European Commission

Survey on researchers in European Higher Education institutions

Annex to MORE3 study: support data collection and analysis concerning mobility patterns and career paths of researchers

IDEA Consult, WIFO and Technopolis
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Research and Innovation

Survey on researchers in European Higher Education institutions – Annex to MORE3 study: Support data collection and analysis concerning mobility patterns and career paths of researchers

European Commission
Directorate-General for Research and Innovation
Directorate B — Open Innovation and Open Science
Unit B2 - Open Science and ERA policy
Contact Emiliano Carozza
E-mail Emiliano.CAROZZA@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

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EUROPEAN COMMISSION

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European Research Area

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1. Introduction

1.1. Objectives of the MORE3 study

The MORE 3 study, titled "support of data collection and analysis concerning mobility patterns and career paths of researchers", is carried out under the framework contract "provision of services in the field of research evaluation and research policy analysis" Lot 2 "Data collection and performance indicators to monitor the European Research Policy". It foresees **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. The MORE3 study provides new indicators and thus new surveys to meet emerging policy needs and priorities.

The main objective of the MORE3 study is defined 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 part of the Second Interim Report of the MORE3 study consisting of the final reports for Task 1 and Task 3:

- Part 1: Task 1 – EU higher education survey results
- Part 2: Task 3 – Indicator report on researchers

The underlying report thus presents the final results of Task 1, the EU HE survey of researchers working in Europe.

1.2. Guide to the reader

In what follows, we first summarise the relevant policy context for the EU HE survey 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 9 contain the results of the EU HE survey in Task 1 of the study, structured according to this conceptual framework:

- Section 5: Characteristics of researchers and career paths
- Section 6: Working conditions
- Section 7: Collaboration and mobility during PhD stage, including:
  - International collaboration and mobility (stock, flow, motives, barriers)
  - Interdisciplinary experiences
  - Intersectoral experiences
- Section 8: Collaboration and mobility in post-PhD stage, including:
  - International collaboration and mobility (stock, flow, motives, barriers, effects)
  - Interdisciplinary collaboration and mobility (stock, flow, motives, barriers, effects including virtual mobility)
  - Intersectoral collaboration and mobility (stock, flow, motives, barriers, effects)
- Section 9: Attractiveness of the European Research Area

Section 10 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 indicator tables are included there.

2. Policy context

2.1. The European Research Area

The **European Research Area** concept was introduced in the 2000 Communication 'Towards a European Research Area'[1] and endorsed by the Lisbon European Council. The primary objective was to create a "unified area, open to the world, based on the internal market in which researchers, scientific knowledge and technology circulate freely and through which the Union and its Member States strengthen their scientific and technological bases, their competitiveness and their capacity to collectively address grand challenges".[2] The underlying motivation of this concept was that in order to remain competitive at the global level, Europe needed to increase the number of researchers and foster the quality of research outputs. In order to maintain and improve Europe's leading role in scientific development and capacity to compete globally, public policies needed to be oriented towards obtaining such an outcome.

One of the major requisites to create a critical mass of researchers that could impact Europe's role in global competition was and is the need to create an 'internal market' of researchers. By lowering the barriers to free movement, and by promoting the coordination of programmes, research activities and policies at the EU level. The creation of this internal market will lead to an increase of knowledge and technology circulation across Europe. This internal market encompasses measures to promote transnational mobility, fostering interdisciplinary collaboration and encouraging collaboration and movement between the public and private sectors. In this sense, removing the barriers to free movement does not only include those administrative or financial obstacles that hinder researchers' mobility both within and across countries, but also involves improving the working conditions for men and women. From the side of research institutions and private sector, the ERA encourages the use of fair, open and transparent recruitment at Higher Education Institutions (HEI).

Although the promotion of the ERA has also been done at the national and regional levels, it is the EU, and most notably, the European Commission, that has led the process by introducing new and improving existing policies related to R&D support – the 6th and 7th Framework Programmes whose activities were explicitly intended to structure the ERA, the Marie Skłodowska-Curie actions, the European Charter for Researchers, and the Code of Conduct for the Recruitment of Researchers, the 'Scientific visa' package, and the Integrated European Researcher Partnership.

The ERA and the aims associated with it are pursued and reinforced up to the present day. The ERA was **further anchored in the EU2020 strategy**[3], as a cornerstone of the **Flagship Initiative "Innovation Union"**, which fully incorporated the strengthening of the ERA in the context of boosting sustainable, inclusive and, in particular, smart growth in an evolving economic and social landscape. The smart dimension is related to investment in education, research and innovation. Increasing digitalisation and the changes derived from it are profoundly modifying not only our economic system, but also the way we live. In this context, the development of knowledge-based economies is said to be the main driver of economic growth and social development and that researchers, education and innovation lie at the core of them.

1 COM(2000) 6
2 http://ec.europa.eu/research/era/pdf/era-communication/era_what-why-when.pdf
3 COM(2010) 2020

The Innovation Union Flagship Initiative builds on the assumption that investments in R&D drive long-term growth and that those countries that invest the most in R&D recover faster from economic crises[4]. This Flagship Initiative aims at refocussing R&D and innovation policy on the challenges facing our society, such as climate change, energy and resource efficiency, health and demographic change. The completion of the European Research Area is an explicit objective of the Flagship with the purpose to develop a strategic research agenda focused on these (new) societal challenges, and to enhance joint programming with Member States and regions.[5]

Next to the completion of the ERA, the Flagship of the Innovation Union further aims at providing better conditions and access to finance for research and innovation. The creation of such an innovation-friendly environment entails strong public education systems, facilitating the access to financing mechanisms, and an affordable patenting mechanism. Efforts to achieve this end need to be coordinated at the national and European level: up-to-date legislation needs to be developed, public procurement has to be strategically used and standard-setting mechanisms must be speeded up.[6] A context particularly relevant for the MORE3 study is that, from the perspective of the researchers, the Innovation Union Initiative aims at facilitating their mobility, the development of high-standard skills and the access to research funding. This initiative also contemplates measures that affect researchers' environment and how they work by enhancing public-private collaboration and opening access to research results.

The commitment to the completion and further reinforcement of the ERA was reaffirmed in the 2012 Commission Communication 'A Reinforced European Research Area Partnership for Excellence and Growth'.[7] In this communication, measures for a more efficient and effective public research system were defined in view of the completion of the ERA by 2014. The measures envisage increased cooperation to reduce duplication of research efforts and increased competition to ensure that the best researchers and teams receive funding and can compete in the global research landscape. Six 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;
6. International cooperation.

With this 2012 Communication, the start of a new phase in further developing the ERA was announced. Its further progress towards completing the ERA is monitored regularly in the ERA progress reports. The latest ERA progress report dates from 2014[8] and concluded that progress had been made on all five key priorities, but that still more efforts were needed to address specific issues and disparities between countries. National research systems had become more aligned to the ERA priorities, scientific international cooperation and coordination in addressing the grand challenges were increasing and there were improvements in terms of open, transparent and merit-based recruitment in

[4] Innovation union. A pocket guide on a Europe 2020 initiative. 2013. p.10.
[5] COM(2010) 2020
[6] For a complete list of global policy targets see: Innovation union. A pocket guide on a Europe 2020 initiative. 2013. p.10.
[7] COM(2012) 392 final
[8] COM(2014) 575 final
http://ec.europa.eu/research/era/pdf/era_progress_report2014/era_progress-report_150521.pdf

view of creating an open labour market for researchers. Gender issues in research and innovation as well as research infrastructure, open access to publications and data and knowledge transfer strategies had gained increased recognition, although additional measures were (to be) put in place to speed up the progress or implementation at national level. To follow-up on this, the ERA Roadmap at European level was developed in 2015[9] to provide guidelines and key measures to address the remaining bottle necks. Focus is on those actions that will have the biggest impact on Europe's research and innovation performance, while at the same time recognising the differences across European national systems and leaving freedom to the Member States to select and implement the most suited approaches for their system[10]. An overview is given in Table 1.

Table 1: ERA Roadmap priority actions for each of the five ERA priority areas

ERA priority areas (2012)	ERA Roadmap Top Action Priorities (2015)
1. More effective national research systems	▶ Strengthening the evaluation of research and innovation policies and seeking complementarities between, and rationalisation of, instruments at EU and national levels.
2. Optimal transnational cooperation and competition	▶ Improving alignment within and across the Joint Programming Process and the resulting initiatives (e.g. Joint Programming Initiatives (JPIs)) and speeding up their implementation. ▶ Making optimal use of public investments in Research Infrastructures (RIs) by setting national priorities compatible with the European Strategy Forum on Research Infrastructures (ESFRI) priorities and criteria taking full account of long term sustainability. ▶ Developing and implementing appropriate joint strategic approaches and actions for international Science, Technology and Innovation (STI) cooperation on the basis of Member States' national priorities.
3. An open labour market for researchers (facilitating mobility, supporting training and ensuring attractive careers)	▶ Using open, transparent and merit based recruitment practices with regard to research positions.

[9] ERAC Opinion on the European Research Area Roadmap 2015-2020, 20 April 2015, ERAC 1208/15.
[10] Council conclusions of 29 May 2015 on the European Research Area Roadmap 2015-2020, Doc. 9351/15.

4. Gender equality and gender mainstreaming in research	▶ Translating national equality legislation into effective action to address gender imbalances in research institutions and decision making bodies and integrating the gender dimension better into R&D policies, programmes and projects.
5. Optimal circulation and transfer of scientific knowledge	▶ Fully implementing knowledge transfer policies at national level in order to maximise the dissemination, uptake and exploitation of scientific results. Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs) should make knowledge transfer second nature by integrating it in their everyday work. ▶ Promoting Open access to scientific publications.
6. International cooperation	▶ Develop and implement appropriate joint strategic approaches and actions for international STI cooperation on the basis of Member States' national priorities.

Source: ERA Roadmap 2015-2020 (ERAC 1208/15)

An update of the ERA progress report is foreseen in 2016, for the first time integrating the monitoring of the ERA Roadmap.

2.2. The three Os: Open Innovation, Open Science and Open to the World.

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[11]: 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[12].

2.2.1. Open innovation

The concept of Open Innovation has been applied to R&D since the beginning of the 2000s and has been used in recent years as a new paradigm in the generation and distribution of knowledge. Companies and research institutions are no longer regarded as separate units that work in isolation trying to make the most out of their human and technical assets. They are now seen as part of an interconnected, collaborative environment in which all actors need to participate. This was indeed one of the conclusions of the Independent Expert Group on Knowledge Transfer and Open Innovation, set up by DG Research and Innovation in 2012[13]. Along similar lines, Dahlander and Gann (2010) claimed that the origins of the idea of openness lies in the

[11] Speech of 22 June 2015. http://europa.eu/rapid/press-release_SPEECH-15-5243_en.htm
[12] Open Innovation, Open Science, Open to the World - a vision for Europe. Directorate-General for Research and Innovation. May 2016.
[13] Open Innovation, Open Science, Open to the World - a vision for Europe. Directorate-General for Research and Innovation. May 2016.

fact that single organisations cannot innovate in isolation. Together with other researchers on the field of innovation, they argue that organisations need 'to engage with different types of partners to acquire ideas and resources from the external environment to stay abreast of competition'.[14]

What is Open innovation? Chesbrough (2006) stated that '[a]t its root, open innovation assumes that useful knowledge is widely distributed and that even the most capable R&D organisations must identify, connect to, and leverage external knowledge sources as core process in innovation'[15]. Innovation is no longer regarded as the result of the efforts of a single organisation, but rather as 'the outcome of a complex co-creation process involving knowledge flows across the entire economic and social environment'[16]. This was clearly summarised by Chesbrough in 2006 when he stated that:

> '***Not all the smart people work for us. We need to work with smart people inside and outside our company'***[17].

On the basis of this concept, the Commission[18] has suggested to focus on three primary mechanisms: outside-in, inside-out and coupled process. The outside-in process focuses on the **accumulation of knowledge** and the sources through which this knowledge is acquired (Enkel et al, 2009)[19]. The inside-out mechanism is based on the idea that organisations need to **externalise** '**their knowledge and innovation** in order to bring ideas to market faster than they could through internal development'. Finally, the coupled process focuses primarily on **co-creation** with different other actors. It is considered to be the result of implementing both outside-in processes (acquiring knowledge beyond the organisation) and inside-out processes (introducing new ideas into the market).

For who? Users at the core of innovation. The Commission, in line with the academic research to date on open innovation, states that innovation needs to be 'user-centric': 'an invention becomes an innovation only if users become a part of the value creation process'[20]. Based on the definition put forth by Eric von Hippel, innovation is expected to become increasingly democratised as consumers gain an increasing capacity to influence the innovation system; that is, 'to get precisely what they want by designing it for themselves'(2005,p.2)[21]. This user-centric innovation seems to increase social welfare and one of the aims of the Responsible Research and Innovation[22] programme in Horizon 2020 - to foster public engagement in innovation.

How? Drawing from the academic literature on open innovation, and acknowledging the difficulties in defining precisely what Open innovation is, the Commission intends to create a set of context-dependent innovation policies. These cover different aspects of the innovation process: research, development, commercialisation, etc. The objective is that all levels of government – regional, national and European – get involved in the co-

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14 Dahlander, L., & Gann, D. M. (2010). How open is innovation?. Research policy, 39(6), 699-709.
15 Chesbrough, H., Vanhaverbeke, W., & West, J. (Eds.). (2006). Open innovation: Researching a new paradigm. OUP Oxfoapprox.
16 Open Innovation, Open Science, Open to the World - a vision for Europe. Directorate-General for Research and Innovation. May 2016
17 Chesbrough, H. W. (2006). The era of open innovation. Managing innovation and change, 127(3), 34-41.
18 These mechanisms are based on Chesbrough, p.13.
19 Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&d Management*, *39*(4), 311-316.
20 Open Innovation, Open Science, Open to the World - a vision for Europe. Directorate-General for Research and Innovation. May 2016.Pg. 13.
21 Von Hippel, E. (2005). Democratizing innovation: The evolving phenomenon of user innovation. Journal für Betriebswirtschaft, 55(1), 63-78.
22 http://ec.europa.eu/research/innovation-union/pdf/b1_studies-b5_web-publication_mainreport-kt_oi.pdf#view=fit&pagemode=none

creation processes. The participation of these governments would hence be directed towards the creation of an eco-system in which all the relevant actors can collaborate 'along and across industry and sector-specific value chains to co-create solutions to socio-economic and business challenges'[23]. The innovation eco-system targets users but has different actors: academia, businesses, finance and the public sector.

The Commission's objective is to create a proper framework for innovation by developing three pillars that account for the variety of actors in the eco-system:

1. **Pillar 1: Reforming the regulatory environment**. It includes the creation of the Scientific Advice Mechanism, InnovRefit, Innovation Deals and the Policy Support Facility.
2. **Pillar 2: Boosting private investment** in research and innovation, which encompasses the European Fund of Funds and the use of EFSI.
3. **Pillar 3: Maximising impacts**. Under this pillar, the following measures are included: the Seal of Excellence, the European Innovation Council, the merging of digital into thematic priorities (health, energy, food, water) and Horizon 2020: 2nd wave of simplification.

The MORE3 EU HE survey covers a number of issues related to the Open Innovation axis, focusing on the interrelation between academic researchers on the one hand and research in private sectors, collaboration with other disciplines and other actors in society, etc. As such, it sheds light on a crucial aspect of Open Innovation; that is, the openness of organisations to attract knowledge and skills from different sectors. In this respect, it also analyses the impact of a series of factors related to Open Innovation on researchers' career paths, such as the role of transferable skills and the access to research funding.

2.2.2. Open science

The generalisation of Big Data and digital technologies is profoundly altering the way research is being done. In the words of Commissioner Moedas, 'The days of keeping our research results to ourselves are over'[24]. The European commission funded project 'FOSTER' (e-learning platform to Facilitate Open Science Training for European Research) defines Open Science as:

> *"**the practice of science in such a way that others can collaborate and contribute**, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods."*[25]

Pontika et al. (2015) developed an Open Science Taxonomy to structure the concept.[26] It is clear that Open Science involves Open Access, Open Data, Open Source and Open Reproducible Data and shares with these concepts the principles of transparency, universal accessibility and reusability of the scientific information disseminated via online tools[27]. However, Open Science goes beyond results and methods, it affects each step of the scientific process. It was defined in the background paper that was used for the

[23] Open Innovation, Open Science, Open to the World - a vision for Europe. (2016) Directorate-General for Research and Innovation. Pg. 13.
[24] "European research and innovation for global challenges" (2015). Lund.
[25] https://www.fosteropenscience.eu/foster-taxonomy/open-science-definition
[26] *Pontika, N., P. Knoth, M. Cancellieri, S. Pearce (2015) Fostering Open Science to Research using a Taxonomy and eLearning Portal.*
[27] *Pontika, N., P. Knoth, M. Cancellieri, S. Pearce (2015) Fostering Open Science to Research using a Taxonomy and eLearning Portal.*

public consultation[28] as 'the on-going evolution in the modus operandi of doing research and organising science'. Indeed, Open Science is not only associated with access to data and publications, it is also related to how research is evaluated in terms of quality and impact, to dissemination through scientific blogs and other online tools. In other words, *"Open science is about the way research is carried out, disseminated, deployed and transformed by digital tools, networks and media" [29]. The aim is therefore to use technological improvements and cultural changes as a basis to foster* ***collaboration and openness in research[30]****.*

In order to implement Open Science, new types of skills are needed. Pontika et al. (2015) state that:

> *"**OS requires multi-skilled learners**, who must be able to have a good understanding of the requirements needed to conduct science, and recognise how science is evolving. Another important aspect is also the ability to recognise that there is a shift in the philosophy of sharing scientific experiences. Since OS can bring financial benefits to the institutions it is important that researchers are trained to understand the technicalities for practicing OS in order that both they and their institutions take advantage of its benefits and not waste valuable money."*

In sum, awareness of Open Science and training in technicalities related to Open Science become increasingly important for these new dynamics. This is confirmed in the description of Open Science on the European Commission webpage for the Digital Agenda for Europe[31]:

> *"Open Science aims at transforming science through ICT tools, networks and media, to make research more open, global, collaborative, creative and closer to society."*

According to Commissioner for Research, Science and Innovation, Carlos Moedas, Open Science is considered to support **openness as the key to excellence** - excellence which is the foundation of future prosperity for Europe. It requires[32]:

- A cloud for scientists: a virtual environment in which researchers can store and share their data to promote open access to research results and ideas;
- A European initiative on research integrity with standards and mechanisms to tackle scientific misconduct. Integrity is defined as "the performance of research to the highest standards of professionalism and rigour, in an ethically robust manner"[33]
- Better regulation for text and data mining techniques to avoid the legal uncertainties that currently characterise the use of these technologies in many fields and that hinder the benefit that could be derived from their use.
- Encouraging the participation of citizens in scientific initiatives. This line of action is based on the concept of Citizen Science, which includes many different types of action referring to citizen engagement and participation in research and science: being informed, and "participating directly in the scientific process itself by observing, gathering or processing data"[34].

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28 http://ec.europa.eu/research/consultations/science-2.0/background.pdf
29 Open Science. https://ec.europa.eu/digital-single-market/en/open-science
30 Open Science. https://ec.europa.eu/digital-single-market/en/open-science
31 https://ec.europa.eu/digital-agenda/en/open-science
32 Open Innovation, Open Science, Open to the World - a vision for Europe. (2016) Directorate-General for Research and Innovation. Pg. 45.
33 8 Science Europe Briefing Paper, "Research Integrity: What it Means, Why it is Important and How we Might Protect it" (2015). December.
34 https://ec.europa.eu/digital-single-market/en/citizen-science

A stakeholder consultation held between July and September 2014 showed that the concept of Open Science needs to be strongly related to digital technologies, as well as new ways of disseminating research results and collaborating (globally).[35] The main barriers at the individual level are the concern on quality assurance of new and non-traditional research outputs, legal constraints, the lack of awareness and credit given to Open Science, of financial support and of skills. Regarding the institutional level, the main barriers mirror to some extent those occurring at the individual level. Lack of awareness and skills, concerns about quality assurance, and uncertain benefits are among the most relevant barriers encountered by institutions regarding Open Science.

Despite these barriers, Open Science is seen to bring diverse and significant benefits:

- More collaboration and new forms of collaboration
- Breaking down discipline barriers
- Reliability and efficiency of science
- Greater scientific integrity
- Data-intensive science as a key economic driver
- Interest in new ways to disseminate findings
- Faster and wider innovation
- Public demand for faster solutions to societal challenges
- Interactions with actors outside the research community
- A way of reconnecting science and society
- Science being more responsive to societal challenges

An Open Science Policy Platform is being established to address the main action lines identified from this consultation process and laid down in the draft European Open Science Agenda. In 2016, the Platform will start working on a list of topics. Individual working groups will be set up for each of these topics: rewards, altmetrics, Open Science Cloud, changing business models for publishing, research integrity, Citizen Science, open education and skills, FAIR open data.

From the discussion of barriers and benefits, the stakeholder consultation resulted in a list of policy recommendations, of which a number related directly to research careers and individual researchers:

- Financial support: modify patterns of research funding (cross-border) and include also the creation and maintenance of research infrastructure;
- Enforcement of rules & governance: quality assurance, alternative or complementary methods of measuring research output, data protection;
- Impact on research careers: Set clear expectations about the role of Open Science in research career paths, provide or support training on 'innovative digital skills'.

Regarding the MORE3 surveys, there is one aspect of Open Science that directly concerns researchers' careers: how activities under Open Science (e.g. data curation) can be recognised and considered in recruitment and career progression, without being an additional stress factor for (young) scientists. Transparency and merit-based research careers remain important in this sense. Also (transferable and alternative) skills training and new ways of collaborating are addressed in the MORE3 survey. Virtual mobility, interdisciplinary mobility and collaboration with non-researchers directly relate to these aspects.

[35] http://ec.europa.eu/research/consultations/science-2.0/science_2_0_final_report.pdf#view=fit&pagemode=none

2.2.3. Open to the world

On the basis that responses to actual challenges, such as climate change, food security or water availability, will be based on international cooperation, the European Commission has and continues to aim at including the international dimension as one of the main aspects of its actions. The EC sees international cooperation and the commitments that derive from it as a valuable source of knowledge and, hence, of innovating solutions to tackle with current and future world-wide challenges, such as the UN Convention for Climate Change, the 2030 Agenda for Sustainable Development, or the Resolutions of the World Health Organization.

Science and researchers are no exception to this objective. Researchers and the industry are now working increasingly in a global environment in which the outcome of their efforts – publications, products, or services – aims at a global public. In this context, the EC has introduced a global dimension into its researcher-oriented actions. Regarding individual researchers, the EC aims at lowering the barriers to researchers' mobility in several dimensions: lowering administrative barriers ensuring reciprocal access to programmes and the development of efficient and fair intellectual property rights systems. To this end, the focus has been put on developing a Global Research Area which follows the example of the ERA in articulating a system of collaboration across borders and disciplines at a world-wide level. This Global Research Area is being built sequentially with varying strategies depending on the region or countries that are targeted. Several types of actions have been put in place:

- First, at the EU level, regular contact on issues related to science and technology is maintained with the main world regions and with some 20 partner countries.
- Second, cooperation with neighbouring countries aims at aligning their objectives with and their possible integration in the European Research Area and Horizon 2020. To this end, a 'Common Knowledge and Innovation Space' is being created.
- Third, the diplomatic aspect of research and science receives special attention due to its capacity to prevent disasters and conflicts. Examples of which would be the projects to prevent earthquakes (EU REAKT project), the EU observer status at the Arctic Council, or the role of European research projects in health issues (European and Developing Countries Clinical Trials Partnership (EDCTP2)).

The role of Member States (MS) is also defined under the Open to the World strategy. The fact that the EU lags behind the US in science and technology is, according to the Research, Innovation and Science Policy Experts (RISE), partly due to the excessive pursue of individual S&T collaborations with third countries by Member States[36]. Stemming from this basis, the EC aims at increasing the number of partners, improving the synergies between Member States, and fostering the collaboration and the knowledge exchange between them in what concerns their international strategies and policies.

In addition, to be **Open to the World** refers to Europe's ambition to be not only a global leader in science, but also see this translated into a leading voice in global debates.

- Engage in science diplomacy and global scientific collaboration;
- Lead in developing global partnerships to address global challenges;
- Global research area.

Several sections of the MORE3 project are directly related to the Open to the World dimension of the EC's priorities, in particular the international dimension of mobility and collaboration but also the indicators on the attractiveness of the EU as research environment. Next to the survey in Higher Education in Europe, the Global survey of

[36] https://ec.europa.eu/research/innovation-union/pdf/expert-groups/rise/tsipouri-era_open.pdf

researchers currently working outside Europe (Task 2 of the MORE3 study) regarding their mobility patterns, career paths and working conditions' will shed light on the perceptions of three important groups: European researchers working outside Europe, non-Europeans who have never worked in Europe and non-Europeans who have worked in Europe before. The responses of these groups will allow us to better define and position the strengths of Europe as an optimal breeding ground for the development of research, as well as to design and introduce efficient measures to redress the limitations of the European research institutions. Third, the set of internationally-comparable indicators on researchers (Task 3 of the MORE3 study) contributes to monitor the evolution of the policies that have been carried out or introduced since MORE2 in what concerns the position of Europe in the world and its openness to third countries and organisations.

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. 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 in the MORE2 study (2012) for reasons of consistency and comparability.[37]

The definitions of the mobility concepts further take into account the existing standards or secondary sources so that comparability with other studies and contexts is maximised. In the following sections (3.1 to 3.2.3) we repeat the definitions of a number of key concepts that were applied the same in MORE2: researchers, fields of science and research career stages. Section 3.2.4 elaborates on the key concept of mobility and how it is adapted based on the findings of MORE2. Finally, section 3.3 treats 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.

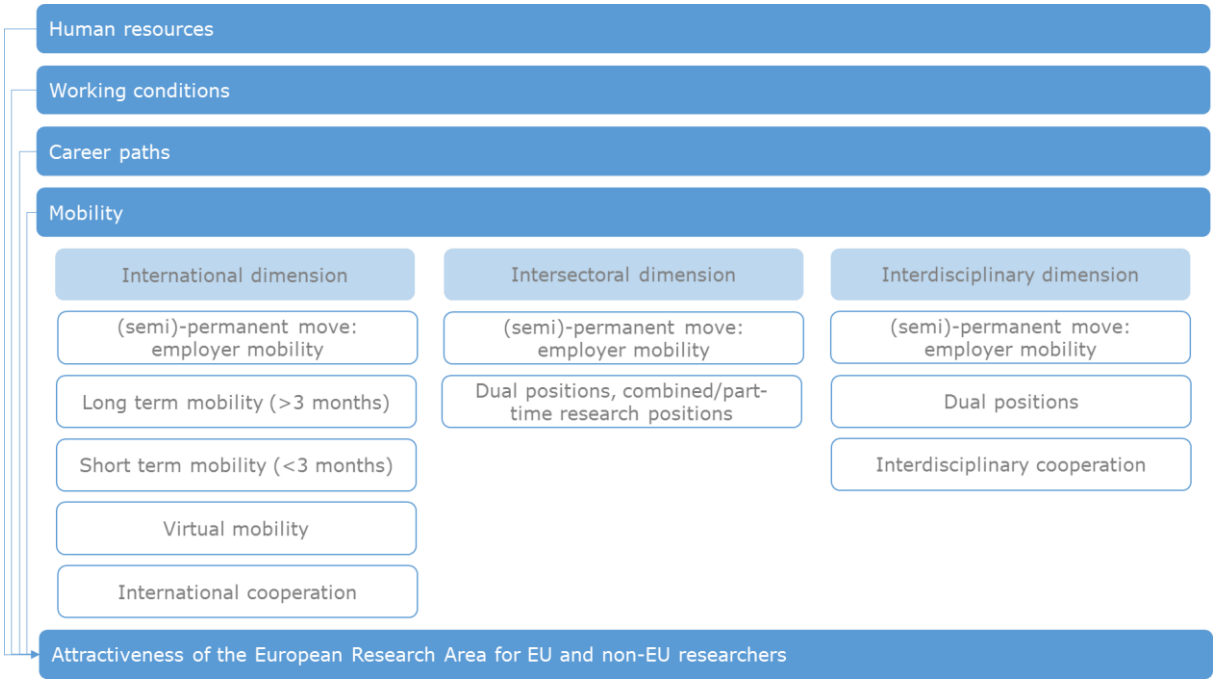
3.1. Conceptual framework

In our conceptual framework, human resources are the starting point, as the stock of human resources is basically our population of interest. Career paths of researchers can be seen as an important element of working conditions; taken together both are important factors which influence the various forms of mobility, e.g. taking the next career step may necessarily involve international mobility to gain access to international networks, or bad working conditions that 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 work can inter alia be seen as indicators, or as monitoring tools for issues of attractiveness.

Generally, 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. They can be put in direct relation to the policy context and in particular to the ERA priorities, as is done in the conclusions in section 10.

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

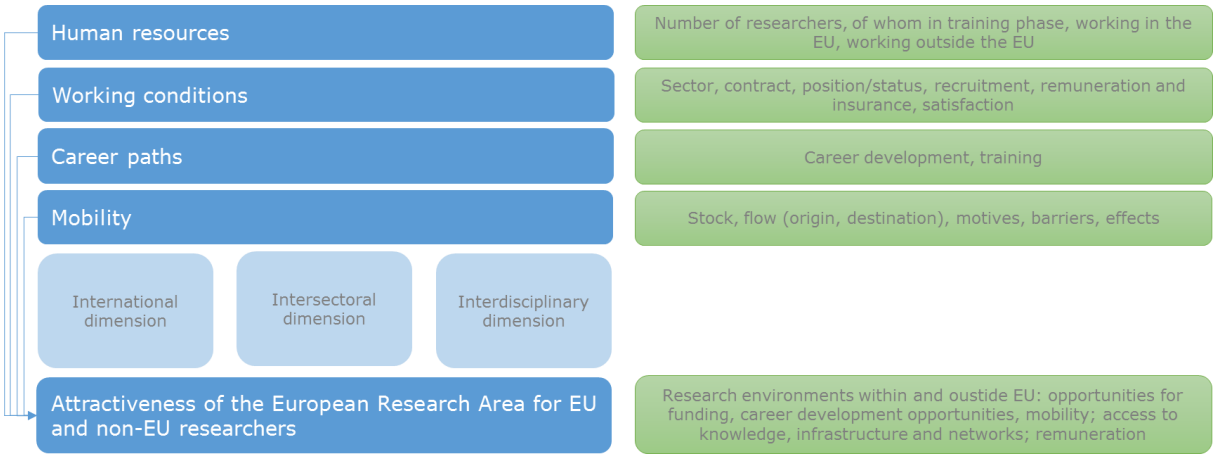
Figure 1: Conceptual framework for the MORE3 study



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

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. The main types of indicators are given in Figure 2. Each of these are further elaborated and detailed in the analysis sections (sections 4 to 9).

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



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

Before turning to the analysis of the indicators, structured in sections according to this conceptual framework, 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.

3.2. Definitions

3.2.1. Researchers

The main definitions on researchers in use derive from the Canberra Manual, covering Human Resources devoted to Science and Technology (HRST), and from the Frascati Manual, covering Research and experimental development and R&D personnel. These definitions have also been used in the previous MORE1 and MORE2 studies[38,39].

Definition from the Canberra Manual[40]:

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

Definitions from the Frascati Manual[41]:

- Research and experimental development (R&D):
  - "Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge."
- R&D personnel:
  - "In broad terms, R&D personnel include highly trained researchers, specialists with high levels of technical experience and training, and other supporting staff who contribute directly to carrying out R&D projects and activities. […], the scope of this concept encompasses all knowledge domains."
  - "R&D personnel in a statistical unit include all persons engaged directly in R&D, whether they are employed by the statistical unit or are external contributors fully integrated into the statistical unit's R&D activities, as well as those providing direct services for the R&D activities (such as R&D managers, administrators, technicians and clerical staff). All persons employed directly on R&D should be counted, as well as those providing direct services such as R&D managers, administrators, and clerical staff."
- Researchers:
  - "Professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods."
  - "For practical reasons, doctoral students engaged in R&D should be counted as researchers."

For this study, a researcher is defined in accordance with the Frascati manual[42] as "professionals engaged in the conception or creation of new knowledge, conducting

[38] IDEA Consult et al. (2010) Study on mobility patterns and career paths of EU researchers. FINAL REPORT (deliverable 7).
[39] IDEA Consult et al. (2013) Support for continued data collection and analysis concerning mobility patterns and career paths of researchers. FINAL REPORT (deliverable 8).
[40] OECD (1995), The Measurement of Scientific and Technological Activities. Manual on the Measurement of Human Resources Devoted to S&T. "Canberra Manual", OECD, Paris. (Section 3.1.1.).
[41] OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264239012-en.
[42] OECD (2015), Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/9789264239012-en.

research and improving or developing concepts, theories, models, techniques instrumentation, software or operational methods". The European Charter for Researchers and Code of Conduct for the Recruitment of Researchers[43], which are key elements in the European Union's policy to make research an attractive career, as well as the European Commission's communication on "Towards a European framework for research careers"[44], also refer to the 2002 version of this definition of researchers[45]. The definition is furthermore applied in R&D surveys which are the source for Eurostat and OECD R&D statistics.

To guarantee that respondents meet the criteria to be considered a researcher according to this definition, the questionnaire of the MORE3 EU HE survey contained the following self-selection paragraph:

> 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. Fields of Science

Fields of science (FOS) are defined according to the Fields of Research and Development (FORD) classifications proposed by the OECD in the 2015 Frascati Manual[46]:

- Field 1: Natural Sciences
- Field 2: Engineering and Technology
- Field 3: Medical and health sciences
- Field 4: Agricultural and veterinary sciences
- Field 5: Social Sciences[47]
- Field 6: Humanities and the Arts

Consistent with MORE1 and MORE2, three categories are derived from this for the purpose of the Task 1 survey sample stratification. The three categories are an aggregation of the six FOS as follows:

- 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)

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[43] http://ec.europa.eu/euraxess/pdf/brochure_rights/am509774CEE_EN_E4.pdf

[44] "Towards a European Framework for Research Careers" (European Commission 2011, p. 2 http://ec.europa.eu/euraxess/pdf/research_policies/Towards_a_European_Framework_for_Research_Careers_final.pdf

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

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

[47] Including Economic Sciences.

3.2.3. Research careers

There is a wide but diverse range of literature on the definition and typology of research careers. An overview is given in the RISIS Research Paper on the 'Conceptual framework for the study of research careers'[48]. According to this overview, three theoretical approaches can be identified to research careers: that of the individual agency[49], of institutional and collectively produced processes[50] or in between[51]. Based on these, careers are structured in stages. Four explicit models of career stages are identified, each focusing on different defining factors such as role sets/interdependence and authority (Laudel & Gläser, 2007); competences/independence and leadership (EC); positions/independence (ESF) and positions/ranks (LERU).

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. 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)[52] 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:

- 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).

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[53]:

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."

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48 RISIS – WP24 – Task 1. Conceptual framework for the study of research careers. Research papper synthesizing the theoretical model for research careers. January 2016.

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

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

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

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

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

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.
- 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.

3.2.4. Mobility of researchers

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

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[54], 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 develop a new[55] approach for the concept of PhD mobility and the link with motives for mobility (escape, expected and exchange mobility).

3.2.4.1. Definitions of mobility

According to the expert group on the research profession[56] at least four types of mobility can be recognised:

- 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.

The definitions of the first three types of mobility are based on those formulated in MORE2. In Table 2, they are structured along the dimensions of type of mobility, phase in which mobility takes place, duration and purpose of mobility. Each of the definitions in this table will be analysed in this report in the indicated sections.

[54] New concepts of researcher mobility – a comprehensive approach including combined/part-time positions. Science Policy Briefing, ESF, April 2013.
[55] Compared to MORE2.
[56] "Excellence, Equality and Entrepreneurialism building sustainable research careers in the European Research Area" (2012), by the Expert Group on the Research Profession

Table 2: Definitions of mobility forms analysed in MORE3

<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</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 non-mobility: Having never been PhD degree or during PhD mobile to another country</td><td colspan="2">Non-mobility: Having 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</td></tr>
<tr><td>Interdisciplinary mobility</td><td colspan="4">Having switched to another (sub)field during the academic research career[57]</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

3.2.4.2. A new approach to analysing PhD mobility

The analysis in the MORE2 study has exposed the need to simplify the presentation of PhD mobility to improve understanding and readability of the results.

An important point of discussion in PhD mobility concerned the reference country. Different reference countries were tested: country of citizenship and country of Master degree. The results were presented both in terms of destination (% of researchers that moved TO the country to obtain a PhD) and in terms of origin (% of researchers that moved AWAY FROM this country to obtain a PhD; either from country of citizenship or from country of Master degree). These different presentation forms in particular complicated the interpretation of the results. Therefore in MORE3 we will apply both an improved definition of PhD mobility, controlling for Master mobility, and a simplification of the presentation of the results.

[57] Which is to be distinguished from interdisciplinary research as such.

First, we suggest making the following distinction (see Table 3 for an example):

- PhD mobility: Mobility with the purpose of obtaining the PhD in another country than the country of citizenship AND the country of Master degree. The case where the destination country of the PhD degree is equal to the destination of the Master degree, is classified as Master mobility.
- During PhD mobility: mobility of three months or more during the PhD while still obtaining the PhD in the home country.

Based on the graduation country for each degree, the distinction between PhD mobility, PhD return mobility and Master mobility is made. To grasp Master mobility more directly, we have also asked under PhD mobility whether one who has not obtained/will obtain the PhD in a country other than the one of the previous degree (the degree that gave access to the PhD), already moved during/for his/her Master degree anticipating on entering a PhD in this country. Master mobility will not be analysed as such in the MORE3 study (as it is not a form of researcher mobility but rather of education mobility), but it is necessary to control for it in the interpretation of the PhD mobility.

Table 3: Definition of PhD mobility - example

Country of citizenship	Country of Master degree	Country of PhD degree	Mobility
Country A	Country A	Country A	**Non-mobility for PhD**
Country A	Country A	Country B	**PhD mobility** to country B
Country A	Country B	Country A	**PhD return mobility** to country A *(after Master mobility to country B)*
Country A	Country B	Country B	**Non-mobility for PhD** *(after Master mobility to country B)*
Country A	Country B	Country C	**PhD mobility** to country C *(after Master mobility to country B)*

Source: IDEA Consult

For ease of interpretation, the analysis of PhD mobility focuses on the destination country (=country of PhD):

- **PhD mobility** (including indication of PhD mobility after Master mobility) per country (country moved to for the PhD):

  % of researchers who obtained a PhD in country X and who were mobile for this reason – of whom % after Master mobility;

- **Non-mobility for PhD** (including indication of non-mobility for PhD after Master mobility) per country (country stayed in for the PhD):

  % of researchers who obtained a PhD in country X and who were not mobile for this – of whom % after Master degree.

The latter case, non-mobility for PhD after Master degree, allows a better understanding of the mechanisms behind low PhD mobility to a country. It also enables us to test, for example, the assumption that mobility to this country takes place predominantly before PhD stage.

3.2.4.3. Link with 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, also including negative effects 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 experience 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.

3.3. 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, 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.

3.3.1. 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 (Q27-28-29).

3.3.2. 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[58].

- 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.
- 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 (32.5%).

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.

3.3.3. 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 publically available information systems stating different forms of mobility;

[58] The final study report is available at http://bookshop.europa.eu/en/research-careers-in-europe-pbNC0614200/.

- 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.

3.3.4. Open Innovation, Open Science, Openness to the World

The policy context on the three O's of Open Innovation, Open Science and Openness to the World was given in section 2.2. To introduce the three O'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. Interpretation of the results

The survey methodology of the MORE3 EU HE survey is described in detail in section 1 of the Annex to this report. Before we present the results of the survey, it is however important to note a number of points regarding the interpretation of the indicators that are presented in the following sections 5 to 9. Therefore, in this section, we describe the implications from the sampling and survey methodology and of the resulting sample, for the interpretation and comparability between MORE2 and MORE3.

As is described in more detail in Annex, the MORE3 Higher Education (HE) survey in Europe was implemented to provide estimates on researchers in the EU28+3 HE sector with maximum accuracy at both EU and individual country level (5% max error -p value of 0.05) and including a stratification by fields of science (FOS). In most countries the number of validated questionnaires achieved a margin of error of 5.5%; in four countries a margin of error between 5.5% and 6% was achieved and for one country a 6.5% error was achieved. Overall, the response rates are more equally distributed across countries than in MORE2.

4.1. Implications of the sampling and survey methodology

To reach this level of accuracy, different strategies were developed and implemented: a statistical sampling strategy, a multichannel data collection approach and a data editing and calibration strategy.

Each of these steps in the approach is taken to ensure accuracy of the final results, but each in itself has specific limitations that are to be taken into account in the interpretation of these results. Even though the methodological set-up was developed with great care and has accounted for all practical issues in the most feasible way, a number of practical issues during its implementation are worth pointing out.

In the sampling and data collection strategy, these issues are however expected to have only a very small impact on the results and their interpretation:

- A number of additions to the frame were needed during the survey due to low response rates in specific countries. Individuals are nonetheless selected randomly, so this addition to the frame is not expected to impact the results.
- A very small seasonal effect cannot be excluded since the survey ran until early July and it is therefore possible that there is a small bias towards respondents that were still in the office in the first days of summer. This potential bias is however addressed by the non-response survey (cf. infra on calibration strategy) and is thus expected to have only a very limited effect.

It is also important to note that in comparison to MORE2 the overall quality increased as the seasonal effects and linguistic issues were better anticipated on during MORE3, based on the lessons learnt in this former.

In terms of data editing and calibration strategy, the MORE3 EU HEI survey has two characteristics that, though generally applied in survey design, are worth keeping in mind when interpreting the results of the survey:

- A data editing imputation technique known as 'donor method' has been applied to complete partial responses in such a way that they can be used in the data analysis. The donor method used in editing of partial responses is a standard solution to improve the quality and quantity of the information gathered in the final database but cannot be used widely in order to avoid arbitrary estimates. Data editing was therefore applied to only a limited number of observations (202) that completed already over a third of the questionnaire, including the key questions, and will therefore not affect the outcomes in a significant manner.
- Calibrated weights have been calculated. The aim of the calibration strategy is to reduce the non-response bias by asking the non-respondents about the three key issues of the survey and comparing this to the answers of the respondents. Data collected for this calibration comes from supplementary surveys which are in themselves not representative. However, it is important to note that in this report the results obtained with calibrated weights only affect a few indicators – intersectoral, short-term and long-term mobility - and only when calculating shares with respect to the total population.

These two processes define both the accuracy and limitations of interpreting the results. Overall, the limitations have been anticipated and addressed as far as possible, thus reducing the negative effect thereof on the accuracy of the estimators.

4.2. Potential and limitations of the resulting sample

The sampling errors are low and more equally distributed across countries compared to MORE2. Our methodology thus leads to accurate indicators at the European and country level: if the survey was to be repeated a hundred times, in 95 cases the outcomes at country level would be deviating no more than +/-5% from the outcomes of the MORE3 survey (5% max error -p value of 0.05).

The indicators at other levels of analysis (field of science, gender, career stages, FTE) are not guaranteed to have the same accuracy. Nevertheless, at EU level, the number of observations is sufficiently high to guarantee consistent and accurate results here as well. It is at lower level of subpopulations that the outcomes are to be interpreted with more care (e.g. R1 researchers' opinions in a particular country). Sample size is therefore key to obtaining accurate estimates. For this reason, we do not show subpopulation estimates in the report when the n-value of this subpopulation is below 30. Applying this threshold of 30 observations - the standard used in international reference like the OECD - avoids the publication of non-robust indicators due to low n-values. Moreover, it also ensures that the privacy of the respondents in this small subpopulation is not compromised.

One particular case are the FTE estimates, i.e. estimates at country level for FTE researchers instead of HC researchers. The data allow us to express estimates also in FTE, as the survey contains a question on full-time and part-time employment. However, these will always be less accurate than HC estimates: both incorporate the same sampling error, but FTE estimates are in addition based on a survey question and thus incorporate also the eventual errors due to codification of the information from this question. Therefore, in the indicator report, all estimates are expressed in terms of HC only and correspond to the above-mentioned accuracy level.

Similarly, caution is also needed in the interpretation of the career stage estimates. As with the FTEs, the information on career stages is based on a survey question (self-selection by the researchers). For the interpretation of the analyses referring to career stages, readers need to take into account the existence of certain biases in this factor: the data reflect higher shares of R3 researchers and lower shares of R1 researchers compared to what we can expect based on the information that is available in the

literature and in Eurostat data on R1 researchers. These potential biases are minimised when applying post-stratification weights by career stage. This was tested in section 1.4 in the Annex, where we observe that differences between our main indicators and the career stage post-stratified estimates are relatively small and do not affect the conclusions of the report. Nevertheless, it is important to take this point into account when comparing MORE2 and MORE3 indicators, as both surveys show a slightly different distribution across career stages which may lead to sample-based differences in the estimates between both surveys. This will be further discussed in the next section on comparability with MORE2.

4.3. Comparability with MORE2

Comparability with MORE2 estimates was one of the main goals when designing the approach and developing the questionnaire in MORE3. For this reason, the sampling approach and data editing approach is the same as in MORE2. Only the implementation was improved based on the lessons learned in MORE2. This means the methodology is the same, but better results in terms of accuracy are obtained (cf. supra).

It is important to stress the fact that the two studies do not follow a panel design. This entails that MORE2 and MORE3 are independent from each other in the sense that the two surveys do not include responses from the same individuals. MORE2 and MORE3 offer solid ground for the study of the evolution of indicators at aggregate level between the two points in time, but cannot serve to analyse the evolution of small subgroups (e.g. the abovementioned threshold of 30 observations).

Also the questionnaire was based strongly on the MORE2 questionnaire. The evolving policy context did require a shift in focus towards, for example, skills development, intersectoral and interdisciplinary mobility, open science, etc. For this reason, a number of questions were deleted, replaced or added. Apart from this natural evolution, the key questions were not changed in any way and for questions where a change was needed, the team still took into account maximum comparability. A comparison between the questionnaires is given in Annex 2. Any change in the questions, whether or not having an effect on its comparability or interpretation, is mentioned in the relevant sections on analysis and results.

These general principles in the development of the approach and questionnaire have resulted in strongly comparable indicators between MORE2 and MORE3, in particular in terms of what concerns the key indicators on working conditions and mobility of researchers in Europe. However, we need to point out that comparability is in a limited number of cases affected by the following:

- Changes in the question which may have led to alternative interpretation (e.g. the questions on collaboration partners, recruitment and dual positions);
- Changes in the order of the questions which may have led to another position towards the question (1 case: the question on open, transparent and merit-based recruitment);
- Small changes in routing (but always including more target groups than in MORE2 so that comparability is still possible);
- Different sample composition (e.g. slightly different distribution in career stages with more senior researchers in MORE3 and the share of R1 researchers who are not enrolled in PhD programme is larger in MORE3 than in MORE2)
- The introduction of new questions; i.e. that were not included in MORE2 (e.g. on skills training, dual careers and funding).

Finally, also in the analysis phase, the same principles are applied in MORE3 as in MORE2. In a limited number of cases, we agreed upon a new approach and applied this new approach also to MORE2 data in order to again obtain comparable results. This is,

for example, the case in the calculation of composite indicators, when grouping types of working conditions or mobility motives together.

Further points of attention or limitations on the interpretation of specific indicators are explicitly mentioned in the relevant sections on analysis and results.

5. Characteristics of researchers and career paths

This chapter follows a sequential structure with respect to researchers' characteristics and careers. First, this section presents the distribution of the main sociodemographic variables that are used in the different analyses presented in this report - career stage, field of science and gender. In addition to these main variables, a set of questions included in the questionnaire provides detailed information about the sociodemographic characteristics of the individuals that responded to the survey.

We then go onto analyse PhD studies in the EU as the main point of entry into academic research careers. Given that 84% of researchers have obtained a PhD, the quality and content of PhD studies is very relevant for EU research performance, attractiveness for foreign students and training in broader skills which open up labour market options for researchers. The survey contained questions on PhD training for all R1 researchers who are currently enrolled in a PhD and for all R2 researchers (who are still close enough to the R1 stage to be able to reflect on PhD training).

The next step in a researcher's career is recruitment, the design of which determines whether those with better training and future potential get the jobs. Questions on recruitment conditions and which factors play a role in recruitment are asked and analysed for the four career stages (i.e. all researchers).

We then proceed to an analysis of researcher characteristics across the four career stages and we describe how career progression takes place, e.g. in terms of the time it takes to reach the next career stage. The determinants of this progression form another subsection. Finally, we look at dual positions as a special form of research career. The structure of career paths is a main determinant of the attractiveness of a research system, as it conditions career perspectives and time horizons for research agendas: short fixed-term contracts do not allow for pursuing long-term, risky research strategies.

As these sections will show, some of these factors determine to a certain extent the ability and predisposition of researchers to be internationally, intersectorally and interdisciplinary mobile (sections 7 and 8). Therefore, this overview allows for a better understanding and contextualisation of the findings presented in the more detailed sections of this report.

Sometimes we use country groups for the analysis to sharpen the interpretation. One country grouping is geographical (Western, Northern, Eastern and Southern European countries) and contains all EU28 Member States. It mainly reflects differences in overall economic conditions. A second country grouping of 16 EU countries is based on a classification of higher education systems, based on Janger - Strauss - Campbell, 2013[59], who themselves draw on the comparative higher education literature cited therein, such as Enders-Musselin, 2008[60].

- The Anglo-Saxon and Nordic systems (e.g. United Kingdom, Sweden, The Netherlands) are higher education systems mostly based on collegiate department-style models, an intermediate share of tenured researchers and a high share of structured PhD training;

[59] Janger, J., Strauss, A., Campbell, D., (2013) Academic careers: a cross-country perspective, WWWforEurope.
[60] Enders, J., Musselin, C., (2008)"Back to the future? The academic professions in the 21st century", High. Educ. To, 2030, pp. 125–150.

- The continental higher education system refers to countries such as Germany, the Czech Republic or Poland with a more hierarchical chair-based system and high shares of fixed-term researchers (the "survivor" model, see Enders-Musselin, 2008[61]);
- The Southern European system refers to systems with high shares of tenured researchers also called "protective pyramid", with an early access to a permanent position following a strict competition. Further progression is then organised in hierarchical steps, depending on job availability. As Lissoni et al., 2011[62] and Pezzoni - Sterzi - Lissoni, 2012[63], document for the highly centralised academic systems of Italy and France, criteria for academic promotion in such protective pyramids are not limited to scientific productivity, but include also issues such as social and political capital, seniority, gender.

This is a stylised summary and there are significant intra-group differences, but there are also consistent between-group differences which make the analysis by country group worthwhile, not least due to the high number of EU Member States.

5.1. Sociodemographic information

Characteristics of the population of researchers				
All researchers (n=10,394)				
	EU total[64]	**Per (current) career stage**	**Per FOS**	**Per gender**
2012 (n=10,547)	1,241,290 HC	R1: 17.6% R2: 21.5% R3: 32.2% R4: 28.7%	MED: 26.3% NAT: 36.4% SOC: 37.3%	F: 37.9% M: 62.1%
2016 (n=10,394)	1,373,130 HC	R1: 14.3% R2: 17.9% R3: 38.8% R4: 29.0%	MED: 38.6% NAT: 25.2% SOC: 36.2%	F: 38.8% M: 61.2%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 2: "What is your gender?", question 12: "What is your main field of research in your current position?" and question 15: "In which career stage would you currently situate yourself?"

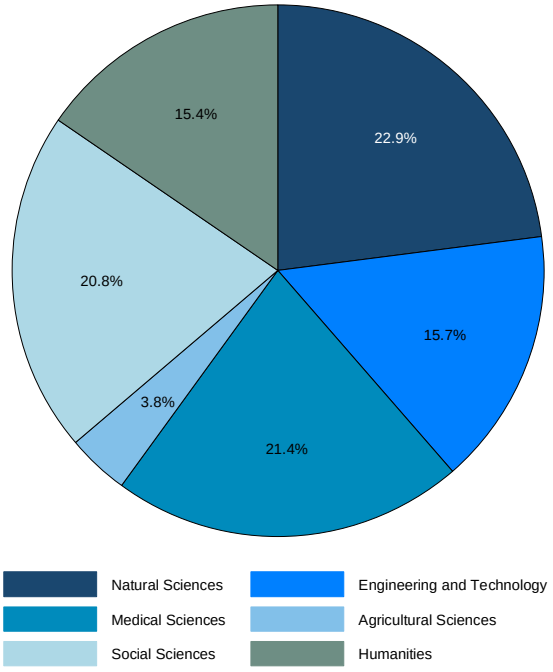
Country level: The information included in this report is always presented at the level of the 28 EU Member States. Figures for three associated countries – Switzerland, Iceland and Norway – are only included in the graphs and the tables including detailed information per country. Detailed information on the sample size and population estimates at country level is provided in Annex 1. Given the setup of the sampling strategy, weighting the number of researchers in the sample per country, yields the population numbers as available in Eurostat.

