in their move towards the EU by finding a suitable position, transferring social security and pension.

EFFECTS OF INTERNATIONAL MOBILITY MOSTLY RELATE TO NETWORK, CAREER AND COLLABORATION

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, and quality of life.

Overall, for EU researchers working outside the EU (TG1) and other mobile researchers (TG2 and TG3), a majority has experienced positive effects in all of these categories, with the most negative effect being decrease in the quality of life for 19% of respondents. The biggest effects among EU researchers are seen in terms of gaining an international network (77%) and recognition in the research community (67%) with overall career progression in between (71%). The expectations, i.e. motives, with which researchers engage in mobility are thus confirmed in the effects. The effects of the stay abroad on scientific output or on job options was 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, quality of scientific output 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.

9.7. 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 MORE3 Global Survey as a basis for investigating more detailed policy options with respect to the five ERA priorities in a separate table below.

9.7.1. 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 very important for recruitment or career progression, while international and interdisciplinary mobility are seen as more influential experiences with higher expected effects on the researcher's scientific knowledge production and career. The findings in the MORE3 Global survey on what matters in research are consistent with the MORE3 EU HE survey and the previous literature[128].

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

[128] 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.

considerably, with the more traditional master-apprenticeship 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 MORE3 Global survey gave indications. Satisfaction with merit-based recruitment and clear career progression based on merit are also divergent, with levels of satisfaction among respondents highest among researchers working in the US[129].

The discrepancy between this 'global awareness' on 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.

Below, we first present the attractiveness of ERA. Overall, even though our sample is not representative at the country level, the findings of the MORE3 Global survey are in line with and confirm not only the results from the MORE3 EU HE Survey, but also from other studies. The pattern of responses between various subgroups of our respondents, as e.g. 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 of course due to the limitations of the data conclusions should be drawn with caution.

9.7.2. Attractiveness of ERA as seen by researchers currently working abroad

The MORE3 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 MORE3 Global survey complements this picture by 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 inside, with the exception of education and training, working with leading scientists, administrative burden and pension plan. However, non-EU researchers who were in the past mobile to the EU from OECD countries 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 reserach, while others are more reserved.

However, a main insight from the MORE3 Global survey is how much the US stands out in terms of attractiveness. The quality of the US system has been outlined above, with respect to PhD studies, recruitment and career progression. But also by direct comparison of research systems, it becomes evident that very 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 remuneration, but not for factors such as social and job security. 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 ouptut and recognition in the research community.

[129] 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 MORE3 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.

9.7.3. 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 MORE3 Global survey shed light on two mutually-supporting policy directions; enablers refer to policies which tackle main barriers to mobility, to come to the EU and drivers are those 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, of course 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. Both in terms of awareness, e.g. for non-EU researchers who were not mobile to the EU, but also in terms of actual usage, there is however room for improvement. The results of the MORE3 Global survey (as in other studies) also show that policies aiming at return mobility of 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)[130].

Improving the attractiveness of ERA hence 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 e.g. 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. But the EU also has an important role to play here, 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 T4, also taking into account the results of T1 MORE3 EU HE report.

[130] 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 MORE3
1. More effective national research systems		⇨ 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 a 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.
2. Optimal transnational cooperation and competition	International cooperation and competition	⇨ International mobility is an important vehicle for international collaboration which in turn boosts scientific productivity; approx. 75% of the mobile researchers (TG1 and TG2) have indicated collaboration with researchers in organisations in another country. Fostering exchange mobility (self-chosen mobility) or helping to overcome barriers to mobility is hence likely to contribute to collaboration and scientific productivity. ⇨ 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 pension and social security). ⇨ The most important difficulties hindering return mobility of EU researchers currently working outside the EU are related to obtaining funding for mobility and for research. ⇨ 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. ⇨ 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, however, 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 lack of knowledge of programs 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. ⇨ 39% of the sample of researchers currently working outside the EU are satisfied with the availability of research funding (this share is low compared to other working conditions). The EU

		researchers currently working outside the EU are most satisfied with research funding (55%) compared to the non-EU researchers. Non-mobile researchers are also less satisfied compared to mobile researchers.
3. An open labour market for researchers (facilitating mobility, supporting training and ensuring attractive careers)	⇨ Facilitating mobility, open labour market for non-native researchers	⇨ See the evidence on barriers to mobility above. ⇨ Euraxess Links is known by about a quarter of our sample of researchers currently working outside the EU. This awareness is, not surprisingly, lowest amongst the non-mobile researchers and the researchers who have been mobile but not towards the EU. Euraxess Links is least known by researchers currently working in non-EU OECD countries and Anglo-Saxon countries (except US) and best known in BRICS countries and the US.
	⇨ Open labour market based on merit, recognition of all relevant skills	⇨ The majority of researchers who participated in the MORE3 Global survey agreed that job vacancies are sufficiently publicly advertised, and that recruitment processes are sufficiently transparent and merit-based. Non-mobile researchers perceive recruitment at their home institution slightly less merit-based and transparent compared to mobile researchers. Also differences between (non-EU) country groups are observed: in particular, researchers working in the US have the highest approval rates and researchers from BRICS and other countries the lowest ⇨ The majority of researchers believe in non-standard activities and paths as positive factors for 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. ⇨ 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 critical and autonomous thinking; decision-making and problem solving; communication and presentation; project management and networking. The shares of researchers perceiving certain skills as important for their future research careers are higher among those researchers who actually received corresponding training (during their PhD training).
	⇨ Training of research skills, as well as other skills to create openness towards careers outside academia	⇨ The supervision of doctoral training varies between countries, with 60% of respondents embedded in a doctoral school in the US and Canada, compared to below 30% for the EU or other non-EU OECD countries. Other Anglo-Saxon countries such as Australia and New Zealand still have a large share of supervision of doctoral training by just one senior researcher or supervisory committee (contrary to US and Canada). ⇨ Training for young scientists in transferable skills broadens their labour market options. On average in the MORE3 Global survey, 93% of PhD candidates receive training in transferable skills. US graduates report more often having received training in transferable skills in various areas than 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. However, differences with respect to researchers' perception of important skills can be observed between researchers who have received respective training in their past and researchers who have not received corresponding training. In particular, while only 50% of researchers who have never had training in entrepreneurship perceive it as an important skill, 87% of researchers who have received training in entrepreneurship agree.
	⇨ Attractiveness of research careers	⇨ 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 pension. Specifically for EU researchers in the US however, many researchers assess working conditions in the US to be better than in the EU. ⇨ 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. ⇨ International evidence and the MORE surveys show that working with leading scientists is a key driver for researchers' mobility and, thus plays a major role in the battle for attracting the best talents. Only a small share of EU researchers currently working abroad think that working with leading scientists is better in the EU in comparison to the working abroad, especially the US. On the other hand, non-EU researchers who have been to the EU in the past do indicate that working with leading scientists is better in the EU than abroad.
4. Gender equality and gender mainstreaming in research	Mainstreaming	⇨ 40% of researchers in the sample of researchers currently working abroad are women. ⇨ Female researchers are more represented in the non-mobile group of researchers. Amongst the mobile groups of researchers, the share of female researchers is the lowest with the group of non-EU researchers who have been to the EU in the past. ⇨ There is a more balanced representation of female researchers in the early career stages (R1: 51%), but women are clearly underrepresented in the R4 career stage (R4: 28%). Male and female researchers are not equally distributed across fields of science. The most balanced disciplines are the Social Sciences, the Humanities and Medical Sciences in which about 50% of the researchers are women. Conversely, in Engineering and Technology (23%), Agricultural Sciences (29%) and in the Natural Sciences (31%), the presence of women is clearly lower.
	Equality	⇨ Women researchers have participated less in international mobility and collaboration over the last ten years. ⇨ The shares for interdisciplinary and intersectoral mobility, however, are rather equal between men

		and women.
5. Optimal circulation and transfer of scientific knowledge	Open innovation	⇨ Of all types of collaboration and mobility, intersectoral activities are the least common among the academic researchers in the MORE3 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 EU Survey. ⇨ The main focus of doctoral training is on research skills and critical and autonomous thinking. There is only very limited cooperation with other sectors. Training for collaboration with non-researchers (citizens, government and broader society) is among the least often received trainings, often not even available as a training module.
	Open science: - Digital innovations - New ways of disseminating research results - New ways of collaborating (globally)	⇨ The majority of researchers believe in non-standard activities and paths as positive factors for their career progression. The main one is international mobility (69%), followed by alternative forms of research output (67%) and transferable skills (62%). ⇨ 84% of researchers consider innovative digital skills important for their future careers. Similarly, 84% consider collaboration with citizens, government and broader society as important.
	Open to the world	⇨ EU researchers who are currently working outside the EU still remain 'connected' with the EU; 66% participates in conferences in the EU, 41% are active in linkage mechanisms, 34% collaborates with scientific journals and 3% keeps in touch with official diaspora networks. ⇨ Non-EU researchers who have been to the EU in the past also remain connected' with the EU; as with the EU researchers they participate in conferences (61%) and are active in linkage mechanisms (42%). An interesting observation is that 52% indicates that they still collaborate with European scientific journals (versus 34% of the EU researchers).
	Knowledge circulation	⇨ 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 a strong knowledge circulation and efficiency in (academic) research, with important spillovers to other levels of society. ⇨ 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.
6. International cooperation	Cross-cutting priority	⇨ Cf. priorities 2, 3 and 5.

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1. Questionnaire

Cf. separate document

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 follows[131]:

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.
- Can take the lead in executing collaborative research projects in cooperation with colleagues and project partners.

[131] IDEA Consult et al. (2013) Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. FINAL REPORT (deliverable 8)

- 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.

3. Policy-driven developments in concepts of career paths and working conditions

Recent developments in the R&D policy context in Europe have necessitated the revision of certain concepts about career paths and working conditions. In the following sections, we discuss the concepts of combined/part-time researcher positions, dual careers or career restarts, the measurement of researchers' achievements and open science in the 3Os framework. In the development of the questionnaire for the MORE3 EU HE survey and MORE3 Global survey, we have taken into account each of these concepts to the extent relevant and complementary to what is already being monitored in other studies (such as the DG EAC study "Research Careers in Europe", cf. infra). This also means that these concepts are new when compared to MORE2 and analysed for the first time in this context.

Combined/part-time researcher positions

One increasingly recognised means to transfer knowledge is **a combined, part-time research position**. The adjunct position can be made on time-bank terms i.e. *"a part-time position defined by a certain % of full position per year allowing the work-load to be flexibly distributed in short or long periods over the year according to the need"* (ESF, 2013). The combined/part-time research position has proven effective for knowledge transfer, networking and research collaboration. An example of this is the Norwegian 'professor 2' 20% combined/part-time positions scheme. The following suggestions were formulated by ESF (2013) concerning combined/part-time research positions:

- *"Should be introduced as part of ordinary employment conditions as well as in scholarships and grants (nationally and in EU-instruments);*
- *Could be established at all levels in the hierarchy;*
- *Might be suitable for implementation of the COM-proposed ERA-Chairs (attracting excellent researchers to build scientific quality in low-performing institutions);*
- *Might be suitable to counteract brain drain from less attractive areas by keeping them connected and cooperating."*

Given the growing importance of this concept, we have further elaborated the questionnaire for the MORE3 EU HE survey in this direction. Whereas the MORE2 study provided basic information on inter-sectoral dual positions, defined as a combined position between academia and another sector, we now allow for a more detailed approach to this concept. The MORE3 questionnaire also covers the share in each position, the possibility of accumulating multiple positions with academia and if so, the country of the academic positions. .

Dual careers/restart of careers

Alternative career paths, including career breaks, restart of careers or implications of dual careers, have gained attention in studies on the topic as well as in the European policy context. In a study managed by the European Commission, DG Education and Culture, these three topic regarding "Research Careers in Europe" were addressed: restart of careers, perception (and promotion) of researcher's careers and dual careers[132].