[61] Ebd.
[62] Lissoni, F., Mairesse, J., Montobbio, F., Pezzoni, M., (2011), "Scientific productivity and academic promotion: a study on French and Italian physicists", Ind. Corp. Change, 20(1), pp. 253–294.
[63] Pezzoni, M., Sterzi, V., Lissoni, F., (2012) "Career progress in centralised academic systems: Social capital and institutions in France and Italy", Res. Policy, 41(4), pp. 704–719.
[64] The EU total corresponds to the current 28 EU Member States for MORE3. At the time of the MORE2 survey in 2012, EU accession of Croatia had not yet taken place so the MORE2 EU total refer to the at that time applicable 27 Members States only.

Career stage: The largest shares of researchers in the sample and population are R3 (39%) and R4 researchers (29%). The percentage of R1 and R2 researchers is lower: 14% and 18% respectively. Further details on the composition of the sample and the post-stratification method to calculate estimates for the population of researchers taking into account career stage information, are provided in Annex 1.

Field of science: According to the self-classification of respondents in terms of field of science, 23% of the researchers in the population work in the Natural Sciences, 21.4% in the Medical Sciences and 21% in the Social Sciences. Fewer researchers work in the Engineering and Technological field (16%), in the Humanities (15%) and in Agricultural Sciences (4%).

Figure 3: Distribution of researchers by field of science (EU28)

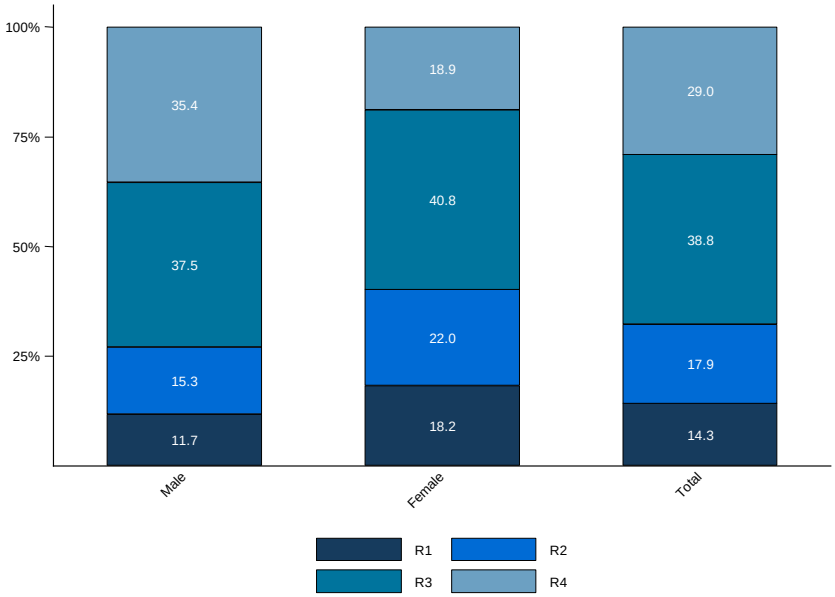


Source: MORE3 EU HE survey (2016)
Note:
- Based on question 12: "What is your main field of research in your current position?"
- (n=10,394)

Gender: In the 31 countries included in the survey, 803,336 researchers (59%) are men and 569,794 (41%) are women. This indicates a slightly better gender balance compared to the results of the MORE2 survey (2012), where women represented 38% of the population of researchers.

Figure 4 shows that there are some differences in terms of gender composition across career stages. The share of male researchers having entered the R4 stage is much higher than the share of women (35% compared to 19%). However, the differences are virtually non-existent in the R3 stage, 41% of female researchers achieve this stage compared to 38% of male researchers. As expected, the proportion of women is more concentrated in the earlier stages (R1, R2).

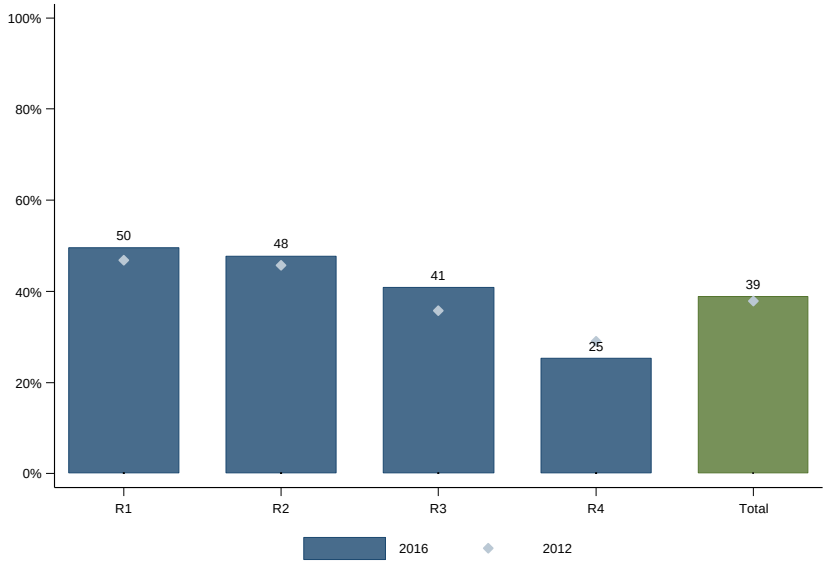
Figure 4: Distribution of researchers by gender and career stage (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 2: "What is your gender?" and question 12: "What is your main field of research in your current position?"
- (n=9,412)

Looking at the same information the other way around in Figure 5, it is confirmed that women are less represented in the higher career stages: while 50% of R1 and 48% of R2 researchers in EU28 countries are women, the percentage drops to 41% for R3 and even to 25% among R4 researchers. Nonetheless, in comparison with MORE2 this means a positive evolution for female representation in research. The share of women in EU28 countries has grown slightly in R1, R2 and R3 groups, with differences of 2.8, 2.0 and 5.1 percentage points between MORE3 and MORE2. Only among R4 researchers do we observe a decline in the share of female researchers: from 29% in MORE2 to 25% in MORE3.

Figure 5: Female representation across career stages (EU28)



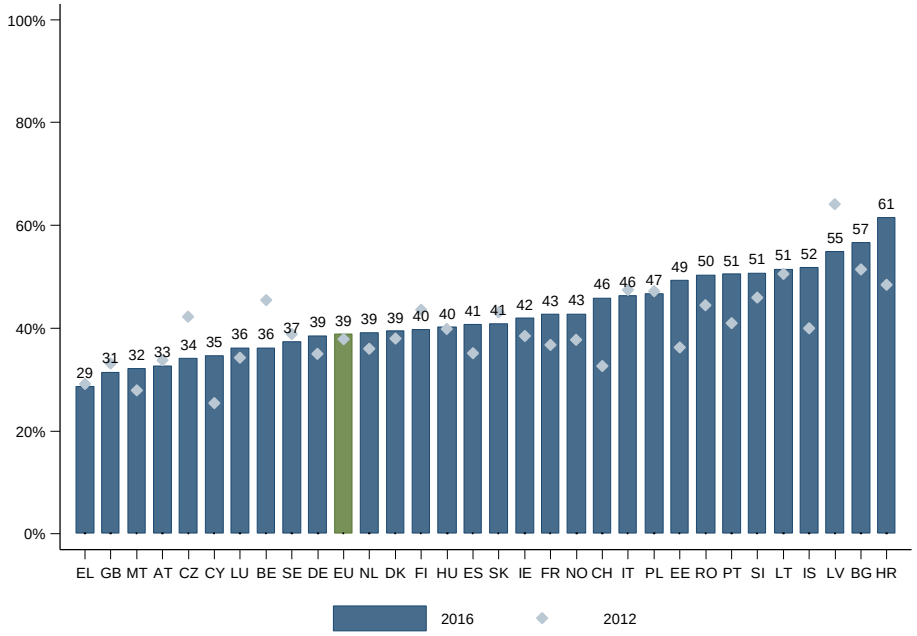
Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Based on question 2: "What is your gender?" and question 15: "In which career stage would you currently situate yourself?"
- (n=9,412)

The participation of women in the research profession offers significant variation across countries. In general terms, data for Eastern European countries indicate higher shares of women than on average in the EU28 countries (39%). This is the case in Slovenia, Poland, Slovakia, Romania, Estonia, Croatia, Bulgaria, Latvia and Lithuania. When analysing the data for Eastern European countries across career stages we also observe that the shares of women are higher than the EU28 averages in each of the career stages: 54% in R1, 56% in R2, 46% in R3 and 36% in R4 (versus 50%, 48%, 41% and 25% respectively at EU28 level).

However, in only three countries do women slightly outnumber men: Lithuania (55%), Latvia (54%) and Iceland (51%). The largest imbalances are found in Malta (33%), France (33%), and Czech Republic (36%).

In terms of the evolution of female representation since 2012, it is important to note that there is a positive trend in two thirds of the countries. The most positive evolution has taken place in Cyprus (+13pp), followed by United Kingdom, Estonia and Iceland (+11pp each). The largest negative changes in the number of women in the research profession have occurred in Latvia (-11pp), Italy (-7pp), and Czech Republic (-6.5%).

Figure 6: Female representation across countries



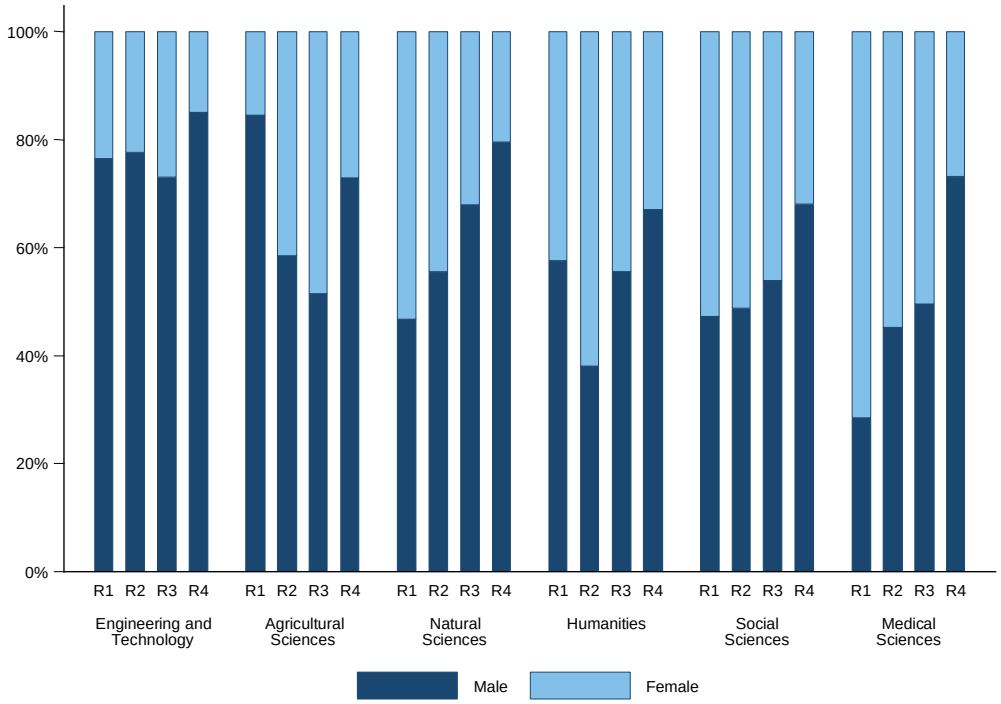
Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Based on question 2: "What is your gender?"
- (n=9,412)

Across most countries gender differences become barely deniable from career stage R3 onward (see Figure 7). With few exceptions (mostly located in Eastern and South-eastern Europe) the share of male researchers predominates in career stage R3. Similarly, the vast majority of researchers in R4 across countries are male. The highest shares of female R4 researchers can be found in Croatia (62% female R4 researchers) and Bulgaria (50% female R4 researchers).

Male and female researchers are not equally distributed across fields of science. In EU28 countries, the most balanced disciplines are Medical Sciences, Social Sciences and Humanities, in which 48%, 45% and 44% respectively of the researchers are women. However, the opposite is found in Engineering and Technology (22%) and in the Natural Sciences (33%) the presence of women is clearly lower. This distribution is very similar to the findings in the MORE2 study.

Figure 7 shows the distribution of male and female researchers across career stages and fields of science. 85% of leading researchers in career stage R4 in Engineering and 79% in Natural Sciences are male. Moreover, the share of male researchers in R4 is also remarkably high in Medical Sciences (73%), while the vast majority of early stage R2 researchers in Medical Sciences is female (72%).

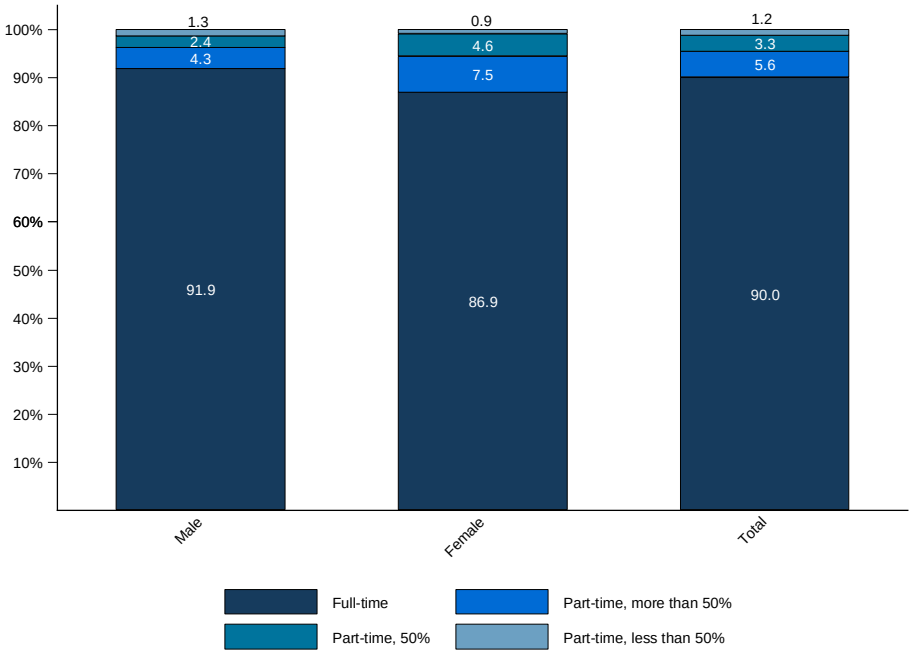
Figure 7: Differences in gender across career stages and fields of science



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 2: "What is your gender?", question 15: "In which career stage would you currently situate yourself?" and question 12: "What is your main field of research in your current position?"
- (n=9,412)

In terms of type of position, there are also a number of differences between male and female researchers. While full-time positions are the most common for both groups, the percentage of women with this type of contract is lower than in the case of men (87% versus 92%). This difference is explained by the larger shares of part-time positions found among female researchers, especially with 50% or more of working time.

Figure 8: Distribution of researchers by type of position and gender (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 2: "What is your gender?" and question 33: "Type of position"
- (n=9,412)

Family composition: In terms of family and personal life, it can be noted that 21% of the respondents opted not to disclose any kind of information on their marital status and whether they have children; a similar percentage refrained to give this type of information in the MORE2 study. However, the available data shows that a large majority of researchers in EU28 countries live in a couple (76%) – 2pp higher than in 2012 (MORE2 study). Slovenia, Norway and Finland are the countries with a higher proportion of researchers living as a couple (83%). Luxembourg and Switzerland have the lowest shares (64% and 66% respectively, see Figure 9). The differences can be explained to a large extent on the effect of age. Indeed, Luxembourg and Switzerland are the countries where researchers have a lower average age - 37 and 40 years respectively-, much lower than the EU28 average (46 years).

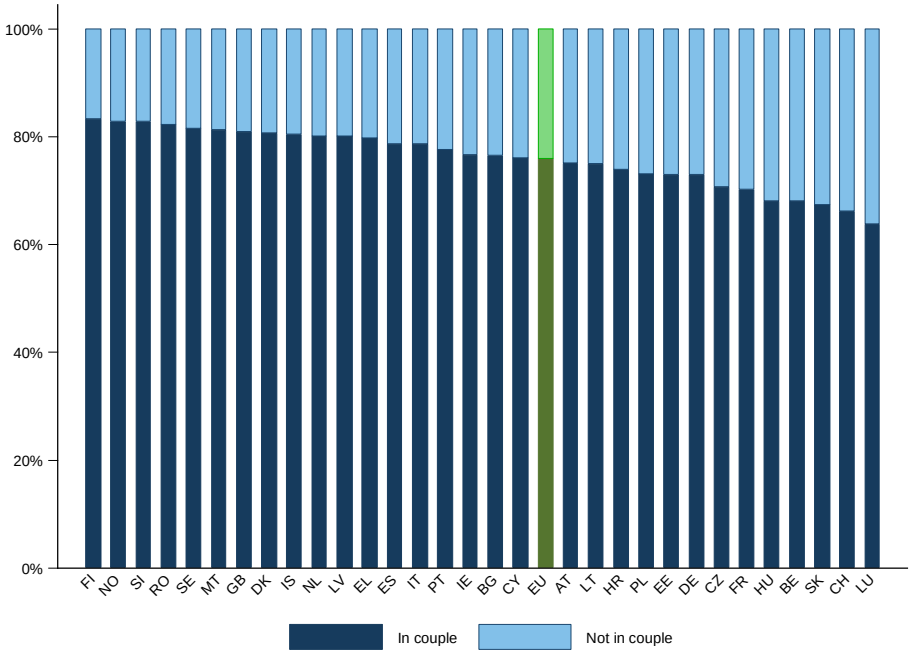
There are important differences when analysing marital status by gender: while 79% of the male researchers live in a couple, only 72% of the female researchers do. This is possibly related to the higher representation of female researchers in the earlier career stages.

There are no large differences when analysing marital status across fields of science. The field of science with the highest rate of researchers living in couple is the Engineering and Technology field (79%). The field of science with the lowest share is the Agricultural Sciences (72%). Between these two fields are the Natural Sciences (78%), Medical Sciences (76%), Social Sciences (75%) and Humanities (74%).

Interestingly, the partners of nearly one third of those who live in a couple in EU28 countries (27%) also work as researchers[65;66].

[65] This share compares to the total of all researchers living in a couple, including those who prefer not to disclose whether their partner works as a researcher.

Figure 9: Share of researchers living in couple

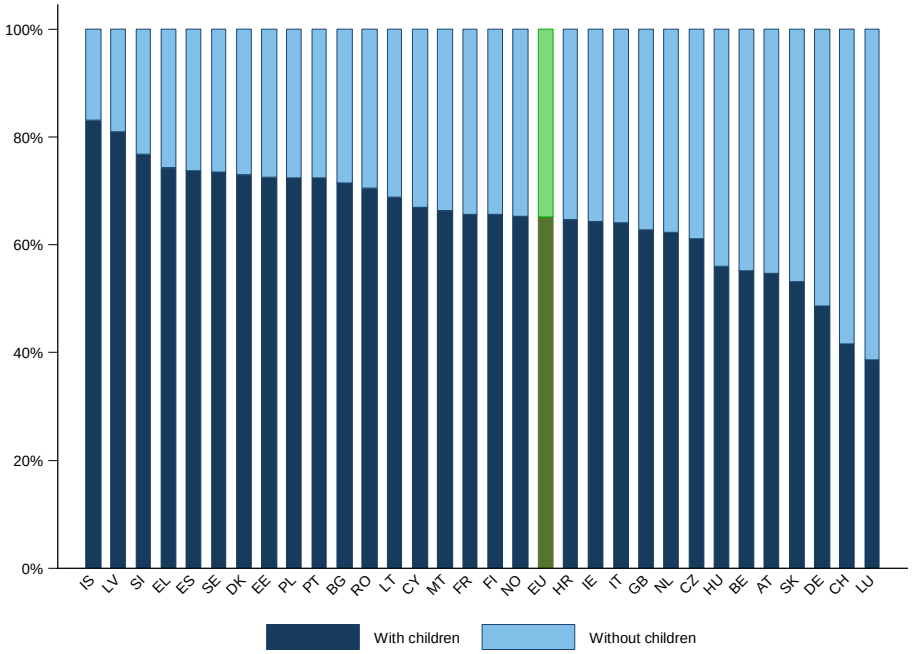


Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 6: "What is your status?"
- (n=8,306)

When analysing the characteristics of researchers with children it is important to note that they are very similar to those living as a couple. In the EU28 countries, 63% of the researchers have children, but there are also differences between men and women. Not only are male researchers more likely to live in a couple, they are also more likely to have children: 68% of them have children compared to 56% of their female counterparts. This gender difference was also observed in the MORE2 study, but it is important to note that both values have dropped: the share of women with children declined by 6pp between 2012 (62%) and 2016 (56%), and the share of men in this situation declined by 5pp (73% to 68%).

[66] As a benchmark, we mention that the DG EAC study "Research Careers in Europe" obtained a share of 39% of researchers in the "dual-career couple" situation. However, the definition in this study was broader, including couples 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. In the MORE3 EU HE survey we only consider a couple where both partners are researchers. It is thus logical that the share found here is lower than the broader defined share in the DG EAC study.

Figure 10: Share of researchers with children



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 6: "What is your status?"
- (n=8,306)

When analysing country differences, the picture is similar to the one shown for marital status. Luxembourg, Switzerland and Germany display the lowest shares of researchers with children – between 39% and 49%. Slovenia (77%), Latvia (81%), and Iceland (83%) are the countries with a higher proportion of researchers with children. Also these findings are coherent with the results obtained in the MORE2 study.

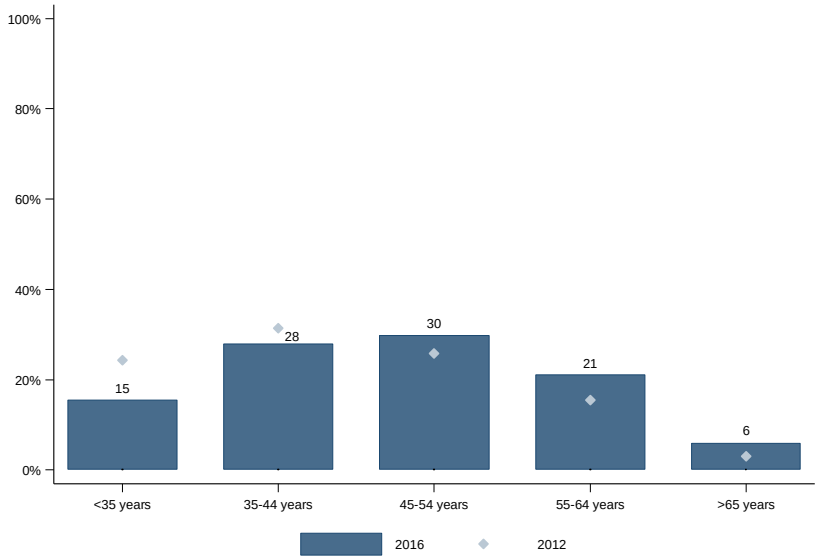
With respect to fields of science, the shares of researchers with children across fields do not show very significant differences, ranging from 58% in the Humanities to 65% in the Natural Sciences[67].

An interesting difference relates to single parenthood. Although the overall share of single researchers with children is rather low (5%), the share of single female researchers with children nearly duplicates the share of male researchers in the same situation: 7 compared to 4%.

Age structure: Regarding age structure, the largest age group is that formed by the researchers between 35 and 54 years old. There are fewer researchers in the younger cohorts compared to the general population (Figure 12). This difference is due to the age of entry in the profession. On average, researchers in the EU28 countries start their career as researchers (career stage R1) when they are 27.8 years old. With respect to MORE2 there are no large differences, but we see that in MORE3 the older groups are somewhat higher and vice versa (Figure 11). More detailed information on the researchers' characteristics in each of the career stages are provided in Section 5.4.

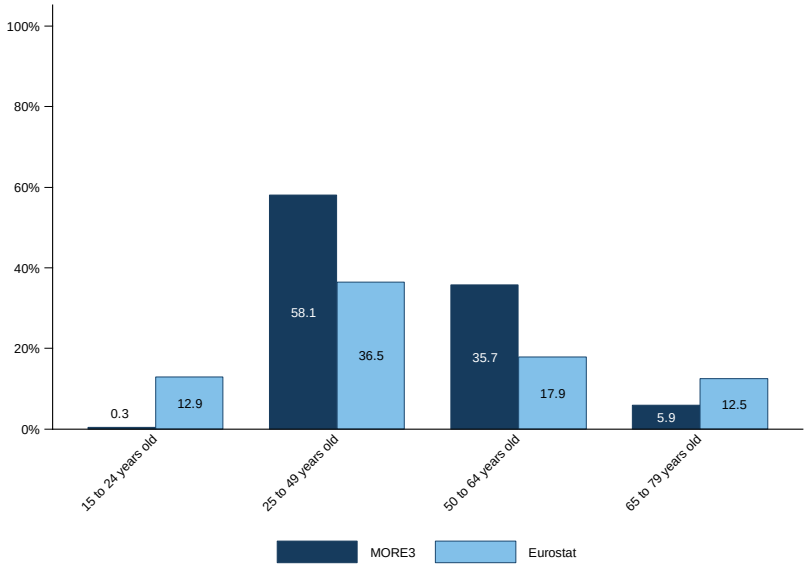
[67] The shares of researchers with children in the rest of the fields are the following: 63% in Engineering and Technology, 64% in Medical Sciences, 63% in Agricultural Sciences and 62% in Social Sciences.

Figure 11: Age structure of the researcher population (EU28)



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Based on question 3: "What is your year of birth?"
- (n=9,412)

Figure 12: Comparison between Eurostat statistics on the total population and MORE3 data on the population of researchers (EU28)



Source: Eurostat and MORE3 EU HE survey (2016)
Notes:
- Based on question 3: "What is your year of birth?"
- (n=9,412)

Education: The European research landscape is characterised by a high level of specialisation. A large majority of researchers holds a PhD degree: 84% in the EU28 countries, and 83% in the larger sample. In the MORE2 study the share of researchers with a PhD was slightly higher (90%), but the results of MORE3 indicate that having PhD degrees continue to be paramount to develop a professional career in research. In addition, 67% of R1 researchers who have not reached this educational level are currently working on their PhD thesis.

5.2. Education and training: PhD studies

The MORE3 EU HE survey contained questions on the researchers' PhD degree: did they or will they obtain a PhD? For the R1 researchers who are currently enrolled in a PhD, and for the R2 researchers holding a PhD, information was also collected on their PhD supervision and training. This information is analysed in the following three sections, but first we give an overview of the extent to which a PhD is prevalent among researchers.

Share of early-stage researchers currently enrolled in a PhD program
Of all R1 researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=1,621)	86.8%	R1:	86.8%	MED:	81.4%	F:	84.8%
		R2:	-	NAT:	88.9%	M:	88.5%
		R3.	-	SOC:	87.9%		
		R4:	-				
2016 (n=1,339)	61.1%	R1:	61.1%	MED:	62.8%	F:	60.6%
		R2:	-	NAT:	64.1%	M:	61.6%
		R3.	-	SOC:	57.2%		
		R4:	-				

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- The discrepancies between MORE2 (2012) and MORE3 (2016) result, inter alia, from differences in the sampling. The share of R1 researchers without a PhD and who are not currently enrolled in a PhD program (MORE2: 11.1%; MORE3: 18.9%; unweighted) and the share of R1 researchers with a PhD and who are not currently enrolled in a PhD program (MORE2: 2.9%; MORE3: 10.8%; unweighted) are larger in MORE3 than in MORE2.
- Based on question 25: "Are you currently working on a PhD or are you enrolled in a doctoral program?"

Share of researchers currently enrolled in a PhD program or already holding a PhD
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=9,016)	90.5%	R1:	89.7%	MED:	87.4%	F:	89.1%
		R2:	90.4%	NAT:	91.9%	M:	91.3%
		R3.	92.0%	SOC:	91.0%		
		R4:	91.1%				
2016 (n=9,412)	91.9%	R1:	72.5%	MED:	92.9%	F:	90.9%
		R2:	94.3%	NAT:	92.6%	M:	92.6%
		R3.	95.6%	SOC:	90.6%		
		R4:	95.2%				

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 25: "Are you currently working on a PhD or are you enrolled in a doctoral program?" and question 9: "Please indicate below all higher education (=post-secondary) diplomas/degrees you have obtained so far and their details."

5.2.1. PhD degree or enrolment in PhD program

Quality and structure of PhD studies play an important role for the skills of researchers. Since a very high share of researchers (MORE3: 92%[68]) in HEIs has either finished their PhD studies or is currently enrolled in a PhD program, it should be clear that the quality of the research carried out during their subsequent careers is heavily influenced by the quality of the PhD program. Policies which address the quality of PhD-studies such as the EU-funded MSCA initiative are hence very important. By comparison with MORE2, the share of researchers who obtained a PhD or who are currently enrolled on a PhD programme has remained roughly stable.

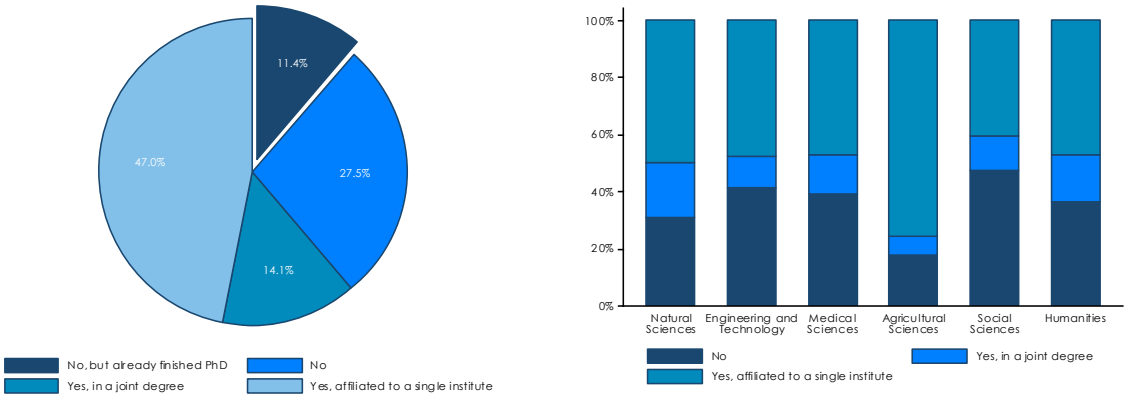
Within the group of EU researchers qualified as being in the R1 career stage, 61% indicated that they were enrolled on a PhD program. The majority (77%[69]) of these researchers' PhD programs are affiliated to a single institute, while 23%[70] are joint degrees by more than one institute.

Country level: Within the surveyed countries, joint degrees are most frequent in Switzerland, whereas the share of joint PhD studies is almost twice as high as the EU average (14%).

Field of science: When comparing different fields of science, joint degrees are most common in Natural Sciences. In Agricultural Sciences PhD studies affiliated to more than one institute are less common (see right panel in Figure 13).

Within the remaining group of R1 researchers (39%), 11% have already finished their PhD but are still in an employment position classified as R1 (see left panel in Figure 13).

Figure 13: Enrolment in PhD programs in R1 career stage and across fields of science (EU28)

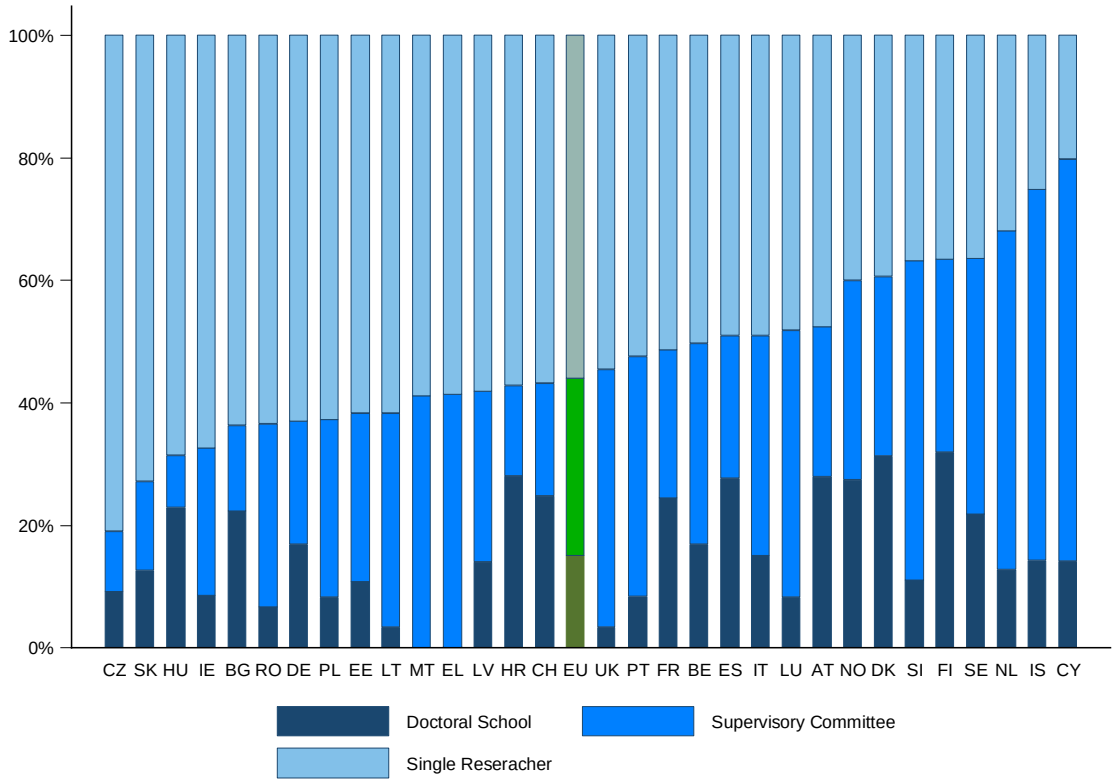


Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 researchers.
- Based on question 25: "Are you currently working on a PhD or are you enrolled in a doctoral program?"
- (n=1,339)

[68] PhD-holders who are enrolled in a second (or multiple) PhD program are included in the 92% of the researcher population with a PhD.
[69] Unless otherwise indicated, in the following PhD candidates are defined as R1 and R2 researchers currently enrolled in a PhD program.

5.2.2. PhD supervision

Figure 14: PhD supervision structures per country



Source: MORE3 EU HE Survey (2016)
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 49: "How would you describe your PhD in terms of supervision structure?"
- (n=2,786)

Within the EU, the supervision of doctoral training mainly lies in the hands of single researchers. 56% of PhD studies of R1 and R2 researchers in Europe are supervised by a single researcher, 29% by a supervisory committee and 15% are embedded in a doctoral school. This indicates that there is room for further professionalisation in European PhD training, or an increase in structured PhD training, such as supported by the EU's MSCA (Marie Skłodowska-Curie actions).

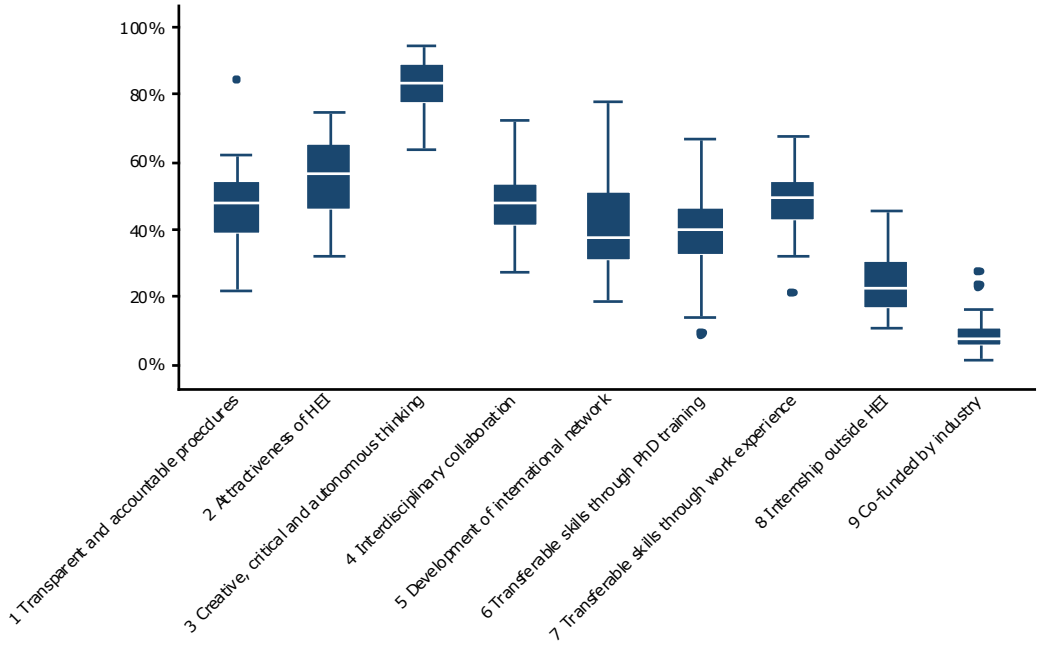
Country level: However, EU (and associated) countries handle supervision very differently (see Figure 14). While in the Czech Republic 81% of all PhD candidates[71] are supervised by a single researcher, it is only 20% in Cyprus or Iceland. Supervisory committees are most common in Cyprus, Iceland, the Netherlands, Slovenia and the United Kingdom. Doctoral schools are almost non-existent in Malta and Greece. On the other hand, more than one fourth of all PhD candidates is embedded in a doctoral school in Finland (32%), Denmark (31%), Croatia (28%), Austria (28%), and Spain (28%).

[71] Unless otherwise indicated, in the following PhD candidates are defined as R1 and R2 researchers currently enrolled in a PhD program.

Career stage: Supervision by one single researcher is slightly more common in Agricultural Sciences than in other fields of science. In Medical Sciences supervisory committees are most often used, while doctoral schools reach the highest share in Natural Sciences. Overall, the differences in the importance of supervision structures across fields of science are much less significant than across countries (see Figure 160 in the annex).

5.2.3. PhD training

Figure 15: Characteristics of PhD training – variation across EU28



Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- The figure shows box plots for different answer categories. A box plot shows the full range of variation of a data set by its minimum and maximum (top and bottom lines), its median (line within the shaded box) and the data between the first and third quartile (shaded box). Outliers are presented by dots.
- Based on question 51: "Which of the following statements are applicable to your PhD training?"
- (n= 2,516)

Country level: Figure 15 shows that there exist differences across countries in Europe in terms of how they fulfil important features of PhD programs. For instance, on EU28 average, 83% of PhD candidates say that they were trained to think creatively, critically and autonomously. The highest share of PhD candidates agreeing to this statement is found in Greece (95%) while it is lowest in Hungary (64%). When comparing different HE systems, countries with the Anglo-Saxon system score higher in shares of PhD candidates trained to think creatively on average, while the countries with the lowest shares can be found in the group of countries classified as having a continental HE system or as the Southern European HE system (see Table 4).

PhD candidates were asked whether the institution where they obtain their PhD is attractive in terms of working conditions, research independence and career development opportunities. The share of R1 and R2 researchers who agree is the highest in countries based on the Anglo-Saxon and Nordic HE systems. Among the countries with the highest shares of students assessing their institution as attractive are Sweden (75%, the highest

share in EU28), Ireland, the Netherlands and the UK. On the other hand, among the countries with the lowest shares of PhD candidates assessing their institution as attractive are mainly countries with the Southern HE system (France – with the lowest share 32%, Italy and Spain) or the Continental system (Hungary, Austria), but also Cyprus, Switzerland and Lithuania. On average, about one half (54%) of all young researchers in the EU28 countries consider themselves as satisfied with the attractiveness of their PhD institution.

Similar results are found for transparent and accountable procedures for admission, supervision, evaluation and career development. Besides Malta (which has a very high share, 84.1%), in the Anglo-Saxon and Nordic system higher shares of researchers considering procedures to be transparent and accountable can be observed than in the Southern and Continental system. The lowest shares of PhD candidates perceiving procedures as transparent and accountable can be found in Austria (22%), France (24%), Portugal (26%), Romania (28%), and Hungary (29%).

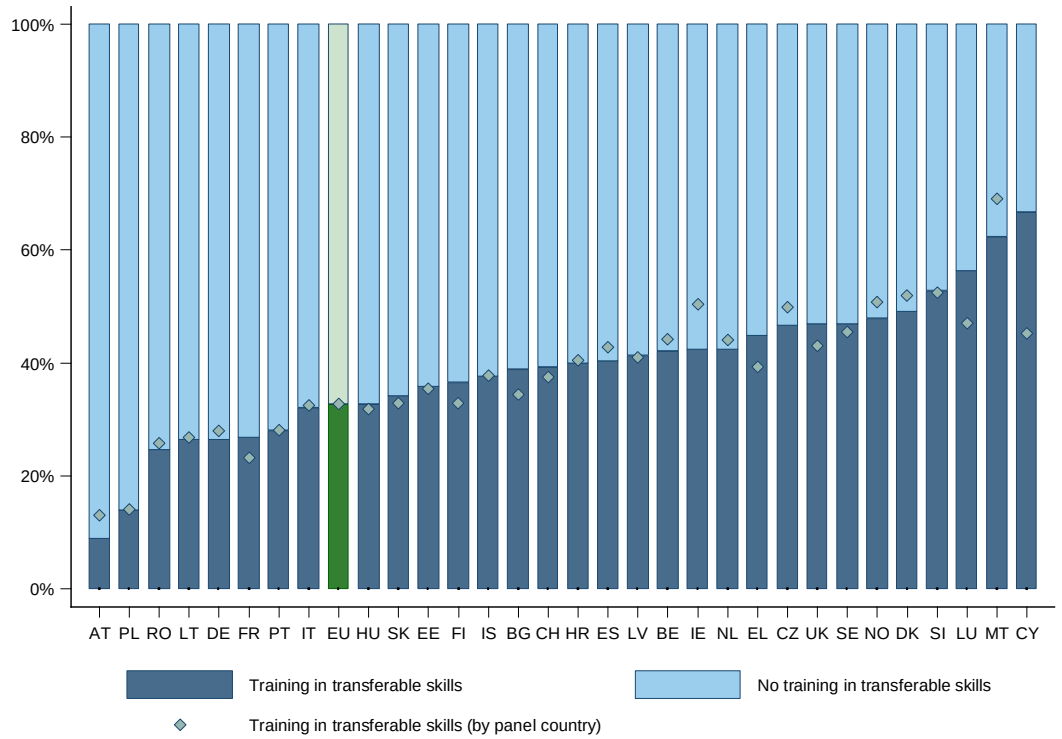
Table 4: Characteristics of PhD training – deviation from country with highest share

Country of PhD	Higher Education System	Procedures	Attractiveness	Thinking	Interdisciplinary	International	Training Skills	Experience Skills	Internships	Industry-Funding
Greece		0,35	0,71	0,00	0,46	0,69	0,38	0,30	0,63	0,83
Croatia		0,52	0,44	0,59	0,31	0,53	0,46	0,30	0,36	1,00
Estonia		0,47	0,42	0,42	0,57	0,59	0,53	0,42	0,46	0,85
Iceland		0,37	0,47	0,33	0,21	0,08	0,50	0,17	0,47	0,77
Latvia		0,41	0,23	0,12	0,00	0,18	0,44	0,00	0,44	0,53
Malta		0,00	0,02	0,02	0,44	0,00	0,08	0,16	0,56	0,60
Norway		0,29	0,11	0,24	0,40	0,31	0,33	0,35	0,78	0,78
UnitedKingdom	Anglo-Saxon	0,58	0,16	0,35	0,44	0,68	0,34	0,53	0,85	0,71
Ireland	Anglo-Saxon	0,47	0,01	0,36	0,57	0,36	0,42	0,20	0,87	0,83
Sweden	Anglo-Saxon	0,36	0,00	0,23	0,57	0,39	0,34	0,30	0,88	0,43
Belgium		0,49	0,12	0,33	0,40	0,26	0,43	0,38	0,78	0,81
The Netherlands	Anglo-Saxon	0,58	0,03	0,55	0,55	0,45	0,42	0,27	0,64	0,65
Denmark	Anglo-Saxon	0,60	0,35	0,18	0,49	0,28	0,30	0,25	0,36	0,16
Slovenia		0,56	0,40	0,19	0,24	0,55	0,24	0,08	0,06	0,70
Finland		0,74	0,36	0,16	0,28	0,47	0,52	0,40	0,91	0,87
Luxembourg		0,64	0,23	0,51	0,71	0,41	0,18	0,34	0,77	0,89
Czech Republic	Continental	0,48	0,13	0,36	0,17	0,69	0,35	0,32	0,00	0,00
Slovakia	Continental	0,57	0,64	0,62	0,47	0,78	0,56	0,29	0,40	0,82
Poland	Continental	0,48	0,60	0,45	0,57	1,00	0,91	0,49	0,40	0,88
Germany	Continental	0,82	0,57	0,22	1,00	0,87	0,70	0,61	0,90	0,88
Switzerland		0,85	0,82	0,21	0,95	0,65	0,48	0,45	1,00	0,81
Austria	Continental	1,00	0,77	0,03	0,95	0,90	1,00	1,00	0,78	0,71
Hungary	Continental	0,89	0,98	1,00	0,55	0,80	0,59	0,61	0,72	0,69
France	Southern	0,97	1,00	0,88	0,70	0,75	0,69	0,66	0,61	0,60
Lithuania		0,70	0,77	0,98	0,81	0,89	0,70	0,71	0,71	0,89
Spain	Southern	0,66	0,69	0,83	0,93	0,59	0,46	0,36	0,13	0,84
Italy	Southern	0,69	0,77	0,35	0,69	0,79	0,60	0,58	0,60	0,64
Cyprus		0,81	0,99	0,13	0,71	0,62	0,00	0,49	0,79	0,95
Portugal	Southern	0,94	0,60	0,29	0,43	0,88	0,67	0,75	0,22	0,79
Romania		0,90	0,49	0,56	0,42	0,89	0,73	0,51	0,47	0,67
Bulgaria		0,45	0,31	0,42	0,33	0,88	0,48	0,26	0,53	0,42
EU		**0,70**	**0,50**	**0,37**	**0,70**	**0,74**	**0,59**	**0,54**	**0,69**	**0,75**

Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Graph illustrates distance from the country with the highest share of PhD candidates answering the respective question with yes: 0 = country with highest share (green); 1 = country with lowest share (red); x = (maximum share – country share)/(maximum share – minimum share).
- Instead of following an alphabetical order, countries are grouped by higher education systems.
- Based on question 51: "Which of the following statements are applicable to your PhD training?"
- (n= 2,786)

Interdisciplinary collaboration is most common for PhD candidates studying in Latvia, the Czech Republic, and Iceland. On EU28 average, 40% of all PhD candidates have collaborated with or worked in more than one discipline for their PhD. Least common in the EU and associated countries is interdisciplinary work in Germany (27%), Austria (30%), and Switzerland (30%). Interestingly, the latter scores very highly in the share of PhD candidates whose PhD program is affiliated to more than one institute. Obviously, the higher share of joint degrees does not translate into higher share of PhD candidates with experience in interdisciplinary work. In Iceland and Latvia high shares of researchers have been able to develop international networks (e.g. by collaborations, a dual or joint degree, or mobility) during a PhD program, however, the highest share of PhD candidates who declare that they have developed international networks is found in Malta (78%). Only 19% of PhD candidates in Poland were able to develop an international network.

Figure 16: Share of researchers receiving training in transferable skills during PhD per country (bar = by country of PhD and dot = by panel country)



Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Share of researchers receiving training in transferable skills per country of PhD (bars) and panel country (dots).
- With country of PhD the country where one obtained a PhD or is currently enrolled in a PhD programme; and with panel country the country where the researcher is currently working according to the ex ante data collection in the sample.
- Based on question 51: "Which of the following statements are applicable to your PhD training?"
- (n= 2,786-2,989)

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, in the EU28 countries, 33% of PhD candidates indicate that they have received training in transferable skills during their PhD training. This can be compared to 81% of researchers who state that these skills are a positive factor for their career progression (see Figure 30). Within the EU there exist large differences across countries regarding the share of young researchers receiving training in such transferable skills. Countries like Austria, Poland, Germany or France show low levels of PhD candidates stating that they have received training in transferable skills during their PhD (see Figure 16). On the other hand, in Cyprus, Malta, but also in the Scandinavian countries (Denmark, Norway, and Sweden) as well as the United Kingdom, the shares of PhD candidates that state training in transferable skills forms a part of their PhD training is relatively high. The difference in shares between the lowest share (Austria, 9%) and the highest share (Cyprus, 67%) is significantly high.

Interestingly, countries with low shares of PhD candidates that declare they have received structured training in transferable skills tend to also have low shares of students that think they have developed transferable skills through work experience (e.g. Austria, France, Germany, Lithuania, Portugal; see Table 4).

The extent of training in transferable skills also strongly varies across countries. While in Bulgaria (see Figure 159 in Annex for country details) almost two out of three PhD candidates indicate that they have received training (if any) lasting more than three weeks, in the EU28 it is only 18% on average. The highest shares of PhD candidates declare that they have received one to two weeks training in transferable skills per year (38% in EU28). One out of five PhD candidates in the EU indicate that they have received training in transferable skills less than one week.

Figure 16 also illustrates the share of PhD candidates stating that they have received training in transferable skills by the country of employment. Comparing the shares by country of PhD and by country of employment (panel country: dot), the figure shows that some countries benefit from other countries by importing transferable skills via mobile researchers. When the dot is higher than the bar, the share of researchers with transferable skills training during PhD is higher among those currently working in the country (having obtained their PhD in this country or elsewhere) than among those who obtained/will obtain their PhD in this country. This indicates that the country profits from mobile researchers trained abroad who were more likely to receive transferable skills training than researchers trained in the country itself. For instance, while only 9% of Austrian PhD candidates (based on the country of PhD) state that they have received training in transferable skills, 13% of R1 & R2 researchers working in Austria (based on the panel country) do so, implying that training in transferable skills in Austrian PhD-programmes is low, but that some of that lack of training is being compensated for by researchers who obtained their PhD elsewhere. Among the benefitting countries are Belgium, Denmark, Ireland (showing the largest positive difference between the compared shares), Latvia, Malta and Norway. Interestingly, Malta – although already showing the second highest share of PhD candidates indicating that they have received training in transferable skills – is able to further increase this share by incoming researchers. Yet Poland (as the country with the second lowest share by country of PhD) only slightly benefits (from 14% to 14%). On the other hand, some countries are net exporters of structured training. Among these countries are Cyprus, Luxembourg, Greece and the United Kingdom.

Table 5 presents the shares of R1 and R2 researchers indicating that they have received training in transferable skills during their PhD training (second column) and have (not) obtained competitive funding for basic research based on peer review from one of the sources listed in the first column. The third column shows the respective shares of funded and non-funded researchers without training in transferable skills. In comparison to R1 and R2 researchers that did not declare having received training in transferable skills during their PhD, a higher share of researchers with training in transferable skills have received competitive funding from one of the sources listed in Table 5.