- Dual careers are defined as living in couple where both life partners pursue a career or seek jobs which are highly demanding and strongly oriented at career progression, and at least one of them is a researcher.

[132] The final study report is available at http://bookshop.europa.eu/en/research-careers-in-europe-pbNC0614200/.

- A career break is defined as a period away from what someone considers to be his/her main career, including a situation in which a researcher temporarily works in a non-research position either within or outside of an academic institution.

Concerning dual careers, the study measured for example the number of researchers who are in a "dual-career couple" relationship: almost 39% of respondents were in this situation. Around 66% of researchers being in this kind of dual-career relationship reported dual-career problems affecting their professional and/or personal lives. These outcomes point at a very important field of research to better understand career paths and career decisions of researchers.

In relation to career breaks, the study showed that around 35% of researchers experienced a career break or were planning to take one in the near future. For these researchers, childcare commitments were the major motivation (40%), followed by a lack of positions (34%) and end of contracts (33%).

Given this recent and detailed study on this topic, the MORE3 study did not explicitly focus on motives for and details regarding these concepts. The questionnaire did include a question (Q7) on whether or not the respondent's partner is also working as a researcher, thus allowing us to measure accurately (representative at country level) the share of researchers in a dual-career relationship.

Measurement of researchers' achievements

Overall, new concepts of mobility bring with them the need for new evaluation measures for researchers' achievements. ESF (2013) has formulated some recommendations for international, inter-sectoral, interdisciplinary as well as virtual mobility. Their cross-cutting recommendations are:

- "Providing standardised CV in publicly available information systems stating different forms of mobility;
- Recognising non-academic achievements in peer review;
- Normalising a researcher's achievements by normalizing the experience to the time actually spent in research."

- In the MORE2 study, researchers' achievements were not taken into account. In MORE3 we have addressed the growing importance thereof by including questions on:
  - The extent to which specific experiences or skills are appreciated for recruitment and career progression (e.g. interdisciplinary mobility or collaboration, transferable skills, etc.).
  - Competitive funding at European or national level and the timing thereof.

Open Innovation, Open Science, Openness to the World

To introduce the 3O's in the MORE3 study, existing questions were elaborated and new questions developed. For example:

- Skills training: introduction of the categories 'innovative digital skills' and 'collaboration with citizens, government and broader society'
- Recruitment and career progress: introduction of a question on how 'alternative' skills and outputs are taken into account, namely 'alternative forms of research output' (e.g. project reports, grant writing, the development and maintenance of data infrastructure, organisation of research events/conferences, etc.), 'intersectoral mobility', 'interdisciplinary mobility', 'international mobility' and 'transferable skills'.
- Collaboration: introduction of 'non-researchers' in the list of potential collaboration partner.

4. Additional info on sampling and survey implementation

Sampling

In tandem with the development of the online survey questionnaire, the identification of potential respondents was also in progress. Therefore, 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 can be characterised by 'convenience' sampling. We used a web-based method to collect large samples of researchers' emails. This method has been previously used under MORE1 and MORE2 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 the URLs of academics' home pages. This is achieved through Bing advanced site-specific searches of a list of thousands university web sites for keywords like "home page", "homepage", "CV" or "Curriculum Vitae", as well as non-English variations, such as "página principal". 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 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 a previous study it had a reasonable success rate. These searches will be submitted via automatically by the commercial Bing API, paid through by the Microsoft Cognitive Services framework. For countries with small university websites or low numbers of email addresses found, the above will be supplemented by web crawling of university websites.
- 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 of their academics which does not include an email address or that obscures their email address.

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

(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 we will adopt the inclusive approach of surveying all email addresses that we can find.

On top of this contact generation approach, the survey was announced to the researchers through various means. On the Euraxess and Marie Curie websites, an information section about the survey and its objectives and a link to the online survey was added. In addition, the survey was announced in the communities of EU researchers abroad, like the ones that can be accessed through the EU centres of excellence around the world. This combined approach has worked well in the MORE1 and MORE2 study.

Survey implementation

After the data collection process described above, the email addresses were inputted into the online survey tool and the survey is launched automatically. In terms of follow-up, a number of precautions were taken in order 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 followed up response and consequently decided on the optimal timing for sending out reminder emails.
- The respondents also received an email address where they were able to address any questions or comments in relation to the questionnaire. One of the team members of Task 2 was responsible for responding to these emails and provided clarifications or assistance when needed on a daily basis.
- The response evolution was followed 'on the foot' in order to take corrective measures if/when needed.

Finally, also "snowballing" was used as an additional source to increase the survey sample. All respondents of the survey had the opportunity to forward the survey link to people potentially interested in the survey. The sampling method generated far more emails than was necessary. However, a large sample set is required in order to balance the size of the populations we are interested in, and to have a 'reserve' in case response rates were not as expected. Response rates are lower for some types of country due to the low numbers of relevant researchers and the limited web presence of research institutions in some research areas.

5. Overview table country group allocation

Table 50: Country groups by country of employment of researchers

Region	Countries	Total	TG1	TG2	TG3	TG4
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States	986	288	127	95	476
US	United States	236	91	17	15	113
Non-EU OECD	Australia, Canada, Chile, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	1,193	350	164	118	561
BRICS	Brazil, China, India, Russia, South Africa	320	40	59	36	185
Other	Akrotiri, Algeria, Argentina, Bangladesh, Belarus, Cameroon, Colombia, 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	214	27	40	24	123

Table 51: Country groups by country of PhD graduation of researchers

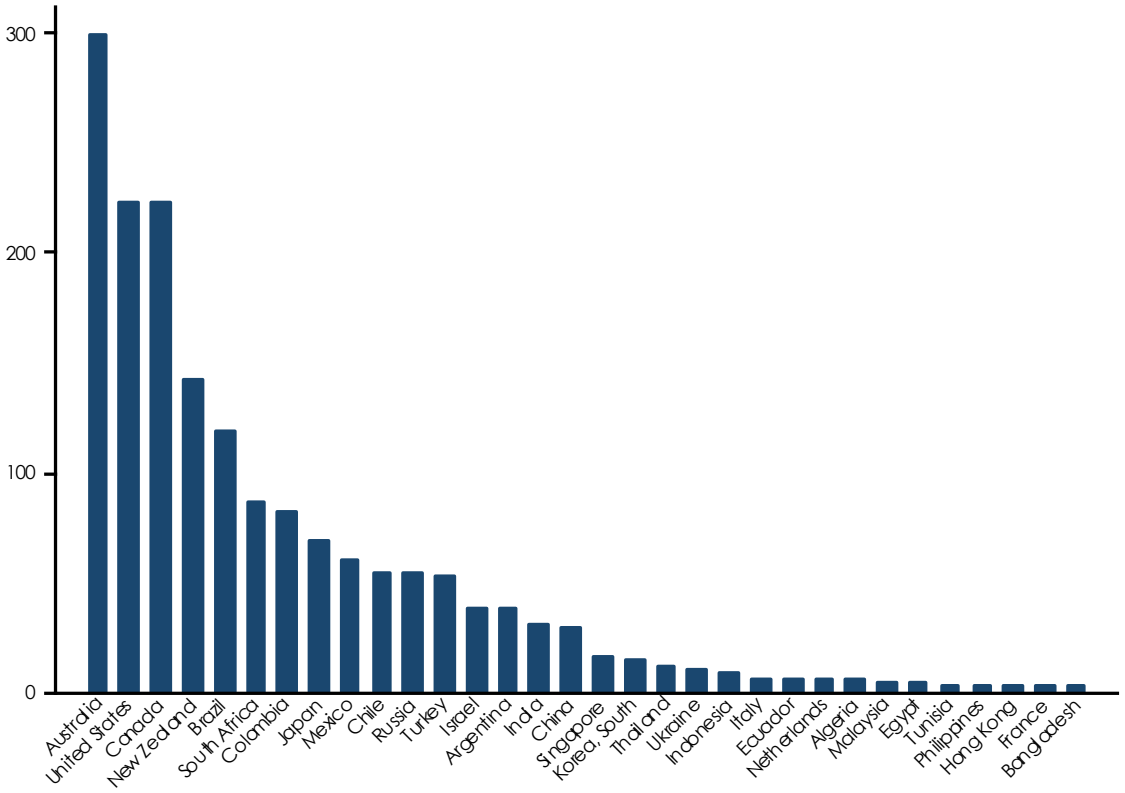
Region	Countries	Total	TG1	TG2	TG3	TG4
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States, Ireland, United Kingdom	885	167	130	108	480
US	United States	279	39	31	55	154
EU and associated countries	Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Slovenia, Sweden, Switzerland, United Kingdom	462	298	65	23	76
Non-EU OECD	Australia, Canada, Chile, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	837	104	130	110	493
BRICS	Brazil, China, India, Russia, South Africa	243	11	45	26	161
Other	Algeria, Andorra, Argentina, Belarus, Botswana, Cameroon, Colombia, Cuba Ecuador, Egypt, Hong Kong, Indonesia, Kazakhstan, Malaysia, Panama, Serbia and Montenegro, Singapore, Sudan, Taiwan, Thailand, Tunisia, Ukraine, Venezuela	90	4	17	9	60

Table 52: Country groups by country of citizenship of researchers

Region	Countries	Total	TG1	TG2	TG3	TG4
Anglo Saxon	Australia, Canada, New Zealand, South Africa, United States, Ireland and United Kingdom	733	89	120	83	441
US	United States	150	0	14	26	110
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	417	417	0	0	0
Non-EU OECD	Australia, Canada, Chile, Israel, Japan, South Korea, Mexico, New Zealand, Turkey, United States	793	0	153	112	528
BRICS	Brazil, China, India, Russia, South Africa	0	63	33	189	285
Other	Algeria, Argentina, Bangladesh, Belarus, Cameroon, Colombia, Cuba, Ecuador, Egypt, Ethiopia, Ghana, Hong Kong, Indonesia, Iran, Kazakhstan, Kenya, Malawi, Malaysia, Morocco, Nepal, Nigeria, Pakistan, Panama, Peru, Philippines, Samoa, Saudi Arabia, Serbia and Montenegro, Singapore, Sudan, Taiwan, Thailand, Tunisia, Uganda, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Zimbabwe	232	0	47	33	152

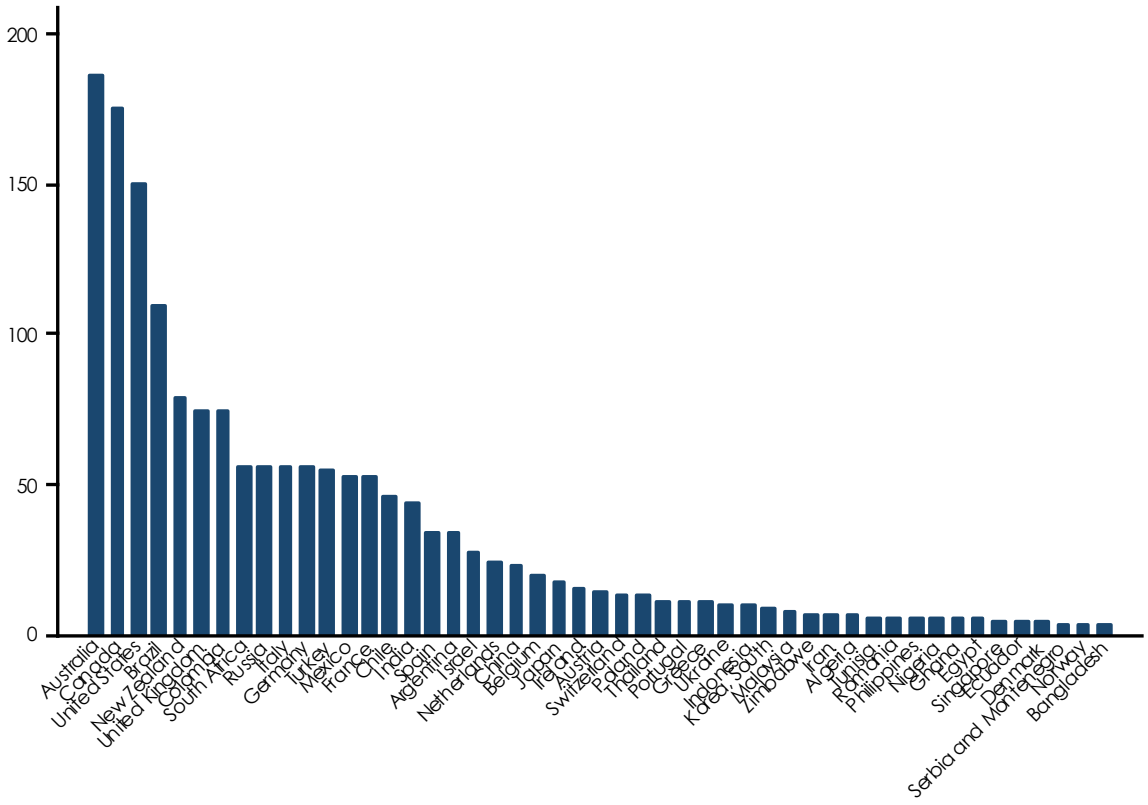
6. Additional graphs and tables chapter 5