In total, 43% of R1 and R2 researchers declaring that they have received training in transferable skills during their PhD training have gained competitive funding from at least one of the sources listed in Table 5. 36% of researchers within the group of R1 and R2 researchers without training in transferable skills have obtained funding from the sources listed below at least once. Contrary to this, 57% of R1 and R2 researchers thinking that they have received training in transferable skills during their PhD have never received funding from the sources listed below. 64% of R1 and R2 researchers without training in transferable skills during their PhD have never obtained this kind of competitive funding. The odds ratio can be calculated to quantify the level of association between funding (yes/no) and received training in transferable skills (yes/no). It turns out that the odds of obtaining funding when researchers indicate having received training in transferable skills

during the PhD is 1.3 times higher than the odds of gaining funding without training in transferable skills.[72]

In particular, for the funding programs listed under the titles `Individual fellowship under ERC: Starting or Consolidator Grant´ (odds ratio=2.8), `Individual fellowship under Marie Sklodowska-Curie Actions: Experience researcher´(odds ratio=2.6) and ´Funding under other Marie Sklodowska-Curie Actions: ITN, RISE, COFUND´ (odds ratio=2.5) the chances for obtaining funding are more than two times higher in cases where researchers indicate that they have received training in transferable skills during PhD training in comparison to those who stated that they had not.[73]

Table 5: Share of researchers receiving training in transferable skills during PhD by funding

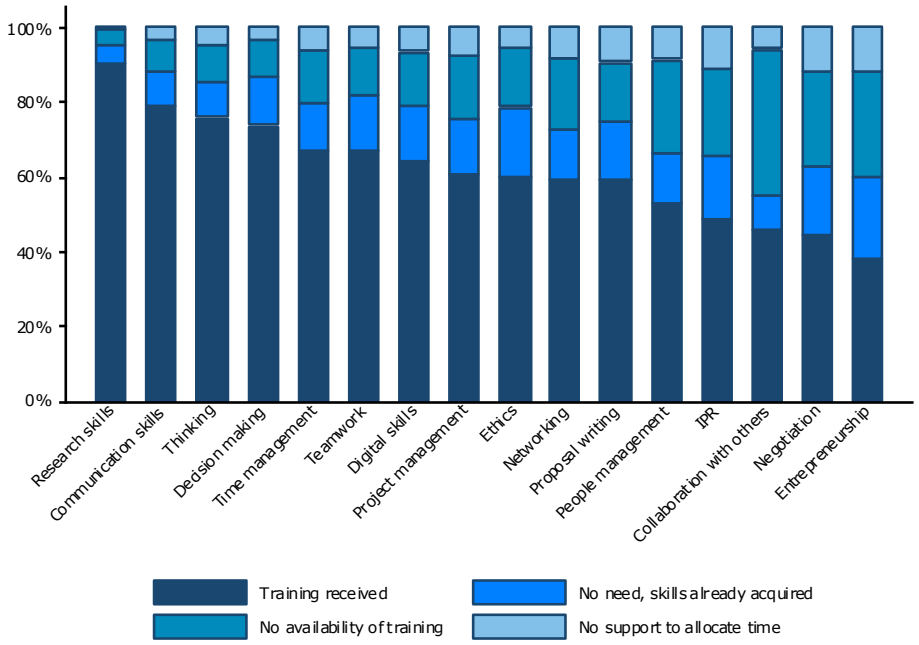
Funding Source	Training in transferable skills: yes	Training in transferable skills: no
Individual fellowship under ERC: Advanced Grant	1.5%	1.6%
Individual fellowship under ERC: Proof of Concept	0.3%	0.1%
Individual fellowship under ERC: Starting or Consolidator Grant	2.4%	0.9%
Individual fellowship under ERC: Synergy Grant	0.6%	1.0%
(Other) FP or H2020 funding	6.7%	4.3%
Individual fellowship under Marie Sklodowska-Curie Actions: Experience researcher	1.6%	0.6%
Individual fellowship under Marie Sklodowska-Curie Actions: Early stage researcher	1.9%	1.6%
Funding under other Marie Sklodowska-Curie Actions: ITN, RISE, COFUND	1.5%	0.6%
National competitive funding (based on peer review)	34.4%	30.0%
Funding (irrespective of the source): yes	**42.9%**	**36.2%**
Funding (irrespective of the source): no	**57.1%**	**63.8%**
	100.00%	100.00%

Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Researchers can receive funding from more than one of the listed sources. Therefore, the sum of the percentages per funding source exceeds the total percentage of researchers that have received funding from at least one of the sources listed.
- Based on question 51: "Which of the following statements are applicable to your PhD training?" and question 105: "Have you obtained competitive funding for basic research (based on peer review) from one or more of the following sources?"
- (n=2,522)

The most frequent training modules in transferable skills that have been received by PhD candidates during their doctorate – if any – refer to research skills (see Figure 17). 90% of all PhD candidates educated in the EU28 countries who declare that they have received any training in transferable skills also state that they have received training in research skills. Another 5% indicate that they already acquired these skills and therefore do not need training, while 4% indicate that this kind of training is not available. Communication and presentation skills, decision making and problem solving, and critical and autonomous thinking are also well covered training modules in the transferable skills during the PhD. For these skills, more than 80% of PhD candidates indicate that they either have received specific trainings or had already acquired such skills.

[72] The X^2 value, which is a test that the odds ratio is 1, is significant at the 1% level.
[73] The respective X^2 values are always significant at the 1% level.

Figure 17: Training modules in transferable skills (EU28)[74]

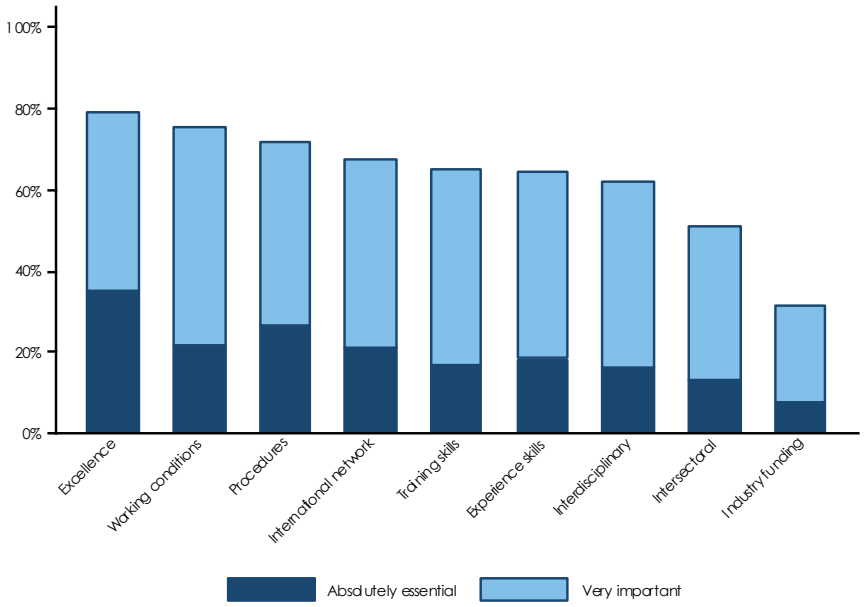


Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders who indicate that they have received any training in transferable skills during their doctorate.
- Reasons why researchers did not receive training on different types of transferable skills (based on question 55). The possible reasons are: No need, skills already required; No availability of this kind of training; No support to allocate time to this kind of training; Others.
- Based on question 54: "Please indicate below the training modules in the transferable skills you received during your doctorate"
- (n= 1,130)

The least frequently offered training is collaboration with citizens, government and broader society, when also considering the share of students who already received training. Almost half of the PhD candidates state that they have neither received a corresponding training nor feel sufficiently educated. This is closely followed by training in entrepreneurship, people management and negotiation. Other reasons for not receiving specific trainings mentioned by interviewees include lack of interest of the students in the training. Furthermore, some students responded that they have not yet received it but intend to do so before finishing their PhD.

[74] The illustrated shares refer to PhD candidates who obtained any kind of structured training - which equates to 32.6% of all PhD candidates. This calculation is based on question 51: "Which of the following statements are applicable to your PhD training?" and refers to R1 PhD candidates and R2 PhD holders.

Figure 18: Importance of principles for PhD training as seen by PhD candidates (EU28)

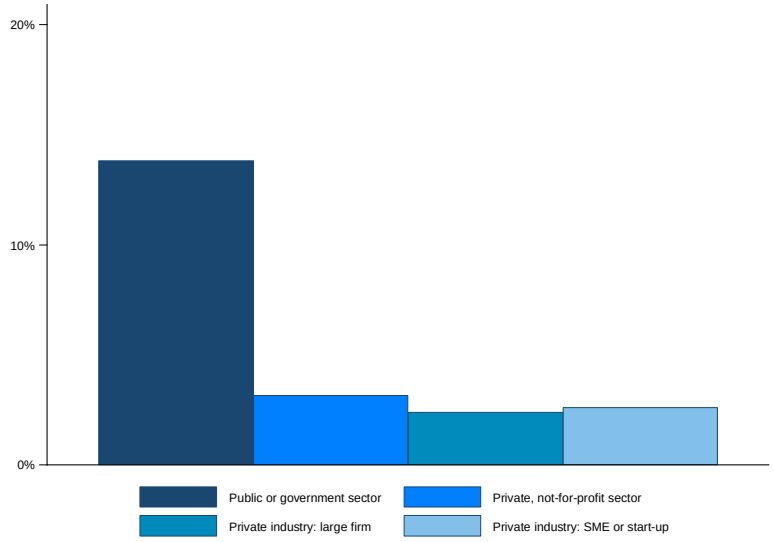


Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 52: "How important do you consider the following principles for PhD training in general?"
- (n= 2,380-2,485)

The most frequently offered training modules overall fit to those principles that PhD candidates highly value. When asking PhD candidates about their opinion regarding the most important principles for PhD training in general, research excellence is mentioned most often. Four out of five see excellence as absolutely essential (35%) or at least very important (44%) for their PhD studies. This is followed by attractive working conditions (incl. research independence and career development opportunities; 21% absolutely essential and 54% very important), and transparent and accountable procedures (27% and 45% respectively). On the other hand, industry funding is not as often perceived as very important. Only 31% of R1 and R2 researchers who are currently enrolled in or have recently finished a PhD program value industry funding at least as very important. In addition, intersectoral collaboration (including work placements and internships) is also lowly rated. This is in contrast with the principles of innovative doctoral training, where "industry exposure", including intersectoral collaboration, figures prominently. However, only 9% of R1 researchers and 11% of R2 researchers are aware of these principles. The remaining four principles (international networks, the development of transferable skills through work experience or through training, and interdisciplinary collaboration) are perceived as being as very important by about two thirds of these researchers.

The comparably low share of PhD candidates assessing private co-funding by industry as very important for their PhD is mirrored by the share of researchers receiving such funding. Within EU28 member states only 8% of PhD candidates are co-financed by industry. Across countries, the respective share ranges from 2% (Croatia) to 27% (Czech Republic) (see Table 4 for details). Across fields of science, the highest share of co-funded PhD candidates is unsurprisingly found in Engineering (14%) but followed by Humanities (9%) and Medical Sciences (7%), while it is lowest in Agricultural Sciences (5%).

Figure 19: Work placements and internships (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 53: "Please indicate in which sector(s) you undertook any work placements or internships (outside the university or higher education institution):"
- (n = 2,517)

We also see a similar pattern when looking at internships and work placements during the PhD. While internships and work placements are more common in the public or government sector (incl. research performing organisations), they are less common in the private sector. On the one hand, 14% of R1 and R2 researchers state that they have undertaken a work placement or internship in the public sector. On the other hand, between 2-3% have done this in the three private sectors respectively: private, not-for-profit oriented organisations (e.g. research foundations or NGOs, 3%), large firms (2%) as well as SMEs and start-ups (3%).

5.3. Recruitment

The design of recruitment policies for researchers is a major feature of research organisations, shaping career perspectives and perceptions of attractiveness of research jobs, particularly for early stage researchers. This matters for the EU with its goal of a growing number of researchers. Recruitment can be an important tool for universities and research organisations to build up promising newcomers, give fresh impetus to ongoing research and shape their scientific profile. MORE3 included several questions on recruitment policies of research organisations, which were asked of all researchers in all career stages and are analysed in the following sections.

5.3.1. Open, transparent and merit-based recruitment

Share of researchers who agree that research job vacancies are sufficiently externally and publicly advertised in their home institution
Of all researchers

	EU total	Per career stage	Per FOS	Per gender
2012 (n=9,016)	60.0%	R1: 56.1% R2: 58.6% R3. 60.1% R4: 63.3%	MED: - NAT: - SOC: -	F: - M: -
2016 (n=8,632)	80.3%	R1: 78.6% R2: 80.0% R3. 80.2% R4: 81.6%	MED: 79.9% NAT: 80.0% SOC: 81.0%	F: 78.0% M: 81.8%

Share of researchers who agree that the recruitment process is sufficiently transparent in their home institution
Of all researchers

	EU total	Per career stage	Per FOS	Per gender
2012 (n=9,016)	64.6%	R1: 62.3% R2: 60.6% R3. 65.0% R4: 68.8%	MED: - NAT: - SOC: -	F: - M: -
2016 (n=8,624)	74.1%	R1: 74.5% R2: 70.8% R3. 72.9% R4: 77.4%	MED: 76.4% NAT: 76.5% SOC: 69.9%	F: 70.9% M: 76.1%

Share of researchers who agree that recruitment is sufficiently merit-based in their home institution
Of all researchers

	EU total	Per career stage	Per FOS	Per gender
2012 (n=9,016)	65.7%	R1: 67.3% R2: 60.1% R3. 66.9% R4: 67.9%	MED: - NAT: - SOC: -	F: - M: -
2016 (n=8,317)	76.5%	R1: 78.8% R2: 76.5% R3. 74.3% R4: 78.5%	MED: 77.4% NAT: 79.8% SOC: 72.4%	F: 74.9% M: 77.6%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
- Based on question 40: "What is your opinion on the following issues with respect to recruitment in your home institution"

Comparing the data based on MORE2 with the answers regarding the recruitment processes in 2016, there has been an important improvement in the degree of perceived transparency and the perceived role of merit across the EU. The degree of perceived

openness deserves a special mention. In 2012 only 60% of the researchers perceived that vacancies were sufficiently advertised in their home institution. Four years later the share of researchers feeling that vacancies are sufficiently externally and publicly advertised and made known by their home institution reached 80% (Figure 20). However, the respective question that was posed in MORE2 differs slightly from the question asked in 2016 (see notes of Figure 20 for more details) and was placed at a different position in the questionnaire. This is unlikely, however, to have caused such a big difference on its own. Real developments also play a role, in particular in the strong increase of the first factor (public advertisement of vacancies). Based on national sources (experts), we found that in three countries that experience a very strong rise in this indicator, real events took place that can be expected to have contributed to this rise[75]. This is the case in Romania (30pp rise), Austria (24pp rise) and Lithuania (20pp rise). In Romania, the EURAXESS initiative seems to have been strongly promoted in the last years: all vacancies/open positions (both national and international) must now be advertised on EURAXESS. In Austria, we found that public and international advertisement of new positions on Euraxess was already compulsory before but that in the 2013-2015 performance agreements with the universities, internationalisation was increasingly focused on, with emphasis on the compulsory use of Euraxess for international job advertisements. In 2015, a new mobility strategy of the Austrian government was implemented which stressed the use of the Euraxess platform as a central information platform. Finally, in Lithuania there is also the practice of public advertisement of vacancies, but more importantly the rise in this indicator can be associated with a recent expansion in the scope of project-based competitive funding to research provided by the Research Council of Lithuania. These are new research (usually short-term and often part-time) positions that are also publically advertised and which may thus have an influence on the researchers' perception. Moreover, increasing competitive pressure for talent has been cited by country experts, as well as the increased use of online platforms for recruiting (such as www.academicjobseu.com).

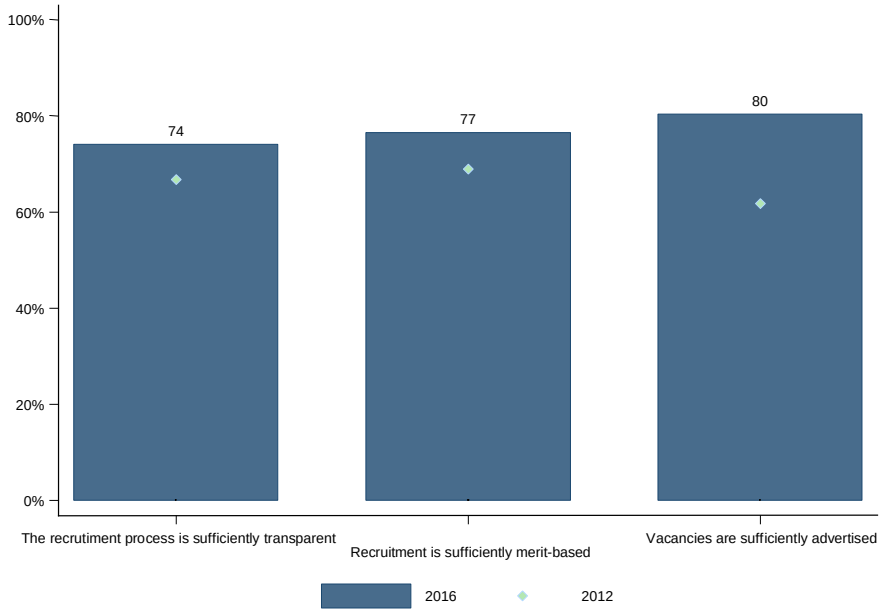
Country level: Generally, the variation with respect to researchers' perception of recruitment processes in their home institutions is rather high across countries (see Table 66) and follows a similar pattern to researchers' perception of career progress in their home institutions (see chapter 4.4.3.1. and Table 68). The share of researchers who agree that recruitment is sufficiently merit-based varies across countries. It ranges between a vast majority of researchers maintaining that it is sufficiently merit-based in the UK (85%), the Czech Republic (86%) and Iceland (87%), to countries where not even two out of three researchers perceive recruitment to be sufficiently merit-based, like Hungary (55%), Italy (61%) and Portugal (61%). Within the EU mostly Southern and Eastern European countries are below the EU28 average (77%).

The share of researchers showing agreement when asked about transparent recruitment processes in their home institution is the lowest in Spain (59%), Hungary (59%), Portugal (61%) and Italy (61%). The highest shares of researchers perceiving recruitment in their home institution as transparent are in Malta (84%), the UK (83%) and in the Czech Republic (83%).

89% of researchers in the UK and 88% of researchers in Romania (cf. supra) perceive research job vacancies to be sufficiently externally and publicly advertised and made known by their home institution, while only 55% of researchers in Spain and 59% of researchers in Hungary agree.

[75] Several country experts were contacted in this regard. Four out of six experts replied to our question. Information on real events that are expected to contribute to the strong rise in the indicator value is available for Romania, Austria and Lithuania. In the Czech Republic no change was observed that could affect this value. For Bulgaria and Latvia, no information was available through the country experts.

Figure 20: Researchers' perception of recruitment processes in their home institution (EU28)

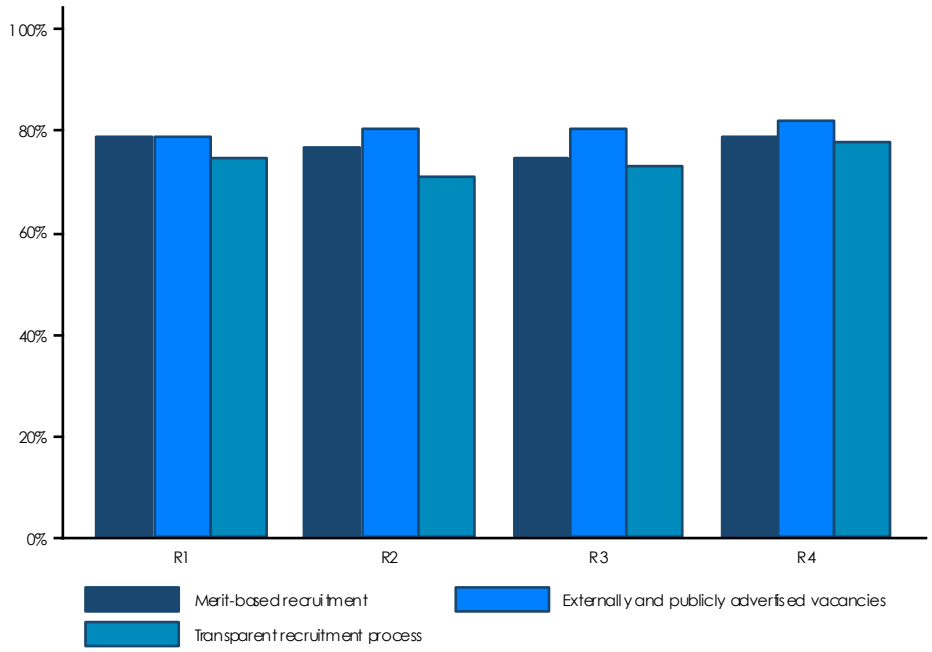


Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:

- Shares of researchers agreeing with the statement of the question.
- Based on question 40: "What is your opinion on the following issues with respect to recruitment in your home institution: 1) Research job vacancies are sufficiently externally and publicly advertised and made known by the institution. 2) The recruitment process is sufficiently transparent. 3) Recruitment is sufficiently merit-based.", with answer categories "I agree", "I don't agree" and "N/A".
- The difference with 2012 data needs to be interpreted with caution since the respective question in MORE2 was stated slightly differently, in particular the item on external advertising. In MORE2: "What is your opinion on the following issues: 1) Are you satisfied with the extent to which job vacancies are publicly advertised and made known by your institution? 2) Do you think that the recruitment process at your home institution is sufficiently transparent? 3) Do you think that recruitment at your home institution is sufficiently merit-based?", with answer categories "yes", "no" and "N/A / no opinion".
- The size of the sample for each of the items is: for the question on transparency, n=9,558; for the question on merit, n=9,224; and for the question on advertisement, n=9,570.

Career stages: Figure 21 shows the shares of agreement among researchers on issues with respect to recruitment in their home institutions across career stages. A slight tendency can be observed that, in comparison to early stage researchers, a higher share of later stage researchers are content with advertising practices. This might be due to their higher level of participation in staffing decisions (79% of R1 researchers, 80% of R2 researchers, 80% of R3 researchers and 82% of R4 researchers perceive vacancies sufficiently publicly advertised, see Figure 21). With respect to the share of researchers in different career stages feeling recruitment to be merit-based, a slight u-shape can be observed. Early stage researchers and leading researchers are more likely to perceive recruitment as merit-based (79% of R1 researchers and 79% of R4 researchers) than researchers in stages R2 (77%) and R3 (74%). This might reflect the fact that mostly R2 and R3 face critical phases of recruitment where they aim at a long-term career in research. The assessment of transparency levels of the recruitment process presents the same slightly u-shaped picture across career stages. The shares of early stage R1 researchers (75%) and leading R4 researchers (77%) that perceive recruitment processes as transparent are higher than the shares of R2 (71%) and R3 (73%) researchers that perceive sufficiently transparent recruitment processes in their home institutions.

Figure 21: Researchers' perception of recruitment processes in their home institution, by career stage (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Shares of researchers agreeing with the statement of the question.
- Based on question 40: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=8.317-8.632)

Fields of science: Researchers in Social Sciences and Agricultural Sciences are the least likely to perceive transparent and merit-based related aspects of recruitment in their home institutions (see Table 6). This is most likely due to more conflicting doctrines within social sciences than in natural sciences. 68% of researchers in Social Sciences and 69% of researchers in Agricultural Sciences perceive recruitment to be transparent. 70% of researchers in Social Sciences and 67% of researchers in Agricultural Sciences perceive recruitment to be sufficiently merit-based. The share of researchers agreeing on research job vacancies sufficiently externally and publicly advertised is lowest in Agricultural Science (74%) and highest in Humanities (83%).

Table 6: Researchers' perception of recruitment processes in their home institution, by field of sciences (EU28)

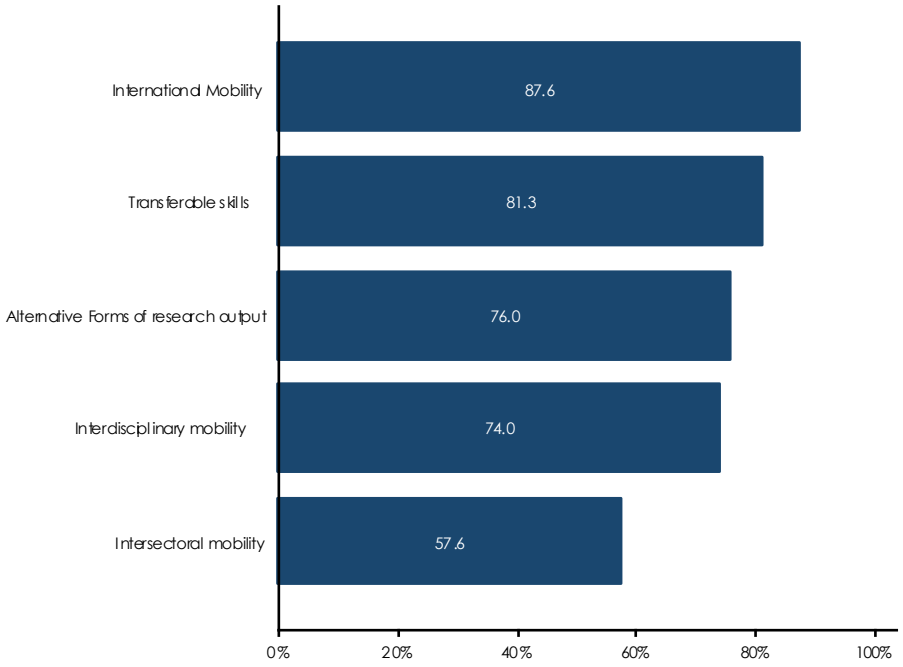
Field of Science	Merit-based	Transparent	Externally and publicly advertised
Natural Sciences	80.4%	76.9%	80.3%
Engineering and Technology	79.0%	75.8%	79.5%
Medical Sciences	79.1%	77.8%	81.0%
Agricultural Sciences	67.1%	68.8%	73.8%
Social Sciences	70.1%	68.3%	79.9%
Humanities	75.5%	72.0%	82.5%

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 40: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=8.317-8.632)

5.3.2. Factors for recruitment

MORE3 also included questions on how non-standard research outputs[76] and career phases such as mobility to industry affects recruitment in their home institution. The three types of mobility considered in the MORE3 study are perceived by researchers as being important for recruitment. However, international mobility is considered to be the most important factor: it has the highest rate of approval to positively affect recruitment across countries (EU28: 88%). Developing transferable skills or producing alternative forms of research output (e.g. project reports, grant writing, the development and maintenance of data infrastructure, organisation of research events/conferences, etc.) outweigh interdisciplinary and intersectoral mobility.

Figure 22: Positive factors for recruitment (EU28)



Source: MORE3 EU HE survey (2016)
Note:
- Based on question 42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=8.483-9.013)

Country level: International mobility is highly valued by most researchers across countries (see Table 67 in Annex). 93% of researchers in Latvia, Estonia and Luxemburg would agree that international mobility experiences positively affect recruitment. On the lower bound 76% of researchers in Bulgaria and 82% of researchers in Portugal and Lithuania still perceive international mobility as being positive for recruitment.

There are more differences across countries, however, regarding the importance of alternative forms of research output, like project reports or grant writing. For instance, while about 88% of researchers in Luxemburg and about 87% of researchers in Belgium

[76] Non-standard or alternative research outputs contrast with scholarly research articles published in peer-reviewed journals, and include project reports, grant writing, development and maintenance of data infrastructure, organization of conferences etc.).

believe that alternative forms of research output are positively affecting recruitment in their home institution, only about 61% of Italian and about 66% of Spanish researchers would agree (EU28: 76%).

Intersectoral mobility is perceived as a positive factor for recruitment especially by researchers in Latvia (83%) and by researchers in Czech Republic (72%), while only about one out of two researchers in Spain (47%) and France (50%) would agree (EU28: 58%). In contrast to some Southern European countries, researchers from Latvia and the Czech Republic evaluate intersectoral mobility almost as positively for recruitment as other factors like interdisciplinary mobility.

Interdisciplinary mobility experience or following an interdisciplinary research approach is perceived to be positively affecting recruitment in Latvia (83%), Romania (83%) and Iceland (82%), whereas only about 64% of researchers in Bulgaria and in France would agree (EU28: 74%).

In general, across countries a rather high correlation between this factor and the effect of transferable skills on future research career can be observed (correlation coefficient: 0.8). In particular, researchers in Latvia (91% of researchers), Belgium (88% of researchers) and Iceland (87% of researchers) perceive transferable skills to positively affect recruitment in their home institutions. Yet only about 69% of researchers in Finland, about 70% of researchers in Bulgaria and about 71% of researchers in Cyprus think that transferable skills are a positive factor for recruitment (EU28: 81%).

Table 7: Positive factors for recruitment by career stage

	R1	R2	R3	R4
Interdisciplinary mobility	80.0%	76.0%	70.3%	75.0%
International mobility	85.1%	88.2%	86.2%	90.3%
Intersectoral mobility	64.1%	60.4%	54.3%	57.5%
Research output	81.2%	77.0%	76.4%	72.6%
Transferable skills	85.9%	83.2%	78.9%	81.3%

Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=1,341-4,015)

Career stages: With regard to international mobility no high levels of heterogeneity can be observed across career stages (see Table 7). The spread ranges from 85% of R1 researchers that regard international mobility experience as a positive factor for recruitment to 90% of R4 researchers that perceive international mobility experience to positively influence recruitment in their home institutions. The largest difference between career stages can be observed with respect to intersectoral and interdisciplinary mobility experiences. A higher share of early stage researchers perceive intersectoral as well as interdisciplinary mobility experience as a positive factor than do established researchers. While 54% of R3 researchers evaluate intersectoral mobility experience as a positive factor for recruitment, 64% of R1 researchers would agree. 70% of R3 researchers perceive interdisciplinary mobility as positive and 80% of R1 researchers would agree. It is interesting to see that R1 researchers are on average more likely to perceive interdisciplinary and intersectoral mobility as well as non-standard research output and transferable skills as positive for recruitment than do (older) R4 researchers, while the opposite is true for international mobility. It remains to be seen whether this reflects a structural change among academic researchers.

Table 8: Positive factors for recruitment by field of science

	Agricultural Sciences	Engineering and Technology	Human-ities	Medical Sciences	Natural Sciences	Social Sciences
Interdisciplinary mobility	75.8%	77.5%	69.5%	77.1%	77.8%	67.1%
International mobility	91.3%	88.0%	87.2%	88.5%	89.2%	84.4%
Intersectoral mobility	64.5%	66.9%	44.3%	61.8%	57.6%	54.8%
Research output	82.8%	75.9%	72.8%	76.4%	79.0%	73.5%
Transferable skills	74.2%	82.4%	76.5%	85.8%	82.7%	79.3%

Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=325-2,632)

Field of science: Across different fields of science the greatest homogeneity can be found regarding international mobility (see Table 8). The share of researchers considering international mobility as positive factor for recruitment in their home institution is above 84% in every field of science (with a maximum of 91% of researchers in Agricultural Sciences). In contrast, between fields of science the largest heterogeneity can be observed with respect to positive effects of intersectoral mobility experience. While in Humanities only 44% of researchers consider mobility between sectors as a positive factor influencing recruitment, in 67% of researchers in Engineering would agree. A somewhat smaller variation between sciences can be seen regarding the influence of transferable skills, interdisciplinary mobility and alternative forms of research output (e.g. grant writing). 74% of researchers in Agricultural Sciences and 86% of researchers in Medical Sciences think that transferable skills positively affect recruitment in their home institution. 73% of researchers in Humanities and 83% of researchers in Agricultural Sciences think that alternative research output as positive for recruitment. With regard to interdisciplinary mobility, which is generally considered by a lower share of researchers to positively influence recruitment, 67% of researchers in Social Sciences and 78% of researchers in Natural Sciences would agree.

5.4. Research careers

This subsection examines first the profiles of researchers within the career stages R1 to R4 and finds significant differences. It then looks at the average length of these career stages across countries and again finds significant heterogeneity. The next section looks at the determinants of progression along career stages in terms of whether researchers perceive career progression to be merit-based and transparent. Finally, dual research careers are examined as a specific type of research career.

5.4.1. Career stages: profiles of researchers

The distribution of researchers over career stages was discussed in the socio-demographics section (5.1). In this section, we focus on career stages from the perspective of career progression. We start with an analysis of the distribution over career stages per country that points at different patterns, from flat to pyramid distributions. We then further characterise the career stages in terms of age, contract types, and teaching activities to create a profile of each career stage in terms of stability and autonomy.

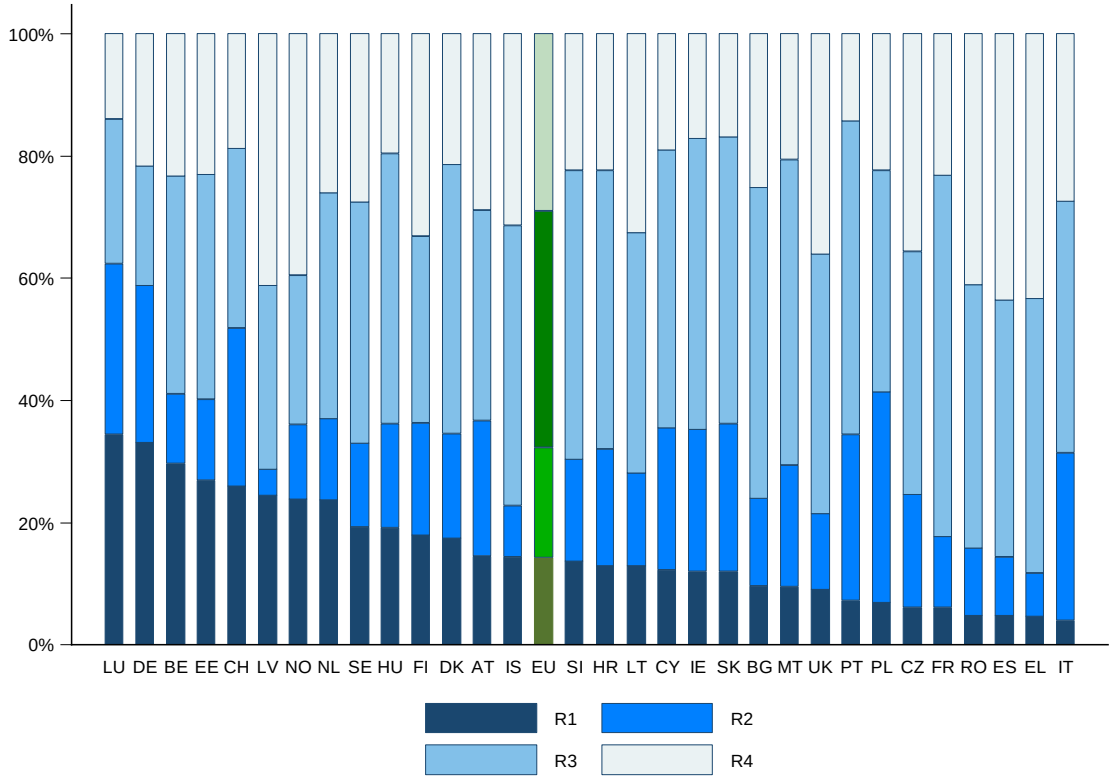
Country level: Figure 23 provides an overview of the distribution of researchers in various career stages in different European countries. While in some countries the shares

of researchers in different career stages are about comparable in size, in other countries some career stages are much larger than others.

For instance, Switzerland is characterised by almost equally sized shares of R1, R2 and R3 researchers, although the number of leading researchers is somewhat lower. About 26% (2012: 32%) of researchers in Switzerland are at career stage R1 and another 26% (2012: 26%) are in career stage R2. About 30% (2012: 22%) of researchers are in R3 and 19% (2012: 20%) of researchers are in R4. In comparison with the MORE2 survey there has been a slight shift from the number of early R1 researchers in favour of established R3 researchers in Switzerland in recent years.

In contrast, France and Spain have a particularly high share of established and leading researchers in comparison to low numbers of early-stage researchers. Only about 6% of researchers in France and 5% of researchers in Spain are in career stage R1 and respectively 12% and 10% of researchers are in R2, while respectively 59% and 42% are in career stage R3 and respectively 23% and 44% are in R4. The shares of R1 researchers in these countries that were already below EU average in 2012 have further decreased. Based on MORE2 survey, the average share of R1 researchers in the EU27 was 18% in 2012, while the share of R1 was 11% in Spain and 14% in France. The survey was not designed to reflect the distribution of researchers over career stages ex ante. However, the fact that such large differences between countries are observed can point to different structures of higher education systems in terms of the size of the "pyramid". We then see countries featuring hierarchical chair-based systems and few tenured positions such as Germany having a smaller share of R4 researchers, while e.g. southern European systems such as Spain, Greece and Italy feature high shares of tenured R3 and R4 researchers, leading to a lower number of R1 and R2 researchers. As mentioned, this should be interpreted with caution as sample sizes and researcher self-assessment in terms of career stage vary across countries. Generally, such structural differences seem to be rather persistent. In 2012, nations featuring hierarchical chair-based systems were also among the countries with the lowest shares of R4 researchers, like Hungary (2012: 17% of R4 researchers), Czech Republic (2012: 19% of R4 researchers) and Poland (2012: 17% of R4 researchers). Southern European countries, however, could be found in the group characterised by high shares of R3 and R4 researchers. For instance, in 2012 47% of researchers in Greece and 44% of researchers in Spain were in career stage R4 (EU27: 28% in 2012).

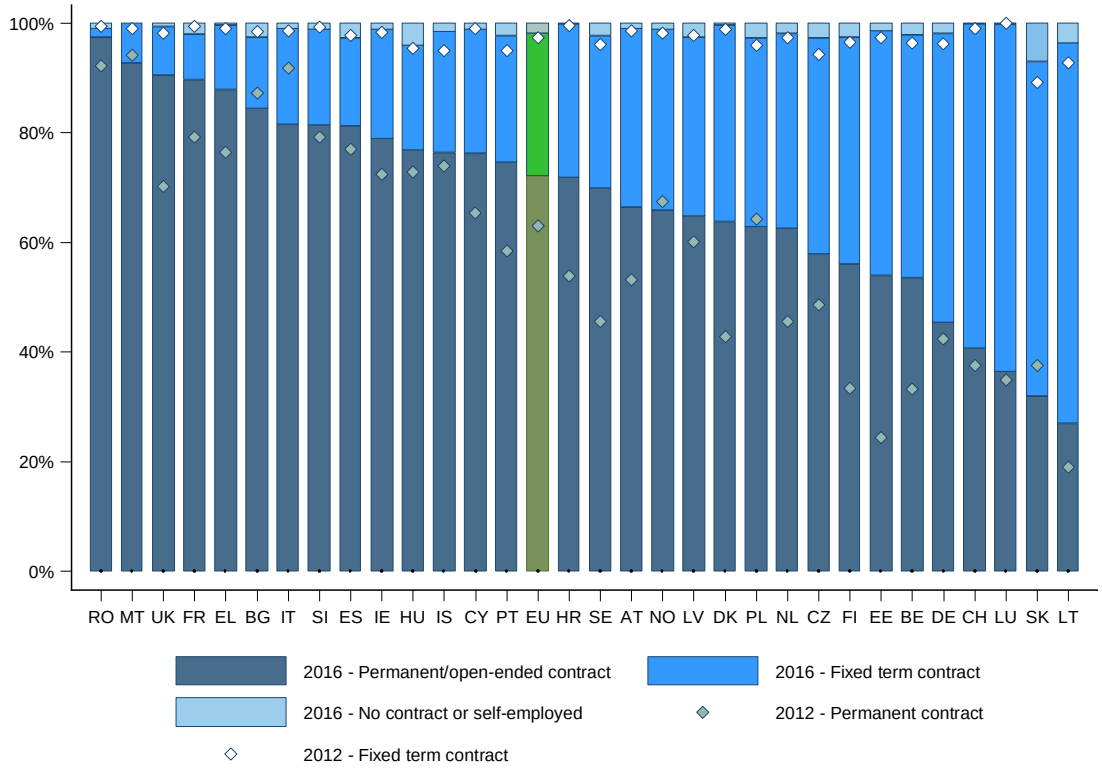
Figure 23: Distribution of researchers across career stages R1 to R4, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 42: "In which career stage would you currently situate yourself?"
- (n= 10,394)

Variation between countries is observed with respect to the contractual situation of researchers. Figure 24 presents the shares of researchers having a permanent or open-ended contracts, fixed-term contracts (e.g. contracts limited to one or two years) and no contract at all or are self-employed by countries. The highest share of researchers with permanent contracts can be found in Romania (97%), but also the respective shares of Malta (93%) and the UK (90%) are significantly above the EU28 average (72%). On the bottom side are Lithuania (27%), Slovakia (32%) and Luxembourg (36%). In comparison with 2012 (MORE2) in most countries the share of researchers with permanent or open-ended contracts has increased, in particular in Estonia, Sweden and Finland. Only in some countries, like Italy, Greece and Slovakia, has the share of researchers having a fixed-term contract increased between 2012 and 2016.

Figure 24: Contractual situation of researchers, by country



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Based on question 32: "Type of contract"
- (n=10,184)

Table 9 shows an overview of characteristics of researchers by career stage. This confirms the findings of the MORE2 study in 2012. R1 and R2 researchers are younger and are more likely to be employed on fixed-term contracts, while R3 and R4 researchers are older and mostly on permanent contracts. R4 researchers are more likely to be male than female (see also section 5.1).

Table 9: Characteristics of researchers by career stage

	R1	R2	R3	R4
Type of contract				
No contract (regarded as a student)	6.3%	0.6%	0.2%	0.3%
Fixed term <= 1 years	11.4%	7.1%	1.2%	0.3%
Fixed term >1-2 years	13.5%	8.1%	2.0%	0.8%
Fixed term >2-4 years	28.1%	21.0%	5.1%	1.3%
Fixed term > 4 years	12.0%	13.9%	7.6%	3.7%
Permanent contract / open-ended contract	27.9%	49.1%	83.4%	92.8%
Self-employed	0.8%	0.4%	0.5%	0.9%
Total	100.0%	100.0%	100.0%	100.0%
Gender				
Male	50.4%	52.3%	59.2%	74.7%
Female	49.6%	47.7%	40.8%	25.3%
Total	100.0%	100.0%	100.0%	100.0%
Age category				
<35	59.2%	22.9%	7.0%	0.6%
35-44	19.4%	43.4%	36.3%	11.1%
45-54	12.4%	21.6%	35.2%	36.1%
55-64	7.7%	10.2%	18.4%	37.8%
65+	1.3%	1.9%	3.1%	14.5%
Total	100.0%	100.0%	100.0%	100.0%

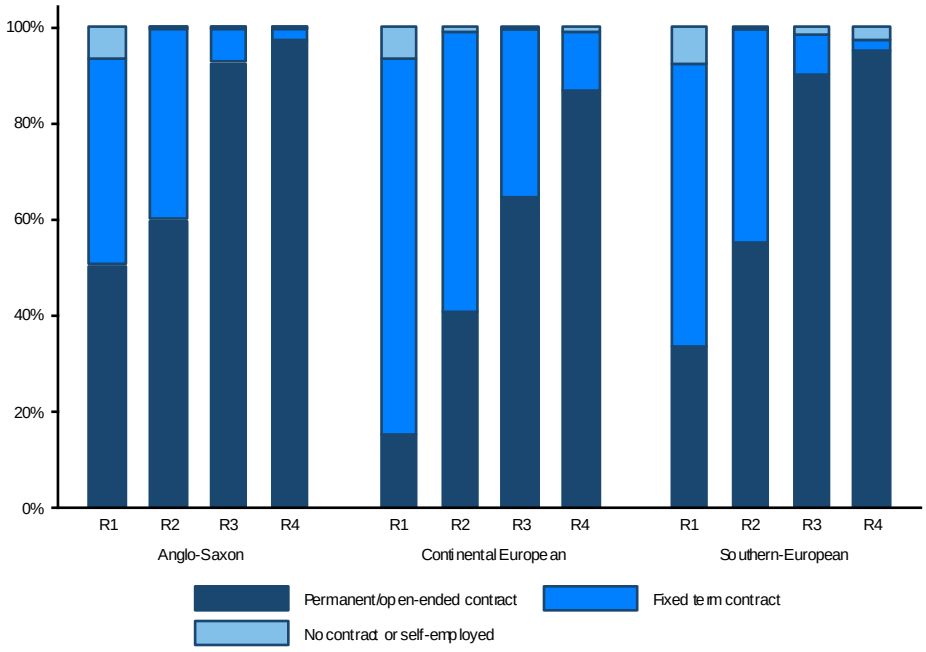
Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 70: "What was the type of contract?", question 2: "What is your gender?" and question 3: "What is your year of birth?"
- (n=9,412)

About 59% of all R1 researchers are under 35. In total, only 28% of researchers in R1 have a permanent contract. The majority of R1 researchers are doing a PhD (61% of R1 researchers). These researchers are either affiliated to a single institute (47% of R1 researchers) or enrolled in a joint PhD program (14% of R1 researchers). 39% of R1 researchers are currently not working on a PhD and are not enrolled in a doctoral program. Of those R1 researchers currently not working on a PhD, 71% already have a PhD, and 41% have a permanent or open-ended contract. Most of those affiliated in a joint degree have either fixed term contracts (64%) or permanent contracts (28%). Only a minor fraction (6%) already have a PhD. A similar structure can be observed with PhD candidates in R1 affiliated to a single institute. Among those the majority (70%) have fixed term contracts and only 7% already have a PhD.

Researchers in R2 are in their early 30s to early 40s. They are engaged in research as well as in teaching activities, although differences across countries are observable, which might be due to differences in the underlying higher education system (see Figure 26). Generally their teaching load is much lower than of researchers in later career stages, however, within Eastern European countries the teaching load for R2 researchers is significantly higher than in the rest of Europe (see Figure 26). In contrast to R1 researchers, almost 50% of recognised researchers in R2 have a permanent or open-ended contract. Country differences are rooted in different higher education system structures (see Figure 25 and discussion at the beginning of section 5, with "tenure" systems opposed to systems with chairs leading to a low share of permanent or open-

ended contracts at early stages; Kreckel 2010[77], as well as Figure 51 for detailed information across countries). The share of permanent or open-ended contracts in both Anglo-Saxon/Nordic countries and Southern European countries is higher than in Continental countries across all career stages, in line with different higher education models (see beginning of section 5). The share of permanent contracts in Anglo-Saxon and Southern European countries is similar for the career stages R2-R4. In contrast with the existing literature, in R1 the share of permanent or open-ended contracts is higher in the Anglo-Saxon/Nordic model. This is presumably due to the higher prevalence of structured PhD-training in this model (see section 5.2). Looking at the decomposition of fixed-term contracts of R1 researchers, in particular the share of contracts limited to one to two years is higher in Continental Europe than in the Anglo -Saxon/Nordic or Southern European countries. With respect to the other three career stages, especially higher shares of researchers with contracts with a retention period of two to four years or more than four years are observed in Continental European countries than in countries favouring one the other HE models. This is, however, also an issue for further research.

Figure 25: Contractual situation by country groups and career stages



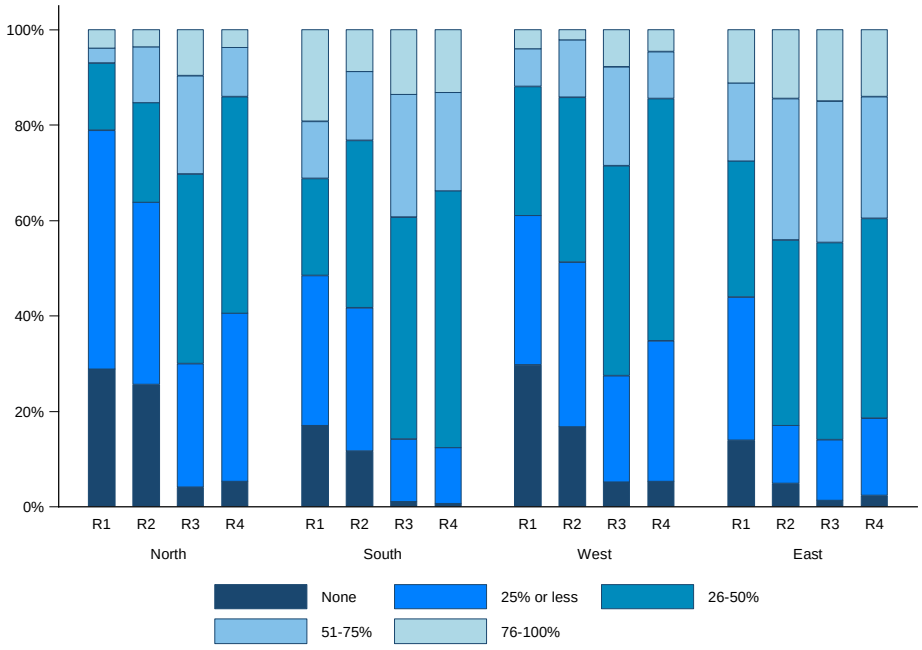
Source: MORE3 EU HE Survey (2016)
Notes:
- Average shares of the following country groups are shown: Anglo-Saxon (UK, SE, DK, NL, IE), Continental European (DE, AT, PL, HU, CZ, SK) and Southern European (IT, FR; ES, PT).
- Based on question 32: "Type of contract"
- (n= 9,213)

A majority of R3 researchers is equipped with permanent or open-ended contracts (83%). Most established researchers are either in their late 30s/early 40s (36%) or in their late 40s/early 50s (35%). In general, their teaching load is significantly higher than in R2, but this is also connected to a better contractual status as well as being strongly dependent on their geographical position (see Figure 26).

[77] Kreckel, R., (2010) "Karrieremodelle an Universitäten im internationalen Vergleich", 7, pp. 33–44.

More than 88% of R4 researchers are over than 45 and the vast majority has a permanent contract (93 %). The teaching load is high and comparable to R3 researchers. However, differences in the teaching load of researchers in later career stages (R3 and R4) between geographical regions within Europe are observed. The teaching load in Eastern and South Europe is significantly higher for established and leading researchers than in Western and Northern Europe (see Figure 26). Likewise, in R4 the degree of research autonomy is further improved, which again might be a consequence of permanent contracts opposed to project-based related fixed term contracts.

Figure 26: Teaching activities by current career stage and geographical region



Source: MORE3 EU HE Survey (2016)
Notes:

- Share of researchers per career stage and per region that indicate they spend a certain share of their time on teaching. E.g. More than 10% of R2 researchers in the Western European countries spend 25% or less of their working time on teaching.
- Average shares of the following country groups are shown: East (CZ, EE, HU, LV, LT, PL, SI, SK, BG, RO, HR), North (NO, SE, FI, DK, IS), South (PT, ES, IT, EL, MT, CY) and West (BE, FR, DE, NL, LU, AT, UK, IE, CH).
- Based on question 35: "Teaching activities (as % of your overall working time)"
- (n=10,394)

The current employment duration for researchers across career stages has gone up by comparison with MORE2, mirrored by a decrease in the share of fixed-term contracts by comparison with MORE2, which is a positive development as fixed-term contracts negatively impact on knowledge production because short time horizons allow only for the implementation of incremental, less risky research projects[78].

[78] Petersen, Alexander M., Massimo Riccaboni, H. Eugene Stanley, and Fabio Pammolli. 'Persistence and Uncertainty in the Academic Career'. Proceedings of the National Academy of Sciences 109, no. 14 (4 March 2012): 5213–18. doi:10.1073/pnas.1121429109.

Average duration of current employment *In years*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=9,016)	10.7	R1: R2: R3. R4:	4.2 7.2 11.2 16.9	MED: NAT: SOC:	11.1 10.5 10.7	F: M:	9.6 11.4
2016 (n=9,412)	12.4	R1: R2: R3. R4:	5.7 8.6 12.3 18.2	MED: NAT: SOC:	12.8 12.5 12.0	F: M:	11.4 13.0

Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 30: "Employed since"

Share of researchers with a fixed term contract *Of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=8,986)	34.3%	R1: R2: R3. R4:	70.6% 55.6% 23.8% 7.7%	MED: NAT: SOC:	36.3% 38.4% 28.5%	F: M:	38.5% 31.8%
2016 (n=9,213)	26.1%	R1: R2: R3. R4:	65.0% 50.0% 15.9% 6.1%	MED: NAT: SOC:	22.9% 27.8% 26.6%	F: M:	31.3% 22.9%

Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 32: "Type of contract"

5.4.2. Career stages: length

Although researcher career paths are not always linearly progressing from stage R1 to R4, a closer look at the length of time researchers remain in the same career stage might deliver valuable insights regarding structural differences between career phases and countries. In comparison to later career stages, early career stages (R1 and R2) are characterised by reduced research autonomy, higher shares of fixed-term contracts and lower salaries, etc. (see above). Thus, the shorter the length of early career stages, the higher the attraction of research careers in general.

The first stage of a researcher career takes on average 4.7 years in the EU28 countries (see Table 64 in Annex). The average retention period in the second career stage is similar to the first stage: 5 years. Unfortunately, regarding the retention period of the third stage (R3 to R4) the data are limited due to rather small observation numbers of R4 researchers. Thus, the mean time researchers in EU28-member countries dwell in R3 (7 years) has to be treated with caution.

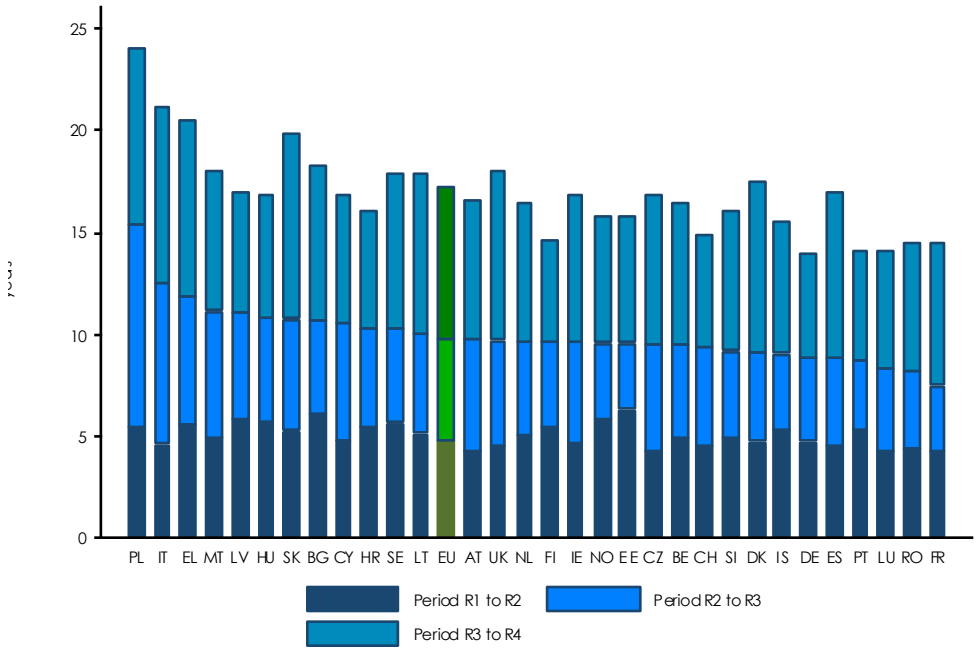
Country level: Figure 27 shows variations in the average length of time it takes to switch from one career stage to another across countries. On average, within the EU28 it takes about 17 years from stage R1 to reach career stage R4 (see also Table 64 in Annex). However, there is substantial variation for reaching R4 from R1 across countries, ranging from 14 years (Germany) to 24 years (Poland).