Figure 111: Researchers' countries of residence



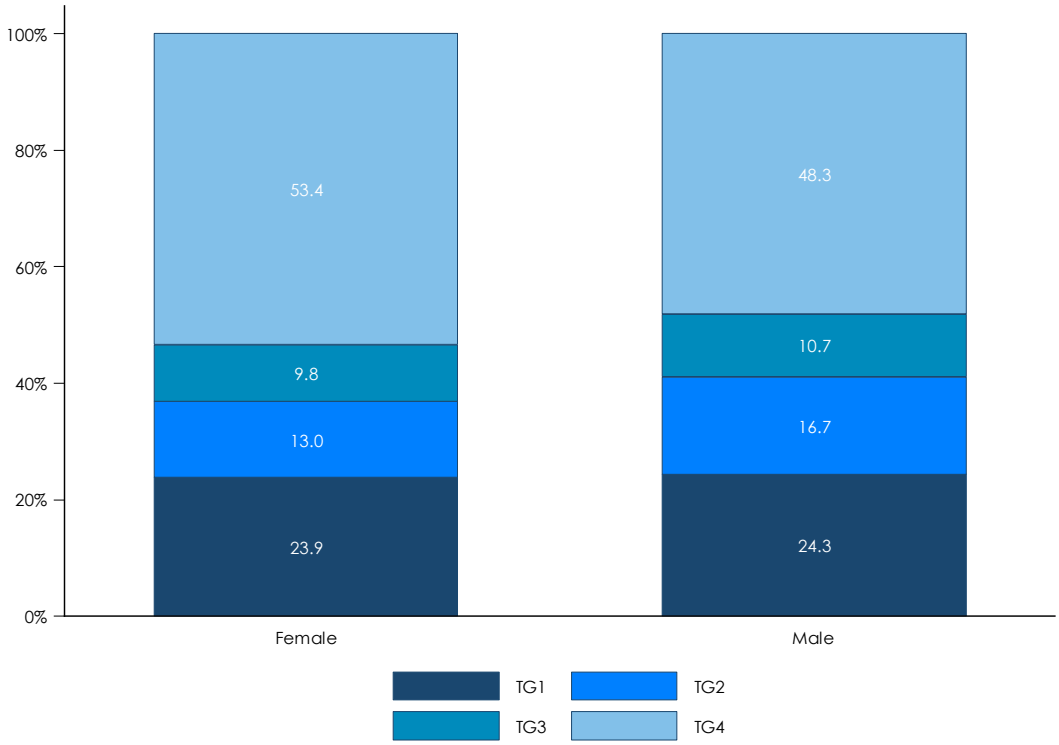
Source: MORE3 Global survey (2017)
Notes:
- Only countries where more than 2 respondents indicated to use it for residence purposes.
- Based on question 4: "What is your country of residence?"
- (n=1,727)

Figure 112: Researchers' countries of citizenship



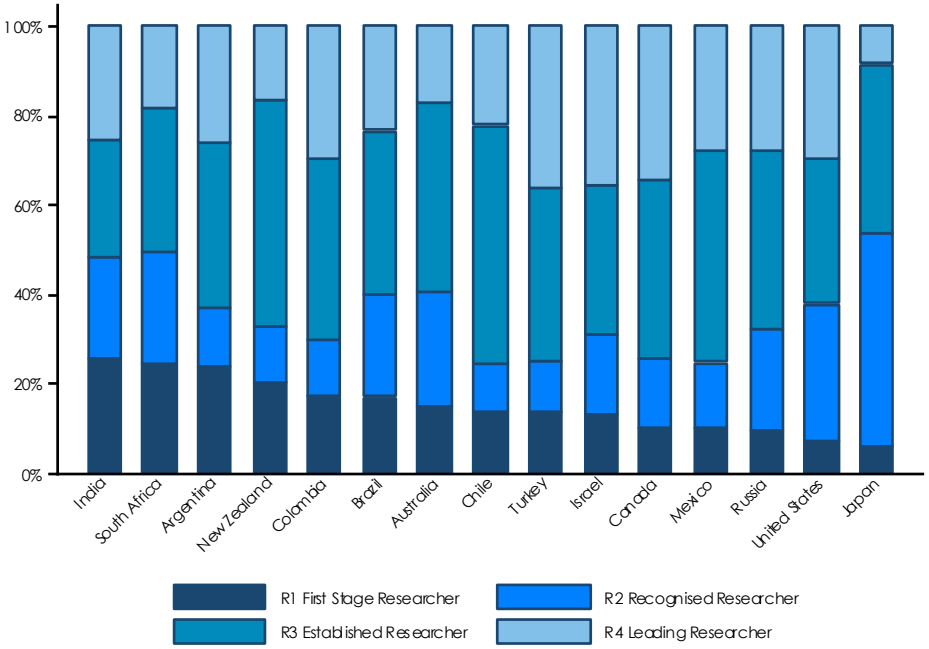
Source: MORE3 Global survey (2017)
Notes:
- Only countries where more than 2 researchers indicated it as their county of citizenship. In case of double citizenships just one country is included in the values.
- Based on question 5: ""What is your country of citizenship?"
- (n=1,727)

Figure 113: Distribution of researchers by gender and target group



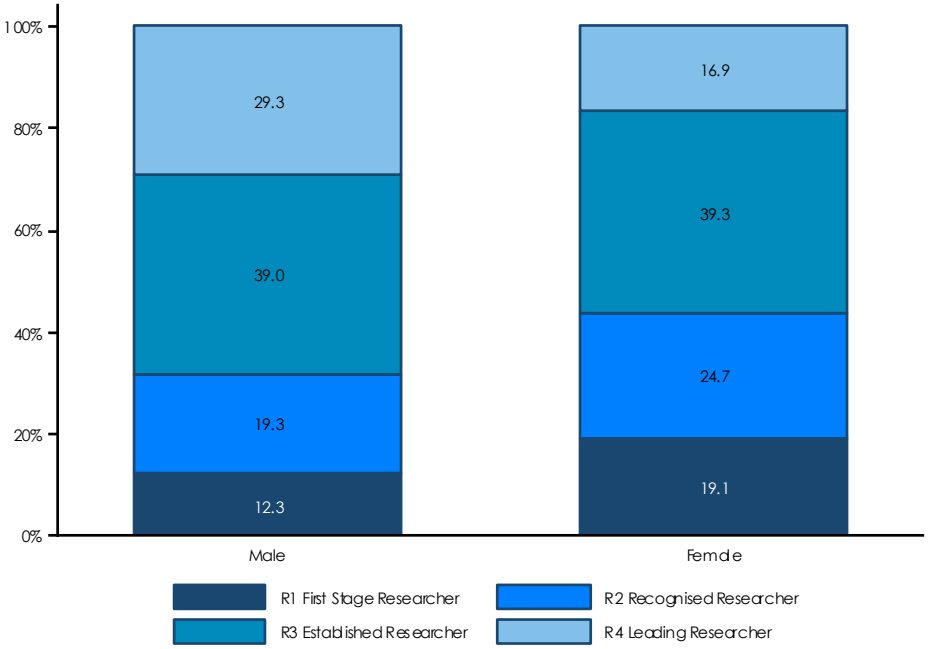
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 2: "What is your gender"

Figure 114: Distribution of researchers across career stages (R1 to R4), by countries



Source: MORE3 Global survey (2017)
Notes:
- Based on question 22 "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= 1,587)

Figure 115: Distribution of researchers by gender and career stage



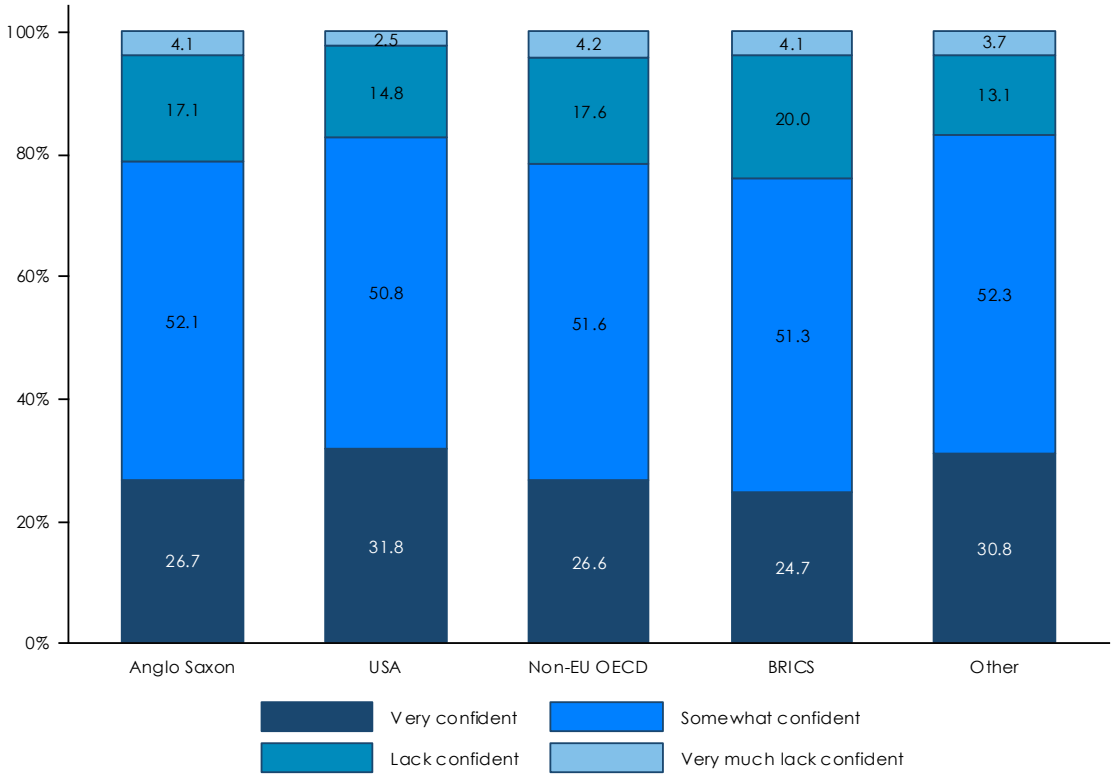
Source: MORE3 Global survey (2017)
Notes:
- Based on question 2 "What is your gender?" and question 10: "In which career stage would you currently situate yourself?"
- (n= 1,727)

Table 53: Researchers with a dual position in current employment

	Total	Per gender		Per current career stage	
2017	12.4%	F:	11.8%	R1:	13.9%
		M:	12.8%	R2:	11.9%
				R3:	10.8%
				R4:	14.5%

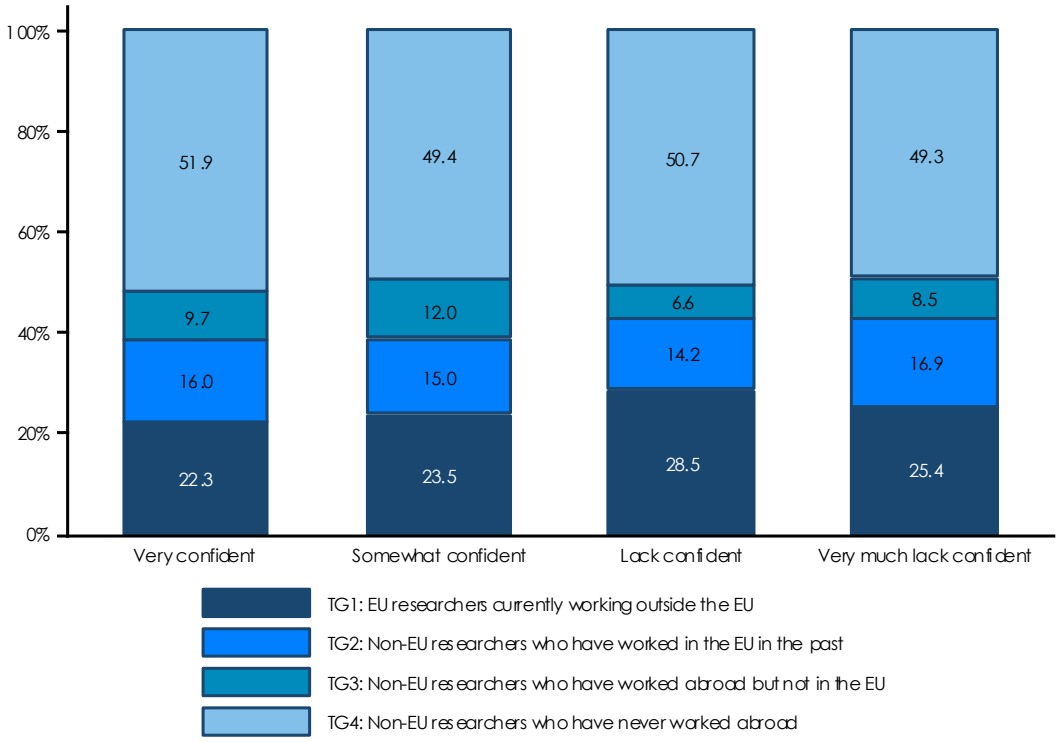
Source: MORE3 Global survey (2017)
Note:
- Total: Researchers currently working outside the EU (n=1,727)

Figure 116: Confidence in future career prospects by country groups



Source: MORE3 Global survey (2017)
Notes:
- (n= 1,727)
- Based on question 36: "Overall, how confident do you feel about the future prospects for your research career?"

Figure 117: Distribution of target groups across levels of confidence in future career prospects



Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 36: "Overall, how confident do you feel about the future prospects for your research career?"

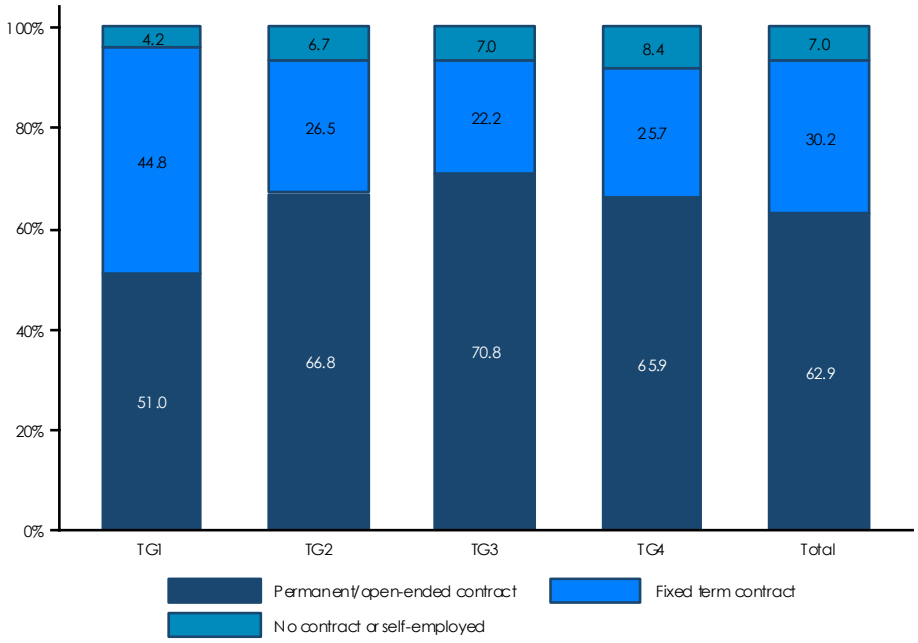
Table 54: Perception of positive factors for recruitment by target groups

	Positive Factor					Negative Factor				
	Total	TG1	TG2	TG3	TG4	Total	TG1	TG2	TG3	TG4
Interdisciplinary mobility	62.1%	62.6%	61.9%	63.6%	61.5%	10.6%	7.6%	9.3%	9.7%	12.7%
International mobility	73%	73.5%	80.8%	72.3%	70.5%	5.5%	3.5%	6.6%	5.7%	6.1%
Intersectoral mobility	43.1%	39.1%	41.4%	43.2%	45.6%	10.9%	10.4%	14.0%	8.1%	10.7%
Research output	64.5%	65.3%	65.5%	64.8%	63.7%	7.6%	6.4%	8.2%	6.2%	8.4%
Transferable skills	60.9%	61.3%	57.5%	62.3%	61.5%	4.7%	2.3%	6.6%	2.6%	5.6%

Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,512)
- TG1: EU researchers currently working outside the EU (n=361)
- TG2: Non-EU researchers who have worked in the EU in the past (n=236)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n=164)
- TG4: Non-EU researchers who have never worked abroad (n=751)
- 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 33: "In your experience would you say that the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=1,363-1,440)

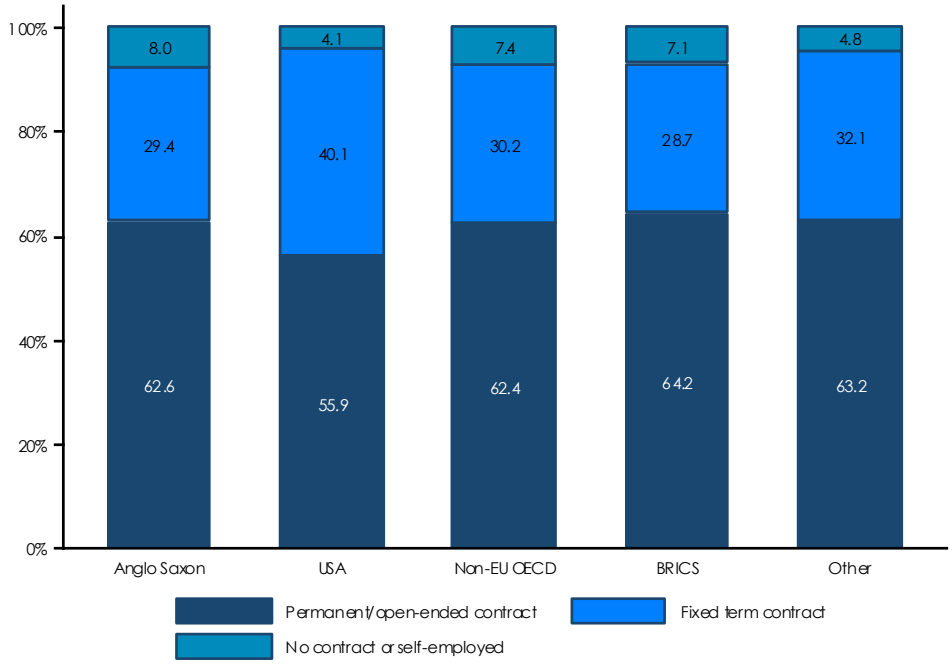
7. Additional graphs and tables chapter 6

Figure 118: Contractual situation of researchers by target groups



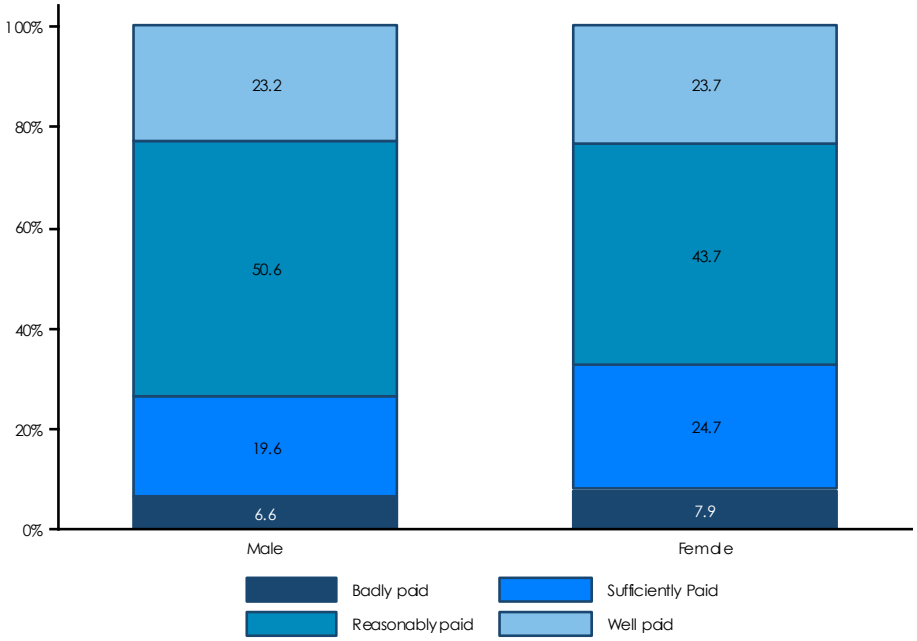
Source: MORE3 Global survey (2017)
Notes:
- Total: Researchers currently working outside the EU (n=1,727)
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- TG3: Non-EU researchers who have worked abroad but not in the EU (n=178)
- TG4: Non-EU researchers who have never worked abroad (n=869)
- Based on question 23: "Type of contract"

Figure 119: Contractual situation of researchers by country groups



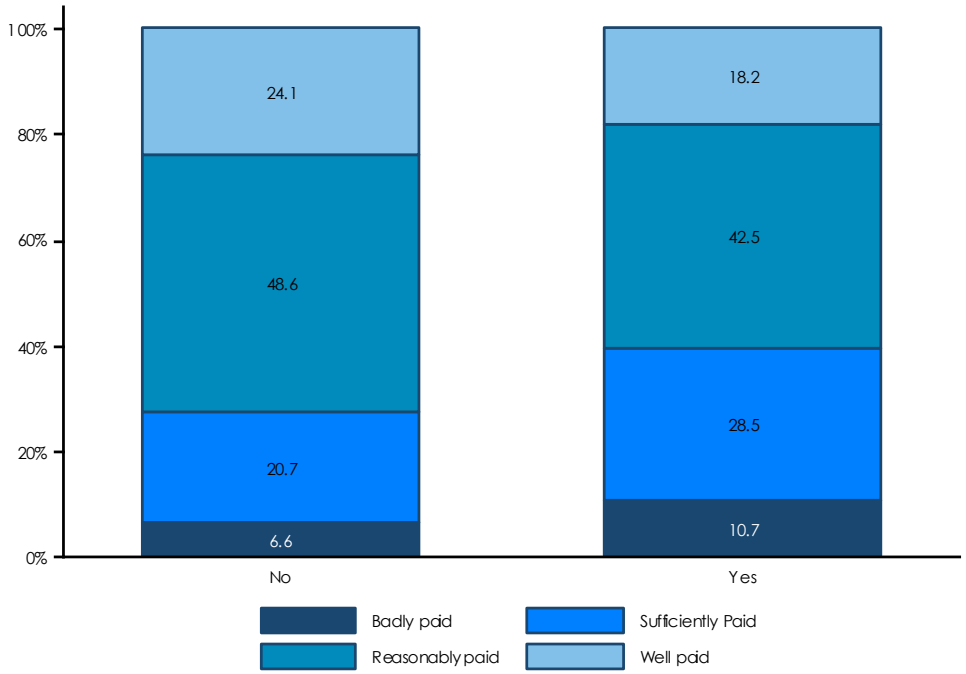
Source: MORE3 Global survey (2017)
Notes:
- Based on question 23: "Type of contract"
- (n=1,648)