As the higher education systems differ mostly in the early career stages, Figure 27 is ordered according to the sum of the average lengths it takes to finish the first two career

stages (R1 and R2). It takes researchers in Poland the longest time to jump from R1 (R2) to R3 (i.e. 15 (10) years) and researchers in France the shortest (i.e. 7 (3) years).

However, aside from that across countries differences in the total length of time it takes to reach career stage R3 from stage R1 and the length of time it takes to accomplish career stage R2 can be observed. For some countries, like Switzerland, Czech Republic or Austria, the length of career stage R2 in relation to other countries is higher than the relative length of time it takes to move from career stage R1 to stage R3. Contrary, in Scandinavian countries, e.g. Sweden, and in some Eastern European countries, like Hungary, Bulgaria or Latvia, it takes relatively less time to accomplish career stage R2 than the time it takes relative to other countries to reach R3 from career stage R1. Although the total length of time it takes to reach career stage R3 might be very similar between some countries, the composition of the length of time it takes to finish the different career stages varies. For instance, the total time it takes to reach stage R3 is 9.5 years both in the Czech Republic and in Norway. However, while the first career stage only takes 4.2 years in the Czech Republic, it takes 5.8 years in Norway. Of course, conversely the second career stage R2 is shorter in Norway (3.8 years) than in the Czech Republic (5.3 years).

Figure 27: Average length of career stages by countries, ordered by the length of time to reach R3 from R1



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on questions 16-24: "Please indicate the starting year in which you first entered the subsequent career stages"
- (n= 8,824)

Field of science: Small differences regarding the field of science can be observed (see Table 64 in Annex). On average, the R1 phase in Social Sciences (5.1 years) takes longer than in Medical Sciences (4.5 years). Moreover, country differences can be substantial. While Estonian researchers of Social Sciences stay nearly 7 years in R1, Czech researchers dwell on the same position less than half of the period (3.4 years).

In comparison to first stage researchers the structural differences with respect to different fields of sciences are reversed, i.e. the second career stage in Social Sciences

take less time than in Natural Sciences (4.5 and 5.4 years respectively). Again, the data indicate wide variations between countries. For instance, the mean dwell period in R2 is 10 years in Poland, while on average French researcher stay only about one-third of this time in the second career stage (3.2 years).
The time researchers stay in R3 tend to be higher than in the previous stages, a result independent of the specific field of science researchers are engaged in. However, due to the lack of data these results should be treated with caution.

5.4.3. Progression along career stages

New compared to MORE2 is that MORE3 asked respondents several questions on how career paths, which regulate career progression, are perceived across countries and similar to recruitment, how non-standard research outputs and mobility phases influence progression along the career path. We first look into the perception regarding transparent and merit-based career progression and then identify the factors that co-determine career progression in research careers. Finally, the confidence of researchers in their future career is analysed.

5.4.3.1. Transparent and merit-based career progression

Share of researchers who agree that the different types of career paths are clear and transparent at their home institution
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=8,711)	70.6%	R1:	70.2%	MED:	68.9%	F:	66.9%
		R2:	69.7%	NAT:	74.4%	M:	73.0%
		R3.	68.9%	SOC:	67.8%		
		R4:	73.7%				

Share of researchers who agree that career progression is sufficiently merit-based in their home institution
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=8,475)	65.1%	R1:	64.4%	MED:	66.3%	F:	61.0%
		R2:	64.3%	NAT:	70.0%	M:	67.6%
		R3.	63.4%	SOC:	59.0%		
		R4:	68.1%				

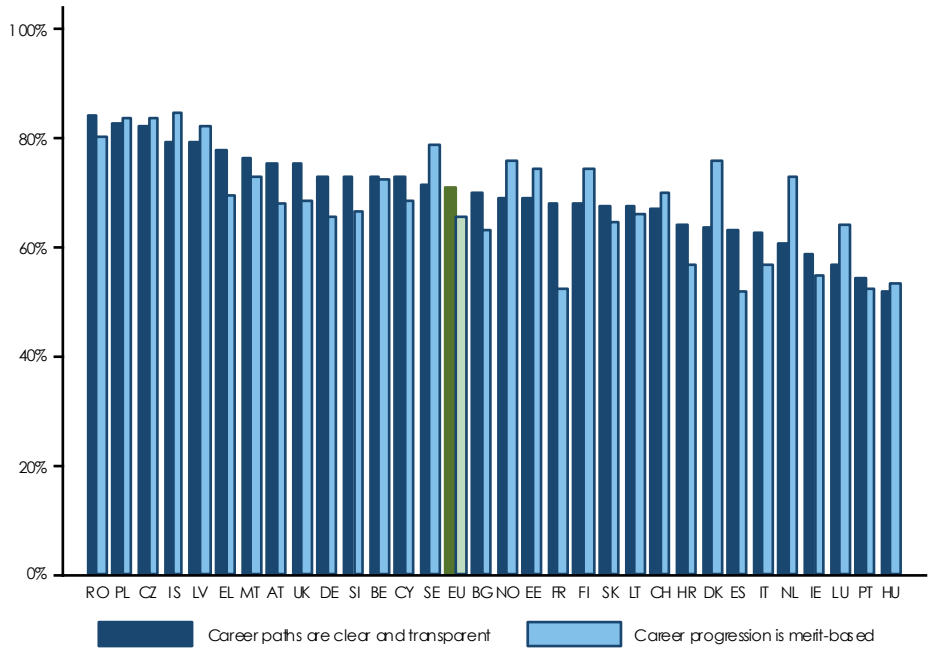
Share of researchers who agree that obtaining a tenured contract based on merit only is common practice at their home institution
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=7,980)	64.2%	R1:	64.2%	MED:	67.8%	F:	58.4%
		R2:	64.6%	NAT:	67.4%	M:	67.7%
		R3.	61.6%	SOC:	58.3%		
		R4:	67.4%				

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 41: "What is your opinion on the following issues with respect to career progression in your home institution?"

In the EU28 the average share of researchers agreeing that the different types of career paths are clear and transparent at their home institutions is 71%. The average share of researchers perceiving the career progression sufficiently merit-based is lower: 65%. 64% of researchers in the EU28 agree that obtaining a tenured contract based on merit only is common practice at their home institution.

Figure 28: Perception of transparent and merit-based career progression in the home institution, by country



Source: MORE3 EU HE survey (2016)
Notes:
- Share of researchers agreeing on these issues with respect to career progression in their home institution.
- Based on question 41: "What is your opinion on the following issues with respect to career progression in your home institution"
- (n= 9, 412)

Country level: As with recruitment, there is country variation in the perception of whether career paths are clear and transparent for researchers (see Figure 28). The lower bound of the share of researchers who agree that the career paths at their home institution are transparent is about 52% in Hungary. Approximately 84% of researchers in Romania perceive career paths to be transparent (see Table 68 in Annex).

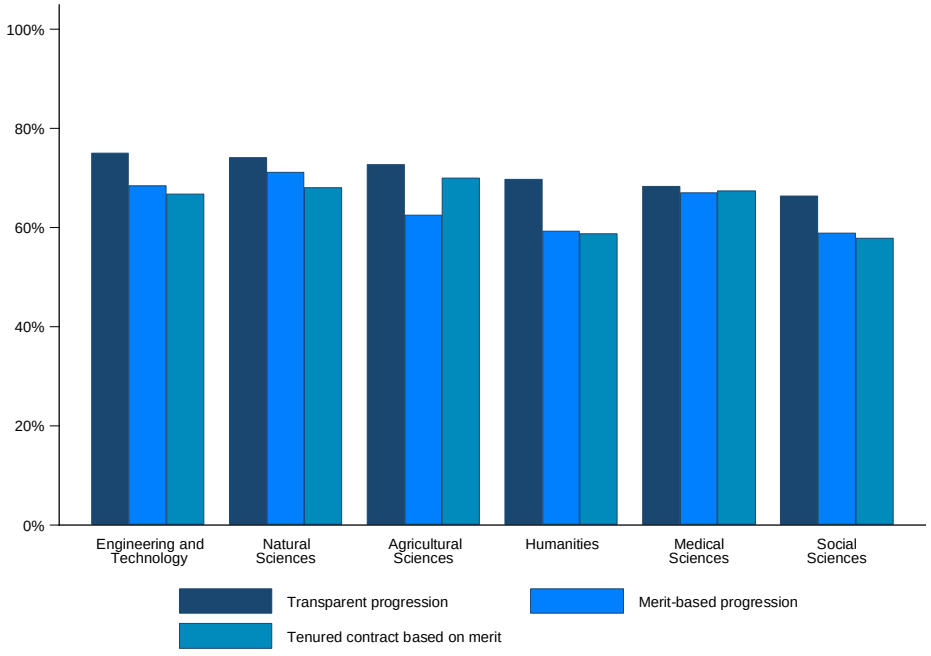
The same range of shares across countries can be observed when researchers are asked whether career progression is sufficiently merit-based. Only about 52% of researchers in Spain would agree, while about 84% of researchers in Iceland consider themselves as being satisfied with merit-based career progression at their home institutions. Generally, the perceived lack of merit-based career progression is considerable in some Southern European countries, e.g. Spain, Portugal and Italy as well as in France, while the highest shares aside from Iceland are located in Eastern Europe, i.e. Poland, Czech Republic or Latvia.

Obtaining a tenured contract based on merit only is perceived common practice particularly in Latvia (77%), Iceland (77%) and Poland (76%). By comparison, about 45% of researchers in Spain and about 46% of researchers in Italy would agree (see Table 68 in Annex).

In general terms, positive responses towards those factors related to career progression and recruitment are very much interrelated. This entails that those countries where researchers perceive recruitment to be more transparent tend to be the countries where career paths are perceived similarly[79] and where merit appears to play the most important factor determining career progression[80]. In this sense, Southern European countries, such as Spain, Italy and Portugal appear to do worse than the EU28 average in these two dimensions (see Table 66 and Table 68 in Annex). The United Kingdom, Poland and Malta, on the contrary, consistently obtain better-than-average results in each of these dimensions.

Field of science: Comparing different fields of science, it can be observed that in Medical Sciences career paths are perceived to be transparent by the majority of researchers (68% of researchers in Medical Sciences). Moreover, the share of researchers agreeing that career progression is also merit-based (67%) and tenure positions are also commonly assigned related to research performance (67%) is comparably high as well (see Figure 29). In Humanities and Social Sciences, however, the share of researchers agreeing that career progress is sufficiently merit-based (59%) and that tenure contracts is based on merit (58% of researchers in Social Sciences and 59% of researchers in Humanities) is lower.

Figure 29: Perception of transparent and merit-based career progression in the home institution, by field of science (EU28)



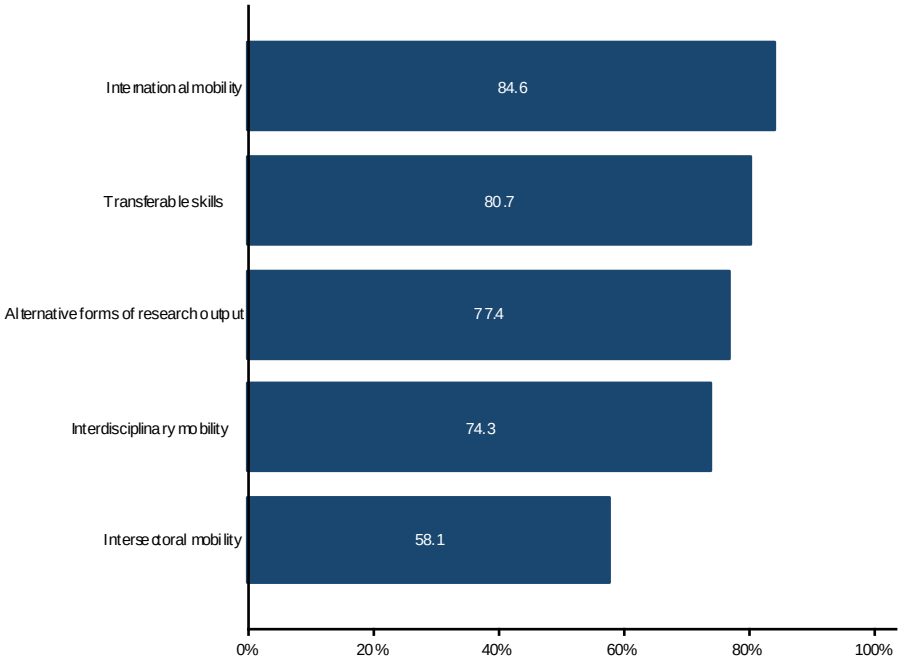
Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers agreeing on these issues with respect to career progression in their home institution.
- Based on question 41: "What is your opinion on the following issues with respect to career progression in your home institution"
- (n= 7,980-8,711)

[79] Pearson correlation p=0.71, statistically significant at 99%.
[80] Pearson correlation p=0.76, statistically significant at 99%.

5.4.3.2. Factors for career progression

The factors that are considered to be most determinant for career progression mirror those that are said to impact primarily recruitment processes. International mobility is the factor that is said to determine career progression the most (85% of the researchers), followed by transferable skills (81%), alternative forms of research output like project reports, grant writing, the development and maintenance of data infrastructure or organisation of research events/conferences (77%), and interdisciplinary mobility (74%). Interestingly, the perceived impact of intersectoral mobility (58%) lags well behind international mobility and other factors (see Figure 30).

Figure 30: Perception of positive factors for career progression (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Share of researchers agreeing that these factors are positive for career progression (EU28 average).
- Based on question 43: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?"
- (n=8,810-8,986)

Moreover, intersectoral mobility is the factor with the highest share of researchers, assuming that it might even negatively influence their career progression (11% of researchers). Another 7% of researchers in Europe suspect that mobility between disciplines negatively influences occupational advancement. A finding that supports the conclusions of Youtie et al., 2013, that European researchers' career progression tends to be more intra-disciplinary than in the US. While 77% of EU28 researchers think that alternative forms of research output, like project reports or grant writing, positively influences career progression, 7% perceive alternative research output to negatively affect career progression. Only 3% of researchers consider international mobility or transferable skills as being negative factors for career progression.

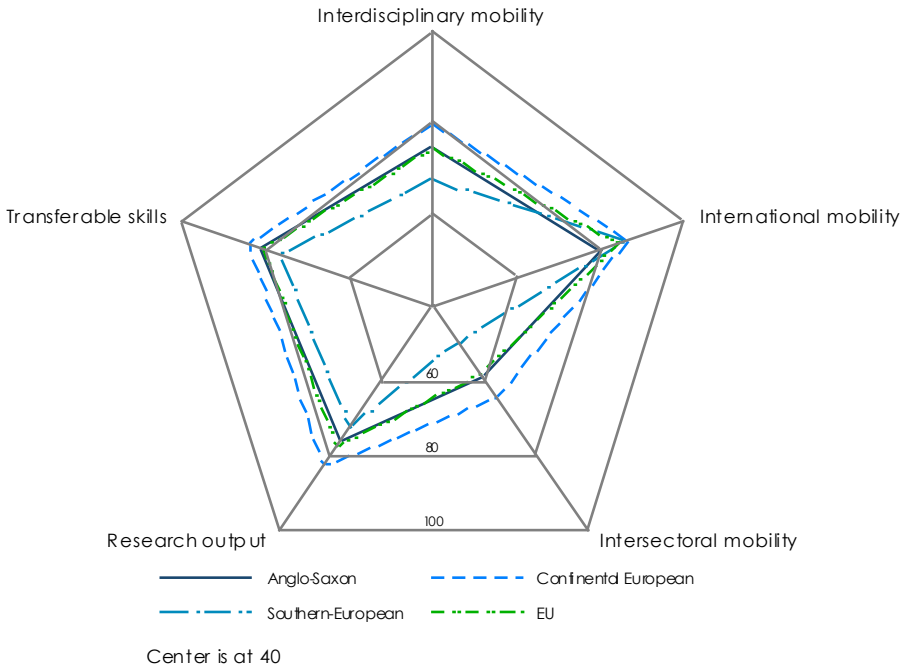
Country level: Alternative research outputs and mobility between sectors correspond to the largest differences across country groups (see Table 71 in Annex). While there is little variation regarding the value of international experience and transferable skills for career progression between different geographical regions within Europe, alternative research

output and intersectoral mobility are slightly less valued by researchers in Southern Europe and more appreciated in Eastern European countries. 64% of researchers in Italy and 67% of researchers in Spain perceive alternative research output as a positive factor for career progression. However, 88% of researches in Belgium and 87% of researchers in Romania, and 86% of researchers in Poland would agree. Regarding intersectoral mobility, the share of researchers perceiving it to be positive for career progression ranges from 45% of researchers in France to 81% of researchers in Latvia.

Regarding different higher educational systems there are also differences in the perception of these potential positive drivers (see Figure 31). Researchers working in strictly hierarchical systems like Germany or Poland look upon intersectoral mobility experiences (59%) or interdisciplinary mobility (75%) more favourably to accelerate career progression than do Southern European countries (49% and 67% respectively). However, the data show a structural difference between those country groups as the Southern European countries generally seem to evaluate impact factors to support career progression more sceptically. In most cases systems characterised by flatter hierarchical structures, like the United Kingdom or The Netherlands, are on average positioned in-between the two aforementioned higher education systems. One exception is international mobility, which is for 80% of researchers from the Anglo-Saxon system a significant positive impact factor.

In general, international mobility is perceived as being very valuable across all countries. The share of researchers considering international mobility as a positive factor for career progression ranges from 80% in Anglo-Saxon countries to 87% in Continental European countries. The slightly lower share in countries following the Anglo-Saxon system in comparison with countries based on other HE systems might be because those countries are on average equipped with the most attractive HEIs.

Figure 31: Perception of positive factors for career progression, by higher education systems



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers agreeing that these factors are positive for career progression.
- Average shares of the following country groups are shown: Anglo-Saxon (UK, SE, DK, NL, IE), Continental European (DE, AT, PL, HU, CZ, SK), Southern European (IT, FR; ES, PT) and EU28.
- Based on question 41: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?"
- (n=8,810-8,986)

Career stage: A comparison between perceptions of leading researchers and those in their early career might provide meaningful insights regarding potential misperceptions of the young researchers that are currently planning their career. However, according to the data no significant structural differences between the various career stages can be found. Leading researchers value international experiences a little more than researchers in R1. 86% of R4 researchers and 84% of R1 researchers think that international mobility experience is a positive factor for career progression. In contrast, the early stage R1 researchers assume transferable skills to be slightly more important than R4 researchers (85% compared to 81%).

Field of science: The largest differences between fields of science can be found with respect to intersectoral mobility. Only 46% of researchers in humanities but 72% of researchers in Agricultural Sciences think that intersectoral mobility is a positive factor for career progression (see Table 72). Similarly the perceived role of interdisciplinary mobility differs across fields of science. While 82% of researchers in Agricultural Sciences agree that interdisciplinary mobility is a positive factor for career progression, only 65% of researchers in Social Sciences would agree. Regarding the impact of alternative research output, international mobility or transferable skills on career progression, only smaller differences across fields of sciences are observable. The shares of researchers considering alternative research output as a positive factor for career progression ranges from 74% (Humanities) to 84% (Agricultural Sciences). Independent of the field of science, international mobility is perceived as positive factor by at least 81% of researchers. The shares of researchers considering transferable skills as a positive factor for career progression ranges from 76% (Agricultural Sciences) to 85% (Medical Sciences).

5.4.3.3. Skills for future career progression

Regarding their future career, the vast majority of researchers in the EU28 agree that skills for decision-making and problem solving (98%), critical and autonomous thinking (98%), communication and presentation (96%), networking (95%) and grant and/or proposal writing (95%) are essential for a prosperous future career (see Table 68). By contrast, only 67% of researchers regard entrepreneurial skills as important and 71% of researchers would agree with respect to intellectual property rights (IPR). Besides, high shares of researchers in the EU28 agree that collaboration with citizens, government and broader society (84%), innovative digital skills (86%), ethics (90%), skills on negotiation (81%) and people management (89%), project management (93%), teamwork (94%) and time management (93%) are important for their future careers.

Country level: Across countries heterogeneity regarding some of the potentially important skills can be observed, particularly for those that have on average lower appreciation in Europe (see Table 70). For instance, while 94% of researchers in Romania think that IPR is important for their future research careers, only 47% of researchers in Norway would agree. Entrepreneurship is regarded to be important by 87% of researchers in Romania and only by 52% of researchers in Norway. Negotiation skills are perceived as important by 92% of researchers in Latvia, while in Norway 66% of researchers would agree.
In contrast, the differences across countries are much smaller for those skills that show the highest shares of researchers regarding them as important: decision making or problem solving skills, critical and autonomous thinking and communication skills. Within Europe, the lowest share of researchers who think that critical and autonomous thinking are important for their future research career is 93% (Bulgaria) and the highest share is nearly 100% (Norway). The share of researchers perceiving decision-making skills as important ranges from 96% of researchers in Slovenia to 99% of researchers in Belgium. The share of researchers considering communication skills to be important ranges from 92% in Italy to 99% in Malta.

Field of science: Also across fields of science considerable differences are observed for those skills that are ranked low on average (see Table 65). While 78% of researchers engaged in Agricultural Sciences are convinced that entrepreneurship is important for their future career, only 58% of researchers in Humanities agree. Similarly, while 63% of researchers in Social Sciences consider IPR (e.g. the application for patents) essential for their future careers, in Agricultural Sciences 83% and in Medical Sciences 77% of researchers think that IPR is important for their future careers. In contrast, the higher ranked skills like decision-making skills, communication skills and critical thinking also show the lowest variation regarding the shares of researchers considering them as positive for a prosperous future career across all disciplines.

5.4.3.4. Confidence in future career prospects

Share of researchers who are very or somewhat confident about their future career
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=9,016)	77.7%	R1:	77.6%	MED:	77.2%	F:	77.1%
		R2:	70.2%	NAT:	78.1%	M:	81.1%
		R3.	77.7%	SOC:	77.5%		
		R4:	83.7%				
2016 (n=9,412)	75.6%	R1:	68.4%	MED:	76.5%	F:	69.0%
		R2:	68.0%	NAT:	78.0%	M:	79.9%
		R3.	77.1%	SOC:	72.4%		
		R4:	82.0%				

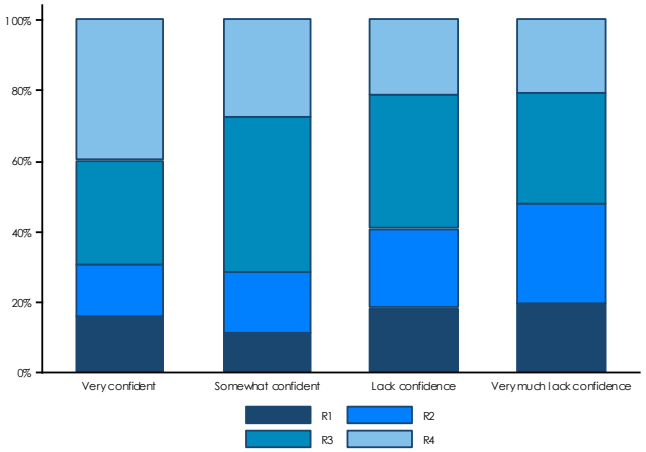
Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"

Researchers were asked how confident they feel about future prospects for their research career. This can be interpreted as a very general 'happiness' indicator. On average, within the EU28 about 76% of researchers feel very or somewhat confident about their future prospects for their research careers.

Country level: Across countries, however, large differences are observable and, aside from Malta (95% of researchers), particular in Northern European the group of optimistic researchers clearly dominates. For instance, 93% of researchers in Iceland, 89% of researchers in Sweden and 86% of researchers in Norway feel very or somewhat confident about their future careers. In contrast, in Southern European countries, particularly in Portugal (54%), Italy (58%) and Spain (64%), the lowest share of researchers feel confident about their professional future (see Table 69 and Figure 163).

Career stage: It seems to be the case 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. This was the case in 2012 (MORE2) and is confirmed in 2016: leading or established researchers (R4 and R3) show higher levels of optimism about their future than their colleagues at earlier career stages. While 82% of R4 researchers have positive feelings about their future career and only 18% of R4 researchers lack (very much) confidence, a higher share of researchers in the early stages are more pessimistic. 32% of R1 researchers and 32% of R2 researchers lack confidence about their future research careers and only two out of three are confident (68% of both R1 and R2 researchers).

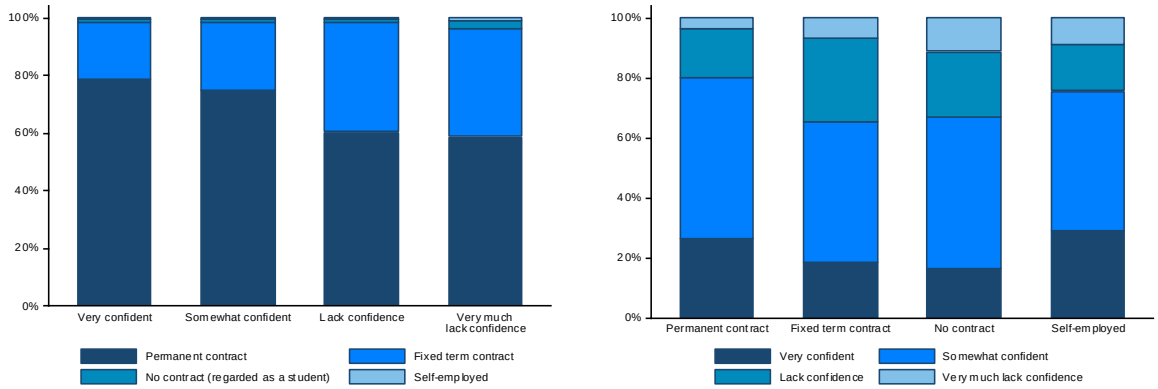
Figure 32: Confidence in future career prospects by current career stage (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Researchers feeling very confident, somewhat confident, lack confidence and very much lack confidence about the future prospects for their research career.
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (n=9,412)

Contract: Similarly, differences in confidence level depending on the type of contract a researcher is awarded (fixed-term contracts versus permanent contracts) are observed (see Figure 33). Only 20% of researchers who feel very confident are those with fixed term contracts (see left hand side of Figure 33). In comparison, the share of researchers with fixed-term contracts is nearly twice as much (37%) in the group of researchers who very much lack confidence about their future career prospects. Looking at the same information the other way around, the highest shares of researchers feeling very confident about their future research career are contained in the group of researchers with permanent contracts (26%) or self-employees (29%) (see right hand side of Figure 33).

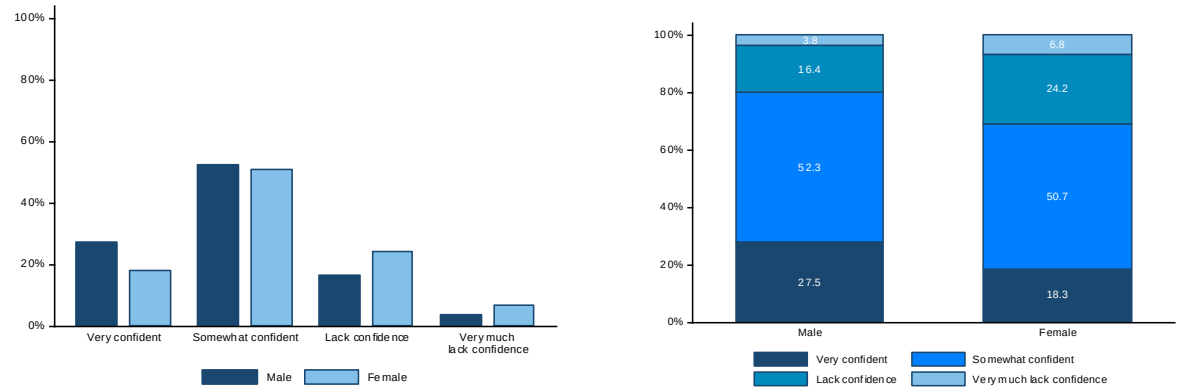
Figure 33: Confidence in future career prospects by contract type (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Researchers feeling very confident, somewhat confident, lack confidence and very much lack confidence about the future prospects for their research career.
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (n=9,412)

Gender: In general, female researchers are more pessimistic than their male colleagues (see left hand side of Figure 34), which is in line with the results from MORE2. Among female researchers, only 18% feel very confident about their future career. The majority, 51% of female researchers, feel somewhat confident about their future careers. In comparison, 28% of male researchers feel very confident and another 52% feel confident about their future career prospects. In contrast, 7% of female and 4% of male researchers very much lack confidence about their future prospects for their research career and 24% female and 16% male researchers lack confidence. Looking at the same information the other side around we find that the share of male researchers that feel very confident is much higher (28%) than the respective share of their female colleagues (18%), while this relation is reverted with respect to the shares of male and female researchers very much lacking confidence about their future research career (male: 4%; female: 7%).

Figure 34: Confidence in future career prospects by gender (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Shares of male and female researchers feeling very confident, somewhat confident, lack confidence and very much lack confidence about the future prospects for their research career.
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (n=9,412)

Differences between female and male researchers can also be observed when differentiating between career stages (see Figure 35). Generally, both sexes show a decreasing share of very confident researchers in comparison with researchers from previous career stages. Only with regard to leading R4 researchers is the share of very confident researchers higher than in the previous R3 stage.

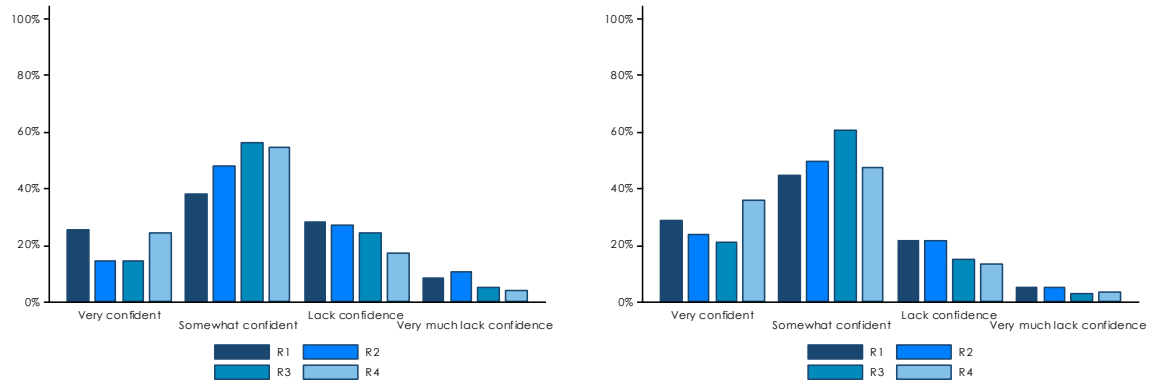
However, the decrease in the share of very confident male researchers between R1 (29% of male R1 researchers) and R2 (24% of male R2 researchers) is much smaller (-5pp) than the drop of very confident female researchers from R1 (25% of female R1 researchers) to R2 (15% of female R2 researchers; change from R1 to R2: -10pp). The share of very confident R3 researchers remains on a low level (14% of female R3 researchers) or decreases a bit further in the case of male researchers (21% of male researchers), before rising again by 15pp (male) or 10pp (female) at career stage R4: 24% of female R4 researchers and 36% of male R4 researchers are very confident about their future.

Focusing on the shares of researchers which very much lack confidence about their future career prospects reveals a complimentary picture. While the share of female researchers very much lacking confidence rises from 8% (R1) to 11% (R2) by 3pp, the share of male researchers very much lacking confidence remains nearly constant at around 5% (it even decreases a little from R1 to R2 by 2%). The shares of researchers which very much lack

confidence in both sexes decrease again between career stage R2 and R3 to 5% (female researchers) and 3% (male researchers).

Figure 35: Confidence of female and male researchers in future career prospects by career stage (EU28)

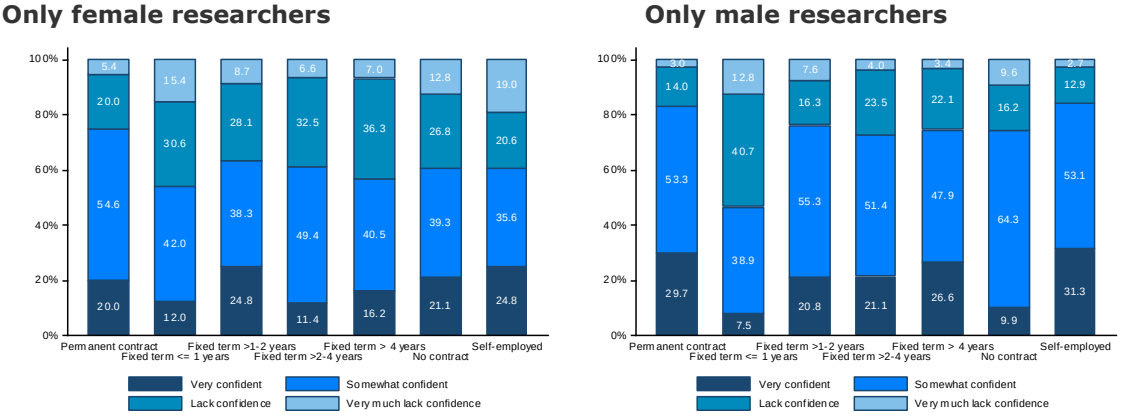
Only female researchers **Only male researchers**



Source: MORE3 EU HE Survey (2016)
Notes:
- Shares of male and female researchers feeling very confident, somewhat confident, lack confidence and very much lack confidence about the future prospects for their research career.
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (female researchers: n=3,832; male researchers: n=5,580)

Combining the information about diverse contract arrangements and researchers' confidence in their future career prospects, as shown in Figure 36, reinforces the idea about more female than male researchers being pessimistic about their future career. Indeed, the shares of female researchers (very much) lacking confidence in their future career are higher than the respective shares of their male colleagues across all types of contracts. It is true that the share of researchers (very much) lacking confidence is the lowest in case of permanent contracts in comparison to other forms of contract irrespective of the researchers' sex (25% of female and 17% of male researchers with permanent contracts). However, female researchers' confidence about their future career shows less variation within the group of fixed-term contracts. In the group with fixed-term contracts with a one-year limitation the share of male researchers lacking confidence is notably higher (41%) than the respective share of female researchers (31%). Generally, the group of researchers having contracts with a one-year limitation is the only group where the shares of male researchers (very much) lack confidence is higher (54%) than the respective share female researchers (46%). With respect to all other contract groups the share of female researchers (very much) lacking confidence about their future career is higher than the respective share of male researchers.

Figure 36: Confidence of female and male researchers in future career prospects by contract type (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Shares of male and female researchers feeling very confident, somewhat confident, lack confidence and very much lack confidence about the future prospects for their research career.
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (female researchers: n=3,722; male researchers: n=5,491)

5.4.4. Dual positions

According to the literature, university-industry knowledge transfers, independent of the specific channel, as well as knowledge spillovers within HEIs can contribute to economic well-being and knowledge gains (Cañibano - Otamendi - Andújar, 2008; O'Shea - Chugh - Allen, 2008; Perkmann et al., 2013[81]). Economic development and competitiveness is strongly connected to an industry's capability to assimilate, process and apply new knowledge in order to translate this knowledge into more efficient production processes or new products and services. The role of commercialisation is also reflected by positive effects of university-industry cooperation on patenting and licensing (Lin - Bozeman, 2006; Motohashi - Muramatsu, 2012; Ponomariov, 2013[82]). Therefore, MORE2 and MORE3 included survey questions on several intersectoral links: mobility, collaboration and dual positions of researchers, defined as being employed in more than one institution/organisation at the same time. This section discussed the situation of researchers currently in a dual position within their research career. The other types of intersectoral links are addressed in the respective sections on intersectoral mobility and collaboration (section 8.3 and subsections).

Having a dual position is still a marginal situation on average in Europe; in total only 10% of researchers in R2-R4 are employed by several institutions, either inside or outside the higher education sector.

[81] 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.

[82] Ponomariov, B., (2013) "Government-sponsored university-industry collaboration and the production of nanotechnology patents in US universities", J. Technol. Transf., 38(6), pp. 749–767.

Share of researchers with a dual position in current employment
Of R2-3-4 researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=8,073)	9.7%	R1:	-	MED:	10.1%	F:	9.4%
		R2:	9.0%	NAT:	8.5%	M:	9.9%
		R3.	9.2%	SOC:	10.8%		
		R4:	10.8%				

Source: MORE3 EU HE Survey (2016)
Notes:
- In MORE3 a "dual position" is defined as being employed in more than one institution/organisation at the same time (either combined positions in more than one HEI or combined position in a HEI and in another sector). This is a broader definition of "dual position" than in MORE2 and, thus 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.
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"

MORE 2 data on dual positions only comprise researchers combining a position inside the higher education sector with at least one other position outside any higher education institution. In 2016 3% of researchers combine their position in a HEI with another position outside the HE sector. The R4 researchers are more inclined to engage in a dual position outside the HE sector (4% compared to 2.8% in R2 and 2.9% in R3). In comparison, according to MORE2 nearly 13% of researchers were employed by a HEI as well as institutions/organisations outside the HE sector at the same time in 2012.[83]

Share of researchers with a dual position combining a HE and non-HE position in current employment
Of R2-3-4 researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=8,046)	12.6%	R1:	-	MED:	19.9%	F:	10.4%
		R2:	14.1%	NAT:	10.9%	M:	13.8%
		R3.	11.0%	SOC:	9.7%		
		R4:	13.3%				
2016 (n=8,073)	3.3%	R1:	-	MED:	5.1%	F:	3.2%
		R2:	2.8%	NAT:	2.6%	M:	3.3%
		R3.	2.9%	SOC:	2.8%		
		R4:	4.0%				

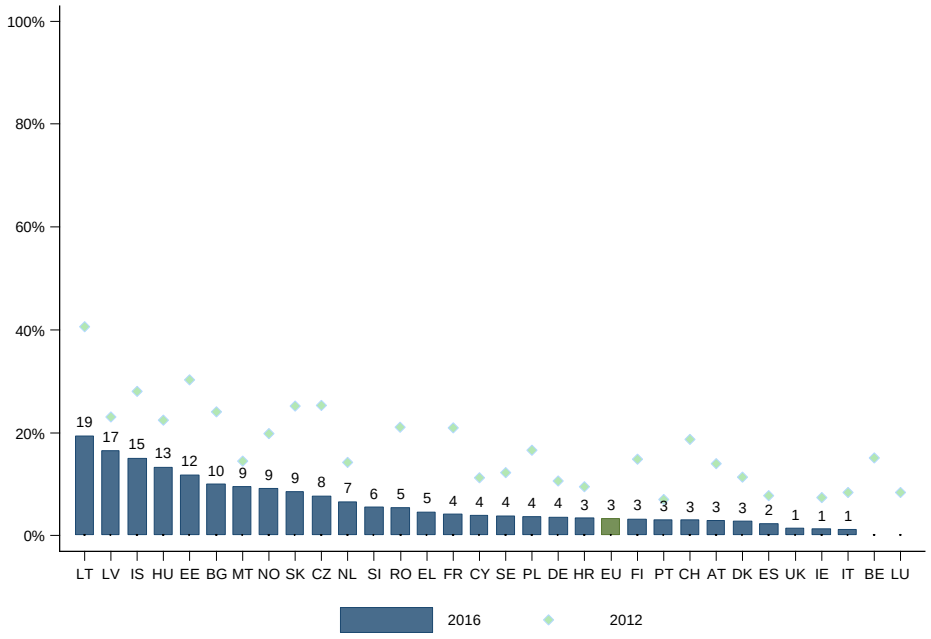
Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Notes:
- In MORE2 it was only asked if researchers combine employment in the HE sector with a position in another sector (outside the HE sector). Therefore, to be able to compare with MORE2 values, the MORE3 values for dual positions in this table are restricted to combined positions in the HE sector with positions in another sector (outside the HE sector).
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"

[83] The questions regarding dual positions are slightly different in MORE2 and MORE3 (see notes below the overview tables). Moreover, in MORE2 the question was answered by researchers at all stages (including R1 researchers), while in MORE3 only R2-R4 researchers answered the question. Although these differences have been taken into account for the calculation of the MORE2-MORE3 comparison, the explanatory power of these data are limited.

Country level: To provide a comparison with MORE2 data across countries, we concentrate on dual positions combining a position in a HEI with a position in an organisation/institution outside the HE sector. Figure 37 indicates that these kind of dual positions are much more common in Eastern and South-Eastern Europe than in other European countries. In comparison with the MORE2 data, the inequality regarding the share of dual positions across countries tends to have decreased. The geographic structural trend, however, can still be observed. This is probably due to better working conditions in Western and Northern European countries, where the satisfaction with salaries and social security is generally higher than in Eastern and South-Eastern Europe (see section 5 on working conditions).

The largest difference between the MORE2 data in 2012 and the MORE3 data in 2016 can be seen for Lithuania, where the share decreased by more than 21pp (2012: 41%, 2016: 19%). Also in Estonia (2012: 30%, 2016: 12%) and Czech Republic (2012: 25%, 2016: 8%) the share decreased by 19 and 18pp respectively. The smallest changes in comparison with MORE2 can be found in Portugal (2012: 7%, 2016: 3%) and Malta (2012: 14%, 2016: 9%).

Figure 37: Share of researchers currently in a dual position combining a HE and non-HE position by country

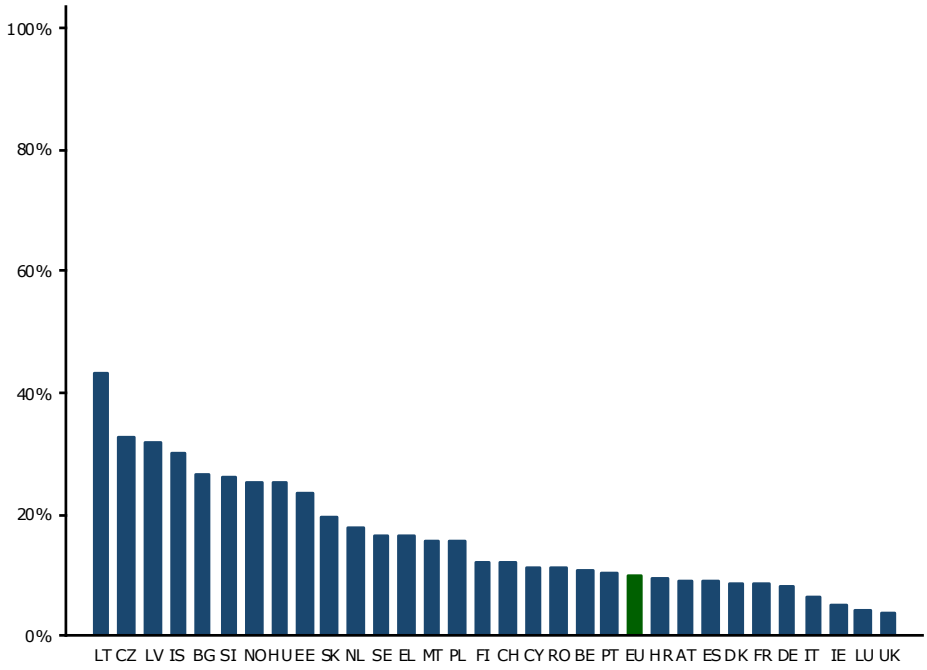


Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:

- Only R2, R3 and R4 researchers.
- In MORE2 it was only asked if researchers combine employment in the HE sector with a position in another sector (outside the HE sector). Therefore, to be able to compare with MORE2 values, the MORE3 values for dual positions in this figure are restricted to combined positions in the HE sector with positions in another sector (outside the HE sector).
- We do not differentiate whether the position in HE is the main or second position of employment.
- In 2016 the share of researchers with dual positions combining a HE and non-HE position in Belgium and in Luxemburg is zero (MORE3).
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"
- (n=8,824)

Figure 38 illustrates the distribution of researchers that are employed by a HEI and by another organisation/institution, either within the HE sector or outside, at the same time. As mentioned before, here only MORE3 values are available (also see notes in Figure 38). Across countries large variation regarding the frequency of dual positions (outside the HE sector) as well as the involved researchers' career stages can be observed, with some countries reaching shares of up to 40% of all researchers that are employed at several institutions/organisations at the same time (e.g. Lithuania). Figure 38 confirms the results above that, in general, dual positions (not only those combining a position in an HEI with another outside the HE sector) are much more common in Eastern and South-Eastern Europe than in other European countries. However, also in Norway and The Netherlands the share of researchers with dual positions is above 17%.

Figure 38: Share of researchers currently in a dual position by country



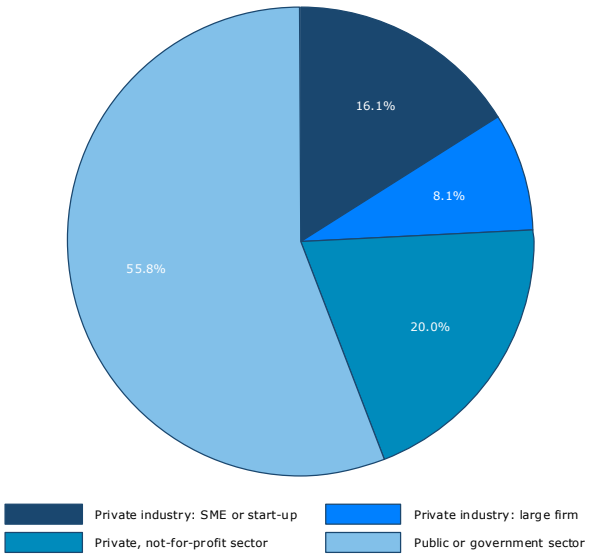
Source: MORE3 EU HE Survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"
- (n=8,824)

Sectoral level: 6% of researchers with dual positions combine positions in several HEIs and, as reported, 3% of researchers are employed in a HEI as well as in another sector at the same time. Aside from their positions at HEIs, 56% of R2-R4 researchers with dual positions outside HEIs are engaged in the public or government sector (see Figure 39). Somewhat more than one third of R2-R4 researchers with dual positions outside HEIs are either employed at or run start-ups and small and medium-sized enterprises (SMEs, 16% of researchers employed in a HEI as well as in another sector at the same time) or private non-profit enterprises (NPEs, 20% of researchers employed in a HEI as well as in another sector at the same time). Only 8% of researchers employed in a HEI as well as in another sector at the same time are employed at large companies.

In comparison to MORE2 data, in 2012, 25% of R2-R4 researchers with dual positions outside HEIs were employed in private firms (2016: 24%). The share of R2-R4

researchers with dual positions at private non-profit organisations has increased from about 12% in 2012 to 20% by 8pp in 2016, while the share of R2-R4 researchers with dual positions in HEIs and in the public or government sector has decreased by 8pp (2012: 64%; 2016: 56%).

Figure 39: Distribution of researchers currently in a dual position combining a HE and non-HE position over non-HE sectors (EU28)



Source: MORE3 EU HE Survey (2016)
Note:
- Only R2, R3 and R4 researchers.
- At the basis of this graph are the 360 researchers or 3% of all researchers in the EU28 who combine a position in the HE sector with another position in another sector.
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"
- (n=382)

Share of researchers with a dual position combining a HE position with a position in private industry in current employment
Of R2-3-4 researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=8,046)	3.1%	R1:	-	MED:	3.4%	F:	2.2%
		R2:	3.4%	NAT:	3.6%	M:	3.6%
		R3.	3.0%	SOC:	2.4%		
		R4:	2.9%				
2016 (n=8,073)	0.8%	R1:	-	MED:	0.8%	F:	0.6%
		R2:	0.9%	NAT:	1.0%	M:	0.9%
		R3.	0.7%	SOC:	0.5%		
		R4:	0.9%				

Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Notes:
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"

Share of researchers with a dual position combining a HE position with a position in public or government in current employment
Of R2-3-4 researchers

	EU total	Per career stage		Per FOS		Per gender	
2012 (n=8,046)	8.0%	R1:	-	MED:	14.7%	F:	6.5%
		R2:	9.3%	NAT:	6.1%	M:	8.9%
		R3.	6.7%	SOC:	5.7%		
		R4:	8.5%				
2016 (n=8,073)	1.8%	R1:	-	MED:	2.9%	F:	1.8%
		R2:	1.1%	NAT:	1.3%	M:	1.8%
		R3.	1.5%	SOC:	1.5%		
		R4:	2.7%				

Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Note:
- We do not differentiate whether the position in the HEI is the main or second position of employment.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?"

Referring to all researchers being at more than one position in an institute/organisation (either inside or outside the HE sector) in 2016 and differentiating between main and second sector of employment, it turns out that the vast majority of researchers that have as main position a HEI position, are employed as the second sector in the public or government sector (57%) or in the private for-profit sector (27%, see Figure 161 in Annex). If the higher education sector is the second sector of employment, 50% is employed as first sector in public or government sector and 16% in the private for-profit sector (see Figure 162 in Annex). Comparing the researchers mainly engaged in the higher education sector with those mainly engaged in the private for-profit sector, the former show a higher probability to join the private for-profit sector than the latter to join the higher education sector. This tilt might hint to better working conditions in the private for-profit sector in relation to the HE sector.

6. Working conditions in the current HEI position

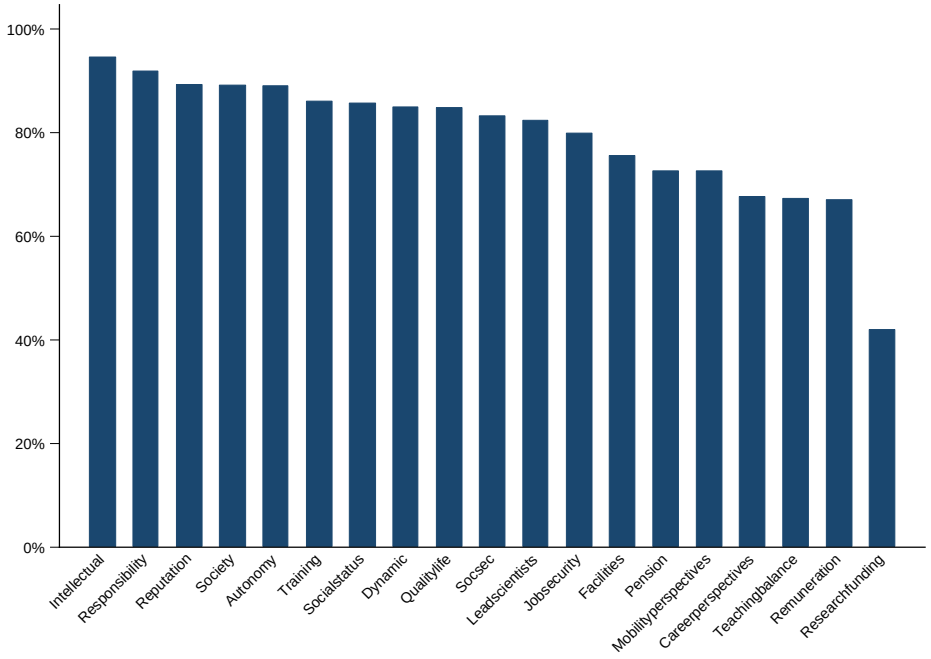
Researchers, particularly academic researchers, experience a highly competitive working environment. The "up-or-out" nature of research results in a high proportion of researchers dropping out of research careers. While the specific "the winner-takes-it-all" aspect of (academic) research might lead to undesired drop outs of highly talented researchers, serious competition among researchers can enhance scientific productivity and lead to new pioneering insights. However, this holds only true if the selection criteria are largely merit-based and leaving the academic labour market is not due to bad working conditions or other individual characteristics like gender or ethnic minority (Geuna - Shibayama, 2015[84]).

Research careers are terminated not only because of low levels of productivity. Donowitz et al., 2007[85], 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. The availability of funding and research grants, as a measure to ensure continuation of career paths and reduce insecurity, is found to be not only productivity enhancing (Dasgupta - David, 1994) but also to reduce chances of researchers leaving the profession (Geuna - Shibayama, 2015[86]). Aside from financial support, there are a number of other factors (e.g. collaboration possibilities, teaching and social recognition) influencing both research quality, scientific productivity and the transition and diffusion of knowledge as well as the well-being and satisfaction of researchers.

In the MORE3 EU HE survey, questions are asked of all researchers on the characteristics of their current employment and on their satisfaction with different conditions in their current employment. In this section, we describe the outcomes thereof. In order to provide a summary, the following figure illustrates researchers' satisfaction with each of the different working conditions listed in the survey. At the bottom end are research funding, remuneration, career perspectives and the balance between teaching and research, at the top end the level of intellectual challenge and responsibility associated with researchers' current position.

[84] 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.
[85] 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.
[86] 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.

Figure 40: Individual satisfaction with working conditions (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=8,382-9,303)

The following tables show the evolution of perceived working conditions between 2012 and 2016 based on the systematisation of MORE2, i.e. on a more restricted set of perceived working conditions than was asked in MORE3, which benefitted from the results of MORE2. The perceived satisfaction with working conditions is clustered into aspects related to academic life (intellectual challenge, reputation of employer, research autonomy and level of responsibility), employment conditions (job location/quality of life, job security, pension plan, remuneration package), personal aspects (contribution to society, social status, dynamic work environment) and career aspects (career and mobility perspectives). By comparison with MORE2, there is a clear upward trend.

Satisfaction in current academic position with academic aspects *Share of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=9,016)	89.3%	R1: R2: R3: R4:	90.8% 86.3% 88.4% 91.7%	MED: NAT: SOC:	90.8% 89.9% 87.6%	F: M:	87.8% 90.2%
2016 (n=9,303)	91.2%	R1: R2: R3. R4:	91.1% 89.6% 90.2% 93.5%	MED: NAT: SOC:	92.0% 92.0% 89.8%	F: M:	90.2% 91.8%
Satisfaction in current academic position with employment aspects *Share of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=9,016)	59.6%	R1: R2: R3: R4:	58.6% 53.7% 59.5% 65.2%	MED: NAT: SOC:	59.9% 60.6% 58.3%	F: M:	57.0% 61.2%
2016 (n=9,412)	77.5%	R1: R2: R3. R4:	73.1% 71.6% 77.9% 82.7%	MED: NAT: SOC:	80.9% 78.0% 74.6%	F: M:	74.0% 79.7%
Satisfaction in current academic position with personal aspects *Share of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=9,016)	83.6%	R1: R2: R3: R4:	81.3% 80.1% 83.9% 87.2%	MED: NAT: SOC:	86.8% 83.9% 81.1%	F: M:	82.3% 84.4%
2016 (n=9,206)	86.6%	R1: R2: R3. R4:	85.5% 86.2% 85.0% 89.4%	MED: NAT: SOC:	90.0% 87.4% 83.3%	F: M:	84.2% 88.0%
Satisfaction in current academic position with career-related aspects *Share of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=9,016)	63.0%	R1: R2: R3: R4:	68.3% 60.1% 59.2% 66.6%	MED: NAT: SOC:	62.6% 65.5% 60.5%	F: M:	58.9% 65.5%
2016 (n=8,827)	70.1%	R1: R2: R3. R4:	67.8% 66.0% 67.2% 78.1%	MED: NAT: SOC:	74.1% 70.4% 66.9%	F: M:	64.0% 74.0%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:

- The MORE3 questionnaire included a larger number of items for this question compared to the MORE2 questionnaire. Therefore differences between MORE2 and MORE3 should be interpreted with caution since the indicators are not based on exactly the same items in MORE2 and in MORE3 (see details below).
- Academic aspects include intellectual challenge, level of responsibility, reputation of employer, degree of independence (MORE2); and intellectual challenge, level of responsibility, reputation of employer, research autonomy (MORE3), respectively.
- Employment aspects include job security, benefits, salary (MORE2); and quality of life, job security, social security, pension plan, remuneration package (MORE3), respectively.
- Personal aspects include contribution to society, dynamism, social status (MORE2); and contribution to society, dynamic work environment, social status (MORE3), respectively.

- Career-related aspects include mobility perspectives, opportunities for advancement (MORE2); and mobility perspectives, career perspectives (MORE3), respectively.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"

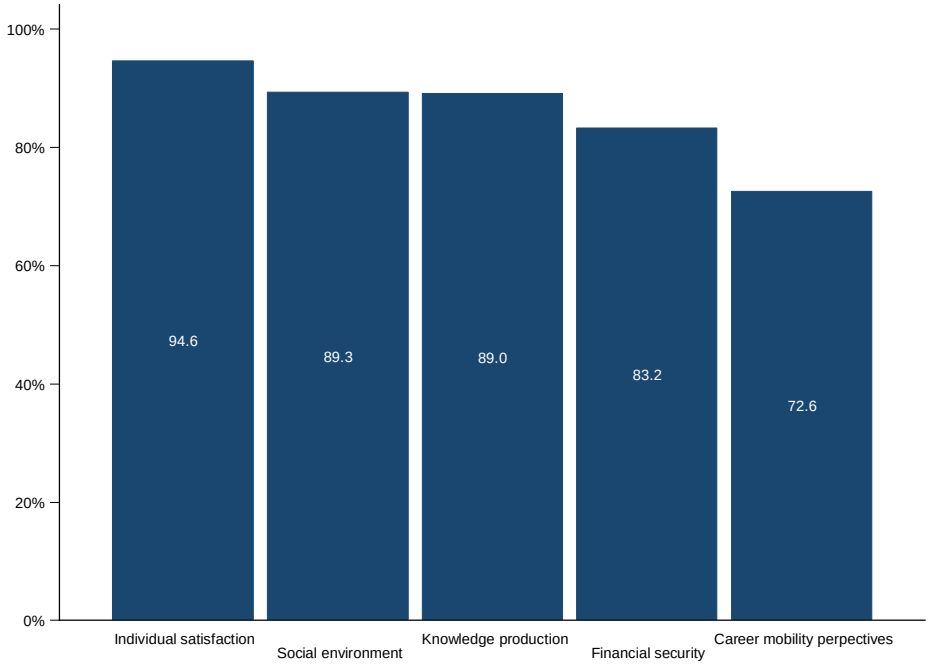
This myriad of perceived working conditions potentially relevant for working as a researcher makes it difficult to single out the main ones. MORE2 used a stated choice approach to identify the most relevant working conditions[87]. Based on the analysis of these data by Janger & Nowotny (2016), in MORE3 we conceptualise the main relevant working conditions to fall into one of three categories, 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 horizon available for implementing one's research agenda.
- Working conditions relevant for both knowledge production and pecuniary motivations, such as career and mobility perspectives.

Figure 41 shows the EU averages for working conditions based on this structure: perceived working conditions affecting extrinsic pecuniary motivations is shown by financial security (average of remuneration, job security, pension plan and social security); social and content-specific working conditions are shown by social environment and recognition (social status, reputation of employer, contribution to society) and individual satisfaction at work (average of intellectual challenge, dynamic work environment, level of responsibility and quality of life); perceived working conditions affecting scientific knowledge production are the average of satisfaction with research funding and access to facilities (financial support for research), working with leading scientists and the perceived quality of education and training (intellectual support), satisfaction with 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 that they are shown as a separate bar. While the share of researchers perceiving satisfaction in their current job is rated highly (95%), the share of researchers that are satisfied with career and mobility perspectives (driven by career perspectives) are at the lower end (73%). This 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. The share of researchers satisfied with social factors is at a rather high level, above 89%. Otherwise, the averages mask heterogeneity within the groups, to be analysed in detail below. Regarding financial security, rather low shares of researchers perceive remuneration as satisfying and high shares are content with social security, while high shares of researchers are satisfied with some conditions for knowledge production (e.g., research autonomy) and lower shares of researchers are satisfied with others (research funding).

[87] 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.

Figure 41: Systematisation of working conditions



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=8,382-9,303)

In the following sections, the findings on working conditions based on MORE3 data will be presented along this systematisation of working conditions. The first section 5.1 will group all working conditions relevant for extrinsic pecuniary motivation and less relevant for scientific knowledge production, the second (5.2) deals with working conditions relevant for scientific knowledge production, the third section with the cross-cutting issues, career and mobility perspectives.

6.1. Remuneration and other non-science related working conditions

This subsection first looks at financial security, then at the social environment and recognition and finally at the individual, content-specific satisfaction at work.

6.1.1. Financial security[88]

6.1.1.1. Remuneration

Share of researchers that consider themselves well paid or paid a reasonable salary
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=9,412)	67.0%	R1:	69.1%	MED:	65.9%	F:	63.9%
		R2:	63.2%	NAT:	69.1%	M:	69.1%
		R3.	65.7%	SOC:	65.7%		
		R4:	70.2%				

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 37: "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)?"

Share of researchers that consider the remuneration package in their current academic position better/worse than that of people with comparable skills and experience outside academia
Of all researchers (n=9,412)

	EU total	Per career stage		Per FOS		Per gender	
Better	9.8%	R1:	14.9%	MED:	10.5%	F:	11.5%
		R2:	9.7%	NAT:	9.2%	M:	8.7%
		R3.	9.0%	SOC:	9.9%		
		R4:	8.3%				
Worse	59,5%	R1:	46,9%	MED:	56,5%	F:	60,1%
		R2:	52,7%	NAT:	61,1%	M:	59,1%
		R3.	63,9%	SOC:	59,7%		
		R4:	64,1%				

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 39: "How would you compare your remuneration package to that of people with comparable skills and experience outside academia?"

Financial security and remuneration is an important aspect of working conditions (Janger and Nowotny, 2016[89]). Therefore, MORE3 introduced a number of questions that ask about remuneration more explicitly than in MORE2.

Overall, about 2 out of 3 EU researchers feel well (19%) or reasonably paid (48%), while 24% feel paid sufficiently to only make ends meet and the remaining 9% indicated that they struggle to make ends meet given the inadequate salary.

[88] The overview tables don't show 2012, as in 2016 a more detailed question was asked about salary. In 2012, on average in the EU27, 53% of researchers were satisfied with their salary, so that 2016 can be seen as an improvement.
[89] Ebd.

Career stage: This pattern does not strongly differ across career stages. Some minor differences with the overall distribution are found for R2 and R3 researchers only. Among R2 researchers, the group feeling sufficiently paid to make ends meet only is somewhat larger (29%), while among the R3 researchers the group feeling badly paid is slightly larger (11% - as shown in the upper left panel of Figure 42).

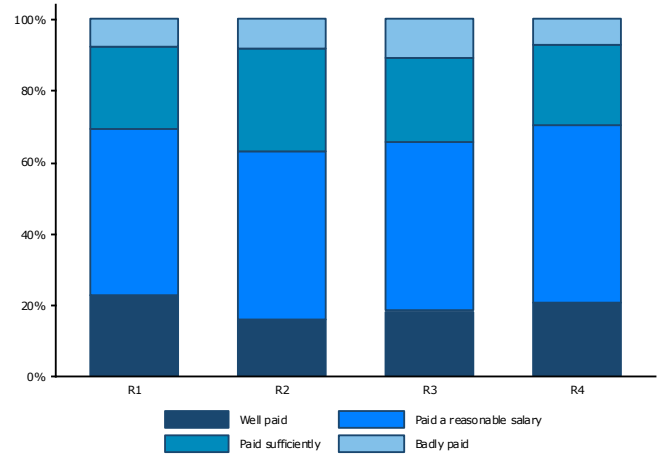
Country level: However, there exist larger differences across countries. While in Luxembourg (89.5%, of which 56% feel well paid), Belgium (89%), the Netherlands (88%) and Switzerland (86%) up to 90% feel well or at least reasonably paid, this share is less than or almost one third in Slovakia (32%), Lithuania (33%), Hungary (34%) and in particular Greece (26%). Hence, in these countries the share of researchers struggling with their income is comparably high.

Interestingly, there exist differences across countries concerning which career stages are most heavily affected by low salaries, or – more precisely – in the researchers' perception of being badly paid. While for instance, Greek researchers in all career stages show similar high shares of bad remuneration[90], in other countries the share of researchers unsatisfied with their remuneration decreases with higher career stages. This holds for instance for Lithuania, Slovakia or Romania, but also for countries where researchers feel better paid overall (e.g. Ireland, Switzerland or Sweden). This could reflect a dominance of general economic conditions or higher education system features in certain countries such as Greece which suffers heavily from the economic crisis, while in other countries more career-stage related characteristics prevail, with R4 researchers achieving good salaries but younger ones being not so well paid.

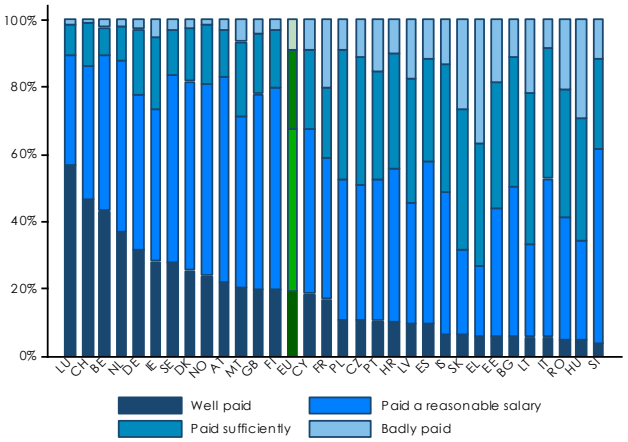
[90] This also holds for the career stages R1 and R2 not shown in Figure 42 due to low number of observations.

Figure 42: Perception of remuneration by career stage and by country

By career stage (EU28)



By country



By career stage and country

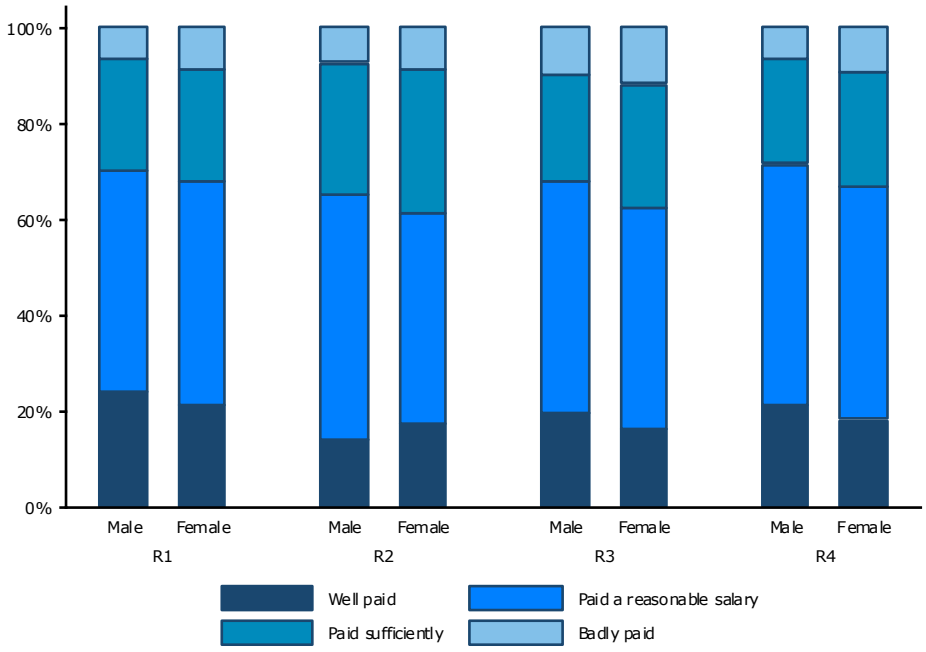
	R1	R2	R3	R4
Austria	33.1%	8.0%	20.0%	13.0%
Belgium	7.3%	13.9%	9.1%	17.2%
Bulgaria	NA	41.2%	49.6%	48.6%
Croatia	46.3%	39.0%	48.1%	40.8%
Cyprus	49.1%	37.1%	32.7%	16.4%
Czechia	NA	63.0%	44.8%	47.7%
Denmark	19.3%	13.1%	19.6%	19.6%
Estonia	65.8%	60.1%	54.2%	45.5%
Finland	42.7%	15.6%	22.0%	9.4%
France	NA	47.6%	41.7%	39.3%
Germany	25.8%	23.2%	14.9%	24.6%
Greece	NA	NA	74.0%	74.0%
Hungary	74.8%	57.8%	63.7%	68.9%
Ireland	34.4%	41.1%	21.2%	17.5%
Iceland	55.7%	NA	64.9%	34.6%
Italy	NA	60.1%	41.8%	39.3%
Latvia	49.1%	NA	50.8%	58.7%
Lithuania	75.1%	70.2%	72.2%	55.6%
Luxembourg	19.3%	7.7%	1.4%	10.1%
Malta	NA	35.2%	25.5%	22.8%
Netherlands	14.9%	22.2%	12.5%	4.2%
Norway	22.2%	32.7%	16.6%	15.1%
Poland	NA	49.7%	54.2%	35.5%
Portugal	NA	46.9%	45.2%	44.8%
Romania	NA	76.7%	68.9%	44.8%
Slovakia	54.7%	74.4%	72.3%	58.7%
Slovenia	54.5%	42.3%	39.0%	25.8%
Spain	NA	57.3%	47.1%	32.3%
Sweden	22.7%	16.2%	21.2%	6.4%
Switzerland	19.1%	15.3%	13.9%	6.3%
United Kingdom	24.0%	27.9%	21.0%	21.5%
EU	**39.6%**	**40.3%**	**38.9%**	**33.7%**

Notes: Only answering options "paid sufficiently…" and "badly paid…"
NA is due to number of observations < 30.
Red = high share of badly/just sufficiently paid researchers.

Source: MORE3 EU HE Survey (2016) (n= 10,394)
Note: Based on question 37: "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)?

Gender: While only minor differences in remuneration can be observed across fields of science, a gender wage gap is found from the perspective of the researchers' perception (see Figure 43). Overall, across career stages the share of female researchers assessing themselves as reasonably or well-paid is by 3% (R1) to 5% (R3) lower than the respective share of male researchers. The pattern seems to be quite robust. However, the results by Janger and Nowotny (2016)[91] show that female researchers attach a lower importance to salary compared with other research job features, so that at the same salary level self-reported satisfaction with salary would be higher for women than men. Also the shares of subgroups indicating either well or reasonably paid researchers is always higher for male researchers[92], while the opposite is true for badly paid researchers or those struggling to make ends meet given the bad salary.

Figure 43: Perception of remuneration, by gender



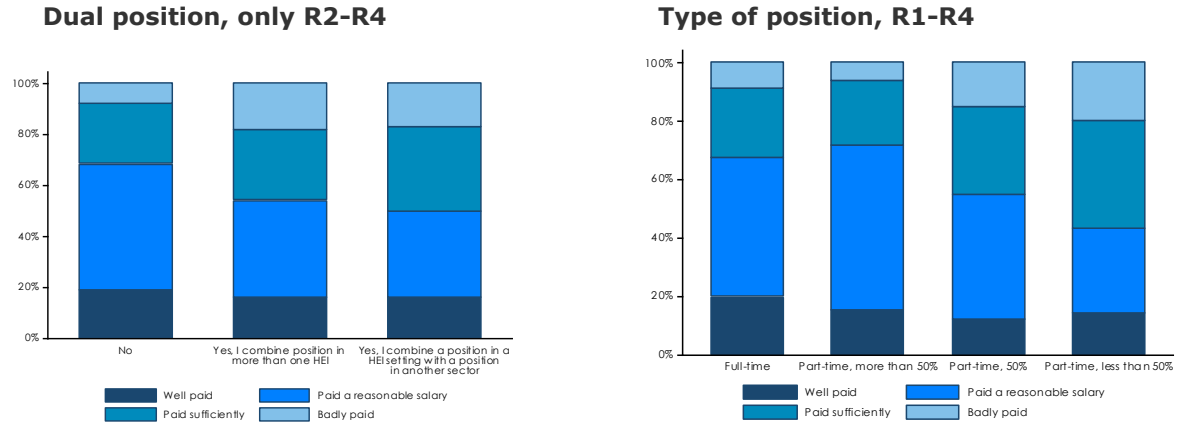
Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers considering themselves well paid, paid a reasonably salary, paid sufficiently to only make ends meet or badly paid and struggling to make ends meet.
- Based on question 37: "How do you feel about your remuneration package (if you do not take into account a second income or, if applicable, the income of your partner)?"
- (n= 9,412)

Dual positions: Only minor differences are observable in the remuneration of researchers with or without dual positions, at least from their own perspective. On the other hand, dual positions seem to go hand in hand with a perception of less attractive

[91] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.
[92] With only one exception of R2 researchers: Here, the group of female researchers assessing themselves as well paid (18.5%) is larger than their male counterparts (16%), relative to the full population of female/male researchers. However, this effect is levelled out by the share of female researchers feeling reasonably paid (43% for female researchers, and 51% for males). Therefore, as for all other career stages, female R2 researchers feel more often badly paid or are struggling to make ends meet than do male researchers.

salaries (see left panel in Figure 44). Researchers who are only employed in one institution are more often satisfied with their salaries. While 68% of these researchers feel well (18%) or reasonably (50%) paid in their HEI, only 8% indicate that they are struggling making ends meet. In contrast, only 54% of the researchers being employed in more than one HEI feel well (16%) or reasonably (38%) paid. Furthermore, those working in both a HEI and in another sector have even slightly lower shares of researchers being satisfied with their remuneration (16% and 34% respectively).

Figure 44: Perception of remuneration, by dual position and by type of position (EU28)



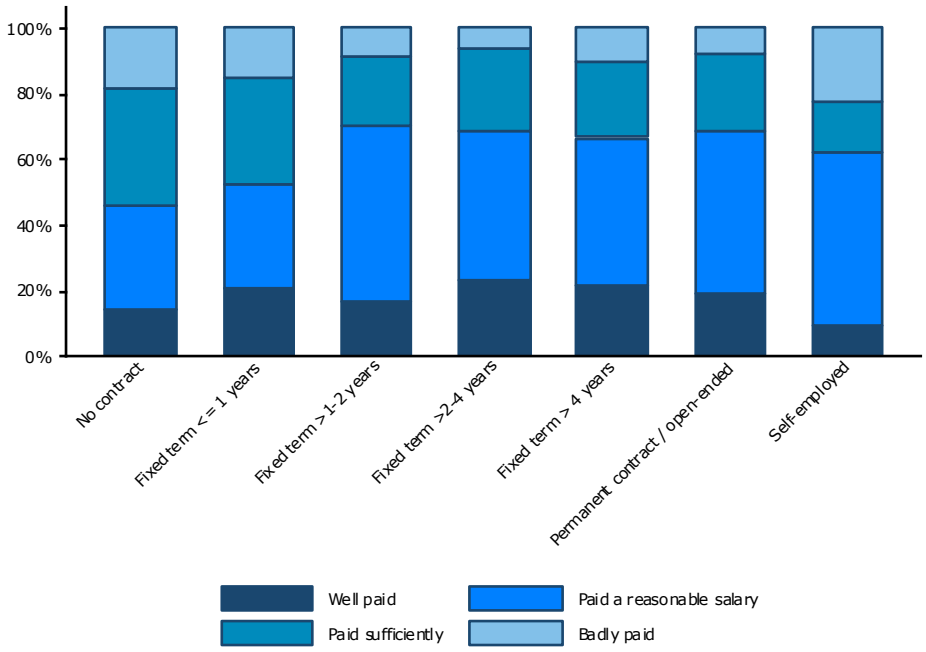
Source: MORE3 EU HE Survey (2016)
Notes:

- Share of researchers considering themselves well paid, paid a reasonably salary, paid sufficiently to only make ends meet or badly paid and struggling to make ends meet.
- Based on question 27: "Are you currently in a so-called "dual position", whereby you are employed in more than one institution/organisation at the same time?", question 33: "Type of position" and question 37: "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)?"
- (left: n= 8,073 and right: n=9,412)

However, given the available data it is not clear whether these differences might be explained by the fact that remuneration for part-time positions[93] is less attractive or whether potentially less attractive remuneration in academia tends to force researchers to take up a second job (outside academia). In terms of type of position (see right panel in Figure 44), researchers evaluate their remuneration to be less attractive if they are working part-time with working hours less (or equal) than 50% of a full-time position. The share of researchers feeling well (14%) or reasonably paid (29%) drops to considerably less than half. Interestingly, differences are quite low between full-time employed and part-time employed with more than 50% of working hours. While the group of full-time employed researchers has the highest share of those feeling well paid (20%), this group of part-time employees excels the full-timers in the sum of well (15%) and reasonably paid (57%).

[93] Researchers were explicitly asked to exclude other income (e.g. of their partner) in evaluating their remuneration at the HEI.

Figure 45: Perception of remuneration, by type of contract



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers considering themselves well paid, paid a reasonably salary, paid sufficiently to only make ends meet or badly paid and struggling to make ends meet.
- Based on question 32: "Type of contract" and question 37: "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)?"
- (n= 9,412)

Type of contract: When looking at satisfaction with remuneration across types of contract, obviously the share of researchers feeling badly paid or only sufficiently paid to make ends meet is highest among those regarded as students and who therefore have no formal contract (see Figure 45).

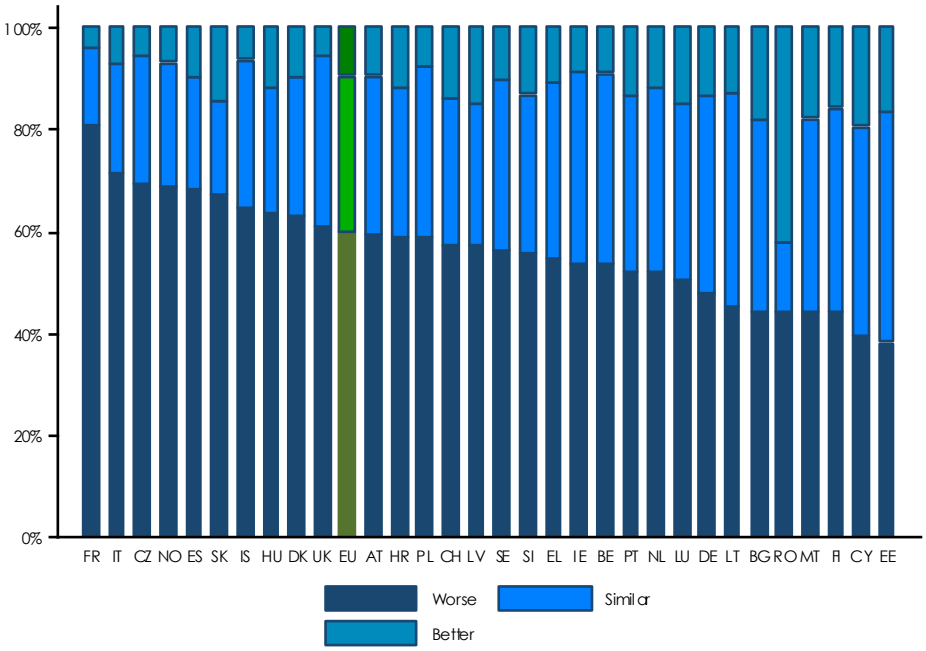
However, differences from the group of researchers with fixed-term contracts lasting less than a year are unexpectedly low. Only slightly over half of these researchers feel well (21%) or reasonably paid (32%). On the other hand the differences among the remaining durations of fixed-term contracts but also permanent contracts are remarkably low. The shortest fixed-term contracts are therefore more related to student status conditions while the longer fixed-term contracts have similar remuneration conditions as in a permanent position. Surprisingly, the share of researchers feeling well paid (23%) is highest among researchers with fixed term contracts lasting between 2 and 4 years. This group also has the lowest share of researchers indicating that they struggle to make ends meet given their bad salary (7%).

On the contrary, among self-employed researchers the share of badly paid researchers is by far the highest (22%) across types of contracts. Except for those researchers who classified their type of contract as "other" (9%), this group also has the lowest share of researchers feeling well paid (10%). However, among the self-employed researchers

more than half (52%[94]) indicated that they are reasonably paid. Taken together, self-employment seems to be a reasonable contract type for researchers in terms of remuneration. However, it also appears to involve the risk of a poverty trap for a substantial share of these researchers.

Finally, differences between researchers having the status of a civil servant or of an employee are less significant (see Figure 164 in Annex). For both groups, about 2 out of 3 indicated that they are well or reasonably paid. However, interestingly among employees less researchers struggle to make ends meet (8%) than do civil servants (12%).

Figure 46: Perception of remuneration compared to outside academia



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers comparing their remuneration to that of people with comparable skills and experiences outside academia and assessing it to be worse, similar or better.
- Based on question 39: "How would you compare your remuneration package to that of people with comparable skills and experience outside academia?"
- (n= 9,121)

Compared to people outside academia with comparable skills and experience, 60% in EU28 Member States feel more badly paid. 30% feel there is little difference and only 10% of EU researchers perceive themselves as better paid than their non-academic counterparts. However, there exist large differences across countries.

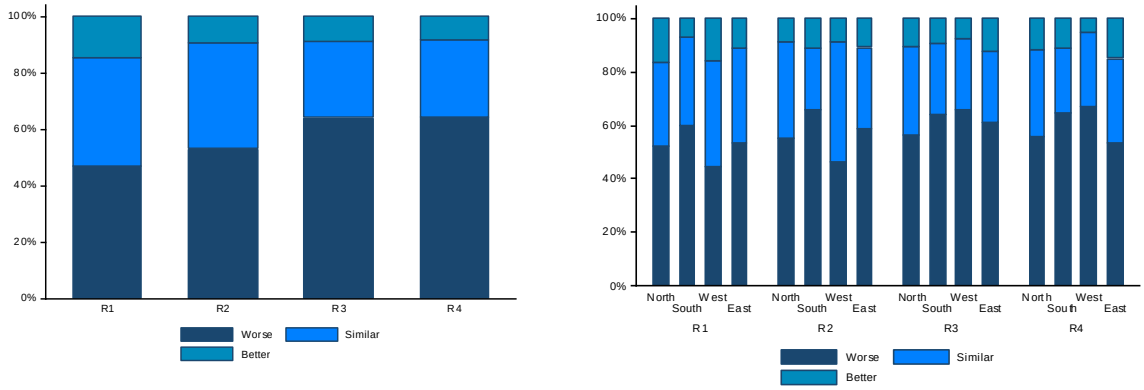
Country level: The largest share of researchers feeling worse paid is found in France (81%) followed by Italy (71%), the Czech Republic (69%), Norway (69%), Spain (68%)

[94] In this category of reasonably paid researchers only the group of researchers with a fixed-term contract between 1 and 2 years has a slightly higher share (54%) than the self-employed.

and Slovakia (67%) (see Figure 46). In Estonia (38%) and Cyprus (39%) the lowest share of researchers feels worse paid.

Interestingly, Romania strikingly stands out in terms of perception of being better paid inside than outside academia. Among Romanian researchers, 42% feel better paid. For the remaining countries, the respective share varies between 4% (France) and 20% (Cyprus). Interestingly, among EU Member States which joined the European Union after 2004, only the Czech Republic (6%) and Poland (8%) are below the EU average, while the top 5 countries with the highest shares of researchers feeling better paid stem all from this group (Romania, Cyprus, Bulgaria, Malta, Estonia)[95]. This observation points at structural differences in the HE but also in the economic system of these countries, where fewer opportunities outside academia appear to be available. This would need further research.

Figure 47: Perception of remuneration compared to outside academia, by career stage (EU28)



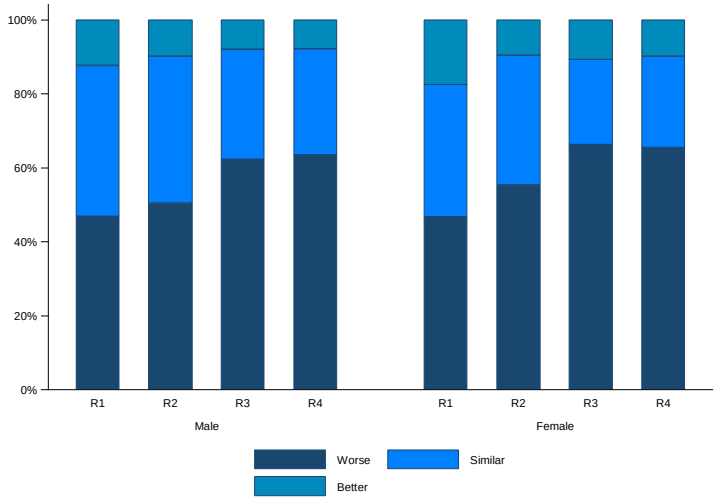
Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers comparing their remuneration to that of people with comparable skills and experiences outside academia and assessing it worse, similar or better.
- Average shares of the following country groups are shown: East (CZ, EE, HU, LV, LT, PL, SI, SK, BG, RO, HR), North (NO, SE, FI, DK, IS), South (PT, ES, IT, EL, MT, CY), West (BE, FR, DE, NL, LU, AT, UK, IE, CH) and EU28.
- Based on question 39: "How would you compare your remuneration package to that of people with comparable skills and experience outside academia?"
- (n=8,212)

Career stage: Across career stages, EU researchers feel more often worse paid than their non-academic counterparts later in their career stage. While about 64% of R3 and R4 researchers feel worse paid, the proportion is only 47% for R1 researchers (see left panel in Figure 47). In terms of the share of those researchers feeling better paid, the EU average drops from 15% in R1 to 8% in R4. This may be linked to increased comparison of income with peers at later stages of life, when investing in human capital to build up a research career becomes less rewarding as the time on which to produce returns on this investment decreases, in accordance with the human capital model of science (see Stephan, 1991, and Janger and Nowotny, 2016[96]).

[95] Moreover, among the top 10 countries another 2 countries (Latvia, ranked 7th, and Slovakia, 9th) are from this group. Only Finland (6th) and Luxembourg (8th) rupture this picture.
[96] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.

However, the pattern is not homogenous across countries (see right panel in Figure 47). The observed relationship between career stage and the perception of both being worse and being better paid than outside academia is mainly driven by the Western European countries. Within this country group, the share of (perceptions of) more badly paid researchers increases from about 45% in the early career stages (44% in R1 and 46% in R2) to about 66% in the later ones (66% in R3 and 67% in R4). The share of the better paid drops from 16% to 5.4% in the Western European countries. In the Eastern European countries, the opposite is found for the group of better paid researchers. Here, the share increases from 11% in R1 to 15.2% in R4. The pattern for those being more badly paid is less clear for this country group. While the shares are similarly low in R1 (53%) and R4 (53%), they are highest in R3 (61%). In the group of Southern European countries, interestingly shares of both the better and the worse paid researchers increase with later career stages. Finally, in the Northern European EU Member States only minor differences are found across career stages[97].

Figure 48: Perception of remuneration compared to outside academia, by gender and career stage (EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers comparing their remuneration to that of people with comparable skills and experiences outside academia and assessing it worse, similar or better.
- Based on question 39: "How would you compare your remuneration package to that of people with comparable skills and experience outside academia?"
- (n=8,212)

Gender: Differences by gender are mainly found for the group of researchers perceiving their remuneration to be better compared to non-academia. On EU average, while 12% of all female researchers feel better paid, it is only 8.7% of male researchers, which corresponds to the higher importance of salary found for male researchers (Janger and Nowotny, 2016[98]). The difference is highest for R1 researchers (17% of female researchers vs. 12% of males) (see Figure 48). On the contrary, female researchers also tend to feel slightly more often worse paid in comparison to non-academic employees.

[97] The most striking pattern for Northern European Member States is the comparably high share of R1 researchers feeling better paid than their non-academic counterparts (16%). This share drops to 9% in R2 and about 11% in R3 (11%) and R4 (12%).
[98] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.

This holds in particular for R2 researchers (55% for females vs. 50% of males). However, on average across the career stages, this difference is only minor (60% vs. 59%).

Field of science: Very few differences are observed across fields of science. Most striking is the higher share of worse paid researchers as well as lower share of better paid in Social Sciences. Small differences are also observed across contract types.

Type of position: However, amongst the group of part-time researchers working at least more than 50% of a full-time position, a significantly lower share (~45%) feels worse paid than their non-academic counterparts. On the contrary, among both groups of full-timers and part-timers (with less than 50% working hours) almost the same share of researchers feel better (9% in both groups) or worse paid (61% and 64% respectively).

6.1.1.2. Job and social security

Next to remuneration, the satisfaction of researchers with these other aspects of financial security are surveyed: job security, pension plan and social security.

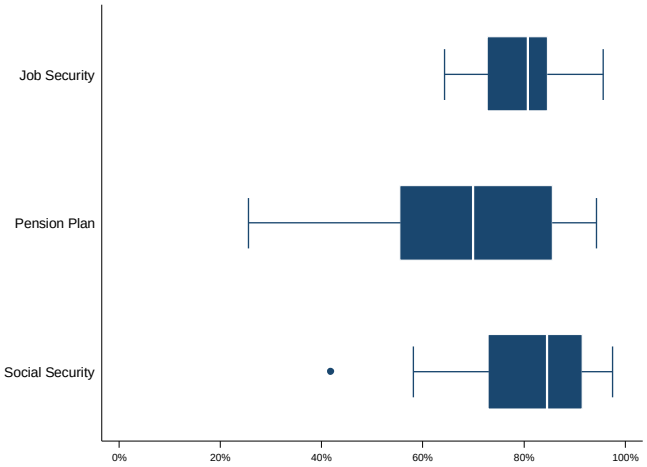
Table 10: Individual satisfaction with job and social security attributes, by country

		Job Security	Pension Plan	Social Security
France	Western European	0.07	0.16	0.10
Norway	Northern European	0.34	0.01	0.00
The Netherlands	Western European	0.33	0.01	0.04
Iceland	Northern European	0.24	0.15	0.11
Austria	Western European	0.37	0.11	0.06
Malta	Southern European	0.00	0.52	0.16
Sweden	Northern European	0.47	0.13	0.11
Switzerland	Western European	0.54	0.04	0.14
Belgium	Western European	0.45	0.18	0.11
Denmark	Northern European	0.71	0.00	0.03
Luxembourg	Western European	0.64	0.12	0.00
Ireland	Western European	0.40	0.20	0.24
Poland	Eastern European	0.30	0.32	0.25
United Kingdom	Western European	0.41	0.26	0.23
Czech Republic	Eastern European	0.37	0.36	0.21
Romania	Eastern European	0.10	0.65	0.25
Finland	Northern European	0.80	0.12	0.11
Spain	Southern European	0.35	0.50	0.25
Slovenia	Eastern European	0.49	0.44	0.23
Croatia	Eastern European	0.51	0.43	0.28
Germany	Western European	0.81	0.22	0.19
Bulgaria	Eastern European	0.50	0.48	0.40
Italy	Southern European	0.43	0.56	0.45
Latvia	Eastern European	0.46	0.45	0.65
Estonia	Eastern European	0.73	0.53	0.37
Portugal	Southern European	0.80	0.57	0.44
Slovakia	Eastern European	0.73	0.65	0.68
Cyprus	Southern European	0.98	0.57	0.52
Hungary	Eastern European	0.93	0.72	0.71
Lithuania	Eastern European	1.00	0.72	0.67
Greece	Southern European	0.80	1.00	1.00
EU		**78.9%**	**67.4%**	**80.1%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their job security, pension plans and social security and other benefits. Graph illustrates distance from the country with the highest share of satisfaction:

0 = country with highest share (green); 1 = country with lowest share (red); x = (maximum share – country share)/(maximum share – minimum share).
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,282-10,048)

Figure 49: Variation in individual satisfaction with job and social security attributes across countries (mean = EU28)



Source: MORE3 EU HE Survey (2016)
Notes:
- Shares of researchers satisfied with their job security, pension plans and social security and other benefits.
- The figure shows box plots for different answer categories. A box plot shows the full range of variation of a data set by its minimum and maximum (top and bottom lines), its median (line within the shaded box) and the data between the first and third quartile (shaded box). Outliers are presented by dots.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,282-10,048)

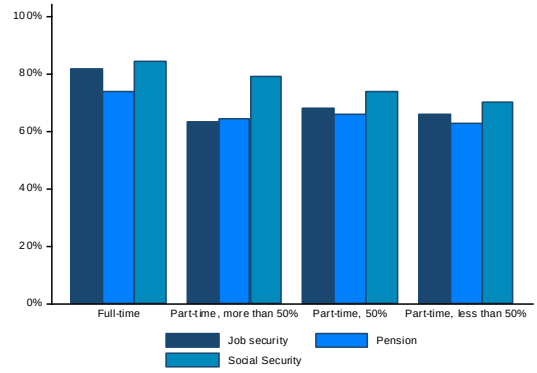
Country level: The satisfaction with financial security attributes strongly varies across European countries. This holds in particular for the satisfaction with the pension plan in place. While in all Western and in particular in the Nordic EU Member States at least 3 out of 4 researchers are satisfied with their pension plan – Denmark is leading with 94% – it is only 1 out of 4 in Greece (26%). However, the share of satisfied researchers in Greece is not only outstandingly low for the pension plan - the same also holds for social security over all. Only 42% of Greek researchers indicate that they are satisfied with their social security. Other Southern and Eastern European countries have much higher shares of satisfied researchers in both attributes, although they do not have equally high shares such as the Nordic countries or the Western European Member States.

In terms of job security, the pattern is less clear. Among the five countries with the highest shares of researchers satisfied with their job security[99] are Malta (leading with 96%), Romania (92%) and Poland (86%). On the contrary, Denmark (with the highest share in pension plan satisfaction) and Luxembourg (highest in social security) only have mediocre shares in job security satisfaction, for instance. Moreover, Germany (71%) has a slightly lower share of researchers being satisfied with their job security than does Greece (71%). This confirms the analysis of career models, where countries such as

[99] The other two countries are France (93%) and Iceland (88%).

Germany with a narrow hierarchical top feature a high share of fixed-term researchers, whereas some Southern European countries have higher shares of tenured researchers. Fewer researchers satisfied with their job security are only found in Lithuania (64%), Cyprus (65%) and Hungary (66%).

Figure 50: Individual satisfaction with job and social security attributes, by type of position



	Job Security		Pension		Social Security	
	Full Time	Part Time	Full Time	Part Time	Full Time	Part Time
North	76.5%	71.8%	88.8%	82.8%	93.2%	84.2%
South	80.5%	53.2%	54.0%	19.6%	73.6%	46.9%
West	82.5%	65.3%	81.0%	68.8%	88.5%	80.0%
East	81.9%	67.8%	63.1%	54.6%	77.5%	65.1%
EU	81.5%	64.9%	73.5%	64.3%	84.0%	76.2%

Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their job security, pension plans and social security and other benefits.
- Right hand side: Average shares of the following country groups are shown: East (CZ, EE, HU, LV, LT, PL, SI, SK, BG, RO, HR), North (NO, SE, FI, DK, IS), South (PT, ES, IT, EL, MT, CY), West (BE, FR, DE, NL, LU, AT, UK, IE, CH) and EU28.
- Right hand side: Green = high compared to the average of the column; Red = low compared to the average of the column.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=8,382 - 9,086)

Type of position: By type of position, full-timers are more often satisfied with their financial security attributes than part-timers (see left panel in Figure 50). This holds in particular for their perception of job security. While 82% of full-timers are satisfied, it is only about 2 out 3 of part-timers. Across the different categories of part-timers, differences are only minor. Similarly, but to a lower extent, full-timers are also more often satisfied with their pension plans. Again, while slightly less than 2 out of 3 part-timers are satisfied with their pension plan, it is 74% among full-timers. In the case of social security there exist also significant differences across part-timers. Again, among full-timers the share of satisfied researchers is highest (84%). Among the part-timers the degree of satisfaction decreases the lower the working time. While 79% of part-timers with more than 50% working hours of a full-timer are satisfied with their social security package, it is only 70% for those with less than 50% working time. On average, it is 76% of all part-timers.

To put this in context, overall the share of part-timers in the EU is low (10%) and this has barely changed since MORE2, as is shown in the table below.

Share of researchers in full-time employment *Of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2012 (n=8,985)	89.6%	R1:	73.2%	MED:	89.3%	F:	86.4%
		R2:	91.7%	NAT:	91.4%	M:	91.5%
		R3.	93.5%	SOC:	87.7%		
		R4:	93.3%				
2016 (n=9,412)	90.0%	R1:	65.7%	MED:	88.2%	F:	86.9%
		R2:	89.1%	NAT:	92.8%	M:	91.9%
		R3.	94.2%	SOC:	88.2%		
		R4:	96.8%				

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 33: "Type of position"

However, there exist large differences across regions in EU28 (see right panel in Figure 50). While in the Northern European countries the difference in shares of researchers satisfied with their financial security attributes is (significantly) less than 10 percentage points for all 3 categories (5pp for job security, 6ppt for pension plan, and 9ppt for social security), it is more than 25pp in the Southern European countries. In the case of pension plans, the difference is even 34pp. While 54% of Southern European full-time researchers are satisfied with their pension plan, it is only 20% of the part-timers. In the Western European and Eastern European Member States the differences in shares of satisfied researchers between full-timers and part-timers varies slightly around the EU28 average. Nonetheless, as already described above, the Western European countries show significantly higher shares of researchers satisfied with their financial security attributes than their Eastern European counterparts (see Table 10).

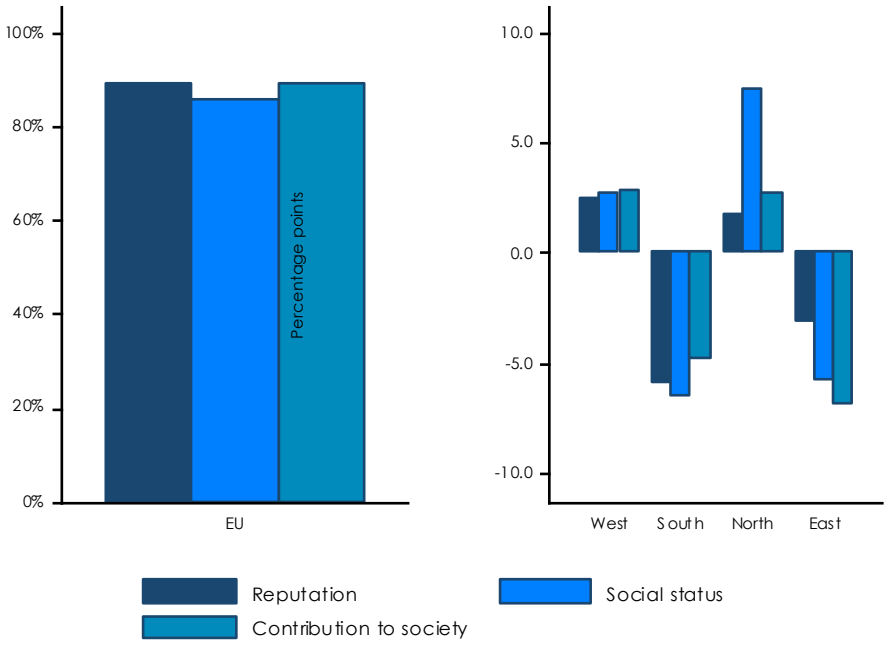
6.1.2. Social environment and recognition

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, 88% of EU28 researchers are satisfied with these kinds of conditions. The left panel in Figure 51 shows in more detail that 89% of all EU researchers are satisfied with their contribution to society, 86% with their social status and 89% with the reputation of their current employer. However, across European countries, differences are observed (see right panel in Figure 51).

Satisfaction with social environment *Of all researchers*							
	EU total	**Per career stage**		**Per FOS**		**Per gender**	
2016 (n=9,084)	88.0%	R1:	87.1%	MED:	92.0%	F:	86.2%
		R2:	87.3%	NAT:	88.3%	M:	89.1%
		R3.	86.6%	SOC:	84.8%		
		R4:	90.8%				

Source: MORE3 EU HE survey (2016)
Notes:
- Share of researchers satisfied with the reputation of their employer, social status and their contribution to society.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"

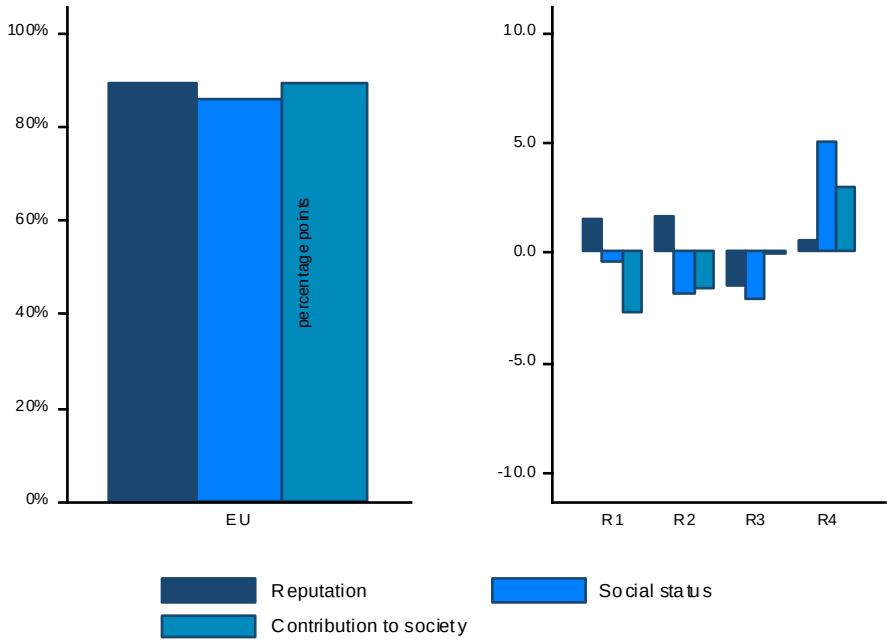
Figure 51: Individual satisfaction with social environment, by country groups



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with the reputation of their employer, social status and their contribution to society (left-hand panel) and differences in percentage points by country group.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,926-10,035)

Country level: Western and Northern European countries have on average higher shares of researchers who are satisfied with their social environment. In particular, the share of researchers satisfied with their social status is 7.4pp higher in Northern European countries than on average. On the contrary, researchers in Eastern European EU Member States and in particular in the Southern European Member States were less often satisfied. The share of satisfied researchers with respect to their social status, their contribution to society and the reputation of their employers are between 3pp up to 7pp lower than on average.

Figure 52: Individual satisfaction with social environment, by career stage



Source: MORE3 EU HE Survey (2016)
Note:
- Share of researchers satisfied with the reputation of their employer, social status and their contribution to society and differences in percentage points.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,412)

Field of science: Across fields of science, researchers working in Medical Sciences are most often satisfied with their social environment. The share of satisfied researchers is slightly more than 5pp higher than the EU28 average for all 3 indicators. On the other hand, researchers working in the Humanities, Social Sciences and Agricultural Sciences[100] are less often satisfied. Here, the share of satisfied researchers is between 2 and 4pp lower than in the EU28 overall.

Career stage: Across career stages, R4 researchers unsurprisingly tend to be more often satisfied with their social status (the share of satisfied R4 researchers is 5pp higher than the EU28 average; see right panel in Figure 52). However, while the respective share of R1 researchers almost equals the EU28 average, it is lower for R2 and R3 researchers. R3 researchers also feel less often satisfied with the reputation of their employer. Finally, the later the career stage, the more often researchers are satisfied with their contribution to society. The share of satisfied researchers increases from 86.4% in R1 to 92% in R4.

[100] Except the satisfaction with their contribution to society.

6.1.3. Individual satisfaction at work

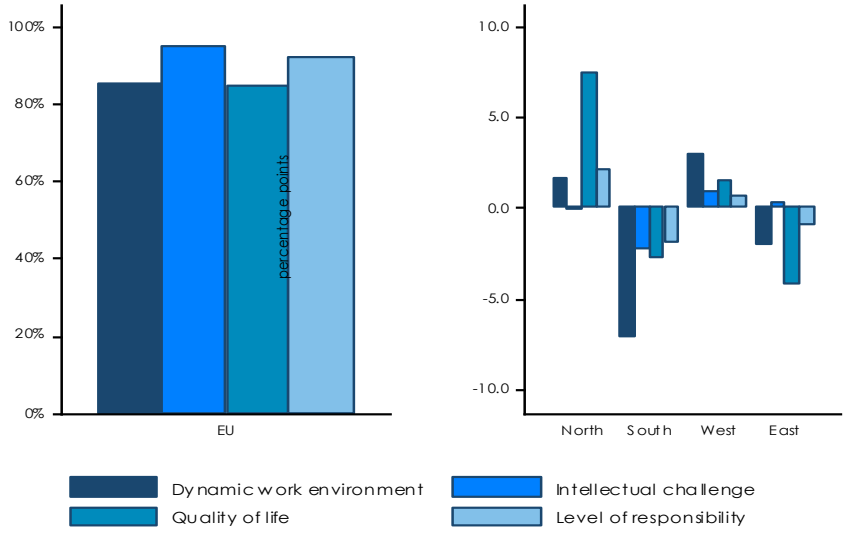
As part of the non-science working conditions to follow social environment and recognition, the satisfaction with intellectual challenge, dynamic work environment, level of responsibility or quality of life are analysed as 'individual satisfaction at work'. Overall, 89% of EU researchers are satisfied with these kind of issues. In more detail: 95% of researchers in the EU28 are satisfied with the intellectual challenge in their current position, 92% with the level of responsibility, 85% with the dynamic work environment, and 85% with the quality of life (see left panel in Figure 53).