Figure 120: Researchers' perception of remuneration, by gender



Source: MORE3 Global survey (2017)
Notes:
- Based on question 27: "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?"
- (n=1,727)

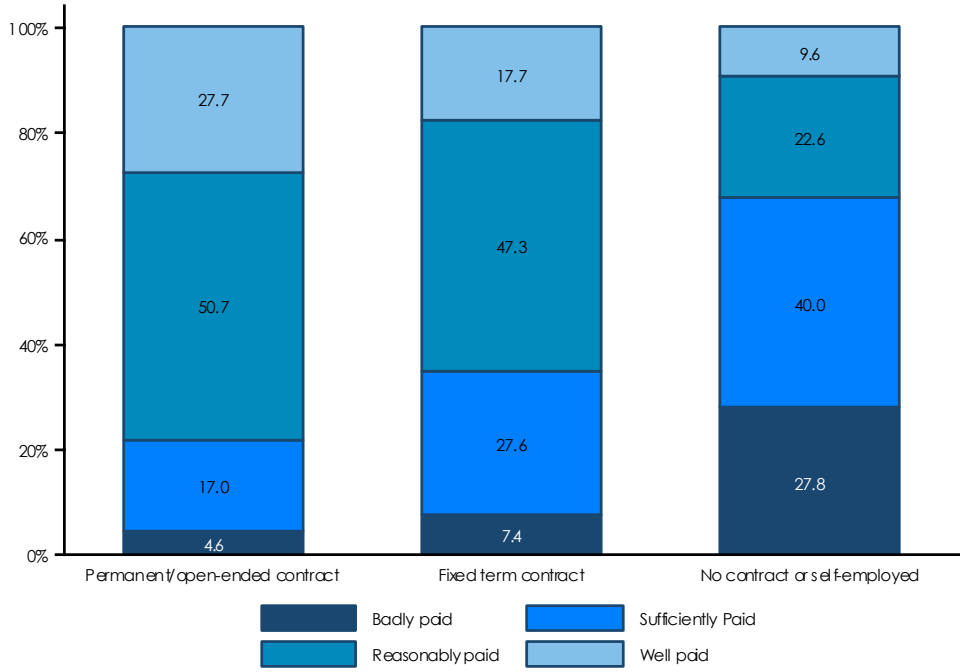
Figure 121: Researchers' perception of remuneration by dual positions



Source: MORE3 Global survey (2017)
Notes:

- Based on question 27: "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 16 "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?"
- (n=1,727)

Figure 122: Researchers' perception of remuneration by type of contract



Source: MORE3 Global survey (2017)
Notes:

- Based on question 27: "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 23 "Type of contract"
- (n=1,648)

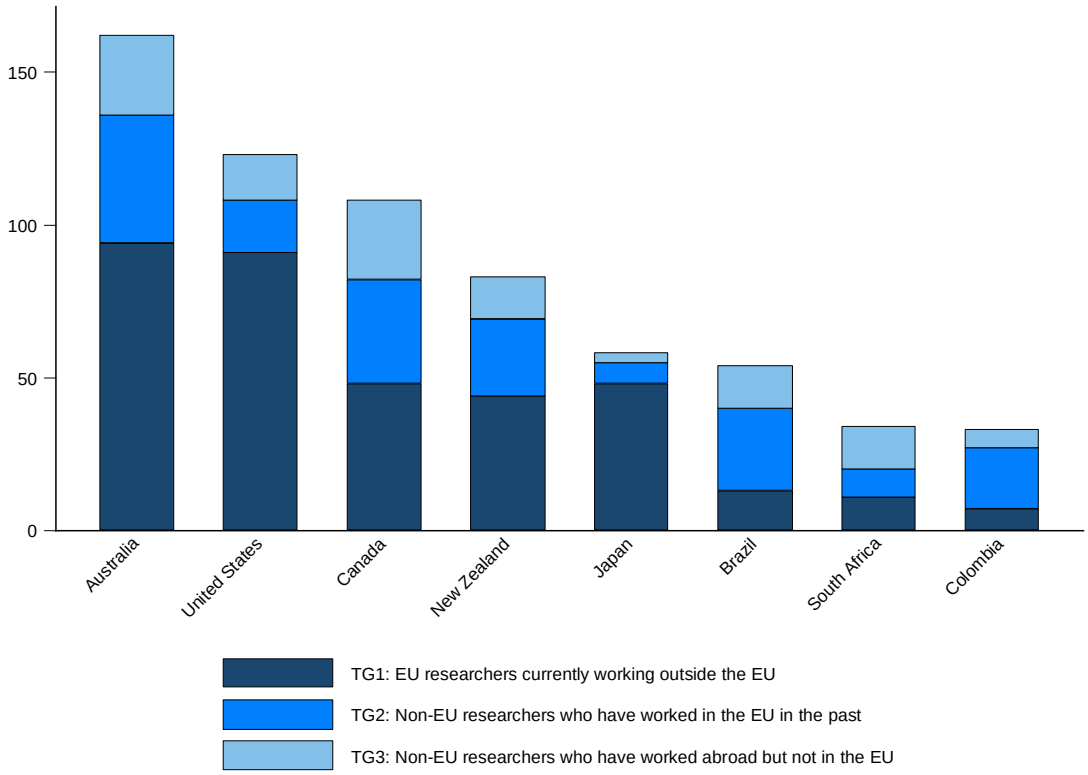
8. Additional graphs and tables chapter 7

7.1.1.1 Mobility patterns

International long term mobility > 3 months (in the past 10 years)

The largest number of responses indicating that they have done this type of mobility is found among those who currently work in Anglo-Saxon countries: Australia (n = 162), US (n= 123), Canada (n = 108), New Zealand (n = 83). The list of top countries in number of respondents is complemented with Japan (n = 58) and Brazil (n = 54). Figure 123 provides an overview of the number of respondents that have been mobile for more than three months per country.

Figure 123: > 3 month international mobility, in the last ten years, by country of employer



Source: MORE3 Global survey (2017)
Notes:

- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?"
- (n = 655)
- Only considers countries where 30 or more researchers are currently employed.

Table 55: > 3 month international mobility in the last ten years TG1, by country

Country of current employment	n
Australia	94
United States	91
Canada	48
Japan	48
New Zealand	44
Brazil	13
Chile	12
China	11
South Africa	11
Singapore	10
Other	35
Total	**417**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" and question 22 "What is your country of current employment?"
- Only considers countries where 10 or more researchers are currently employed.

Table 56: > 3 month international mobility in the last ten years TG1, by country of citizenship

Country of citizenship	n
United Kingdom	74
Germany	55
Italy	55
France	52
Spain	34
Netherlands	23
Belgium	19
Ireland	15
Austria	14
Poland	13
Switzerland	13
Greece	11
Portugal	11
Other	28
Total	**417**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" and question 5 "What is your country of citizenship".
- Only considers countries where 10 or more researchers have their citizenship.

Table 57: > 3 month international mobility in the last ten years TG2, by country

Country of current employment	n
Australia	42
Canada	34
Brazil	27
New Zealand	25
Colombia	20
United States	17
Mexico	13
Other	85
Total	**263**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" and question 22 "What is your country of current employment?"
- Only considers countries where 10 or more researchers are currently employed.

Table 58: > 3 month international mobility in the last ten years TG3, by country

Country of current employment	n
Australia	26
Canada	26
United States	15
Brazil	14
New Zealand	14
South Africa	14
Mexico	10
Other	59
Total	**178**

Source: MORE3 Global survey (2017)
Notes:
- Based on question 37 "After gaining you highest education qualification (PhD or other), how would you typify your international mobility experience?" and question 22 "What is your country of current employment?"
- Only considers countries where 10 or more researchers are currently employed.

International long term mobility > 3 months more than 10 years ago

211 respondents indicated that they had been mobile for more than 3 months but that this was more than 10 years ago. In this category, the largest number of respondents originate from Australia (41) and Canada (40). Of these 211 researchers, 79% were mobile towards the EU more than 10 years ago[133].

Non-mobility

658 respondents indicated that they had not been mobile for more than 3 months in the past 10 years. The countries from which a largest number of non-mobile respondents originate are Australia (94), the United States (87), Canada (74) and Brazil (51).

[133] Based on question 69 "Have you been mobile more than 10 years ago?"

Table 59: Overview of mobility flows from the EU towards other EU countries

Country	n
United Kingdom	46
Germany	24
France	23
Spain	13
Belgium	10
Netherlands	10
Austria	8
Italy	8
Switzerland	8
Sweden	7
Denmark	6
Finland	4
Greece	3
Portugal	3
Norway	2
Poland	2
Romania	2
Iceland	1
Ireland	1
Latvia	1
Lithuania	1
Slovenia	1
Total	**184**

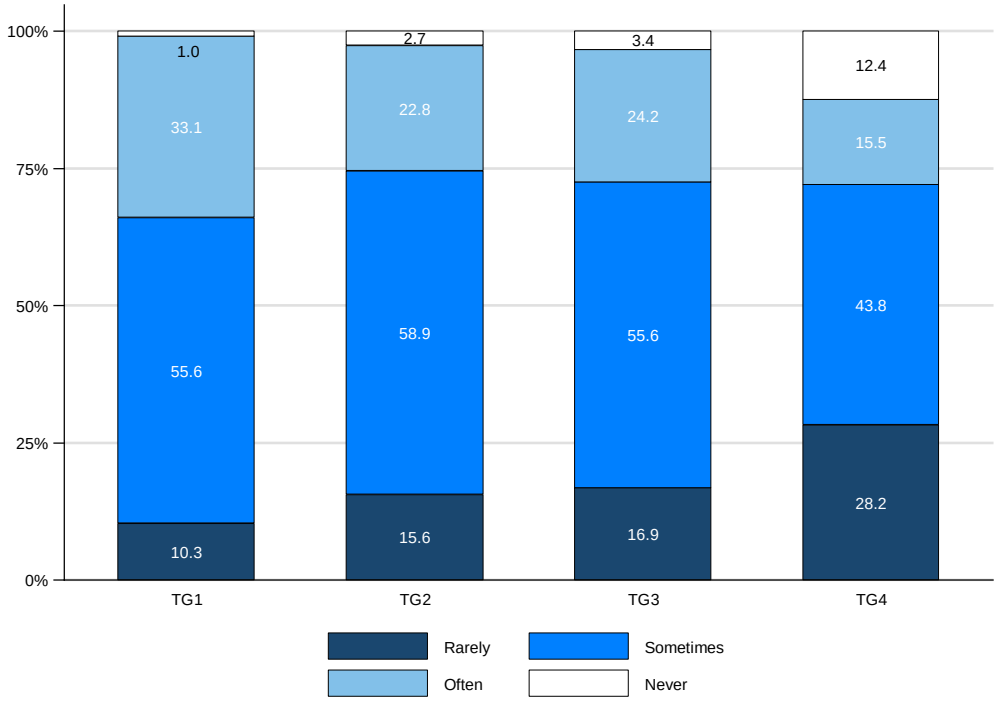
Source: MORE3 Global survey (2017)
Notes:
- Counts of moves from EU countries towards other EU countries by EU researchers who currently work outside the EU.
- Based on question 39 "Please indicate the 3 most recent international steps/moves taken in the last 10 years of your research career?"
- With "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.
- (n = 184)
- Only flows of 3 moves or more are presented

7.1.3 Short travel for conferences, meetings and visits

Conferences

Among the sample of researchers currently working outside the EU, 93% indicated to have undertaken a work-related international travel for conferences. 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: 12% of them does not do this type of move compared to shares below 4% for the rest of the target groups. 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 124: Frequency of international travel to attend conferences or events across target groups



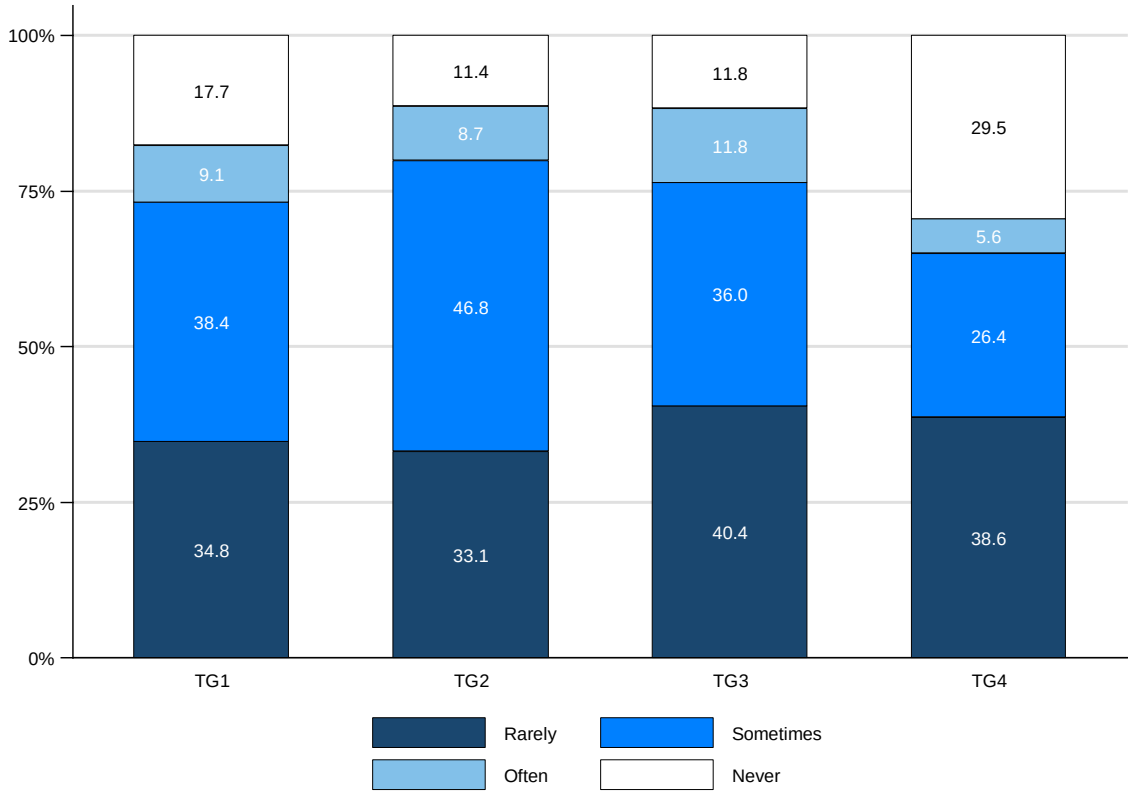
Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n = 263)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n = 178)
- TG4: Non-EU researchers who have never worked abroad (n = 869)
- Based on question 80 "What types of work-related international travel have you undertaken during your research career?

Study visits

Among the researchers currently working outside the EU, 78% indicated to have undertaken a work-related international travel for study visits, research visits and/or fieldwork.

With respect to this type of international travels, the situation across groups is more heterogeneous (see Figure 125) than in the case of conferences. Non-European mobile researchers with (TG2) and those without a previous working experience in Europe (TG3) present a similar pattern with respect to moving abroad for short study visits: only 11% of this type of researchers declare to have never done this type of move, compared to 19% of the European researchers working outside Europe and 30% of the non-European non-mobile researchers. On the contrary, the situation is more homogeneous when looking at the shares of researchers who do this type of move rather frequently: the shares range from 12% for non-European researchers with working experience in other non-EU countries to 6% for those who have never been long-term mobile.

Figure 125: Frequency of international travel for study visits across target groups



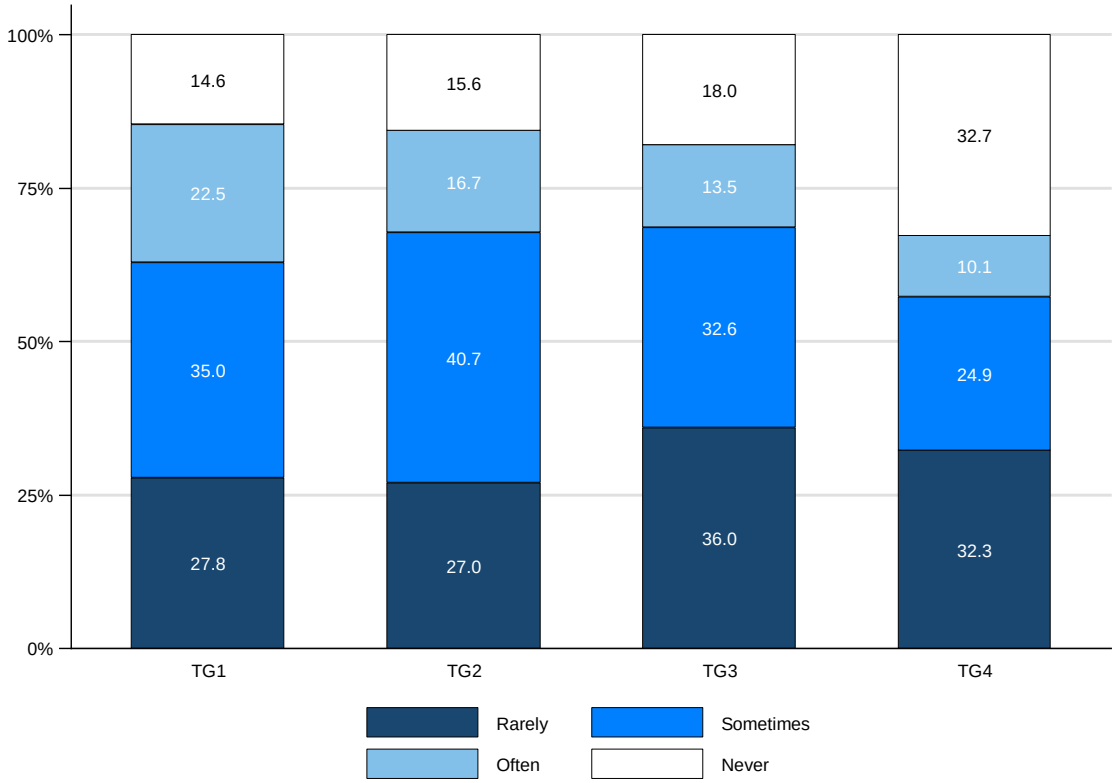
Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n = 263)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n = 178)
- TG4: Non-EU researchers who have never worked abroad (n = 869)
- Based on question 80 "What types of work-related international travel have you undertaken during your research career?

Meetings with supervisors, partners, and/or collaborators

76% of the researchers currently working outside the EU indicated to have undertaken a work-related international travel for meetings with supervisors/partners/collaborators.

15% EU researchers working outside Europe (TG1) declare that they have never gone to another country to have meetings with supervisors, partners, and/or collaborators. This share is similar to that of non-European mobile researchers who have never done so. Non-mobile researchers (TG4) are the least inclined to do this type of move, in a similar way to other types of short-term mobility presented above.

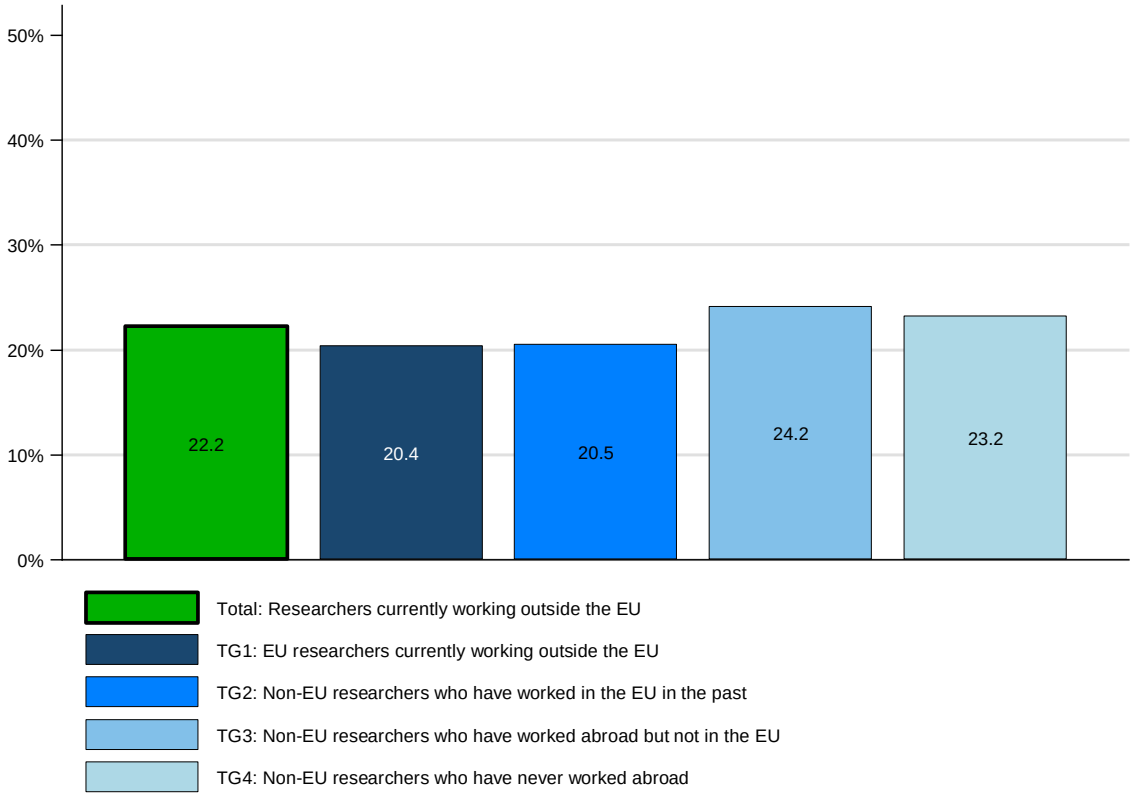
Figure 126: Frequency of international travel for meetings with supervisors, partners, and/or collaborators across target groups



Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n = 263)
- TG3: Non-EU researchers who have not worked in the EU, but in other non-EU countries (n = 178)
- TG4: Non-EU researchers who have never worked abroad (n = 869)
- Based on question 80 "What types of work-related international travel have you undertaken during your research career?