Individual satisfaction at work
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=9,303)	89.1%	R1:	88.3%	MED:	91.0%	F:	87.0%
		R2:	88.1%	NAT:	90.3%	M:	90.3%
		R3.	88.2%	SOC:	86.4%		
		R4:	91.1%				

Source: MORE3 EU HE survey (2016)
Note:
- Share of researchers satisfied with intellectual challenge, dynamic work environment, level of responsibility and quality of life.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"

Figure 53: Individual satisfaction at work, by country groups



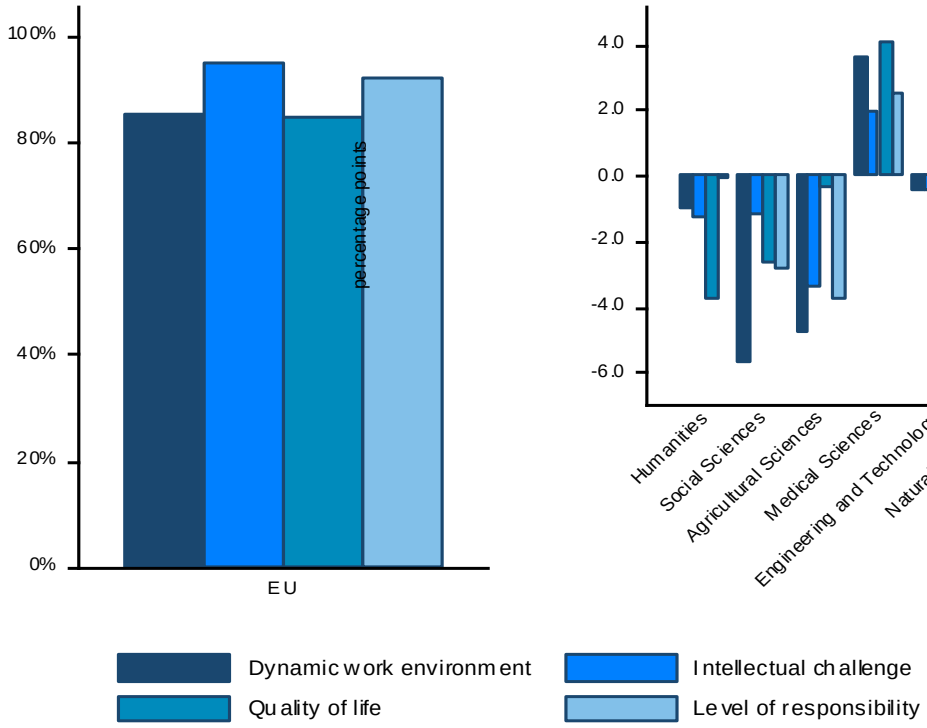
Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their dynamic work environment, intellectual challenge, quality of life and their level of responsibility and differences in percentage points.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,926-10,035)

Country level: Across countries, researchers in Northern European countries tend to be more satisfied with the job related quality of life. The share of satisfied researchers is 7.4ppt above the EU28 average. On the other hand, researchers from Southern and Eastern European countries are more often dissatisfied with the dynamic work

environment, pointing at the traditionally more hierarchical and strongly structured working relations. The respective share of satisfied researchers is 7pp lower than in the EU overall.

Career stage: Across career stages, unsurprisingly satisfaction with the level of responsibility is higher for later career stages (see right panel in Figure 165 in the annex). However, R1 researchers are more often satisfied with their level of responsibility than R2 researchers. On the contrary, R2 researchers are most often satisfied with the dynamic work environment, while this is lowest for R3 researchers. Concerning job-related quality of life, R4 researchers tend to be more often satisfied. The respective share is lowest in R2 but with almost no difference from R1.

Figure 54: Individual satisfaction at work, by fields of science



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their dynamic work environment, intellectual challenge, quality of life and their level of responsibility and differences in percentage points.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=10,035/9,990/9,926)

Field of science: Similarly to the described pattern in the previous section, researchers working in Medical Sciences are also above EU average in shares of satisfied researchers regarding individual job-related satisfaction (see right panel in Figure 54). However, in the respective indicators Natural Sciences show similar high (or even higher) shares of satisfied researchers. On the contrary, researchers in Social Sciences, Agricultural Sciences, and to a lesser extent in the Humanities tend to be less often satisfied with their individual work situation than the EU28 average. For instance, in Social Sciences (79%) and Agricultural Sciences (80%) the share of researchers satisfied with the dynamic work environment is almost 5 to 6pp lower than the EU average.

All in all, relatively high levels of social (security and environmental) and individual (job content) satisfaction – on average in the EU – can be seen to compensate dissatisfaction with pay when compared with outside academia, making research careers attractive. Researchers are willing to trade-off salary against other job features, as previous studies show (Janger and Nowotny, 2016[101]).

6.2. Working conditions for scientific knowledge production

National capabilities to contribute to the scientific frontier are driven by the capabilities of individual researchers. Aside from remuneration, social security standards and individual aspects of the working environment, other factors can be identified that strongly influence researchers' working conditions and attract excellent foreign researchers, increase performance of the existing scientific staff and help to build up promising junior scientists. Factors determining scientific knowledge production comprise financial support (research funding and infrastructure) and intellectual support provided to researchers as well as the degree of time balance between teaching and research and research autonomy. Finally, career path elements also influence scientific knowledge production as career-determined time horizons for research agendas change the content of research (Petersen et al., 2012)[102]. This will be discussed in section 6.3.

Satisfaction with environment for scientific knowledge production
Of all researchers

	EU total	Per career stage		Per FOS		Per gender	
2016 (n=9,223)	73.7%	R1:	79.1%	MED:	75.8%	F:	70.2%
		R2:	76.3%	NAT:	75.7%	M:	75.9%
		R3.	69.9%	SOC:	70.2%		
		R4:	74.9%				

Source: MORE3 EU HE survey (2016)
Note:
- Share of researchers satisfied with research funding, access to research facilities and equipment, working with leading scientists, quality of training and education, balance between teaching and research, and research autonomy.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"

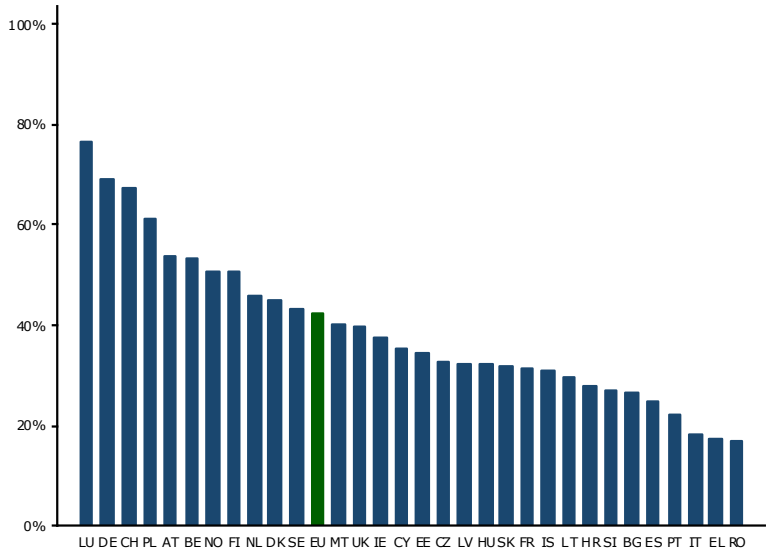
6.2.1. Financial support

Of course, the availability of research funds as well as access to research facilities and proper equipment are clearly factors positively affecting achievement of new knowledge and innovations; they are working conditions that researchers look out for when deciding between jobs. In the following subsections on financial support, we first discuss research funding and then satisfaction with research equipment and facilities.

[101] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.
[102] Petersen, A. M., Riccaboni, M., Stanley, H. E., Pammolli, F., (2012) "Persistence and uncertainty in the academic career", Proc. Natl. Acad. Sci., 109(14), pp. 5213–5218.

6.2.1.1. Research funding

Figure 55: Individual satisfaction with research funding, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with the availability of research funding.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=10,075)

In total, about 42% of researchers in the EU28 consider themselves satisfied with the availability of research funding.

Country level: The data reveal a high degree of heterogeneity across countries (see Figure 55). On the one hand only 17% of researchers in Romania as well as in Greece and 18% of researchers in Italy perceive satisfaction with the availability of research funding. More generally, a pattern is visible with poorer Eastern European countries (with the exception of Poland) and in particular Southern European countries hit by the crisis and fiscal consolidation are at the lower end of the spectrum. On the other hand 76% of researchers in Luxemburg, 69% of researchers in Germany and 67% of researchers in Switzerland are satisfied with the availability of research funding. Scandinavian countries are also all above EU average.

Career stage and country groups: Table 11 shows the distribution of researchers considering themselves as satisfied with research funding and the availability of research facilities across geographical regions as well as the EU28 average per career stage. Remarkably, in the EU28 the share of researchers who are content with research funding is decreasing with every next career stage, ranging from about 62% of satisfied researchers in R1 to only about 40% of researchers in R4 who are satisfied with research funding. The geographical distribution of perceived satisfaction of researchers with research funding presents an unambiguous picture. Generally, Western and Northern European researchers consider their access to research funding better than their colleagues in Southern and Eastern Europe. Looking at the distribution between different career stages one finds that researchers at the beginning of their career (between 34% of R1 researchers in Southern and 68% of R1 researchers in Northern Europe) as well as recognised researchers (between 23% of R2 researchers in Southern and 69% of R2 researchers in Western Europe) are more satisfied with the available research funding than researchers at later stages of their career within the same geographical region

(between 24% of R4 researchers in Southern and 43% of R4 researchers in Northern Europe). Generally, Western and Northern European countries are above the EU28 average. The only exception is the share of R2 researchers in Northern European countries that are satisfied with their availability of research funding (46%) which is lower than the European average (54%).

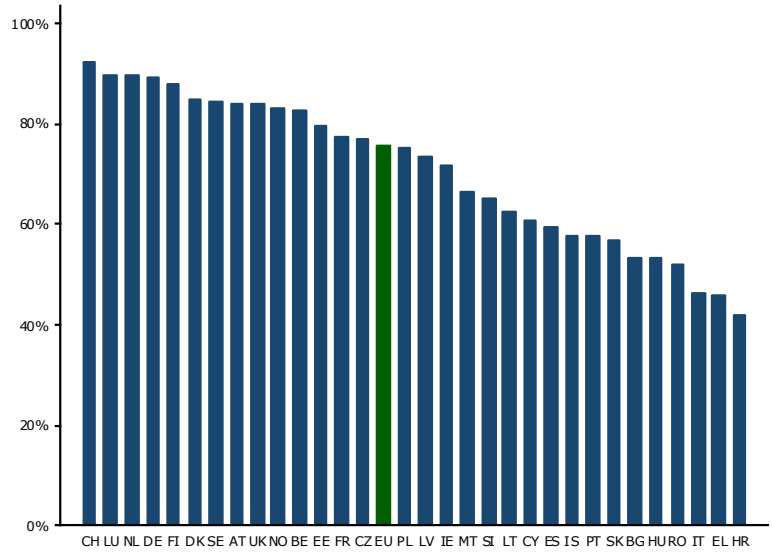
Table 11: Individual satisfaction with research funding and access to research facilities, by country group

	Research facilities				Research funding			
	R1	R2	R3	R4	R1	R2	R3	R4
North	90.7%	86.3%	82.1%	85.5%	68.0%	45.5%	35.5%	43.7%
South	68.3%	52.8%	50.6%	55.7%	34.1%	22.9%	17.4%	24.3%
West	86.4%	88.6%	83.9%	81.3%	65.7%	69.1%	37.7%	42.2%
East	68.6%	66.7%	62.4%	71.4%	50.6%	47.2%	34.9%	42.2%
EU	83.8%	77.3%	72.9%	74.1%	62.1%	54.4%	32.2%	37.9%

Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with research funding and access to research facilities.
- Average shares of the following country groups are shown: East (CZ, EE, HU, LV, LT, PL, SI, SK, BG, RO, HR), North (NO, SE, FI, DK, IS), South (PT, ES, IT, EL, MT, CY), and West (BE, FR, DE, NL, LU, AT, UK, IE, CH) and EU28.
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,412)

6.2.1.2. Research facilities and equipment

Figure 56: Individual satisfaction with research facilities and equipment, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their access to research facilities and equipment.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=10,071)

In total, about 76% of all researchers in the EU28 are satisfied with their access to research facilities and equipment.

Country level: Although less emphasised than with respect to availability of research funding, the heterogeneity across countries regarding perceived satisfaction with access to research facilities and equipment is rather high (see Figure 56). 42% of researchers in Croatia, 46% of researchers in Greece as well as in Italy are satisfied with their access to research facilities and equipment. On the upper bound 92% of researchers in Switzerland, 90% of researchers in Luxemburg and 89% of researchers in The Netherlands are satisfied with their access to research facilities. Again Scandinavian countries are on the higher end and Southern European countries on the lower end of the range.

Career stage and country groups: Table 11 also shows the share of researchers considering themselves as satisfied with the availability of research facilities and equipment across geographical regions for different career stages. Again, the share of researchers perceiving themselves as satisfied is always above the EU28 average in Northern and Western European countries. No large differences between career stages are found, although a slight trend similar to funding availability can be observed. Researchers already more settled show a slightly lower satisfaction with the research facilities provided than younger researchers. While about 91% of R1 researchers in Northern and 68% of R1 researchers in Southern Europe are satisfied with their access to research facilities, only about 86% of R4 researchers in Northern and 56% of R4 researchers in Southern Europe are satisfied. However, in comparison with the access to financial funding, researchers seem to consider themselves rather content in general. The exceptions are those researchers located in South European countries. These countries contain a significantly lower share of researchers considering themselves as satisfied in comparison to other regions independent of the career stage.

6.2.2. Intellectual support

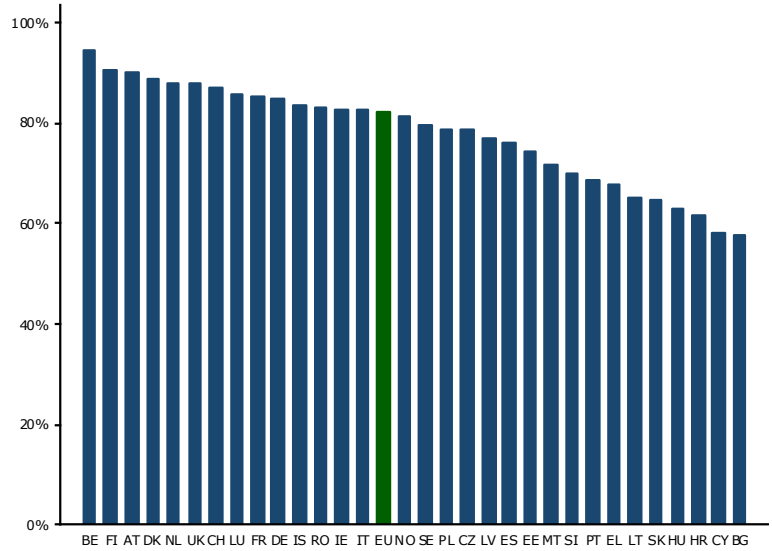
Intellectual support covers both work and close collaboration with leading researchers as well as the availability of distinguished training and education.

6.2.2.1. Collaboration with leading researchers

On average, about 83% of researchers in the EU28 are satisfied with their opportunities to work with leading scientists.

Country level: A comparison between countries shows that the shares of researchers considering themselves as satisfied are particularly high in Belgium (94% of researchers), Finland (91%) and Austria (90%), opposing the rather low shares of satisfied researchers in Bulgaria (58%), Cyprus (58%) and Croatia (61%) (see Figure 57).

Figure 57: Individual satisfaction with collaboration with leading researchers, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with working with leading scientist.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,900)

It should be noted that a higher share of researchers working in Anglo-Saxon and Nordic higher education systems[103], like Denmark, the Netherlands or the United Kingdom, consider themselves, on average, satisfied with their possibilities to work with leading scientists (87% of researchers) than in Continental (82% of researchers) or Southern European (80% of researchers) higher education systems. This corresponds with the rankings of these countries/regions in research excellence indicators (e.g., the share of articles among the top 10% cited in each field, as used in the European Innovation Scoreboard).

Career stage and country groups: Differentiating between career stages reveals that in particular the shares of leading R4 researchers are the highest with respect to perceived satisfaction with their chances to work with other leading researchers (between 86% of R4 researchers in Southern European countries and 90% of R4 researchers in

[103] This country grouping of 16 EU countries, already introduced in section 5 of this report, is based on a classification of higher education systems, based on Janger - Strauss - Campbell, 2013 , who themselves draw on the comparative higher education literature cited therein, such as Enders-Musselin, 2008:
- The Anglo-Saxon and Nordic systems (e.g. United Kingdom, Sweden, The Netherlands) are higher education systems mostly based on collegiate department-style models, an intermediate share of tenured researchers and a high share of structured PhD training;
- The continental higher education system refers to countries such as Germany, the Czech Republic or Poland with a more hierarchical chair-based system and high shares of fixed-term researchers (the "survivor" model, see Enders-Musselin, 2008);
- The Southern European system refers to systems with high shares of tenured researchers also called "protective pyramid", with an early access to a permanent position following a strict competition; the way further up is then organised in hierarchical steps, depending on job availability. As Lissoni et al., 2011 and Pezzoni - Sterzi - Lissoni, 2012 , document for the highly centralised academic systems of Italy and France, criteria for academic promotion in such protective pyramids are not limited to scientific productivity, but include also issues such as social and political capital, seniority, gender.

Anglo-Saxon or Continental European countries) (see Table 12). In countries with Southern higher education systems, recognised researchers in particular are less content with the possibilities to collaborate with established experts in their research fields (74% of R2 researchers in Southern Europe).

Table 12: Individual satisfaction with the quality of education and training and with collaboration with leading scientists, by career stages

	Working with leading scientists				Quality of training			
	R1	R2	R3	R4	R1	R2	R3	R4
Anglo-Saxon	79.3%	88.0%	85.4%	90.4%	84.4%	90.6%	88.8%	92.8%
Continental European	77.6%	81.6%	79.7%	90.4%	84.8%	82.4%	83.6%	92.1%
Southern-European	80.3%	73.6%	77.0%	86.0%	73.2%	84.2%	85.7%	82.2%
EU	78.7%	80.8%	79.9%	88.2%	83.4%	84.7%	85.8%	88.7%

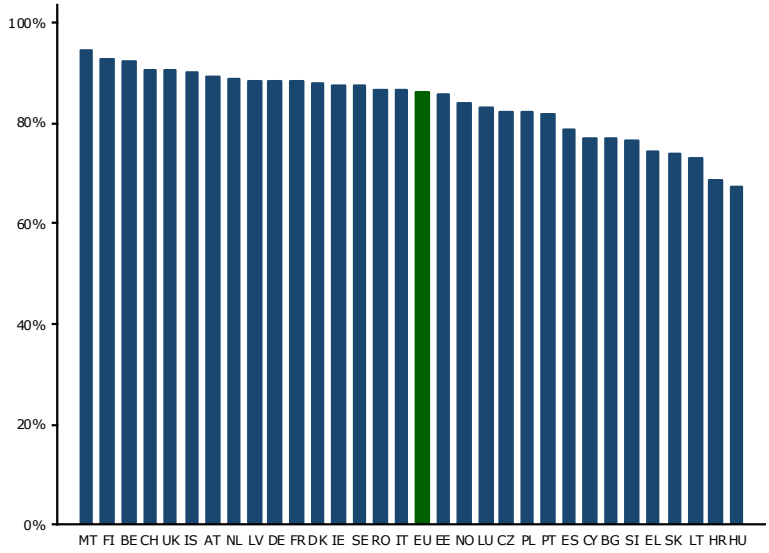
Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with working with leading scientists and the quality of training and education.
- Average shares of the following country groups are shown: Anglo-Saxon (UK, SE, DK, NL, IE), Continental European (DE, AT, PL, HU, CZ, SK), Southern European (IT, FR; ES, PT) and EU28.
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,412)

6.2.2.2. Training and education

A similar pattern to the level of satisfaction regarding collaboration with leading scientists can be observed for perceived satisfaction with training and education, although the level of contentment with training is generally slightly higher than with collaboration with leading experts. In total, about 86% of researchers in the EU28 consider themselves as satisfied with their quality of education and training.

Country level: A comparison between countries shows that a particularly high share of researchers in Malta (94% of researchers), Finland (93%) and Belgium (92%) perceive themselves as satisfied with their education and training, while a lower share of researchers from Hungary (67%), Croatia (68%) and Lithonia (73%) would agree (see Figure 58).

Figure 58: Individual satisfaction with the quality of training and education, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with working with the quality of training and education.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,961)

Career stage and country groups: Again, the share of researchers considering themselves satisfied with training and education is the highest among leading R4 researchers (89% of R4 researchers in the EU28). Researchers from Southern higher education systems are slightly below EU28 average independent of their career stage. However, in contrast to their satisfaction with collaboration with leading researchers, particularly early-stage researchers perceive themselves as being less satisfied with the availability of excellent training and education possibilities (about 73% of R1 researchers in Sothern European education systems).

6.2.3. Time balance and research autonomy

Scientific knowledge production is shaped by the time balance between research, teaching and other activities such as administrative tasks, and within time available for research, by the degree of autonomy granted to early stage researchers to follow individual lines of research. Indeed, in many interviews with young, talented researchers who moved to top institutions in the US, the main reason which emerges alongside clear tenure opportunities is the significant degree of independence they enjoy from an early career stage onwards (R2, assistant professor) [104;105].

[104] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.
[105] See Janger and Nowotny, 2016, for a brief review of the literature and a quasi-experiment which puts numbers on the influence of these working conditions on job choice in academia, using MORE2 data.

6.2.3.1. Teaching and research

Teaching and research are often thought to be inseparable and, in the best case, to complement each other. The relationship between research and teaching is what Neumann, 1992[106], calls a strong "symbiotic nexus" and comprises "tangible", "intangible" as well as "global connections" (Neumann, 1992, p.162)[107].

On the one hand, benefits for students of being taught by active researchers include that the latter are more probable to be on the frontier of their discipline and their knowledge might be more cutting-edge than what is written in dated textbooks ("tangible connection"). Moreover, teachers talking about their own current research are more authentic and might be better in transmitting the excitement about a specific topic and the attitude towards research than anybody else ("intangible connection").

On the other hand, the benefits of teaching for researchers include that they might be forced to remember the big picture and to situate the contribution of their specific, state-of-the-art research ("global connection"). In addition, questions and remarks might help to enrich current research and researchers' basic stock of knowledge can be consolidated by teaching activities (Marsh - Hattie, 2002[108]). Teaching may also help researchers recruit graduate students for lab work. The former are all non-pecuniary extrinsic motivations for teaching, but researchers might also simply intrinsically enjoy imparting knowledge, in the same way that they have a "taste for science" (Roach - Sauermann, 2010[109]).

However, teaching also ties resources to time that otherwise could be used to pursue research activities. Therefore, the relationship between research and teaching is ambiguous and, naturally strongly depends on individual researchers' attitudes (Robertson - Bond, 2001[110]). The analysis by Janger and Nowotny (2016)[111] using MORE2 data shows a non-linear relationship between the probability of job choice and teaching load, with no teaching being less attractive than moderate amounts of teaching (about 27% of combined teaching-research time for early stage researchers and 29% for later stage researchers).

According to the MORE3 data, about 67% of researchers in the EU28 are satisfied with their balance between teaching and research time; the teaching load has gone up slightly by comparison with MORE2.

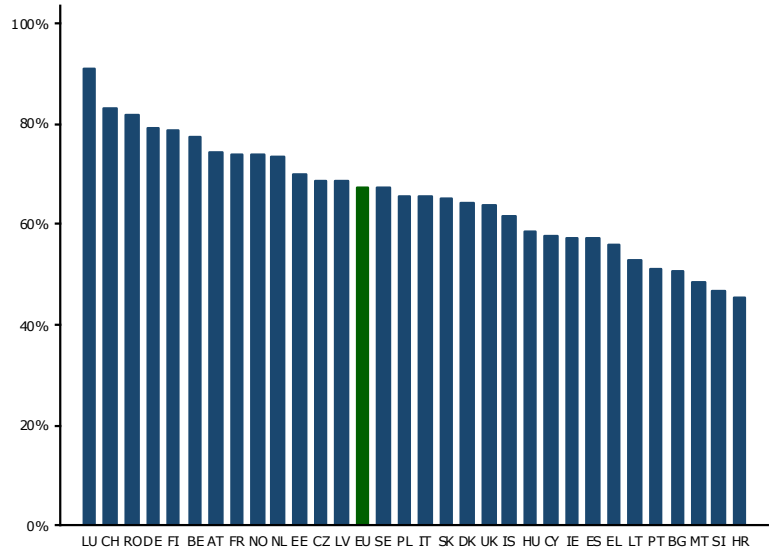
[106] Neumann, R., (1992) "Perceptions of the teaching-research nexus: A framework for analysis", High. Educ., 23(2), pp. 159–171.
[107] Ebd.
[108] Marsh, H. W., Hattie, J., (2002) "The relation between research productivity and teaching effectiveness: Complementary, antagonistic, or independent constructs?", J. High. Educ., 73(5), pp. 603–641.
[109] 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.
[110] 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.
[111] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.

Average category of teaching load *For all researchers*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n=8,985)	1.7	R1: 1.10 R2: 1.66 R3. 1.95 R4: 1.88	MED: 1.49 NAT: 1.60 SOC: 2.00	F: 1.76 M: 1.70
2016 (n=9,412)	1.92	R1: 1.37 R2: 1.71 R3. 2.19 R4: 1.98	MED: 1.76 NAT: 1.86 SOC: 2.10	F: 1.94 M: 1.91

Source: MORE3 EU HE Survey (2016) and MORE2 EU HE survey (2012)
Note:
- With 0 = no teaching; 1 = 0-25% of time teaching; 2 = 25-50% of time teaching; 3 = 50-75% of time teaching and 4 = 75-100% of time teaching.
- Based on question 35: "Teaching activities"

Country level: A comparison between countries shows that the shares of researchers that perceive themselves as satisfied with their balance between teaching and research activities are particularly higher in Luxembourg (91% of researchers), Switzerland (83%) and Romania (82%), while Malta (48%), Slovenia (47%) and Croatia (46%) show lower shares of researchers considering themselves as satisfied with this aspect (see Figure 59).

Figure 59: Individual satisfaction with the balance between teaching and research, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their balance between teaching and research time.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,742)

Career stage and country level: On average, the shares of perceived satisfaction is decreasing with every next career stage in the EU28 countries only to rise again in the last career stage R4, i.e. a slight u-shape of the share data can be observed (see Table 13). The shares of researchers considering themselves as satisfied with the balance

between teaching and research activities is the highest among early-stage R1 and recognised R2 researchers, particularly in Western (81% of R1 and 84% of R2 researchers) and Northern European countries (79% of R1 and 74% of R2 researchers; see left hand side of Table 13). In every career stage the share of researchers perceiving themselves as satisfied is above the EU28 average in Western European countries. In contrast, less than 51% of established researchers in Southern European countries are considering themselves as satisfied with their balance of research and teaching assignments.

Table 13: Individual satisfaction with the balance between teaching and research and with research autonomy, by country groups

	Research autonomy				Balance teaching research			
	R1	R2	R3	R4	R1	R2	R3	R4
North	89.5%	92.9%	89.5%	90.5%	79.1%	73.8%	60.1%	72.9%
South	87.6%	81.5%	82.9%	93.1%	56.4%	60.3%	50.8%	67.1%
West	89.3%	85.6%	90.0%	92.5%	80.9%	84.4%	65.2%	66.2%
East	87.1%	88.0%	88.0%	92.5%	67.4%	63.1%	57.2%	73.8%
EU	89.0%	85.6%	88.0%	92.5%	77.7%	75.0%	60.3%	67.7%

Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their balance between teaching and research time and their research autonomy.
- Average shares of the following country groups are shown: East (CZ, EE, HU, LV, LT, PL, SI, SK, BG, RO, HR), North (NO, SE, FI, DK, IS), South (PT, ES, IT, EL, MT, CY), West (BE, FR, DE, NL, LU, AT, UK, IE, CH) and EU28.
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,412)

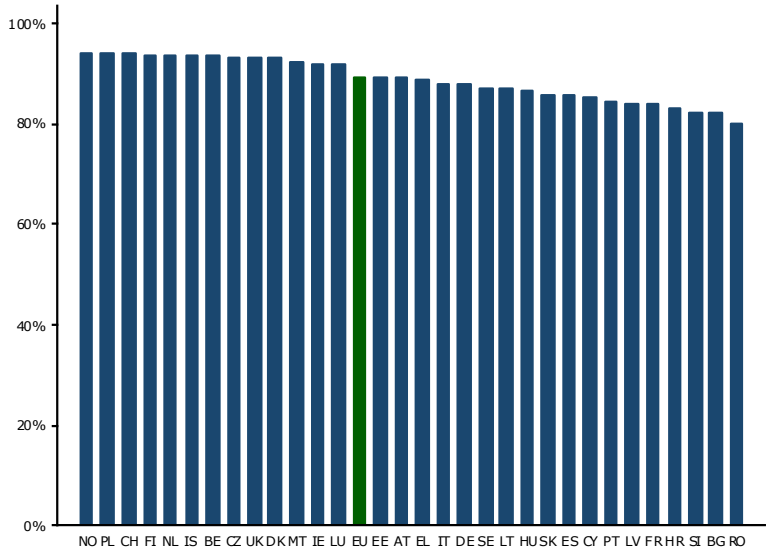
6.2.3.2. Research autonomy

It is well known in the literature that higher levels of autonomy are correlated with stronger personal commitments and higher internal motivation to accomplish tasks excellently (Brock, 2003; Hackman - Oldham, 1976[112]). In particular, high-level research requires strong internal motivation and patience to specialise and stay tuned into one particular research question. Thus, autonomy should be especially high in research jobs, and as outlined above, it is one of the key drivers of mobility of young talented researchers. In the analysis by Janger and Nowotny (2016)[113], researchers are willing to trade a substantial amount of salary for an increased level of research autonomy.
In comparison to the teaching-research balance, researchers are rather happy with their level of research autonomy in European institutions.

About 89% of all researchers in the EU28 perceive themselves as satisfied with their level of research autonomy.

[112] Hackman, J. R., Oldham, G. R., (1976) "Motivation through the design of work: Test of a theory", Organ. Behav. Hum. Perform., 16(2), pp. 250–279.
[113] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.

Figure 60: Individual satisfaction with research autonomy, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with the research autonomy.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,412)

Country level: On the lower bound, 80% of researchers in Romania, 82% in Bulgaria and 82% in Slovenia perceive themselves as satisfied with their degree of research autonomy (see Figure 60). On the higher bound, in Norway, in Poland as well as in Switzerland the share of researchers considering themselves as satisfied with their amount of research autonomy is 94%.

Career stage and country level: Across all country groups, especially those in their early stages and leading researchers, respondents perceive themselves as satisfied with working autonomously (see Table 13). The share of satisfied R4 researchers ranges from about 91% of R4 researchers in Northern Europe to 93% of R4 researchers in Southern European countries. Within the groups of R2 and R3 researchers the variation is slightly higher. About 93% of R2 researchers in Northern European countries and less than 82% of R2 researchers in Southern Europe perceive themselves as satisfied with their level of research autonomy.

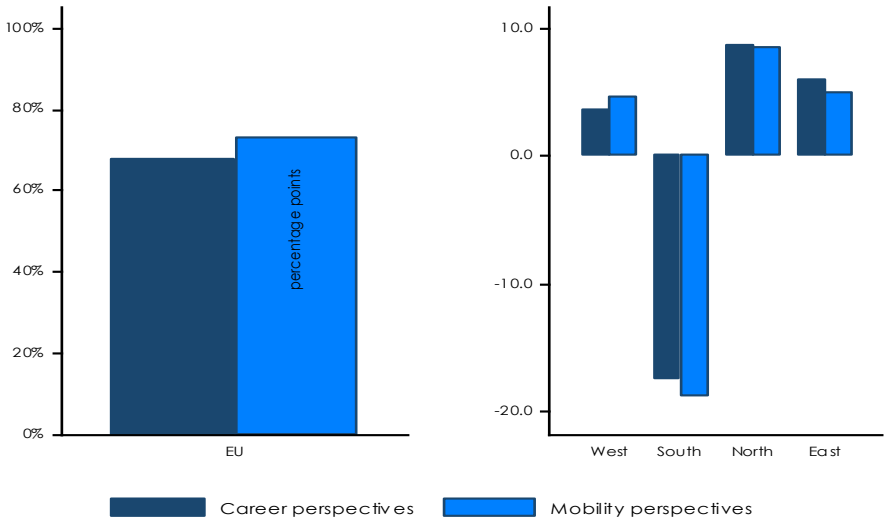
6.3. Career and mobility perspectives as working conditions

As outlined, career perspectives also matter for scientific knowledge production. But they also matter of course for perspectives of job security and financial security. We therefore treat this aspect as a cross-cutting issue relevant for both remuneration and scientific knowledge production. Mobility perspectives shape collaboration patterns (see section 8.1.3.2), so that they also influence scientific knowledge production. Team size and average number of co-authors is on the rise, so that mobility perspectives become more important overall (see e.g. Walsh and Lee, 2015, or Pavlidis et al., 2014).

For both career perspectives and mobility perspectives, more than 2 out of 3 researchers in the EU28 perceive themselves as satisfied with their current position (68% and 73% respectively, see left panel in Figure 61).

Country level: However, when looking at Southern European Member States only, the respective share drops to 1 out of 2 (50%)[114]. On the other hand, slightly more than 3 out of 4 researchers in the Northern European (76%) countries think positively about their future career, followed by the Eastern (74%) and Western European countries (71%). A similar pattern is observed for the perception of mobility perspectives. Again, the share drops to almost one half in Southern Europe (54%) and is highest in Northern Europe (81%).

Figure 61: Individual satisfaction with career and mobility perspectives, by country groups

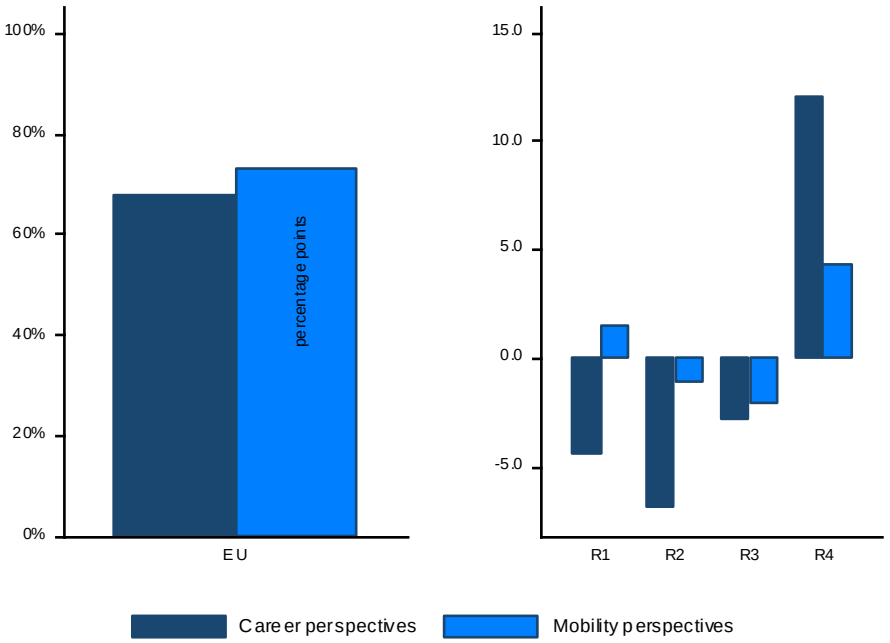


Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their career and mobility perspectives and differences in percentage points.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,741/9,645)

Career stage: The share of researchers who consider themselves as satisfied with their career perspectives is significantly highest in R4 (see right panel in Figure 62). The respective share (80%) is 12pp above the EU average, while it is lowest for R2 researchers (61%) followed by R1 (63%) and R3 (65%). A similar pattern, but to a lower extent is also found for mobility perspectives. This is plausible, as R4 researchers have made it to the top of the career path and hence enjoy their current position; uncertainty about the feasibility of a research career is highest at the R2 stage, when career progression often depends on the assessment of research performance by others.

[114] Malta is a significant outlier in the group of Southern European countries (see Table 14 below).

Figure 62: Individual satisfaction with career and mobility perspectives, by career stages



Source: MORE3 EU HE Survey (2016)
Notes:
- Share of researchers satisfied with their career and mobility perspectives and differences in percentage points.
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,741/9,645)

Career stage and country level: Taking together the perspectives by country and by career stage, researchers tend to consider themselves most often satisfied with their career perspectives in R4 in the Northern European countries while least often in R1 and R2 in Southern Europe (see Table 14)[115]. A very similar picture can also be drawn for mobility perspectives. However, in the case of mobility perspectives, within R1 researchers the respective country shares are often higher than within R2 researchers.

Field of science: Across fields of science, researchers in the Medical Sciences have the most optimistic view on their future careers (see right panel in Figure 166 in the annex). 73% consider themselves as satisfied with their career perspectives. The same holds for their mobility perspectives (77%). The shares of satisfied researchers concerning career and mobility perspectives are lowest in Social Sciences (64% and 70%, respectively) and the Humanities (66% and 69%, respectively).

All in all, when returning to overall perceived satisfaction with working conditions relevant for scientific knowledge production, we find lowest shares of perceived satisfaction for research funding, the balance between teaching and research time and career perspectives. The low shares of perceived satisfaction with research funding may be due to the impact of fiscal consolidation on competitive project-based funding in

[115] Except Malta.

Europe, as perceived satisfaction is higher in countries which did not experience significant fiscal consolidation (e.g. Northern European countries). It shows moreover the importance of EU policies for both research funding (such as through the ERC or the Horizon2020 programme) and career perspectives (such as the MSCA initiative).

Table 14: Individual satisfaction with career and mobility perspectives, by career stages and countries

		Career Perspectives				Mobility Perspectives			
		R1	R2	R3	R4	R1	R2	R3	R4
Austria	Western European	0.55	0.31	0.46	0.13	0.35	0.08	0.40	0.08
Belgium	Western European	0.27	0.70	0.27	0.13	0.15	0.33	0.11	0.15
Bulgaria	Eastern European	0.42	0.36	0.46	0.32	0.74	0.47	0.50	0.63
Croatia	Eastern European	0.44	0.46	0.27	0.27	0.30	0.52	0.27	0.30
Cyprus	Southern European	0.60	0.50	0.51	0.23	0.64	0.49	0.64	0.54
Czech Republic	Eastern European	0.46	0.28	0.16	0.04	0.42	0.31	0.27	0.14
Denmark	Northern European	0.26	0.47	0.25	0.06	0.28	0.49	0.29	0.23
Estonia	Eastern European	0.37	0.33	0.32	0.11	0.44	0.45	0.32	0.19
Finland	Northern European	0.38	0.25	0.34	0.13	0.26	0.07	0.22	0.25
France	Western European	0.41	0.49	0.43	0.41	0.49	0.61	0.46	0.51
Germany	Western European	0.45	0.45	0.44	0.17	0.37	0.25	0.24	0.18
Greece	Southern European	0.80	0.28	0.48	0.46	0.95	0.81	0.74	0.64
Hungary	Eastern European	0.59	0.84	0.44	0.31	0.66	0.70	0.53	0.37
Iceland	Northern European	0.08	0.29	0.11	0.09	0.14	0.11	0.19	0.26
Ireland	Western European	0.21	0.48	0.44	0.19	0.45	0.38	0.52	0.22
Italy	Southern European	0.91	0.84	0.66	0.32	0.44	0.80	0.76	0.62
Latvia	Eastern European	0.36	0.35	0.31	0.08	0.33	0.14	0.19	0.32
Lithuania	Eastern European	0.63	0.57	0.47	0.24	0.44	0.68	0.48	0.34
Luxembourg	Western European	0.41	0.71	0.58	0.42	0.31	0.35	0.33	0.00
Malta	Southern European	0.26	0.01	0.22	0.00	0.24	0.20	0.18	0.05
Norway	Northern European	0.36	0.69	0.07	0.01	0.17	0.50	0.24	0.30
Poland	Eastern European	0.20	0.26	0.29	0.03	0.28	0.34	0.33	0.18
Portugal	Southern European	0.69	1.00	0.80	0.41	0.74	1.00	0.92	0.42
Romania	Eastern European	0.11	0.46	0.26	0.16	0.19	0.53	0.25	0.26
Slovakia	Eastern European	0.66	0.41	0.25	0.08	0.18	0.46	0.23	0.20
Slovenia	Eastern European	0.36	0.47	0.33	0.21	0.43	0.44	0.36	0.30
Spain	Southern European	0.85	0.55	0.62	0.40	0.72	0.68	0.80	0.59
Sweden	Northern European	0.20	0.44	0.35	0.06	0.18	0.34	0.42	0.12
Switzerland	Western European	0.33	0.43	0.31	0.29	0.15	0.37	0.30	0.31
The Netherlands	Western European	0.45	0.42	0.37	0.03	0.30	0.60	0.37	0.09
United Kingdom	Western European	0.34	0.19	0.26	0.11	0.62	0.35	0.37	0.33

Source: MORE3 EU HE Survey (2016)
Notes:

- Share of researchers satisfied with their career and mobility perspectives. Graph illustrates distance from the country with the highest share of satisfaction: 0 = country with highest share (green); 1 = country with lowest share (red); x = (maximum share – country share)/(maximum share – minimum share).
- Based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- (n=9,741/9,645)

7. Mobility and collaboration during PhD stage

In this section of the report, the findings on mobility and collaboration in PhD stage are presented. The section is divided in three main parts, based on the three main dimensions of mobility:

- International mobility (section 7.1);
- Interdisciplinary experiences (section 7.2);
- Intersectoral experiences (section 7.3).

All R1 researchers who have obtained a PhD or are currently enrolled in a PhD programme, as well as all R2 researchers were asked about mobility and collaboration during PhD stage. This is thus the target group on which the analysis in the following sections focusses.

7.1. International collaboration and mobility during PhD stage

In what follows, we first discuss the stock of PhD mobile researchers according to the definitions described in section 3.2.4.2, and summarised as follows:

- PhD degree mobility: Mobility with the purpose of obtaining the PhD in another country than the country of citizenship AND the country of Master degree.
- During PhD mobility: mobility of three months or more during the PhD while still obtaining the PhD in the country where the researcher has started their PhD.

We also look into combinations of both types of PhD mobility and into the non-mobile. In what follows, we further explore the flows, motives and barriers of international PhD mobility.

7.1.1. Stock

Share of researchers with international "PhD degree mobility" (EU) *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n= 3,449)	15.3%	R1: 19.4% R2: 12.3%	MED: 16.4% NAT: 14.5% SOC: 15.5%	F: 12.6% M: 17.5%
2016 (n=2,469)	16.4%	R1: 20.0% R2: 14.6%	MED: 17.1% NAT: 16.7% SOC: 15.7%	F: 15.9% M: 16.9%
Share of researchers with international "during PhD mobility" (EU) *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n= 3,588)	18.3%	R1: 13.9% R2: 21.5%	MED: 16.6% NAT: 16.2% SOC: 21.9%	F: 17.6% M: 18.9%
2016 (n=2,516)	18.2%	R1: 12.9% R2: 21.0%	MED: 17.1% NAT: 16.5% SOC: 21.0%	F: 18.8% M: 17.7%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:

- "PhD degree mobility" is based on question 57: "Did/will you obtain your PhD in a country other than the one where you obtained your previous degree (the degree that gave access to the PhD)?"
- The answer option "No" in MORE2 EU HE survey (2012) was adjusted in MORE3 HE survey (2016) to "No, because I moved during/for my Master's degree anticipating undertaking a PhD

in this country and "No". These two answer options are aggregated in the table above, which makes the results comparable between MORE2 and MORE3.
- "During PhD mobility" is based on question 59: "During your PhD, did you move for 3 months or more to a country other than the country where you did/will obtain your PhD?)"

The tables above give an overview of the shares of researchers that undertook one or another form of PhD mobility, and the differences across the main dimensions of analysis. PhD degree mobility is slightly less common than during PhD mobility (16% versus 18%). However, current R1 researchers – researchers currently enrolled in a doctoral programme - are more inclined towards PhD degree mobility than the current R2 researchers were at the time of their PhD. For during PhD mobility we see an opposite effect.

7.1.1.1. PhD degree mobility

In this section on PhD degree mobility, we analyse the direct question on whether or not researchers did or will obtain their PhD in a country (EU or non-EU) other than the one where they obtained their previous degree. This question was only asked of the R1 researchers currently enrolled in a doctoral programme and to the R2 researchers.

Of the current R1 PhD candidates and R2 PhD holders, 16% indicate that they have moved from the country where they obtained a previous degree with the purpose of obtaining a PhD in the destination country (see Table 15). 2% of the R1-R2 researchers indicate that they already moved during/for their Master's degree anticipating undertaking a PhD in this same country afterwards.

Table 15: PhD degree mobility

PhD degree mobility[116]	16.4%
Non-mobility for PhD, but already moved during/for Master's degree with the objective of obtaining a PhD in that destination country	2.3%
Non-mobility for PhD, and no move during/for Master's degree with the objective of obtaining a PhD in that destination country	81.2%
Total	100%

Source: MORE3 EU HE survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Based on question 57: "Did/will you obtain your PhD in a country other than the one where you obtained your previous degree (the degree that gave access to the PhD)?"
- (n=2,469)

Field of science: Researchers in Engineering and Technology (21%) and Agricultural Sciences (23%) are slightly more inclined towards PhD degree mobility than researchers in other fields of sciences. At an aggregated level (medical, natural and Social Sciences) there are no real differences and the results are similar, as in MORE2.

Career stage: As indicated earlier, the R1 researchers are more inclined towards PhD degree mobility than their R2 colleagues were at the time of their PhD (20% versus

[116] For the post-PhD researchers (R2, R3 and R4) there is no similar direct question but is nonetheless possible by comparing the country of their PhD with their country of citizenship. Results indicate that 13% of R2-R3-R4 researcher have obtained their PhD in a country other than their country of citizenship.

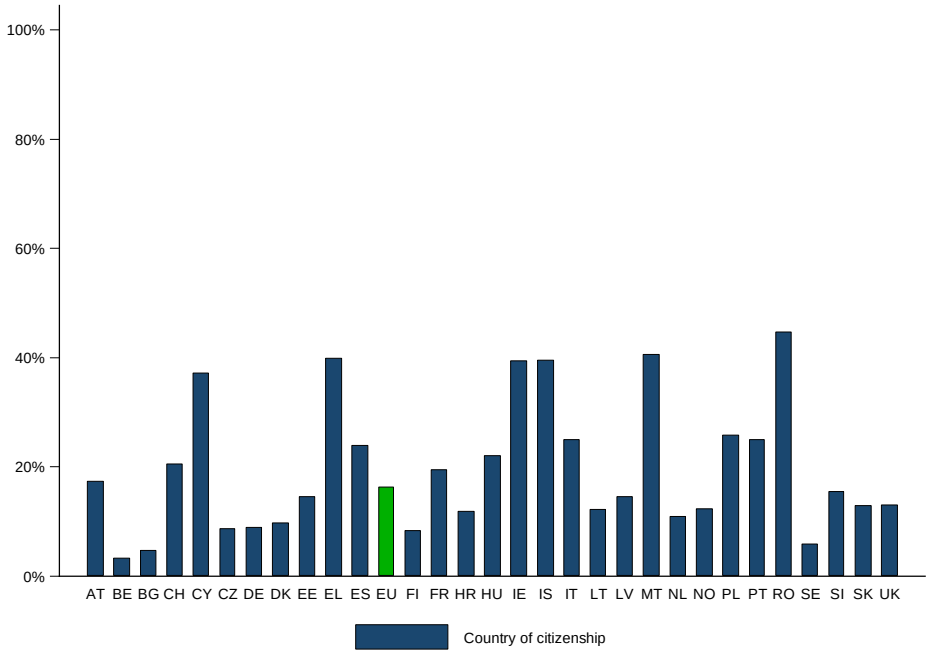
15%). The R2 share has increased somewhat compared to the 2012 data (15% versus 12%), which may be an indication of a trend set since then.

Gender: Compared to the 2012 data, PhD degree mobility seems to have converged for male and female researchers, up to a point where the share for female researchers is very similar to their male counterparts in 2016 (16% versus 17%)

Family status: R1-R2 researchers with children engage/have engaged less in PhD degree mobility (12%) than those without children (19%). The same counts for couples: R1-R2 researchers who are single engage more in PhD degree mobility (20%) then the ones in couple (14%). Of the researchers who are in couple, PhD degree mobility is higher for the ones who have a partner who is also a researcher (18% versus 12%).

Country of departure: To analyse PhD degree mobility from the point of view of the departure country, the share of researchers who indicate in the direct question that they are PhD degree mobile is calculated by country of citizenship (see Figure 63). 16% of the EU28 citizens indicated that they are PhD degree mobile. This is 4pp more than in MORE2. One does have to take into account that it concerns R1 and R2 researchers who are currently working in the EU and associated countries. Citizens from Romania, Greece, Iceland, Ireland, Malta and Cyprus, are most PhD degree mobile (35% or more). Belgium, Bulgaria and Sweden are least PhD degree mobile (below 6%).

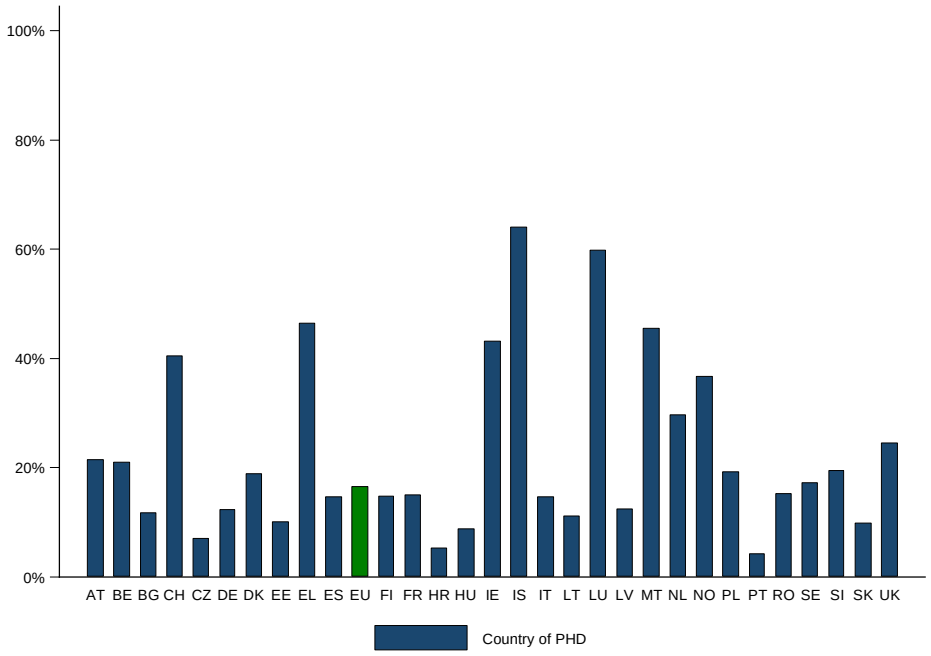
Figure 63: International PhD degree mobility, by country of citizenship (departure)



Source: MORE3 EU HE survey (2016)
Notes:
- Share of R1 PhD candidates and R2 PhD holders that were PhD degree mobile per country of citizenship.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Countries with less than 30 observation are omitted: Luxembourg.
- Based on question 57: "Did/will you obtain your PhD in a country other than the one where you obtained your previous degree (the degree that gave access to the PhD)?" and question 5: "What is your country of citizenship?"
- (n=2,587)

Country of destination: The country of PhD is taken as a basis to analyse PhD degree mobility from the point of view of the destination country. The study estimates what proportion of researchers did or will obtain their PhD in a specific country while being citizens of another country. It is as such a measure of the proportion of foreign researchers among the PhD candidates in that country. Figure 64 shows that Iceland and Luxembourg have high shares of foreign citizens among their PhD candidates. Anglo-Saxon countries are also relatively more receiving countries, as well as some small and open countries (besides Luxembourg, also Malta, Switzerland, the Netherlands, Austria and Belgium). At the other end of the spectrum are countries such as Portugal, Croatia and Czech Republic which attract low numbers of PhD degree mobile researchers compared to their total number of PhD candidates.