7.2 Intersectoral mobility

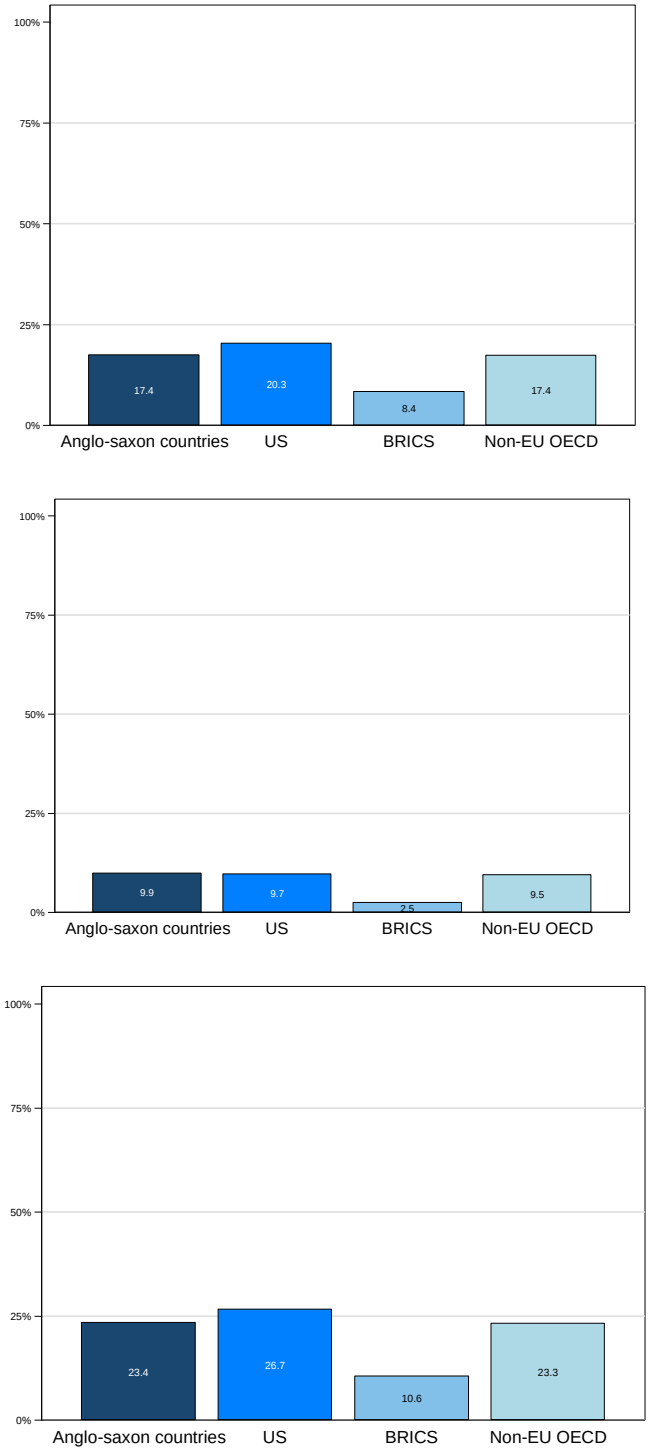
Figure 127: Intersectoral mobility in the last ten years



Source: MORE3 Global Survey (2017)
Notes:
- The figure also reflects those that are employed in dual positions.
- Based on Question 17 "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 20 "Apart from your current sector(s) of employment, in which other sector(s) have you worked (as a researcher) during the last ten years (2007-2017)?"
- (n=1,727)

7.3 Interdisciplinary mobility

Figure 128: Interdisciplinary collaboration (upper panel), intersectoral collaboration (middle panel) and international collaboration (lower panel) across countries



Notes:
- Based on question 57 and question 68 "Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?"
- (n=893)

7.4 Collaboration

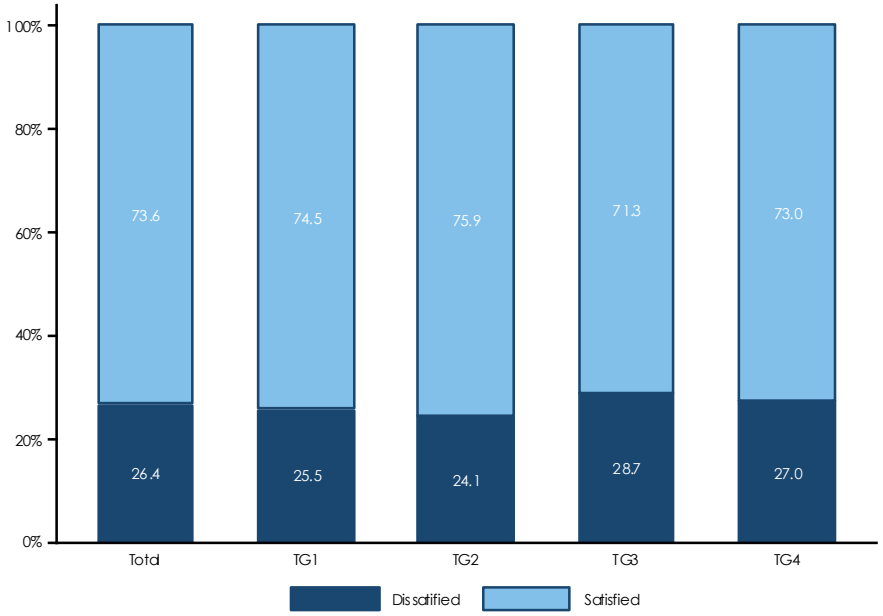
Table 60: Gender differences in collaboration across target groups

		Male	Female	Difference
TG1	Researchers in other disciplines	59.7%	58.5%	1.1%
	Researchers in another sector	31.2%	29.3%	2.0%
	Researchers from another country	81.0%	75.6%	5.4%
TG2	Researchers in other disciplines	62.6%	62.9%	-0.3%
	Researchers in another sector	31.6%	24.7%	6.9%
	Researchers from another country	79.3%	65.2%	14.1%

Source: MORE3 Global survey (2017)
Notes:
- TG1: EU researchers currently working outside the EU (n=417)
- TG2: Non-EU researchers who have worked in the EU in the past (n=263)
- Based on question 2 "Gender", question 57 and question 68 "Please indicate with whom you collaborate in your research. Which of these collaborations was the result of a previous mobility experience?"
- (n=680: 417 in TG1, 263 in TG2)

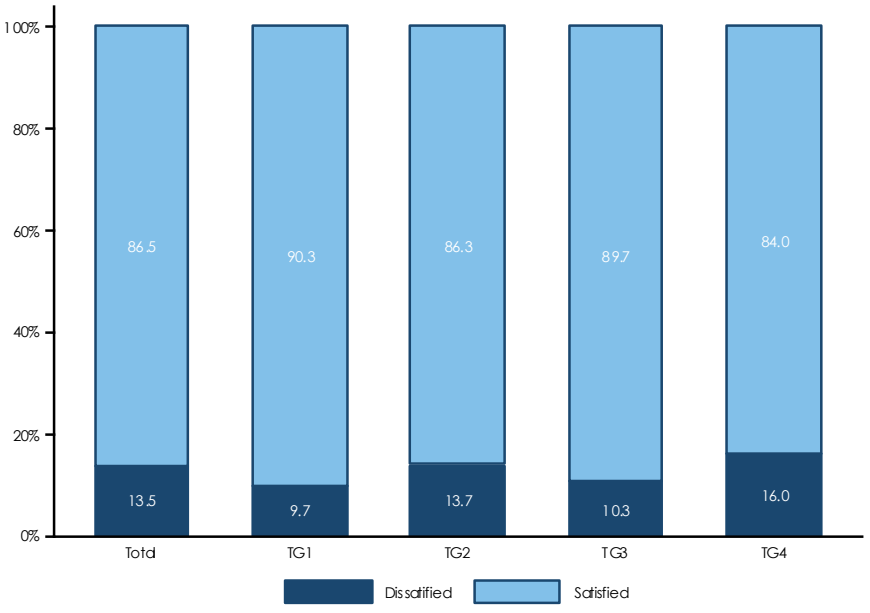
9. Additional graphs and tables chapter 8

Figure 129: Individual satisfaction with quality of training and education, by target groups



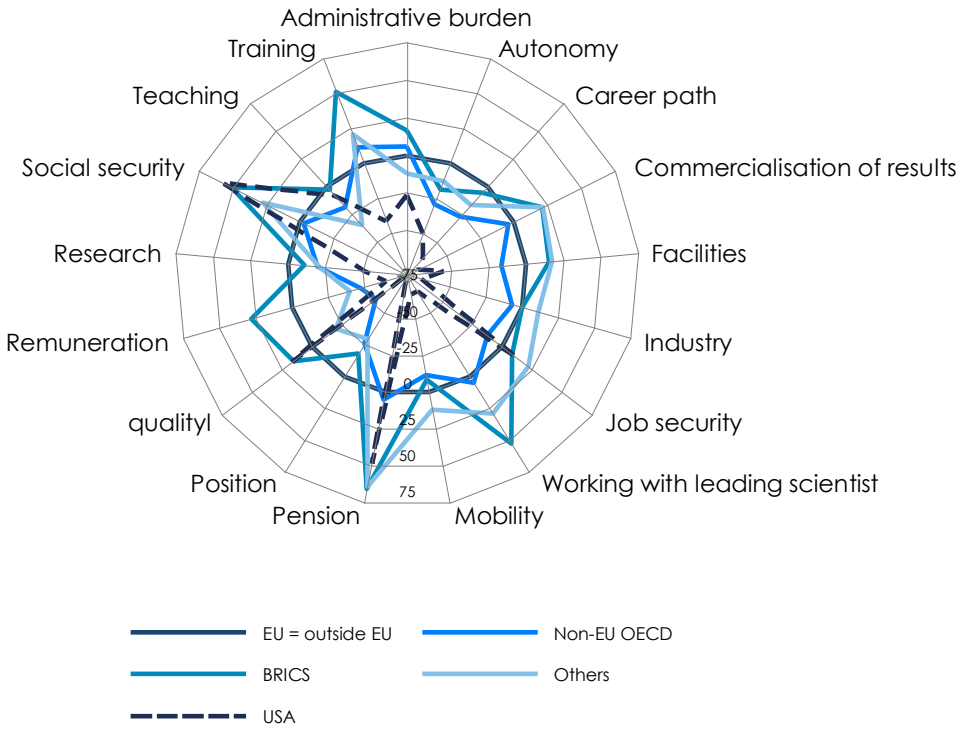
Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,649)

Figure 130: Individual satisfaction with research autonomy, by target groups



Source: MORE3 Global survey (2017)
Notes:
- Based on question 26: "Please indicate your satisfaction with each factor as it relates to your current position."
- (n=1,649)

Figure 131: Perception of EU attractiveness by EU researchers abroad grouped by their current country of employment



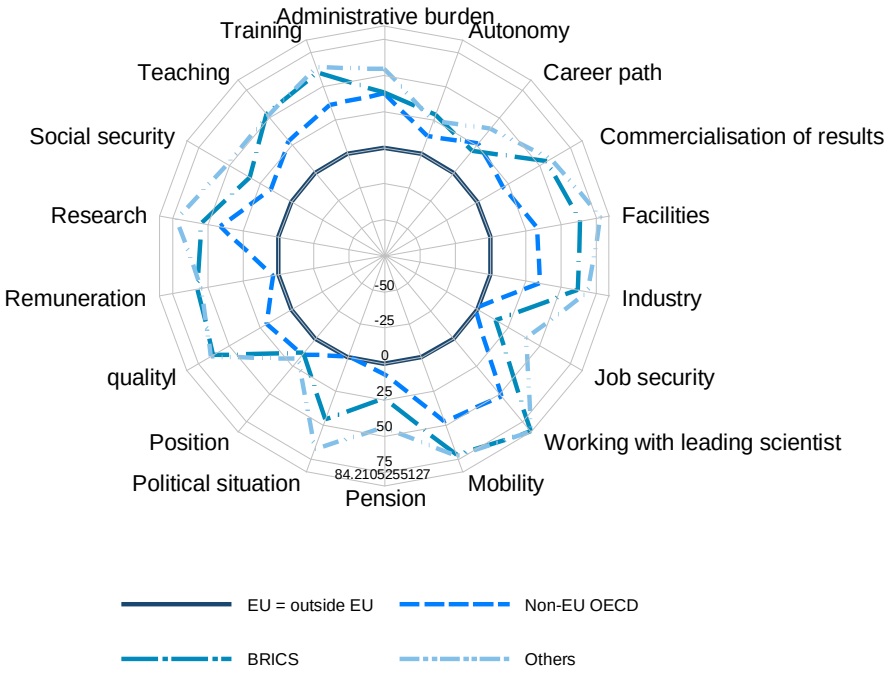
Source: MORE3 Global Survey (2017)
Notes:
- Only EU researchers who work outside the EU, grouped by their current country of employment.
- Based on question 50: "How does working in … compare to working as a researcher in Europe? Please indicate if something is worse, similar or better in … than in Europe."
- (n= 415)

Table 61: Effects of stay abroad for non-EU researchers, grouped by country of stay in the EU

	North	South	West	East
Job options in academia	0.90	0.76	0.58	1.00
Career progression	0.92	0.91	0.78	0.90
Collaboration with other FOS	1.29	1.00	0.90	0.80
Number of co-authored publications	0.83	0.83	0.73	0.78
International Network	1.33	1.39	1.30	1.30
Job options outside academia	0.53	0.52	0.33	0.50
Quality of life	0.75	0.69	0.53	1.11
Quality of output	0.92	0.90	0.81	0.89
Quantity of output	1.04	0.96	0.80	1.10
Recognition	1.21	0.87	0.95	1.10
Research Funding	0.87	0.70	0.58	1.11
Research skills	1.22	1.04	0.97	0.90
Progression in salary	0.64	0.51	0.38	0.56

Source: MORE3 Global Survey (2017)
Notes:
- Only non-EU researchers who have been mobile to the EU, grouped by their country of stay in the EU.
- Based on question 61: "Please indicate below how your stay in Europe has influenced the following factors."
- (n= 195-259)

Figure 132: Perception of EU attractiveness by non-EU researchers who have been mobile to the EU grouped by their current country of employment



Source: 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 60: "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= 261)

Table 62: Awareness of Euraxess Links by country

	Aware	Not Aware	Observation
Akrotiri	0.0%	100.0%	1
Algeria	40.0%	60.0%	5
Argentina	5.3%	94.7%	38
Australia	4.4%	95.6%	297
Bangladesh	50.0%	50.0%	2
Belarus	0.0%	100.0%	2
Brazil	49.6%	50.4%	119
Cameroon	100.0%	0.0%	1
Canada	9.5%	90.5%	222
Chile	5.2%	94.8%	58
China	90.0%	10.0%	30
Colombia	12.4%	87.7%	81
Ecuador	0.0%	100.0%	5
Egypt	0.0%	100.0%	4
Ethiopia	0.0%	100.0%	1
Ghana	0.0%	100.0%	1
Holy See (Vatican City)	0.0%	100.0%	1
Hong Kong	100.0%	0.0%	3
India	100.0%	0.0%	31
Indonesia	71.4%	28.6%	7
Israel	5.1%	94.9%	39
Japan	87.0%	13.0%	69
Kazakhstan	0.0%	100.0%	2
Kenya	0.0%	100.0%	1
Korea, South	20.0%	80.0%	15
Malaysia	100.0%	0.0%	5
Mexico	8.2%	91.8%	61
New Zealand	2.8%	97.2%	144
Nigeria	0.0%	100.0%	1
Panama	0.0%	100.0%	1
Peru	0.0%	100.0%	2
Philippines	100.0%	0.0%	3
Russia	13.2%	86.8%	53
Saudi Arabia	0.0%	100.0%	1
Senegal	0.0%	100.0%	1
Serbia and Montenegro	100.0%	0.0%	1
Singapore	66.7%	33.3%	15
South Africa	5.8%	94.3%	87
Sudan	0.0%	100.0%	1
Taiwan	50.0%	50.0%	2
Thailand	100.0%	0.0%	10
Tunisia	66.7%	33.3%	3
Turkey	7.7%	92.3%	52
Ukraine	22.2%	77.8%	9
United States	37.3%	62.7%	236
Uruguay	0.0%	100.0%	1
Uzbekistan	50.0%	50.0%	2
Vietnam	100.0%	0.0%	1

Source: MORE3 Global Survey (2017)
Notes:
- Based on question 81: "Do you know Euraxess Links?"
- (n=1,727)

Table 63: Overview of potential data sources for the estimation of the number of EU researchers currently working abroad

Source	type of data	Level of aggregation	Years covered	
OECD	Share of international students enrolled by country of origin	Master's and doctoral or equivalent level (ISCED2011 levels 7 and 8) by country of origin	2013/2014	US, CA, JP, KR, AU, NZ, CL
	Number of mobile students by country of destination	Master's and doctoral or equivalent level (ISCED2011 levels 7 and 8)	2013/2014	US, CA, RU, JP, KR, AU, NZ, BR, CL
	Share of mobile students by country of destination	Master's and doctoral or equivalent level (ISCED2011 levels 7 and 8)	2013/2014	US, CA,JP, KR, AU, NZ, CL
	Share of international graduates	Total tertiary education (ISCED2011 levels 5 to 8)	2013/2014	
	International graduates by origin	Doctoral graduates (isced2011 level 8)	2013/2014	CA, AU, NZ, CL
	Enrolment of international students by origin	Doctoral candidates (isced2011 level 8)	2013/2014	CA, RU, JP, KR, AU, NZ, BR, CL
	Enrolment of international students by origin	Total tertiary education (ISCED2011 levels 5 to 8)	2013/2014	US,CA, RU, JP, KR, AU, NZ, BR, CL, ZA
	OECD Foreign/international students enrolled	Advanced research programmes (ISCED1997 level 6)	2007-2012	CA, JP, KR, AU, NZ, BR, CL
	OECD Foreign/international students enrolled	Total tertiary education (ISCED1997 level 5&6)	2007-2012	US,CA, RU, JP, KR, AU, NZ, BR, CL, ZA
	New entrants in doctoral studies by area of origin (rest of the world, or excluding mobile students)	Doctoral candidates (isced2011 level 8)	2005, 2010, 2011,2012, 2013	
	Inflows of foreign population by nationality	--	2000-2013	
	Stock of foreign labour by nationality	--	2000-2013	
	Status changes in international students	--	2000-2013	
	Professional, scientific and technical activities (M) (Employment by activities and status)	Professional acivities	Annual (2003-2013)	
	Immigrants by citizenship and age, level of education	Advanced research programmes (ISCED1997 level 6)	2000	US,CA, NZ,
	Immigrants by citizenship and age, level of education	Total tertiary education (ISCED1997 level 5&6)	2000	US,CA, JP, AU, NZ,
	Immigrants by detailed occupation	Occoupation	2000	US,CA, AU, NZ,
	Database on immigrants	Total tertiary education (ISCED1997 level 5&6)	2010/11	US,CA, RU, JP, AU, NZ, BR, CL, AR, ZA

Source	type of data	Level of aggregation	Years covered	
ilostat	Employment by occupation, total and migrants		2000-2015	
ilostat	Working-age population by sex and education, total and migrants		2000-2015	
UNSD Demographic statistics United Nations Statistics Division (UNSD)	Foreign population (non-citizens) 15 years of age or over by country of citizenship, educational attainment and sex	Advanced research programmes (ISCED1997 level 6)	2010.2011	RU, CN, BR,
United Nations Statistics Division (UNSD)	Foreign-born population 15 years of age or over by country/area of birth, educational attainment and sex	Advanced research programmes (ISCED1997 level 6)	2010	SG, BR, AR
United Nations Populations Dividsion - International Migration	International migrant stock By destination and origin		1990. 1995. 2000. 2005. 2010 .2015	
ScienceEurope	Top pairs of collaboration of Europe countries with countries outside Europe.	Patterns of co-authorships between EU countries and countries in the rest of the world on the basis of sources (articles, books, etc) covered by SCOPUS		
Institute of International Education	Open Doors report: Postgraduate students by country of origin	Graduate	2000-2015	US,
Institute of International Education	Open Doors report: Postgraduate students by country of origin	International students	Selected years 1949-2000;2001-2015	US,
Institute of International Education	Open Doors report: INTERNATIONAL SCHOLARS BY PLACE OF ORIGIN	Scholars	2002-2015	US,
Survey of Earned Doctorates (SED)	Ongoing and finished PhD studies by citizenship	Doctors and PhD students	1957-2014, Access to microdata covering only from 1993	
Survey of Doctorate Recipients (SDR)	Employed doctoral scientists and engineers	Doctors	2013	US,
American Community Survey (ACS)	Number of foreign born doctorate holders residing in the US by country of birth and citizenship	Phd holders	2005-2009	US,

Table 64: Stay rates

	Source	Indikator	Percentage
Stay rate of foreign students in country of destination	National Science Foundation (NSF)	Plans of foreign recipients of U.S. S&E doctorates to stay in the United States, by field and place of origin: 1998–2009	50%
	National Science Foundation (NSF)	Five-year stay rates for U.S. S&E doctorate recipients with temporary visas at graduation, by selected country/economy: 2011	66%
	National Science Foundation (NSF)	Five-year stay rates for U.S. S&E doctorate recipients with temporary visas at graduation, by selected country/economy: 2012	60.4%
	National Science Foundation (NSF)	Stay rates of temporary visa holder U.S. doctorate recipients from top 10 countries of origin: 2005-–15, in percent	50-65%
	Lan, Xiaohuan. "Permanent visas and temporary jobs: evidence from postdoctoral participation of foreign PhDs in the United States." Journal of Policy Analysis and Management 31.3 (2012): 623-640.	U.S.-trained, non-citizen PhDs in science and engineering who work in the US after graduation	75%
	Finn, Michael G. *Stay rates of foreign doctorate recipients from US universities, 2007*. No. 10-SEP-0168. Oak Ridge Institute for Science and Education (ORISE), Oak Ridge, TN (United States), 2010.	Five-year Stay Rates of Temporary Resident Doctorate Recipients in 2007; (2002 grads)	62
	Finn, Michael G. *Stay rates of foreign doctorate recipients from US universities, 2007*. No. 10-SEP-0168. Oak Ridge Institute for Science and Education (ORISE), Oak Ridge, TN (United States), 2010.	Ten- year Stay Rates of Temporary Resident Doctorate Recipients in 2007; (1997 grads)	60%
	Han X, Stocking G, Gebbie MA, Appelbaum RP. Will They Stay or Will They Go? International Graduate Students and Their Decisions to Stay or Leave the U.S. upon Graduation. Montoya ARH, ed. *PLoS ONE*. 2015;10(3):e0118183. doi:10.1371/journal.pone.0118183.	Share of foreign S&E doctorate recipients staying in the U.S.	50%
PhDs working in research	National Science Foundation (NSF)	Share of foreign born S&E doctorate holders with academic employment in postdoc positions, by place of birth; average of 1973–2013	33.1%
	National Science Foundation (NSF)	Share of foreign born S&E doctorate holders with academic employment in postdoc positions, by place of	47.5%

		birth; 2013	
	Lan, Xiaohuan. "Permanent visas and temporary jobs: evidence from postdoctoral participation of foreign PhDs in the United States." Journal of Policy Analysis and Management 31.3 (2012): 623-640.	Share of researchers taking postdoctoral positions in US-trained, foreign PhDs who stay in the US after graduation	54%
	Lee, Hsing-fen, Marcela Miozzo, and Philippe Laredo. "Career patterns and competences of PhDs in science and engineering in the knowledge economy: The case of graduates from a UK research-based university." *Research Policy* 39.7 (2010): 869-881.	Share of graduates having their first job in academia/work as a public researcher/ work in technical positions in manufacturing	30-42%