Figure 64: International PhD degree mobility, by country of PhD (destination)



Source: MORE3 EU HE survey (2016)
Notes:
- Share of R1 PhD candidates and R2 PhD holders that were PhD degree mobile per country of PhD.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Countries with less than 30 observation are omitted: Cyprus.
- Based on question 57: "Did/will you obtain your PhD in a country other than the one where you obtained your previous degree (the degree that gave access to the PhD)?"
- (n=2,716)

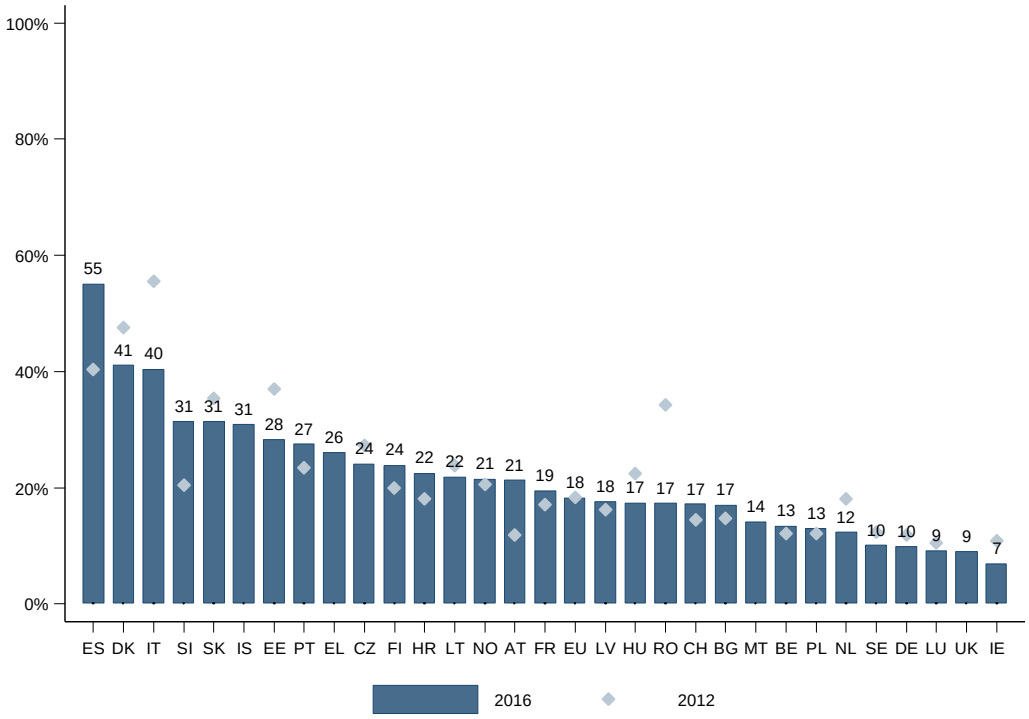
7.1.1.2. During PhD mobility

Aside from PhD degree mobility, we have also defined during PhD mobility: >3 months mobility to a country other than the country where the researcher did/will obtain his or her PhD. According to a direct question in the 2016 survey, 18% of the current R1-R2 researchers have undertaken this kind of during PhD mobility.

Departure country: Figure 65 provides an overview of the during PhD mobility per country of PhD (i.e. the country where the PhD is or will be obtained, in this case the departure and return country). The shares for researchers who will/did obtain a PhD in

Spain, Denmark and Italy are considerably higher than the EU average (between 40% and 60% compared 18%). These researchers are thus mobile over average during their PhD. Slovenia, Slovakia and Iceland are also ranked high for this indicator, with values over 30%. Researchers who obtain(ed) their PhD in Ireland, the UK, Luxembourg, Germany and Sweden are less frequently engaged in during PhD mobility (10% or below). This is in part due to other types of mobility being more prevalent in these countries, such as the PhD degree mobility or Master mobility. When comparing to 2012, we observe a decrease for researchers from Italy and Romania. In Romania, the European Social Fund and the Sectoral Operational Programme Human resources development 2007-2013 supported heavily mobility of researchers. This programme ended in 2015 though and could be a reason why mobility has dropped more recently.

Figure 65: >3 month international mobility during PhD, by country of PhD (departure)



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Share of R1 PhD candidates and R2 PhD holders that were >3 month mobile during their PhD per country of PhD.
- With '>3 month mobility during PhD' defined as moving for 3 months or more to a country than the one in which they obtained or will obtain their PhD.
- Countries with less than 30 observations are omitted: Cyprus.
- Based on question 59: "During your PhD, did you move for 3 months or more to a country other than the country where you did/will obtain your PhD?)"
- (n= 2,764)

Career stage: As indicated before, R2 researchers more frequently engaged in during PhD mobility (21%) than R1 researchers currently working on their PhD (13%).

Field of science: the differences between aggregated fields of science are relatively small, but it is clear that Social Sciences (20%) and Humanities (23%) have higher shares of R1 and R2 researchers who moved for a fixed period of time during their PhD to another country. This is expected from existing literature, and was also found in the 2012 data.

Gender: There is are no large gender differences, with 18% of the male researchers versus 19% of the female researchers. A similar value was found in 2012, but then with a slightly higher outcome for men (19% versus 18 %).

Family situation: R1-R2 researchers without children are somewhat more inclined to engage in during PhD mobility (22%) compared to those without children (17%), but not surprisingly the difference is smaller than for PhD degree mobility (4.6pp versus 6.4pp difference). There are no significant differences between single researchers versus those in a couple, but of the latter group, mobility during PhD is more frequent among researchers with a partner working in research (23% versus 18%).

7.1.1.3. PhD degree and during PhD mobility

When combining the information from both questions, we find that 4% of the R1-R2 researchers combined the two forms of PhD mobility, while 70% did not engage in either of them ('non-PhD mobile researchers', cf. next section). This means that:

- 14% undertook a move during their PhD, but did not engage in PhD degree mobility (compared to a total of 18% with during PhD mobility);
- 12% undertook mobility with the purpose of obtaining their PhD in the destination country, but did not combine this with another move during the PhD (compared to a total of 16% with PhD degree mobility).

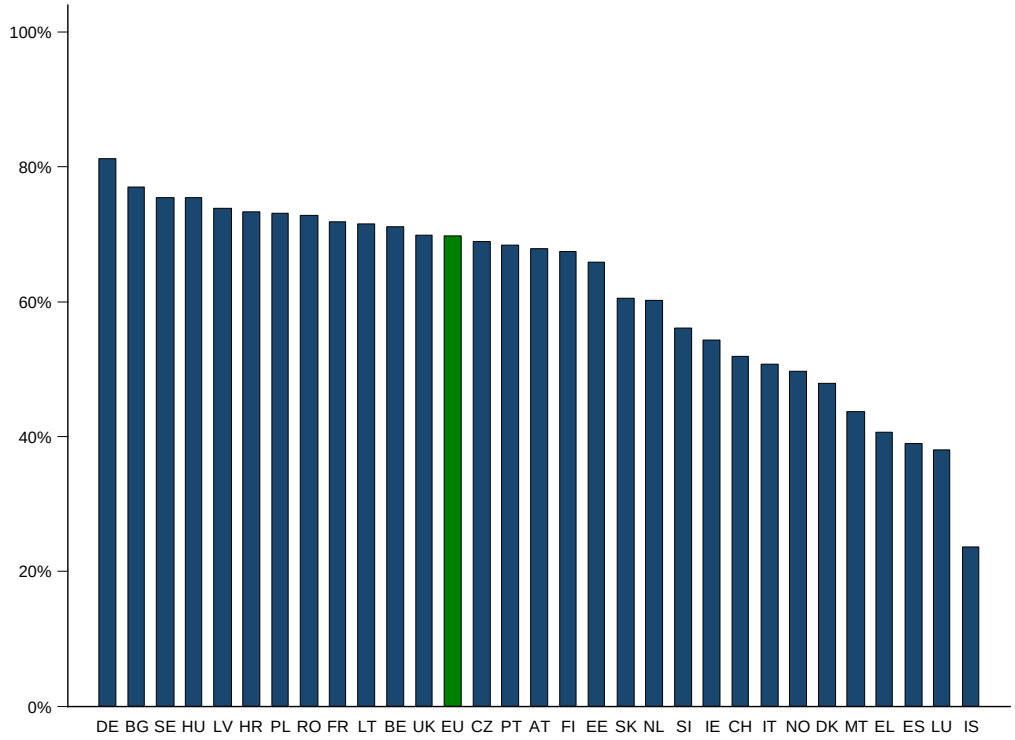
Interestingly, the rate of during PhD mobility is considerably higher among researchers who were not mobile for their PhD degree, because they already moved during their Master degree: 37% versus 18% in total. Their Master mobility can thus be considered an early indication of their international orientation.

7.1.1.4. Non-mobility for PhD

Non-mobility for PhD is defined as the experience of a researcher who has undertaken neither PhD degree mobility nor >3 month mobility during PhD. This is the subgroup of researchers which was further questioned on their non-mobility in the survey.

The bars in Figure 66 represent those researchers who obtained/will obtain their PhD in the country but who were never mobile for or during the PhD phase. At the EU level, 70% of the R1-R2 researchers were as such non-mobile for the PhD.

Figure 66: Non-mobile researchers for PhD degree or during PhD, by country of PhD



Source: MORE3 EU HE survey (2016)
Notes:
- Share of R1 PhD candidates and R2 PhD holders that were never PhD degree mobile nor mobile during their PhD per country of PhD.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- With '>3 month mobility during PhD' defined as moving for 3 months or more to another country than the country where he/she did or will obtain their PhD.
- Countries with less than 30 observations are omitted: Cyprus.
- Based on question 57: "Did/will you obtain your PhD in a country other than the one where you obtained your previous degree (the degree that gave access to the PhD)?" and question 59: "During your PhD, did you move for 3 months or more to a country other than the country where you did/will obtain your PhD?)".
- (n=2,763).

Country level: Many countries situate around or just above the EU average. Germany (81%), Bulgaria (77%), Sweden (75%) and Hungary (75%) are also more non-mobile than on average for PhD in Europe Eastern European countries are distributed more or less equally over the spectrum. At the lower end of the spectrum is Iceland (24%) together with a number of Southern European countries: Malta (44%), Spain (39%), Greece (41%). In these countries, researchers are thus more inclined to undertake at least one type of PhD mobility than on average in the EU. Countries that are renowned as 'open' countries in terms of outgoing mobility, such as Luxembourg (38%), Norway (50%), Denmark (48%), Ireland (54%) and Switzerland (52%) are also at the right hand side of the graph.

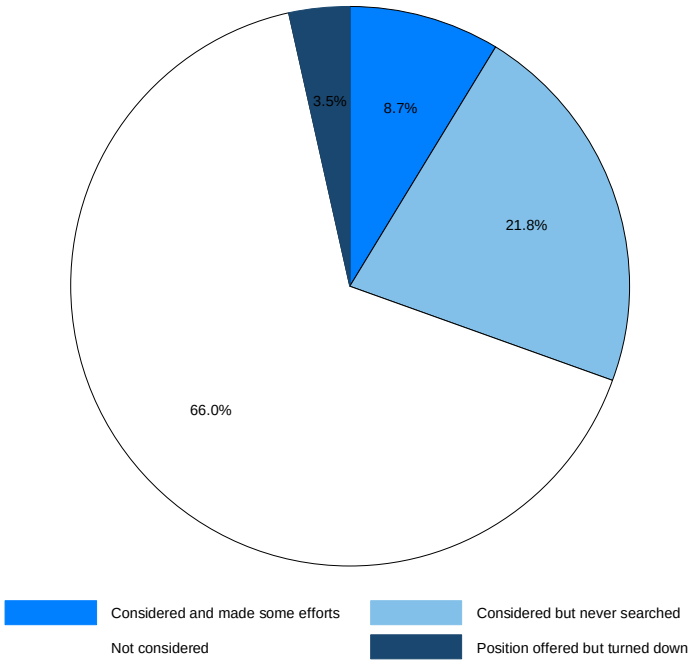
Career stage: Differences in terms of career stages are not significant, with a value of 71% for R1 and 69% for R2.

Field of science: Differences between fields are small, as indicated before for the different types of mobility and mirrored in the non-mobility. The highest non-mobility occurs in the Medical Sciences (73%) and Natural Sciences (74%).

Gender: There are no significant differences between male and female researchers in terms of non-mobility for PhD.

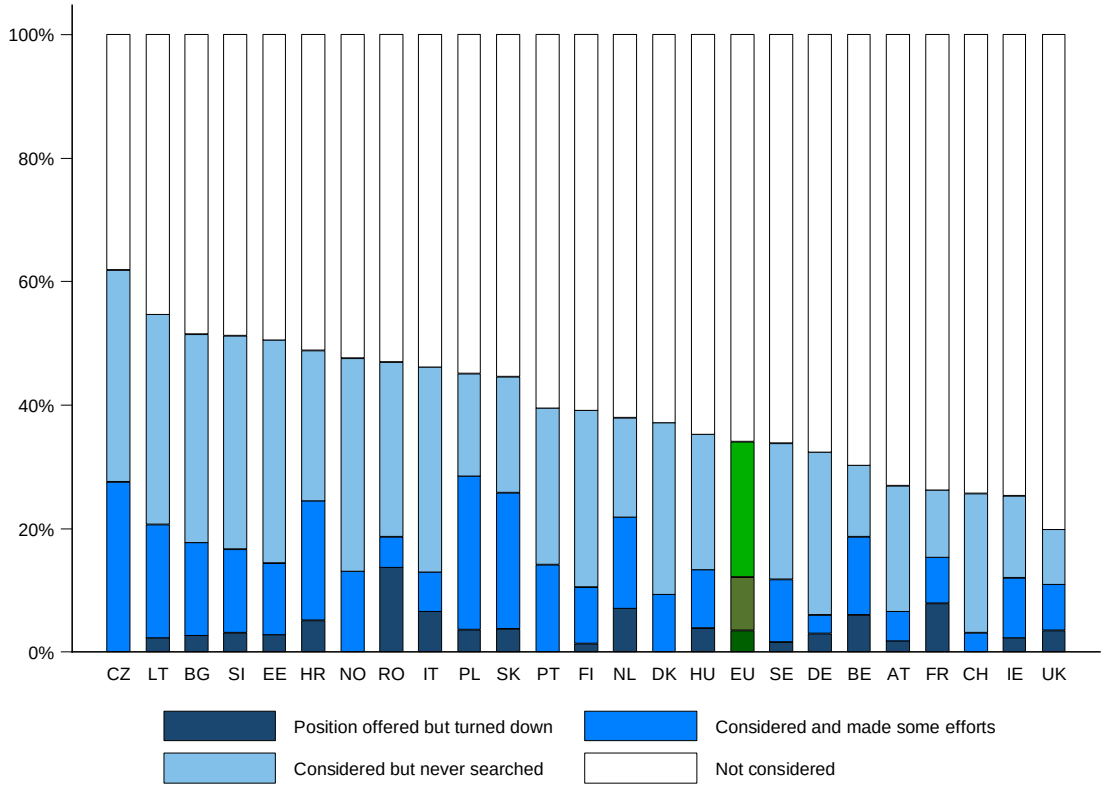
Over one third of the non-mobile have ever considered to take part or all of their PhD in a country other than that in which they obtained their previous degree (see Figure 67): 22% has considered it but never searched for concrete opportunities, 9% considered it and did undertake some efforts to become mobile and finally, 3% considered it and was even offered a position in another country, but turned it down. Country differences are large, as shown in Figure 68, and not necessarily related to the degree of (non-) mobility in the country.

Figure 67: Degree of consideration of PhD mobility among the non-mobile



Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of R1 PhD candidates and R2 PhD holders that were non-PhD mobile (i.e. not PhD degree mobile nor mobile during their PhD) over levels of consideration of PhD mobility.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- With '>3 month mobility during PhD' defined as moving for 3 months or more to another country than the country where he/she did or will obtain their PhD.
- Based on question 62: "Did you ever consider undertaking part or all of your PhD in a country other than the one in which you obtained your previous degree?"
- (n=1,512)

Figure 68: Degree of consideration of PhD mobility among the non-mobile per country of PhD



Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of R1 PhD candidates and R2 PhD holders that were non-PhD mobile (i.e. not PhD degree mobile nor mobile during their PhD) over levels of consideration of PhD mobility by country of PhD.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- With '>3 month mobility during PhD' defined as moving for 3 months or more to another country than the country where he/she did or will obtain their PhD.
- Countries with less than 30 observations are excluded: Cyprus, Greece, Spain, Iceland, Luxembourg, Malta and Latvia.
- Based on question 62: "Did you ever consider undertaking part or all of your PhD in a country other than the one in which you obtained your previous degree?"
- (n=1,500)

7.1.2. Flows

The R1-R2 researchers indicated between 1 and 3 different countries for their >3 month mobility during their PhD. 82% indicated one country, 15% 2 countries and 4% three countries. The main destination countries for >3 month mobility during PhD are the United States (12%), the United Kingdom (12%) and Germany (11%). This top three is the same as in MORE2, only the share of the United States has decreased from 16% in MORE2 to 12% in MORE3. Of the R1 and R2 researchers who moved for >3 months during their PhD towards the United States, 16% were Italian, 14% Danish and 9% Spanish. From Table 16 we discern that the top 10 destination countries for during PhD mobility are often visited by R1 and R2 researchers from Southern European countries (Italy, Spain, Greece, Portugal).

Table 16: Main destination countries for >3 month mobility during PhD (EU28 departing countries)

Destination	Share (%)	Cum. share (%)	Origin1 (citizenship)	Origin2 (citizenship)	Origin3 (citizenship)
United States	11.8%	11.8%	Italy (16.5%)	Denmark (13.9%)	Spain (8.9%)
United Kingdom	11.7%	23.5%	Spain (15.4%)	Portugal (11.5%)	Greece (7.7%)
Germany	11.4%	34.9%	Poland (10.5%)	Croatia (7.9%)	Slovakia (7.9%)
France	7.3%	42.3%	Romania (16%)	Poland (14%)	Spain/ Italy (12%)
Sweden	4.3%	46.6%	Estonia (21%)	Poland (14%)	Finland (13.8%)
Spain	4.2%	50.8%	Portugal (25%)	Italy (14%)	Finland (10.7%)
Italy	3.7%	54.6%	Italy (28%)	Slovakia (16%)	Spain (12%)
Switzerland	3.0%	57.6%	Lithuania (15%)	Germany (10%)	Austria (10%)
Belgium	2.8%	60.4%	Denmark (15.8%)	Greece, Latvia, Poland (10.5%)	
Canada	2.4%	62.8%	Portugal (25%)		

Source: MORE3 EU HE survey (2016)
Reading note: Of the total number of researchers currently working in the EU but who were mobile for more than three months during their PhD to the United States, 16% were Italian, 14% Danish and 9% Spanish.
Notes:
- Share of R1 PhD candidates and R2 PhD holders currently working in the EU which were mobile for more than three months during their PhD to a specific destination country.
- Destination countries with less than 15 observations are not included in the table.
- Based on question 60: "To which country(ies) was this?"
- (n=667)

7.1.3. Motives

This section discusses the motives of R1 and R2 researchers to engage in an international move for or during their PhD. A list of 15 factors were presented for each type of mobility (plus the 'other' category). Motives are analysed individually and also across categories of motives. These categories follow a similar rationale to those presented in Section 6 on researchers´ satisfaction with working conditions. We can differentiate between 1) motives related to remuneration and other non-science related factors, 2) motives related to scientific knowledge production, and 3) motives related to career progression.

The first set encompasses to two main categories: Financial security and satisfaction at work.

- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Another category encompasses those motives that refer to non-work related reasons such as culture, personal or family reasons and other non-specified factors.

The second main group of motives –related to conditions to create scientific knowledge - is formed by financial support, intellectual support, and time constraints.

- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance and research autonomy includes research autonomy and balance between teaching and research time.

Finally, the last group makes reference to those factors related to career progression.

7.1.3.1. Motives for PhD degree mobility

In this section, we address the factors which were important in the decision of the researchers to engage in PhD degree mobility. This question was asked to all R1 PhD candidates and R2 PhD holders who will obtain/obtained their PhD in a country other than the one where they obtained their previous degree (the degree that gave access to the PhD). An overview of the motives for PhD degree mobility in 2012 and 2016 is provided in Table 17.

All aspects have been ticked more often by the researchers as motive for their PhD degree mobility in 2016. The main differences occur for aspects at the lower end, thus resulting in convergence of the importance of the different motives. Examples are: social security and other benefits (28pp difference), personal or family reasons (25pp), remuneration (20pp) and job security (18pp).

Overall, a very similar ranking of the motives is obtained in 2016 compared to 2012. Working with leading scientists, quality of training and education, career progression, availability of suitable PhD positions and international networking are the top 5 motives in 2016, each of which were already in the same regions in 2012. There is thus a stable pattern in the motives why researchers engage in PhD degree mobility. International networking was only added for the first time in the 2016 survey and immediately proves an important motive for PhD degree mobility (82%). Only pension plan is indicated by less than 50% of the PhD degree mobile R1-R2 researchers as a motive.

In Table 18, the main motives for PhD mobility in 2016 are summarised into the categories defined above. Motives of intellectual support, career progression and financial support are the main ones for PhD degree mobility.

Table 17: Importance of motives for international PhD degree mobility (2012-2016, EU)

Share of respondents that indicate this motive as one of the motives for international PhD degree mobility *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme and that were PhD degree mobile*	**2012** (n=653)	**2016** (n=491)
Pension plan	(together with social security benefits in 2012 survey)	49.2%
Personal/family reasons	35.1%	60.3%
Job security	44.5%	62.1%
Culture and/or language	58.9%	62.5%
Social security and other benefits	35.3%	63.6%
Balance between teaching and research time	/	64.7%
Remuneration	50.8%	70.9%
Research autonomy	64.6%	77.9%
Access to research facilities and equipment	69.5%	79.0%
Availability of research funding	72.6%	79.2%
International networking	/	81.8%
Availability of suitable PhD positions	83.9%	84.5%
Career progression	74.5%	84.5%
Quality of training and education	76.4%	86.9%
Working with leading scientists	73.2%	87.8%
Working conditions	62.6%	/

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Notes:

- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Based on question 58: "Which of the following factors were important in your decision to obtain your PhD in another country?" The answer options between MORE2 and MORE3 differ slightly.

Table 18: Importance of categories of motives for international PhD degree mobility (EU28)

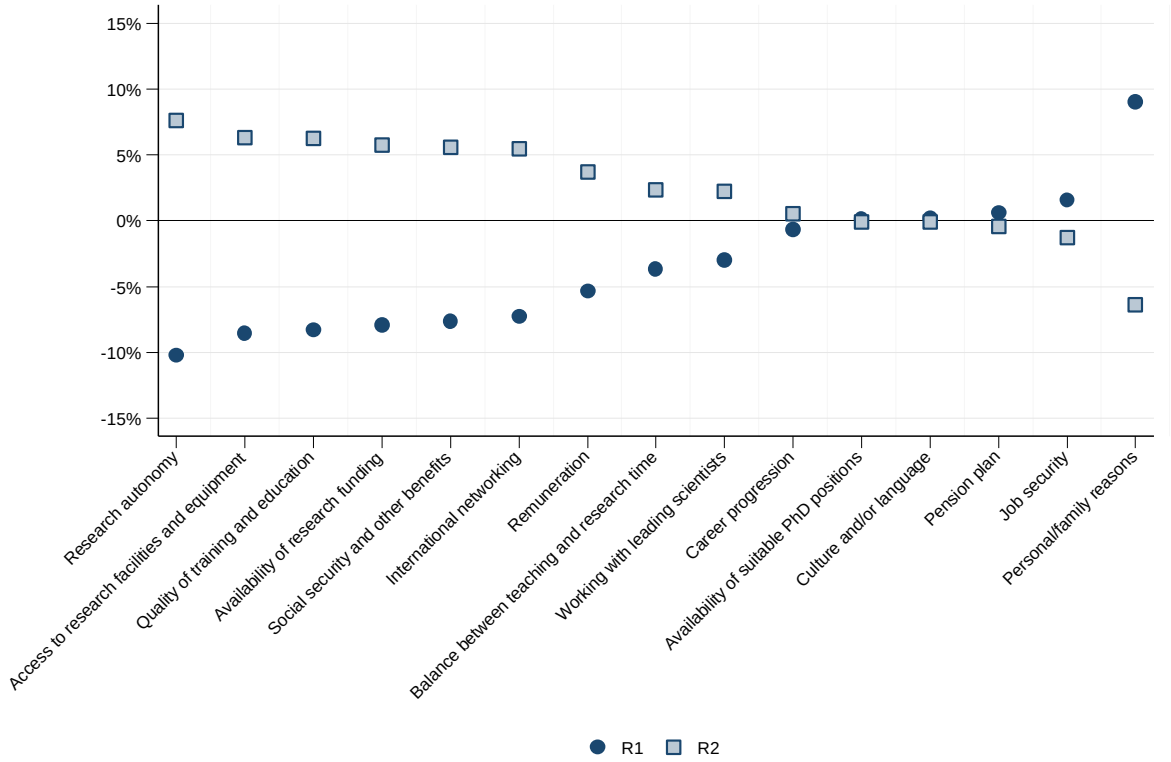
Average share of respondents that indicate the motives in this category as one of the motives for international PhD degree mobility *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme that were PhD degree mobile (n=491)*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
Financial security	61.5%	R1: 58.8% R2: 63.4%	MED: 65.2% NAT: 39.2% SOC: 49.3%	F: 61.1% M: 61.9%
Satisfaction at work	61.4%	R1: 66.0% R2: 58.2%	MED: 59.3% NAT: 69.2% SOC: 56.1%	F: 58.8% M: 63.9%
Financial support	80.9%	R1: 75.4% R2: 84.9%	MED: 85.1% NAT: 86.7% SOC: 70.7%	F: 78.4% M: 83.0%
Intellectual support	85.5%	R1: 79.3% R2: 90.2%	MED: 87.7% NAT: 88.3% SOC: 80.2%	F: 85.1% M: 85.9%
Time balance	71.3%	R1: 64.4% R2: 76.3%	MED: 66.7% NAT: 79.4% SOC: 69.8%	F: 70.3% M: 72.5%
Career progression	84.5%	R1: 83.8% R2: 85.1%	MED: 85.4% NAT: 93.4% SOC: 75.0%	F: 85.3% M: 83.8%

Source: MORE3 EU HE survey (2016)
Notes:
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Satisfaction at work refers to culture, and personal or family reasons.
- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance includes research autonomy and balance between teaching and research time.
- Based on question 58:"Which of the following factors were important in your decision to obtain your PhD in another country?"

Career stage: The majority of motives, and in particular those included as intellectual and financial support, are more important for R2 researchers than for R1 researchers, or in other words, R2 researchers have ticked more options than R1 researchers. When the items are analysed separately we observe that only personal and family reasons and job security are indicated by a larger share of R1 than R2 researchers (16pp difference and 3pp difference respectively). These are overall also among the less important motives. Career progression, availability of a suitable positon, culture and/or language and pension plan are motives that are equally important for both.

Gender: There are no large gender differences across the different set of motives, the exception being that male researchers consider satisfaction at work more important than their female counterparts. When analysing each of the items individually, we observe that men are comparatively more motivated for PhD degree mobility by finding a better balance between teaching and research time (9pp difference), a suitable PhD position (9pp), access to research facilities and equipment (8pp) and working with leading scientists (7pp). On the other hand, female researchers find international networking (6pp difference), research autonomy (5pp) and pension plan (4pp) more important.

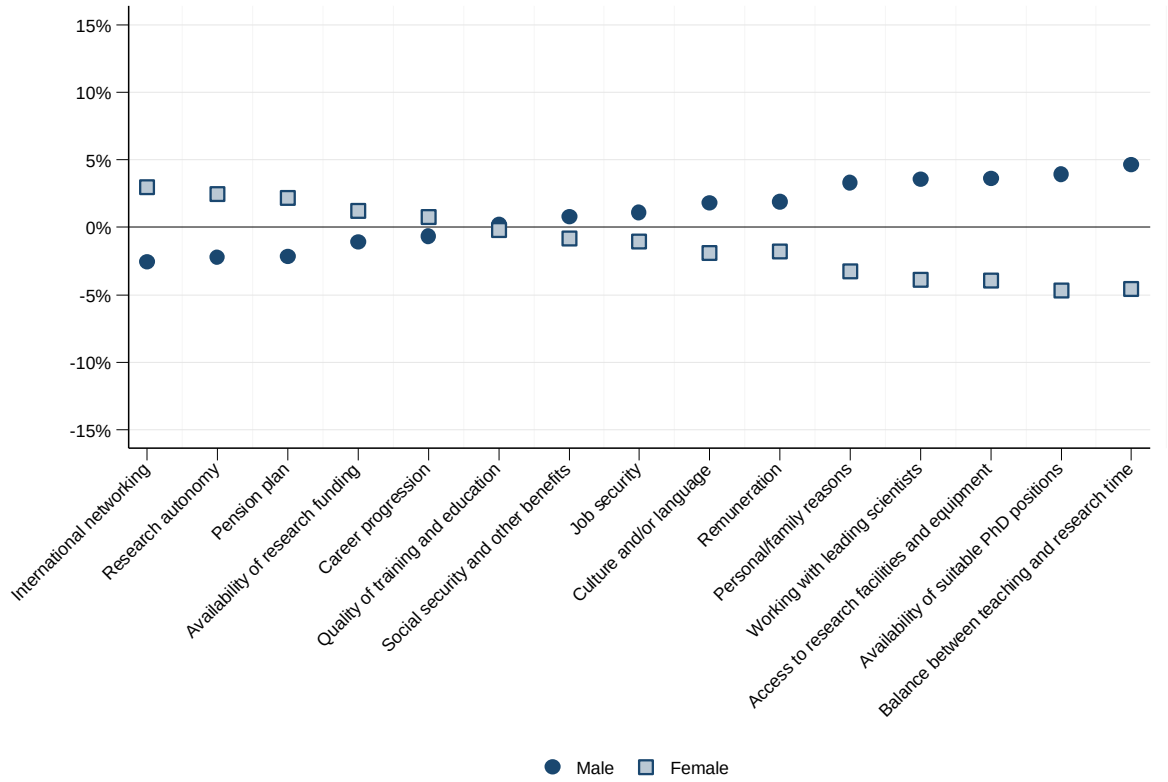
Figure 69: Importance of motives for international PhD degree mobility, by (current) career stage (EU28)



	R1	R2	Total
Research autonomy	67.7%	85.6%	77.9%
Access to research facilities and equipment	70.5%	85.3%	79.0%
Quality of training and education	78.6%	93.1%	86.9%
Availability of research funding	71.2%	84.9%	79.2%
Social security and other benefits	56.0%	69.2%	63.6%
International networking	74.6%	87.3%	81.8%
Remuneration	65.6%	74.6%	70.9%
Balance between teaching and research time	61.1%	67.1%	64.7%
Working with leading scientists	84.8%	90.0%	87.8%
Career progression	83.8%	85.1%	84.5%
Availability of suitable PhD positions	84.6%	84.4%	84.5%
Culture and/or language	62.7%	62.4%	62.5%
Pension plan	49.8%	48.8%	49.2%
Job security	63.7%	60.9%	62.1%
Personal/family reasons	69.4%	53.9%	60.3%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of R2 PhD degree mobile researchers who find research autonomy important exceeds the share of R1 PhD degree mobile researchers who find this important by 18pp. The share is 86% for R2 researchers and 68% for R1 researchers.
Notes:
- Only R1 PhD candidates and R2 PhD holders that were PhD degree mobile.
- Difference between percentage of PhD degree mobile researchers that find the motive important (versus not important) for their PhD degree mobility per career stage and the total share of PhD degree mobile researchers that find it important.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Based on question 58:"Which of the following factors were important in your decision to obtain your PhD in another country?"
- (n=491)

Figure 70: Importance of motives for international PhD degree mobility, difference between genders (EU28)



	Male	Female	Total
International networking	79.2%	84.8%	81.8%
Research autonomy	75.7%	80.4%	77.9%
Pension plan	47.0%	51.4%	49.2%
Availability of research funding	78.1%	80.4%	79.2%
Career progression	83.8%	85.3%	84.5%
Quality of training and education	87.1%	86.7%	86.9%
Social security and other benefits	64.4%	62.8%	63.6%
Job security	63.2%	61.1%	62.1%
Culture and/or language	64.3%	60.6%	62.5%
Remuneration	72.8%	69.1%	70.9%
Personal/family reasons	63.6%	57.1%	60.3%
Working with leading scientists	91.3%	83.9%	87.8%
Access to research facilities and equipment	82.6%	75.1%	79.0%
Availability of suitable PhD positions	88.4%	79.8%	84.5%
Balance between teaching and research time	69.3%	60.1%	64.7%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of female PhD degree mobile researchers who find international networking important exceeds the share of male PhD degree mobile researchers who finds this important by 6pp. The share is 85% for female researchers and 79% for male researchers.
Notes:

- Only R1 PhD candidates and R2 PhD holders that were PhD degree mobile.
- Difference between percentage of PhD degree mobile researchers that find the motive important (versus not important) for their PhD degree mobility per gender and the total share of PhD degree mobile researchers that find it important.
- With 'PhD degree mobility' defined as obtaining or having obtained a PhD in another county than the one where one obtained his/her previous degree.
- Based on question 58: "Which of the following factors were important in your decision to obtain your PhD in another country?"
- (n=491)

Family status: Regarding the family status of the researchers, we do find substantial differences between those living in couple or not and having children or not. The largest difference between those living in a couple versus those that are single is found for personal and family reasons (23pp difference) and for culture and/or language (12pp difference). Next to these personal motives, also the availability of a position, working with leading scientists and international networking are more important for researchers in a couple (10pp, 8pp and 8pp difference respectively). On the other hand, job security, remuneration and career progression are more important for researchers who are single (12pp, 6pp and 4pp difference respectively).

Interestingly, the motives that have proven to be more important for researchers in a couple are typically less important for those in a couple whose partner is also a researchers. For example:

- Personal and family reasons are less important when the partner is a researcher: 7pp difference compared to those with a partner who is not a researcher.
- Availability of a suitable position: 9pp difference.
- International networking: 14pp difference.

Research autonomy and remuneration on the other hand, are more important when the partner is a researcher (10pp and 6pp difference respectively). (Much) less important are social security, career progression, quality of training and education and job security (17pp, 16pp, 16pp and 12pp difference respectively).

Similar to the differences found with respect to living in couple or not, personal and family reasons are also more important motives for PhD degree mobility among the researchers with children than for those without children (23pp difference). Here, also social security and other benefits and pension plan are considerably more important (13pp and 10pp difference respectively), together with access to research facilities and equipment (12pp difference). Again, job security and remuneration, but also career progression and research autonomy, are more important for the researchers without children (12pp, 3pp, 4pp and 3pp difference respectively).

7.1.3.2. Motives for >3 month mobility during PhD

In this section, we address the factors which were important in the decision of the researchers to engage in >3 month international mobility during their PhD. Current R1 and R2 researchers who were not PhD degree mobile but did engage in >3 month mobility to a country other than the country where they did/will obtain their PhD, were asked for motives for their during PhD mobility.

An overview of the motives for during PhD mobility in 2012 and 2016 is provided in Table 19. Here, no convergence is observed compared to the MORE2 like for the PhD degree mobility. On the other hand, like for the PhD degree mobility, a very similar ranking of the motives is obtained in 2016 compared to 2012.

Compared to the PhD degree mobility motives, two observations are made. First, the majority of motives appear to be on average more important for PhD degree mobility than for during PhD mobility, or in other words more motives were considered applicable for PhD degree mobility by one respondent.

Second, a logical pattern appears. Working with leading scientists (88%), international networking (86%), quality of training and education (71%) and career progression (71%) are also important motives here. Availability of suitable PhD positions is, as can be expected, less important than for PhD degree mobility (57%). Overall, contract-related aspects such as pension plan, social security and job security are not important for during PhD degree mobility. Personal and family reasons are only important for 30% compared to 60% in PhD degree mobility. Higher ranked for during PhD mobility is

research autonomy, but the share is still lower than for PhD degree mobility (75% versus 78%).

The 2016 results are further summarised in Table 20 according to the categories defined above. The major difference with PhD degree mobility relates to job security: 23% of the respondents considered it important for during PhD mobility compared to 62% who declared it was important for PhD degree mobility.

Table 19: Importance of motives for >3 month mobility during PhD (2012 and 2016, EU)

Share of respondents that indicate this motive as one of the motives for international during PhD mobility (>3 months) *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme and that were >3 month mobile during PhD*		
	2012 (n=552)	**2016** (n=420)
Pension plan	(together with social security benefits in 2012 survey)	12.2%
Social security and other benefits	13.2%	19.7%
Job security	22.6%	22.7%
Personal/family reasons	52.3%	29.8%
Remuneration	26.2%	34.1%
Balance between teaching and research time	/	47%
Availability of suitable PhD positions	41.6%	56.7%
Availability of research funding	63%	67.3%
Culture and/or language	68.2%	68.2%
Career progression	83.3%	70.6%
Quality of training and education	62.4%	71.0%
Access to research facilities and equipment	78.3%	74.7%
Research autonomy	75.0%	75.4%
International networking	/	86.1%
Working with leading scientists	82.1%	88.5%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- With '>3 month mobility during PhD' defined as moving for 3 months or more to another country than the country where he/she did or will obtain their PhD.
- Based on question 61:"Which of the following factors were important in your decision to move to another country?" The answer options between MORE2 and MORE3 differ slightly.

Table 20: Importance of categories of motives for >3 month mobility during PhD (EU28)

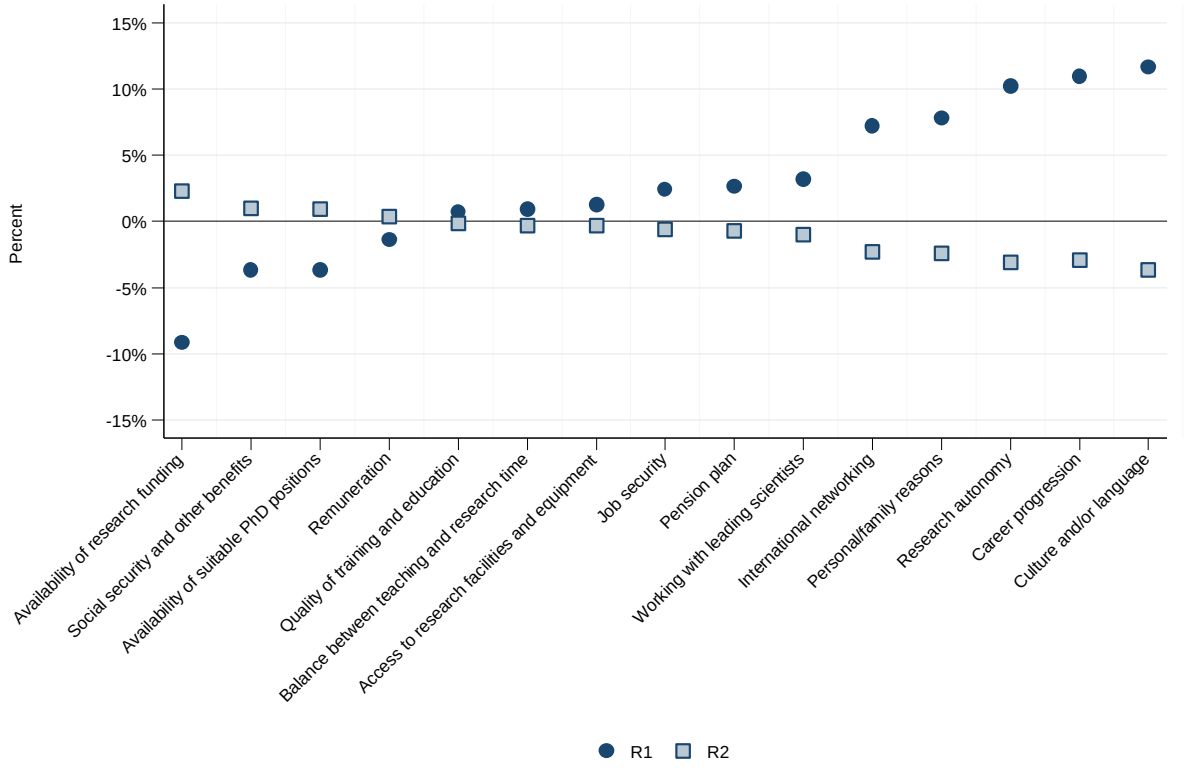
Average share of respondents that indicate the motives in this category as one of the motives for >3 month mobility during PhD *Of all R2 researchers, or R1 researchers that are enrolled in a doctoral programme and that were >3 month mobile during PhD (n=420)*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
Financial security	22.2%	R1: 22.2% R2: 22.2%	MED: 29.9% NAT: 16.9% SOC: 18.8%	F: 22.0% M: 22.3%
Satisfaction at work	49.0%	R1: 58.7% R2: 46.0%	MED: 46.9% NAT: 41.1% SOC: 56.0%	F: 53.7% M: 44.3%
Financial support	66.3%	R1: 62.4% R2: 67.2%	MED: 63.5% NAT: 76.8% SOC: 61.3%	F: 65.2% M: 67.2%
Intellectual support	81.9%	R1: 85.6% R2: 80.7%	MED: 84.6% NAT: 83.1% SOC: 78.1%	F: 83.2% M: 80.6%
Time balance	61.2%	R1: 66.8% R2: 59.5%	MED: 60.1% NAT: 60.1% SOC: 62.7%	F: 56.7% M: 65.5%
Career progression	70.6%	R1: 81.5% R2: 67.6%	MED: 69.9% NAT: 63.0% SOC: 76.6%	F: 64.3% M: 76.6%

Source: MORE3 EU HE survey (2016)
Notes:
- With '>3 month mobility during PhD' defined as moving for 3 months or more to another country than the country where he/she did or will obtain their PhD.
- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Satisfaction at work refers to culture, and personal or family reasons.
- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance includes research autonomy and balance between teaching and research time.
- Based on question 61:"Which of the following factors were important in your decision to move to another country?"

Career stage: Opposite to what was observed for PhD degree mobility, the majority of motives are now more important for R1 than for R2 researchers. Interestingly, those factors related to financial support, such as the availability of funding and positions and remuneration and social security benefits are more important for R2 researchers. Intrinsic factors such as career progression, research autonomy and international networking are more important for the R1 researchers, as are personal motives.

Gender: Figure 72 shows the difference between male and female researchers in terms of importance of motives for their during PhD mobility. The figure is symmetric, meaning that both groups have indicated a similar number of motives and that, although each have their own preferences, the differences are relatively small. Research autonomy and career progression are more important for the male researchers, as are availability of positions and remuneration (16pp, 12pp, 8pp and 7pp difference respectively). Female researchers find personal and family reasons, culture and language, quality of training and education and job security more important (11pp, 8pp, 8pp and 7pp difference respectively). The pattern is somewhat different from that for PhD degree mobility. In this case, it was the male researchers who found personal reasons more important than female researchers and research autonomy was more motivating for female researchers compared to their male counterparts.

Figure 71: Importance of motives for >3 month mobility during PhD, by (current) career stages (EU28)

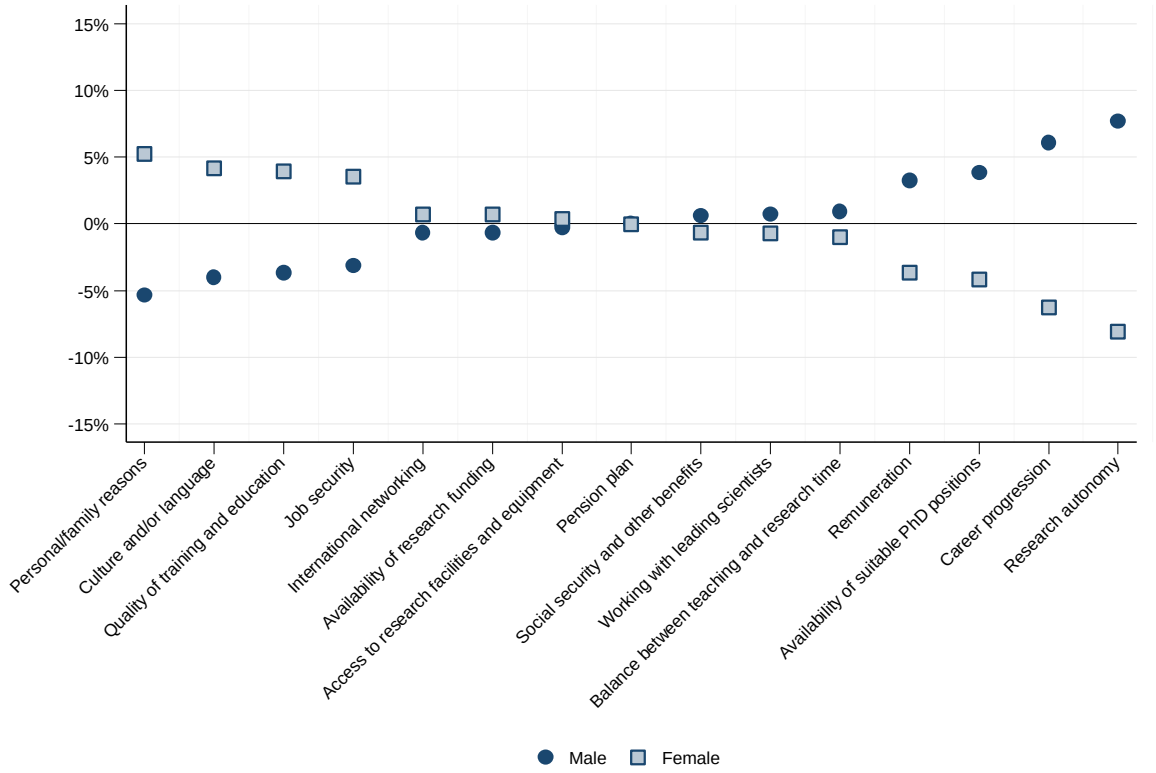


	R1	R2	Total
Availability of research funding	58.2%	69.6%	67.3%
Social security and other benefits	16.0%	20.6%	19.7%
Availability of suitable PhD positions	53.0%	57.6%	56.7%
Remuneration	32.7%	34.5%	34.1%
Quality of training and education	71.7%	70.8%	71.0%
Balance between teaching and research time	47.9%	46.7%	47.0%
Access to research facilities and equipment	76.0%	74.4%	74.7%
Job security	25.1%	22.1%	22.7%
Pension plan	14.8%	11.5%	12.2%
Working with leading scientists	91.7%	87.5%	88.5%
International networking	93.3%	83.9%	86.1%
Personal/family reasons	37.6%	27.4%	29.8%
Research autonomy	85.7%	72.4%	75.4%
Career progression	81.5%	67.6%	70.6%
Culture and/or language	79.8%	64.5%	68.2%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of R2 researchers who have been mobile during their PhD who find the availability of researcher funding important exceeds the share of R1 during PhD mobile researchers that finds this important by 11pp. The share is 70% for R2 researchers and 58% for R1 researchers.
Notes:

- Only R1 PhD candidates and R2 PhD holders that were >3 month mobile during PhD.
- Difference between percentage of researchers who have been mobile during their PhD that find the motive important (versus not important) for their >3 month mobility during PhD per career stage and the total share of researchers that have been mobile during their PhD and who find that find it important.
- With '>3 month mobility during PhD' defined as moving to another country than the country of PhD for three months or more.
- Based on question 61:"Which of the following factors were important in your decision to move to another country?"
- (n=420)

Figure 72: Importance of motives for >3 month international mobility during PhD mobility, difference between genders (EU28)



	Male	Female	Total
Personal/family reasons	24.5%	35.1%	29.8%
Culture and/or language	64.2%	72.3%	68.2%
Quality of training and education	67.3%	74.9%	71.0%
Job security	19.5%	26.2%	22.7%
International networking	85.5%	86.9%	86.1%
Availability of research funding	66.7%	68.0%	67.3%
Access to research facilities and equipment	74.4%	75.1%	74.7%
Pension plan	12.2%	12.2%	12.2%
Social security and other benefits	20.2%	19.0%	19.7%
Working with leading scientists	89.2%	87.7%	88.5%
Balance between teaching and research time	47.9%	46.0%	47.0%
Remuneration	37.4%	30.5%	34.1%
Availability of suitable PhD positions	60.5%	52.5%	56.7%
Career progression	76.6%	64.3%	70.6%
Research autonomy	83.1%	67.3%	75.4%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of male researchers who have been mobile during their PhD and who find research autonomy important, exceeds the share of female during PhD mobile researchers that finds this important by 16pp. The share is 83% for male researchers and 67% for female researchers.
Notes:
- Only R1 PhD candidates and R2 PhD holders that were >3 month mobile during PhD.
- Difference between share of researchers who have been mobile during their PhD that find the motive important (versus not important) for their >3 month mobility during PhD per gender and the total share of researchers that have been mobile during their PhD and who find this important.
- With '>3 month mobility during PhD' defined as moving to another country than the country of PhD for three months or more.
- Based on question 61:"Which of the following factors were important in your decision to move to another country?"
- (n=420)

Family status: Regarding the family status of the researchers, we do find substantial differences between those living in couple or not and those having children or not. The largest difference between those living in a couple versus those who are single is found for social security and other benefits (5pp difference) and for international networking (4pp difference). On the other hand, jobs security, remuneration, access to research facilities and equipment are more important for researchers who are single (19pp, 12pp and 11pp difference respectively). Other differences occur with culture and/or language (10pp difference) and balance between teaching and research time (9pp).

There are also interesting differences in the motives for those in a couple whose partner is also a researcher. For example:

- Job security is more important for researchers in couple whose partner is also a researcher (5pp)
- Availability of suitable PhD position (37pp); balance between teaching and research time (27pp); quality of training and education (23pp) and availability of research funding (20pp) are more important for researchers when the partner is also in researcher.

Similar to the differences found with respect to living in couple or not, social security and other benefits are also more important motives for during PhD mobility among the researchers with children than for those without children (21pp difference). Here, pension plan and other personal family reasons are also considerably more important (8pp and 7pp difference respectively), together with working with leading scientists (10pp difference). Availability of suitable PhD positions and researcher funding are more important for the researchers without children (8pp and 5pp).

7.1.4. Barriers

As described in the section on non-mobility for PhD (section 7.1.1.4), 34% of the current R1-R2 researchers who have not been for or during PhD mobile, did consider to take part or all of their PhD in a country other than the one in which they obtained their previous degree.

The main factors which finally prevented them from undertaking a move are summarised in Figure 75 and presented together with the 2012 results in Table 21. The main barrier for PhD mobility is personal or family related (58%) followed by the ability to obtain funding for mobility (44%) or for research (43%) and finding a suitable position (42%). Practical matters such as culture, obtaining a visa or work permit, language of the PhD programme and of teaching on the other hand, are not important as barriers for PhD mobility (4% up to 10%). Like for the motives, the pattern of top-ranked barriers is stable compared to the MORE2 data (2012), but here the shares of researchers who considered the factor a barrier for PhD mobility were systematically higher in MORE2.

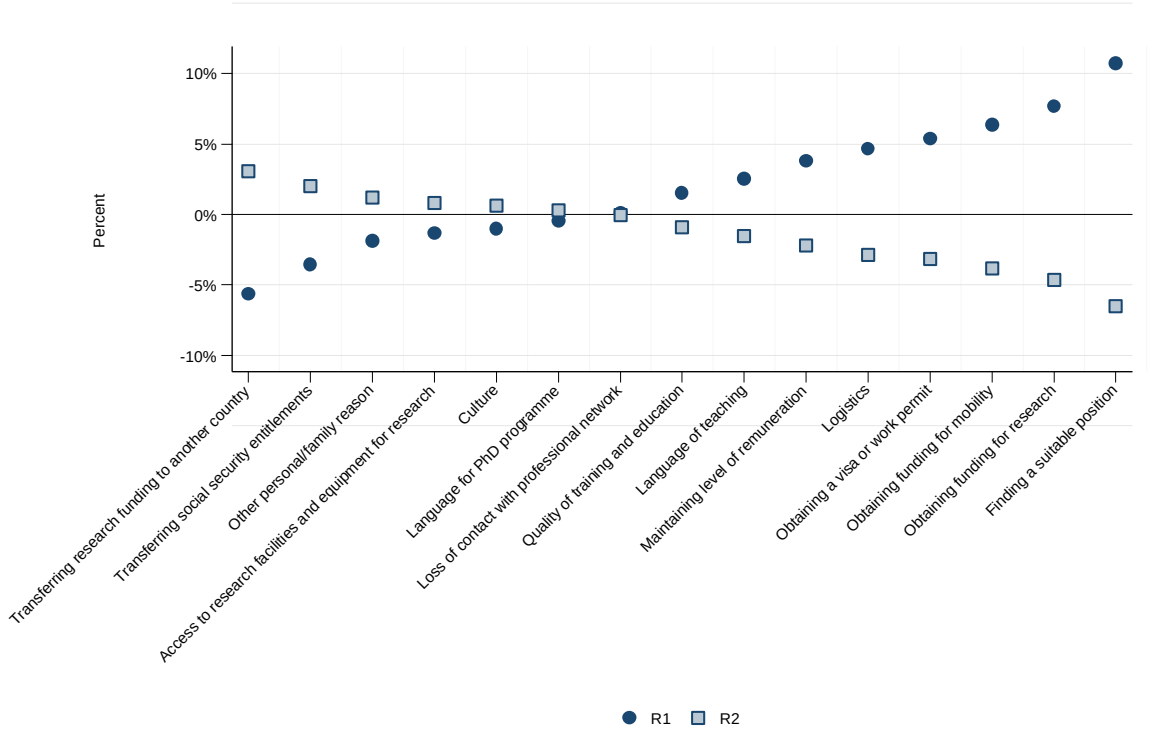
Table 21: Importance of barriers for PhD mobility among the non-mobile (2012 and 2016, EU)

Share of non-mobile respondents that indicate this barrier as one of the factors keeping them from international PhD mobility *Of all non-mobile R2 researchers, or non-mobile R1 researchers that are enrolled in a doctoral programme*	**2012** (n=825)	**2016** (n=595)
Culture	(together with language for teaching and language for PhD programme in 2012 survey)	4.1%
Obtaining a visa or work permit	NA	6.0%
Quality of training and education	25.5%	10.1%
Language for PhD programme	22.1%	10.3%
Language of teaching	(together with culture and language for PhD programme in 2012 survey)	12.8%
Transferring social security entitlements	NA	12.9%
Transferring research funding to another country	34.0%	14.6%
Access to research facilities and equipment for research	25.7%	15.4%
Maintaining level of remuneration	NA	21.6%
Loss of contact with professional network	25.8%	22.0%
Logistics	44.0%	28.8%
Finding a suitable position	54.5%	41.9%
Obtaining funding for research	63.8%	43.5%
Obtaining funding for mobility	(together with funding for research in 2012 survey)	44.1%
Other personal/family reason	54.0%	58.0%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Share of non-mobile R1 PhD candidates and R2 PhD holders with some consideration of PhD mobility that indicate the barrier as important for non-PhD mobility.
- With 'non-PhD mobile' defined as never having been PhD degree mobile nor mobile during PhD.
- With 'some consideration of PhD mobility' defined as not having indicated to have never considered it (thus having considered it but made no effort; have considered it and searched and having turned down a concrete offer).
- Based on question 63: "Which of the following factors prevented you from taking part or all of your PhD in another country"? The answer options between MORE2 and MORE3 differ slightly.

Career stage: The current R1 researchers seem to observe more barriers to PhD mobility than the current R2 researchers. Among the non-mobile, the current R1 are more often kept from mobility due to problems with finding a suitable position (17pp difference with the R2) or funding for research (12pp) or mobility (10pp), logistics (8pp) and maintaining the level of remuneration (6pp). These are typically the more common barriers in total, so we can say that in total the R1 show the same, but more pronounced pattern than the average. The R2 put more emphasis on transferring their funding (9pp difference with the R1) and social security benefits (6pp), which are generally less common barriers. The main barrier when considering the total, personal and family reasons, is equally important to both groups (56% for R1 and 59% for R2).

Figure 73: Importance of barriers for PhD mobility among the non-mobile, by (current) career stage (EU28)



	R1	R2	Total
Transferring research funding to another country	9.0%	17.7%	14.6%
Transferring social security entitlements	9.4%	15.0%	12.9%
Other personal/family reason	56.2%	59.2%	58.0%
Access to research facilities and equipment for research	14.0%	16.2%	15.4%
Culture	3.1%	4.7%	4.1%
Language for PhD programme	9.8%	10.6%	10.3%
Loss of contact with professional network	22.0%	21.9%	22.0%
Quality of training and education	11.6%	9.2%	10.1%
Language of teaching	15.3%	11.2%	12.8%
Maintaining level of remuneration	25.4%	19.4%	21.6%
Logistics	33.5%	26.0%	28.8%
Obtaining a visa or work permit	11.4%	2.8%	6.0%
Obtaining funding for mobility	50.5%	40.3%	44.1%
Obtaining funding for research	51.2%	38.8%	43.5%
Finding a suitable position	52.7%	35.4%	41.9%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of non-mobile R1 researchers (i.e. who were neither PhD degree mobile nor mobile during their PhD) who consider finding a suitable position important, exceeds the share of non-mobile R2 researchers that finds this important by 17pp. The share is 52.7% for R1 researchers and 35.4% for R2 researchers.
Notes:

- Only R1 PhD candidates and R2 PhD holders that were non-PhD mobile.
- Difference between the share of non-PhD mobile researchers with some consideration of PhD mobility that indicate the barrier as important for non-PhD mobility per current career stage and the total share.
- With 'non-PhD mobile' defined as never having been PhD degree mobile nor mobile during their PhD.
- With 'some consideration of PhD mobility' defined as not having indicated to have never considered it (thus having considered it but made no effort; having considered it and searched and having turned down a concrete offer).
- Based on question 63 MORE3: "Which of the following factors prevented you from taking part or all of your PhD in another country"?
- (n=595)

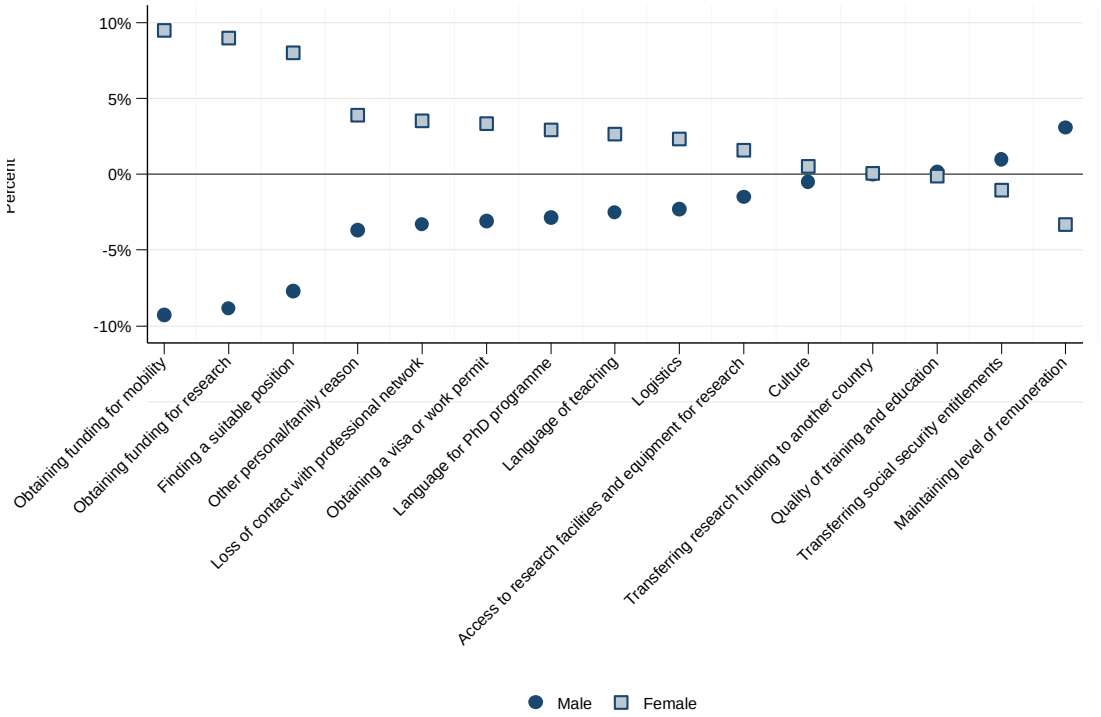
Gender: Figure 74 shows the difference between the non-mobile male and female researchers in terms of importance of barriers for PhD mobility. The figure is asymmetric, with female researchers being more inclined to finding different factors important. They are particularly more hindered by problems with obtaining funding for mobility (19pp difference with male researchers) or for research (18pp) and finding a suitable position (16pp). These factors are at the same time the most common barriers for all, so it seems that the general pattern is even more pronounced for female researchers. Interestingly, personal and family reasons and the potential loss of contact with the professional network are also more important barriers to female researchers (8pp and 7pp difference respectively). Only problems with maintaining the level of remuneration was more important to male researchers (6pp difference).

Family status: For researchers in a couple, logistics (13pp), maintaining level of remuneration (7pp) and personal/family reasons (6pp) are more frequently a barrier to mobility than for single researchers. Single researchers on the other hand indicate more frequently that obtaining funding for research (22pp), for mobility (16pp) and loss of contact with professional network (12pp) is a barrier to PhD degree mobility than do researchers in a couple.

The barriers to non-PhD mobility are very similar for the single researchers as for the ones without children; obtaining funding for research (27pp), for research (26pp), finding a suitable position (16pp) and loss of contact with professional network (9pp) are more frequently indicated as a barrier for researchers without children compared to researchers with children. Conversely, are researchers without children less affected by quality of training and education (9pp) and personal/family reason (9pp) than researchers with children?

Level of consideration of mobility: Figure 75 analyses whether the importance of the barriers for PhD mobility depend on the extent to which the researcher considered mobility. The pattern is very similar for the three profiles, but those who were offered a position and turned it down did not face the barrier of finding funding for mobility to the same extent as the others (17% versus 50% and 45%). Nevertheless, obtaining funding for their research and finding a suitable position remains also for this group an equally important barrier. Among those who made an effort while considering international mobility in their PhD phase, finding funding for mobility was a bigger obstacle, as was the language of teaching and of the PhD programme. It seems this group encountered a number of practical problems when making an effort to find a position, which the group who never made this effort did not face. The latter were more often already prevented from even searching for mobility opportunities due to logistical issues.

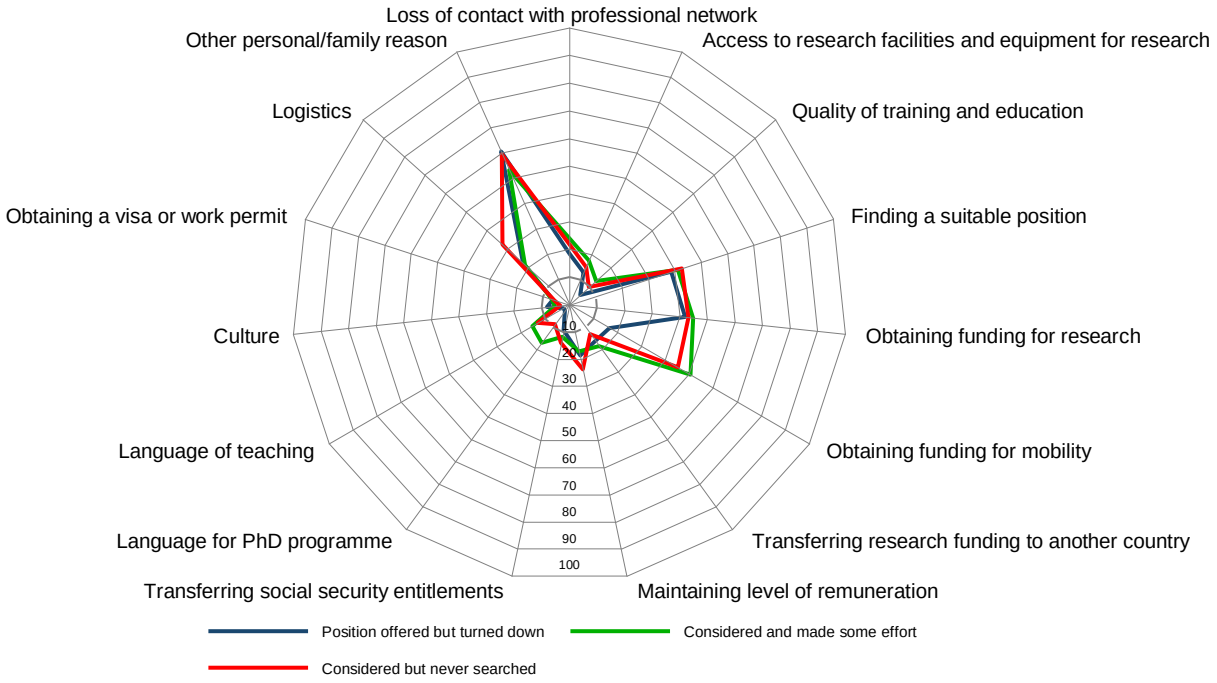
Figure 74: Importance of barriers for PhD mobility among the non-mobile, difference between genders (EU28)



	Male	Female	Total
Obtaining funding for mobility	34.8%	53.6%	44.1%
Obtaining funding for research	34.6%	52.5%	43.5%
Finding a suitable position	34.2%	49.9%	41.9%
Other personal/family reason	54.4%	61.9%	58.0%
Loss of contact with professional network	18.6%	25.5%	22.0%
Obtaining a visa or work permit	2.9%	9.3%	6.0%
Language for PhD programme	7.4%	13.2%	10.3%
Language of teaching	10.2%	15.4%	12.8%
Logistics	26.5%	31.2%	28.8%
Access to research facilities and equipment for research	13.9%	17.0%	15.4%
Culture	3.6%	4.6%	4.1%
Transferring research funding to another country	14.6%	14.7%	14.6%
Quality of training and education	10.2%	10.0%	10.1%
Transferring social security entitlements	13.9%	11.9%	12.9%
Maintaining level of remuneration	24.6%	18.3%	21.6%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of PhD degree mobile nor mobile during their PhD female researchers who find finding obtaining funding for mobility important exceeds the share of PhD degree mobile nor mobile during their PhD male53.6-34.8 researchers that finds this important by 19pp. The share is 53.6% for female researchers and 34.8% for male researchers.
Notes:
- Only R1 PhD candidates and R2 PhD holders that were non-PhD mobile.
- Difference between the share of non-PhD mobile researchers with some consideration of PhD mobility that indicate the barrier as important for non-PhD mobility per gender and the total share.
- With 'non-PhD mobile' defined as never having been PhD degree mobile nor mobile during their PhD.
- With 'some consideration of PhD mobility' defined as not having indicated to have never considered it (thus having considered it but made no effort; having considered it and searched and having turned down a concrete offer).
- Based on question 63 in MORE3: "Which of the following factors prevented you from taking part or all of your PhD in another country"?
- (n=595)

Figure 75: Importance of barriers for PhD mobility among the non-mobile, by level of consideration of PhD mobility (EU28)



	Position offered but turned down	Considered and made some effort	Considered but never searched
Loss of contact with professional network	18.4%	23.8%	21.7%
Access to research facilities and equipment for research	12.8%	17.5%	14.9%
Quality of training and education	5.4%	13.0%	9.6%
Finding a suitable position	38.7%	41.2%	42.6%
Obtaining funding for research	42.1%	44.8%	43.1%
Obtaining funding for mobility	16.7%	50.4%	45.2%
Transferring research funding to another country	16.0%	18.2%	12.9%
Maintaining level of remuneration	18.7%	17.2%	23.8%
Transferring social security entitlements	9.2%	11.7%	13.9%
Language for PhD programme	2.5%	17.0%	8.7%
Language of teaching	2.3%	15.5%	13.1%
Culture	8.0%	5.1%	3.2%
Obtaining a visa or work permit	6.1%	6.7%	5.7%
Logistics	22.4%	21.6%	32.4%
Other personal/family reason	60.6%	53.2%	59.5%

Source: MORE3 EU HE survey (2016)
Reading note: The proportion of PhD degree mobile nor mobile during their PhD researchers who considered mobility and done some effort indicated more frequently (33pp) that obtaining funding for research is a barrier to mobility compared to the ones who were offered a position but turned it down. The share is 17% for researchers who were offered a position but turned it down and 50% for the researchers who considered mobility and made some efforts.
Notes:
- Only R1 PhD candidates and R2 PhD holders that were non-PhD mobile.
- Distribution of non-PhD mobile researchers with some consideration of PhD mobility that indicate the barrier as important for non-PhD-mobility over level of consideration.

- With 'non-PhD-mobile' defined as never having been PhD degree mobile nor mobile during their PhD.
- With 'some consideration of PhD mobility' defined as not having indicated to have never considered it (thus having considered it but made no effort; having considered it and searched and having turned down a concrete offer).
- Based on question 62: "Did you ever consider undertaking part or all of your PhD in a country other than the one in which you obtained your previous degree?" and on question 63: "Which of the following factors prevented you from taking part or all of your PhD in another country"? The formulation of the question on barriers for mobility is slightly different between MORE2 and MORE3.
- (n=595)

7.2. Interdisciplinary experiences during PhD stage

This section is a summary of findings described in more detail in other sections of this report, combined to provide insights from the specific perspective of interdisciplinary experiences during PhD stage. It concerns information on PhD training and the importance and implementation of the Innovative Doctoral Training Principles, as well as information from the mobility and collaboration questions as discussed in the general sections on interdisciplinary mobility and collaboration (see section 8.2 and subsections).

Importance: With respect to PhD training, interdisciplinarity is less valued as a principle by PhD candidates. 15% consider it absolutely essential, another 48% find it very important. However, this still adds up to a total of 63% of PhD candidates who appreciate interdisciplinary collaboration.

Implementation during PhD training: In terms of implementation, we found that 40% of all R1 and R2 researchers in EU28 have collaborated with or worked in more than one discipline for their PhD. It is most common for PhD candidates studying in Latvia, the Czech Republic, and Iceland. Least common in the EU and associated countries is interdisciplinary work in Germany (27%), Austria (30%), and Switzerland (30%).

Mobility: 30% of the R1 researchers indicate they have actually switched to another (sub)field during their academic career, compared to 34% in total.

Collaboration in current position: 66% of the R1 researchers indicate that they collaborate with, or work in more than one field in their current position. This compares to 74% in total. 54% work with researchers in the same institute, 43% with researchers in other universities or research institutes and 20% with researchers in the non-academic sector. The difference compared to the total is largest for interdisciplinary collaboration with other universities/research institutes (14pp).

Virtual mobility: R1 researchers see the least influence of virtual technology in interdisciplinary collaboration compared to researchers in other career stages. This may be due to a better acquaintance of the younger generation with digital technologies, thus seeing it as part of daily (work) life and less so as a replacement for mobility.

7.3. Intersectoral experiences during PhD stage

This section briefly pinpoints the findings described in more detail in other sections of this report, combined to provide insight from the specific perspective of intersectoral experiences during PhD stage. It concerns information on PhD training and the importance and implementation of the Innovative Doctoral Training Principles, as well as information from the mobility and collaboration questions as discussed in the general sections on intersectoral collaboration (see section 8.3.2).

Importance: intersectoral mobility and industry funding are considered the least important among the Innovative Doctoral Training Principles. 12% of current R1 and R2 researchers find intersectoral mobility essential, 41% find it very important. Only 31% value industry funding as very important to say the least.

Implementation during PhD training: The comparably low share of PhD candidates assessing private co-funding by industry as very important for their PhD is mirrored in the share of researchers receiving such funding. Across fields of science, the highest share of co-funded PhD candidates is unsurprisingly found in Engineering (14%) but followed by Humanities (9%) and Medical Sciences (7%), while it is lowest in Agricultural Sciences (5%). We also see a similar pattern when looking at internships and work placements during PhD. On the one hand, 14% of R1 and R2 researchers state that they have undertaken a work placement or internship in the public sector. On the other hand, between 2-3% have done this in the three private sectors respectively: private, not-for-profit oriented organisations (e.g. research foundations or NGOs, 3%), large firms (2%) as well as SMEs and start-ups (3%).

Collaboration in current position: 25% of the R1 researchers collaborate with partners from outside the academic sector. This kind of collaboration is the least common among the R1 researchers compared to the other career stages and thus below the EU average of 35% across career stages.

8. Mobility and collaboration in post-PhD stage

This section contains all findings regarding mobility and collaboration in post-PhD stage. For simple terminology, we refer to R2 (post-doctoral), R3 (established) and R4 (leading) researchers as those in their post-PhD career stages, regardless of whether or not they obtained a PhD degree. The mobility and collaboration during PhD were described above in section 7.

The section is divided in three main parts, based on the three main dimensions of mobility:

- International (section 8.1);
- Interdisciplinary (section 8.2);
- Intersectoral (section 8.3).

8.1. International mobility and collaboration in post-PhD stage

This section discusses the international mobility related to the post-PhD stage. The analysis is structured according to the types of international mobility and collaboration:

- International long term (>3 months) mobility (section 8.1.1);
- International short term (<3 months) mobility (section 8.1.2);
- International collaboration (section 8.1.3);
- International virtual mobility (section 8.1.4);
- Short travel for conferences, meetings and visits (section 8.1.5).

8.1.1. International long term mobility of >3 months

8.1.1.1. Stock

Share of researchers with >3 month international mobility experience
Of all R2, R3 and R4 researchers

	Less than ten years ago	More than ten years ago	Never
2012 EU27 (n=7,131)	31.0%	17.4%	51.6%
2016 EU28 (n=8,073)	27.4%	18.1%	54.5%

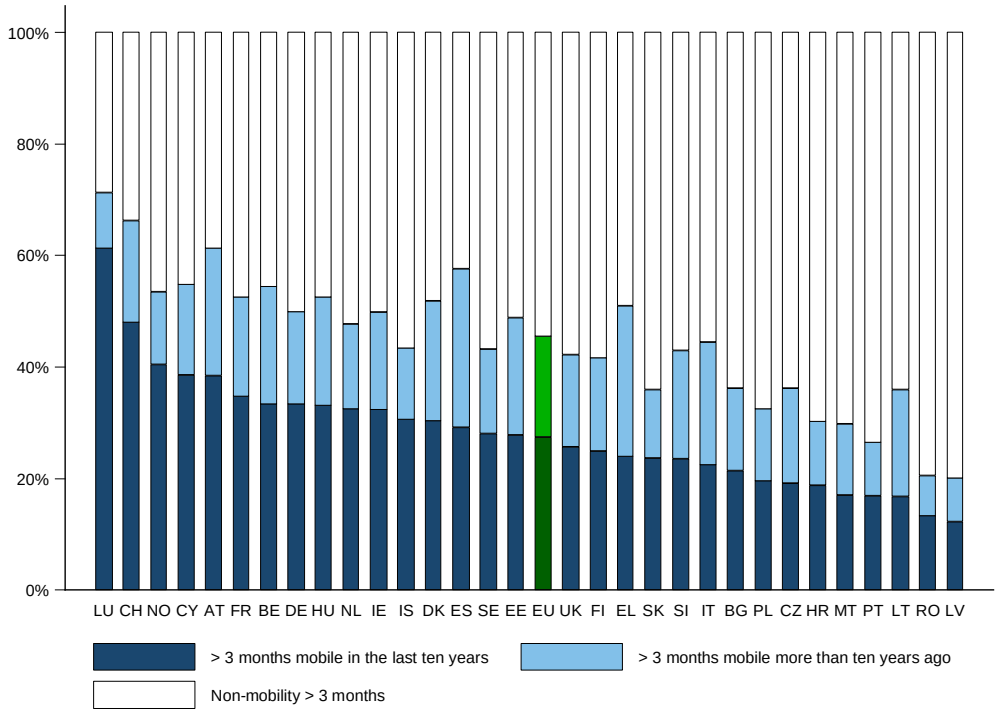
Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"

27% of post-PhD researchers in the EU28 have worked abroad as researchers for more than 3 months at least once in the last ten years. This is a small decrease by 4pp compared to 2012. Another 18% of the post-PhD researchers in the EU28 have been >3 month mobile over ten years ago. In total, 46% has been mobile in their career following their PhD while 54% of the post-PhD researchers has never been mobile for more than 3 months.

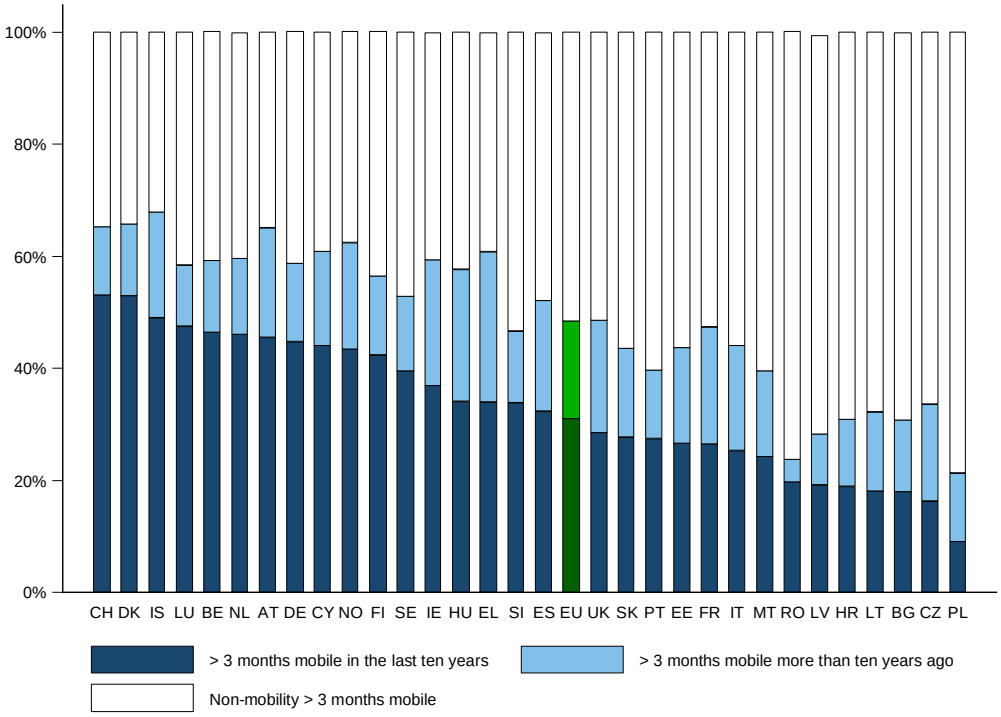
Country level: Figure 76 (and Table 73 in Annex) gives the overview of the recent versus longer ago or never mobile per country in 2016 and in 2012. We will discuss the results and evolutions for each category in detail in the following sections.

Figure 76: >3 month international mobility in post-PhD career stages, by country (2016 and 2012)

2016:



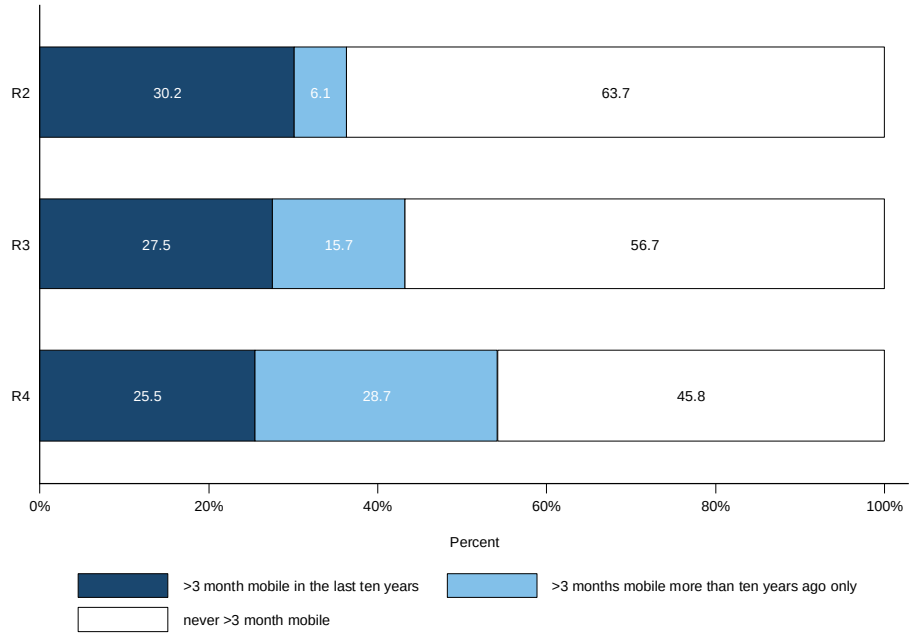
2012:



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Only R2, R3 and R4 researchers.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (2016: n=8,824; 2012: n = 8,357)

Career stage: The share of researchers that have been mobile in the last ten years per career stage is similar but slightly decreases in later career stages (see Figure 77). For those who have been mobile only more than ten years ago, the differences are higher. This situation is clearly most common among the R4. Even more, a higher share of R4 was only mobile over ten years ago compared to in the last ten years (29% versus 26%). The increase in the mobility longer ago during later career stages is intuitive as the career stage is related to age and time in the career and position. It is less likely that post-doctoral researchers have had over ten years of experience, while leading researchers (R4) might have been mobile in the past but have now obtained a tenured position, decreasing the (need for) long term mobility. This pattern is very similar to the 2012 results.

Figure 77: >3 month international mobility in post-PhD career stages, by (current) career stage (EU28)



Source: MORE3 EU HE survey (2016)
Note:
- Percentage of R2, R3 and R4 researchers who have worked abroad for 3 months or more at least once per mobility profile.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

Gender: The share of researchers that have been mobile in the last ten years per gender is slightly larger for male researchers (29%) than for female researchers (25%). A larger difference can be observed in the share of researchers that have been mobile more than ten years per gender: male researchers (21%) have a higher share than female researchers (14%)

Field of Science: Researchers in Natural Sciences are the most mobile researchers (in the last ten years plus more than ten years ago) (56%) whereas those in Medical Sciences (37%) and Engineering and Technology (40%) are least mobile.

8.1.1.1.1. In the last ten years

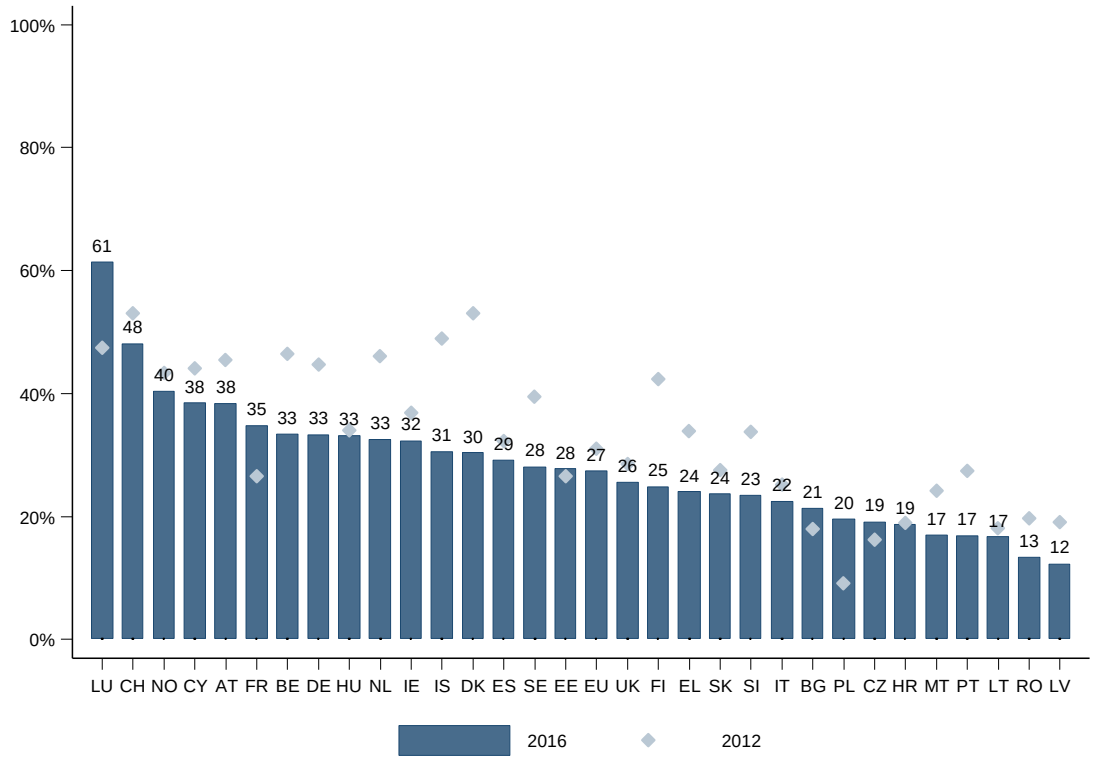
Share of researchers with >3 month international mobility experience in the last ten years *Of all R2, R3 and R4 researchers (n=8,073)*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n=7,131)	31.0%	R2: 30.1% R3: 31.5% R4: 31.1%	MED: 26.3% NAT: 34.4% SOC: 30.5%	F: 25.2% M: 34.2%
2016 (n=8,073)	27.4%	R2: 30.2% R3: 27.5% R4: 25.5%	MED: 19.5% NAT: 28.2% SOC: 30.3%	F: 25.1% M: 28.7%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"

Country level: In three countries, the share of post-PhD researchers who have been abroad for more than three months in the last ten years is clearly higher than average: Switzerland, Luxembourg and Norway each have a share of more than 50% (see Figure 78). Also in Austria, The Netherlands, Ireland and Cyprus the share reaches values higher than 30%. >3 month international mobility is less common in many of the East-European and South-European countries. Latvia, Romania and Malta are at the lower end of the spectrum with 12.4%, 13% and 17% respectively.

Also in 2012, Switzerland was ranked first for this indicator. The top 10 countries are very similar between 2012 and 2016, as are the middle and low-end countries. Denmark and Iceland are still in this top 10 but fell back considerably: from 53% to 30% for Denmark and from 49% to 31% for Iceland. Also shares for Finland have decreased. According to country experts, this might be related to the economic recession and budget cuts, inducing vacant posts and possibilities for mobility. Periods abroad might become less attractive as there are ongoing negotiations about reducing the number of staff. In Denmark, the internationalisation grants and demands have actually increased, but the results are not in line with this increase. Slightly higher dispersion of the highest shares in 2016 result in a higher rank for the EU average and a number of countries in the middle category shifting from just above to just below EU average: Sweden, Greece, Slovenia and Spain. The United Kingdom moved up to just above EU average. The main drop in the middle category is observed for Germany (from 45% to 33%) and Finland (from 42% to 25%).

Figure 78: >3 month international mobility in post-PhD career stages, in the last ten years, by country (2012-2016)

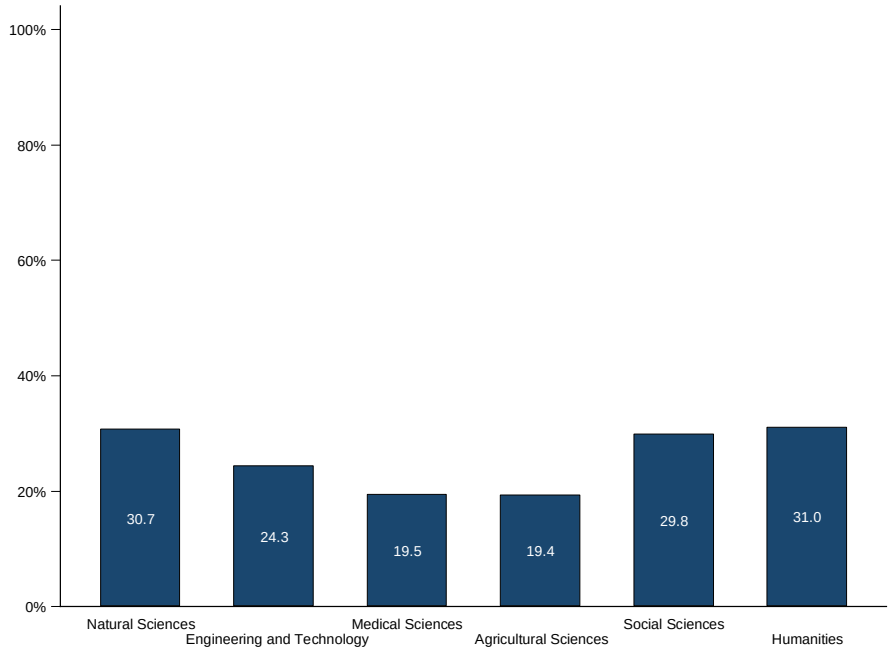


Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (2016: n=8,824; 2012: n=8,357)

Career stage: The combination of mobility profiles per career stage was discussed in the previous section. For the category of researchers that have been mobile in the last ten years we found a similar share in different career stages, though slightly decreasing in later career stages.

Field of science: The share of >3 month international mobility in the last ten years varies more considerably between fields of science. In Humanities, Natural Sciences and Social Sciences, more or less than 30% of the EU28 researchers have been internationally mobile in the last ten years, whereas in the fields of the Medical and Agriculture Sciences, this is around 19% (see Figure 79). This is very similar to the 2012 pattern. Nevertheless, an important decrease of 7 percentage points is observed in Natural Sciences (38% to 31%), in Engineering and Technology (from 31% to 24%) and in Medical Sciences (26% to 19%).

Figure 79: >3 month international mobility in post-PhD career stages, in the last ten years, by field of science (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Percentage of R2, R3 and R4 researchers who have worked abroad for 3 months or more at least once in the last ten years per field of science.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

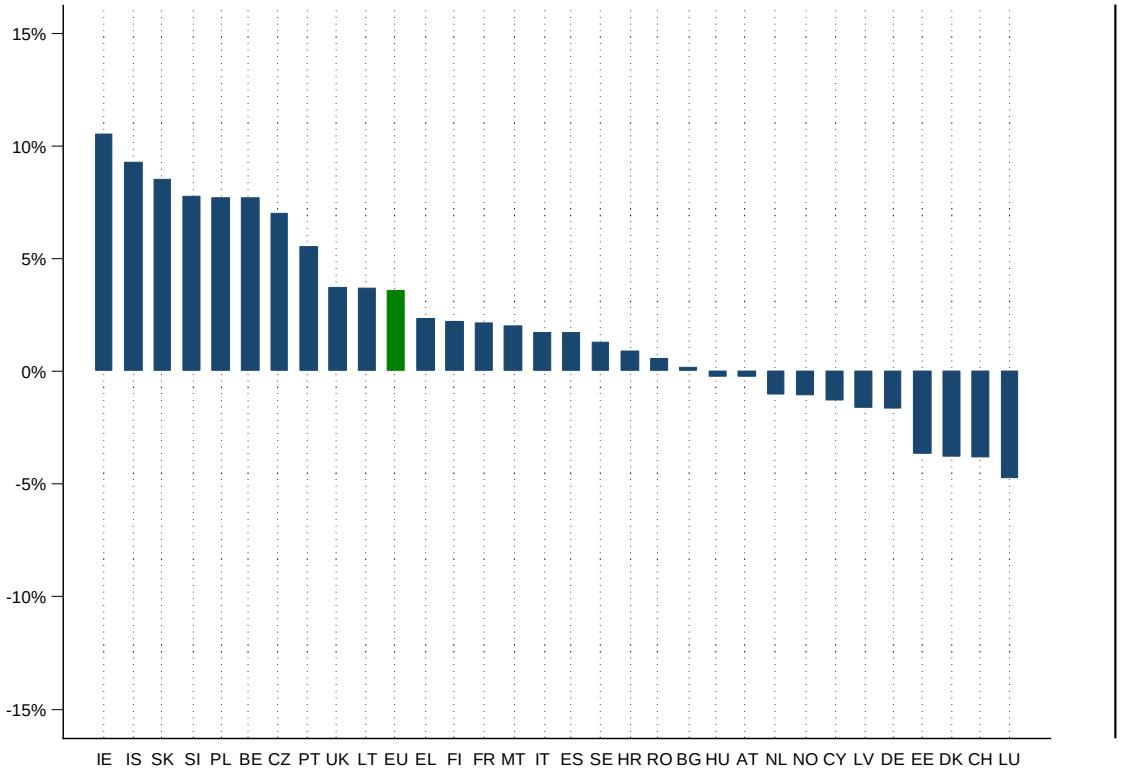
Gender: Female researchers are less inclined to >3 month international mobility in post-PhD career stage during the last ten years, as compared to their male counterparts (25% versus 29%). The gap has decreased though from 9 pp difference in 2012 to 4 pp difference in 2016.

Variations in this gender gap also occur across countries (Figure 80):
- Men are more >3 month mobile in Ireland, Iceland and Slovakia the women (8 to 10 pp difference). Also in Slovenia, Poland, Belgium, the Czech Republic and Portugal, the difference is higher than 5pp.
- Women are more >3 month mobile than their male counterparts in Luxembourg, Switzerland, Denmark and Estonia – but here the difference is each time below 5pp.

Compared to 2012, the gender gap across countries converged. In 2012 differences between men and women ranged from +25% to -5% while in 2016, this range has decreased to +10% and -5%.

Family situation: When looking into the family situation of the researchers, it appears that the traditional patterns set to continue: >3 month mobility in the last ten years was more common among single researchers (33% versus 29% couple) and researchers without children (38% versus 26% with children). Researchers who have a partner also working in research have been on average more >3 month mobile than others (37% versus 26%).

Figure 80: >3 month international mobility in post-PhD career stages, in the last ten years, by gender and country



Source: MORE3 EU HE survey (2016)
Notes:
- Difference between percentage of male and female researchers in R2, R3 and R4 researchers who have worked abroad for 3 months or more at least once in the last ten years.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,824)

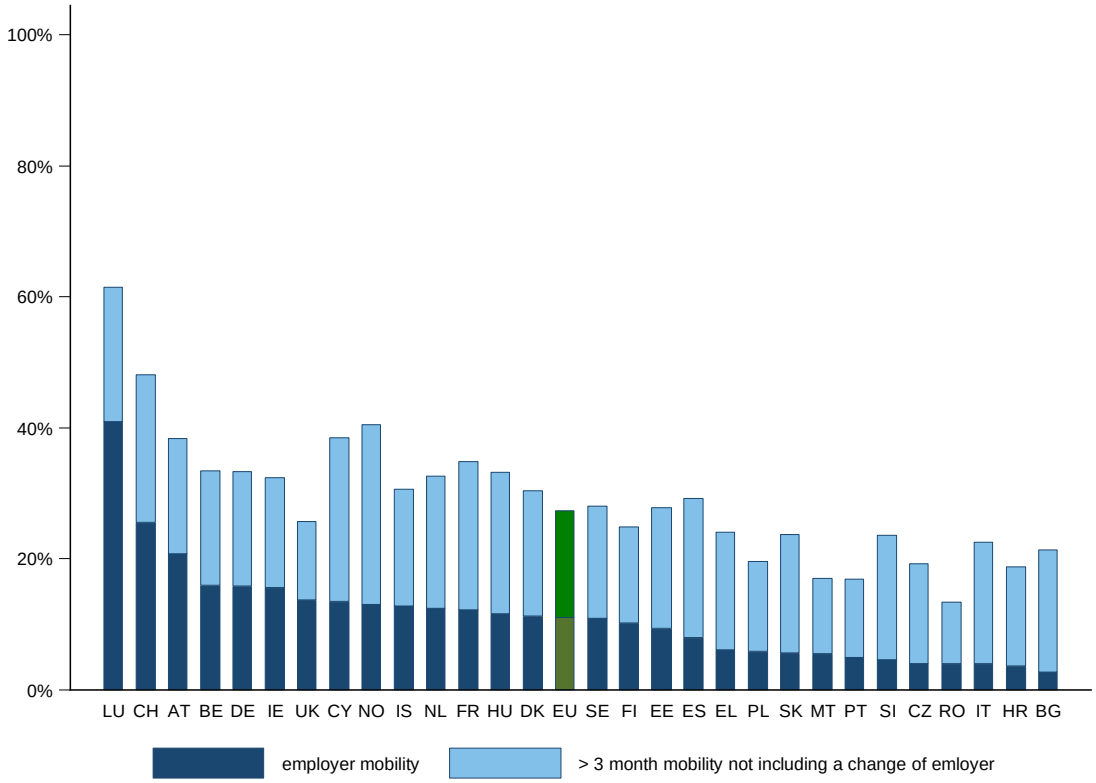
Employer mobility: 11% of the researchers have worked abroad for a new employer (for 3 months or more at least once in the last ten years). This corresponds to around 39% of all internationally mobile researchers and provides an indication of 'employer mobility'. In 2012 this was very similar with 12% and 40% respectively.

Analysing employer mobility at the level of each individual move instead of at the level of the researcher, we find that 33% of all moves of all international mobile researchers involved a change of employer (corresponding to 39% of all internationally mobile researchers).

In Luxembourg, Austria, the United Kingdom and Switzerland more than half of the >3 month mobile respondents have undertaken at least one employer move. In Greece, Slovakia, Czech Republic, Slovenia, Hungary, Italy and Bulgaria, less than one quarter changed employer in one of their moves.

Figure 81 shows that there is an inclination towards more employer mobility when the overall degree of >3 month mobility is higher. This was also the case in the MORE2 study.

Figure 81: International employer mobility as part of >3 month international mobility in post-PhD career stages, in the last ten years, by country



Source: MORE3 EU HE survey (2016)
Notes:
- Percentage of researchers in R2, R3 or R4 career stage who have changed employer in at least one of their moves as part of the share of researchers that were >3 month internationally mobile.
- With '>3 month internationally mobile researchers' defined as researchers that have worked abroad for 3 months or more at least once in the last ten years.
- Countries with less than 30 observations are omitted: Latvia and Malta.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?" and question 69: "Did you change employer?"
- (n=1,950)

8.1.1.1.2. More than ten years ago

Share of researchers with >3 month international mobility experience more than ten years ago only
Of all R2, R3 and R4 researchers

	EU total	Per career stage	Per FOS	Per gender
2012 (n=7,131)	17.4%	R2: 5.2% R3: 15.8% R4: 29.1%	MED: 22.7% NAT: 19.4% SOC: 12.1%	F: 14.0% M: 19.3%
2016 (n=8,073)	18.1%	R2: 6.1% R3: 15.7% R4: 28.7%	MED : 18.6% NAT: 21.2% SOC: 13.0%	F: 13.6% M: 20.5%

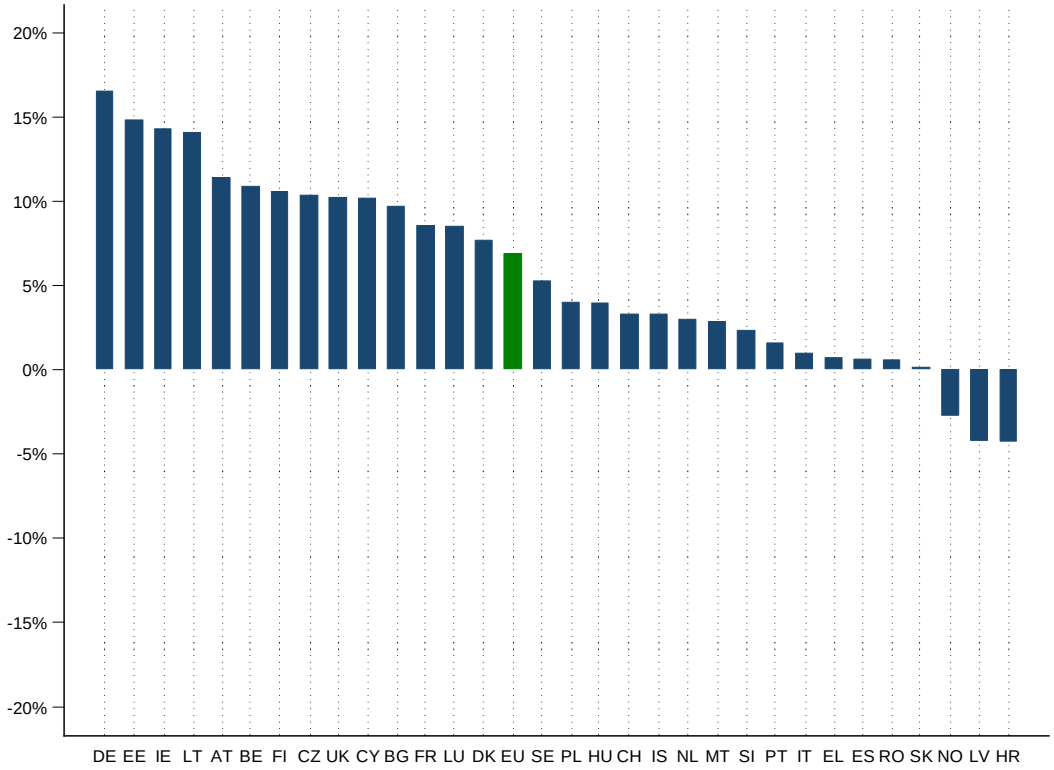
Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"

The overall share of researchers who were internationally mobile for over 3 months, but only more than ten years ago, is similar in 2016 and 2012. Also the increasing pattern across **career stages** is similar and mainly due to the career length effect.

Field of science: There is some variation in the share per field of science between 2012 and 2016, with a small increase in the Natural Sciences and Engineering and Technology, and in the Social Sciences and Humanities, but a decrease in the Medical and Agricultural Sciences.

Gender: In terms of gender, we observe similar differences, with female researchers being almost 7 pp less likely to have engaged in long-term international mobility only more than ten years ago. This is a slightly higher gap than in 2012, but is in part due to the age structure differences in the sample. There are larger gaps at country level, in particular in Germany, Estonia, Ireland and Lithuania with differences ranging from 17% and 14% between men and women (see Figure 82). Only in Norway, Latvia and Croatia do women have higher shares of long-term mobility that only happened more than ten years ago (3pp, 4pp and 4pp difference respectively).

Figure 82: >3 month international mobility in post-PhD career stages, only more than ten years ago, by gender and country



Source: MORE3 EU HE survey (2016)
Notes:
- Difference between percentage of male and female researchers in R2, R3 and R4 researchers who have worked abroad for 3 months or more over ten years ago.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,824)

8.1.1.1.3. Non-mobility

Share of researchers without >3 month international mobility experience *Of all R2, R3 and R4 researchers*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n=7,131)	51.6%	R2: 64.6% R3: 52.6% R4: 39.9%	MED: 51.0% NAT: 46.3% SOC: 57.4%	F: 60.8% M: 46.5%
2016 (n=8,073)	54.5%	R2: 63.7% R3: 56.7% R4: 45.8%	MED: 61.9% NAT: 50.6% SOC: 56.6%	F: 61.3% M: 50.8%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"

Non-mobility in this section is defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before. At the start of this section on the stock of international long-term mobility, we already summarised that 54% of the researchers in 2016 fall under this definition, compared to 52% in 2012. Non-mobility patterns mirror the findings with respect to mobility and this is visible in the analysis per dimension, briefly summarised below.

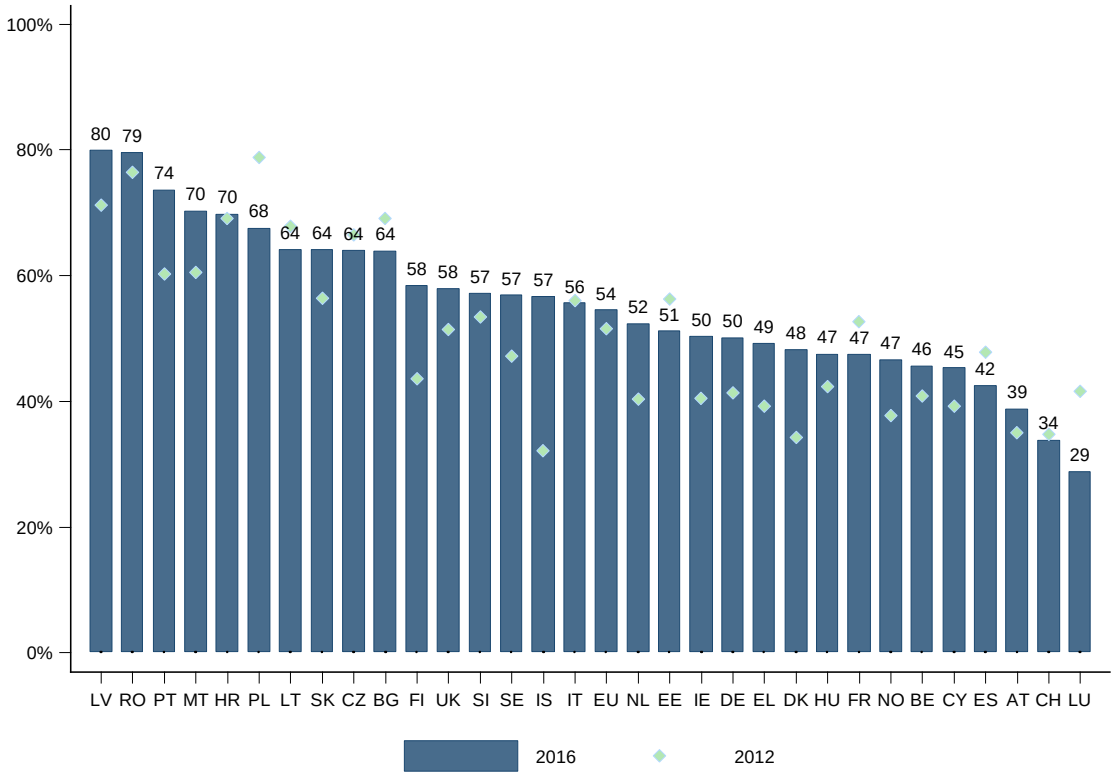
Country level: Complementary to the patterns found in terms of mobility, Spain, Austria, Switzerland and Luxembourg have the lowest share of non-mobile researchers among their citizens (see Figure 83). At the other end are Latvia, Romania, Portugal, Malta and Croatia with a share of non-mobility higher than 70%.

Career stage: Non-mobility follows a decreasing pattern over the career stage of researchers; it is highest amongst R2 researchers (64%) and lowest amongst R4 researchers (46%). This result is intuitive as career stage is highly correlated with age, experience, career and mobility possibilities.

Field of science: Non-mobility is highest in the Medical Sciences and Engineering and Technology (>60%). It has decreased in all Social Sciences between 2012 and 2016.

Gender: Non-mobility is higher among female researchers than among male researchers. The increase in non-mobility compared to 2012 is visible in the shares of both male and female researchers.

Figure 83: Non-mobility of >3 months in post-PhD career stages, by country (2012-2016)

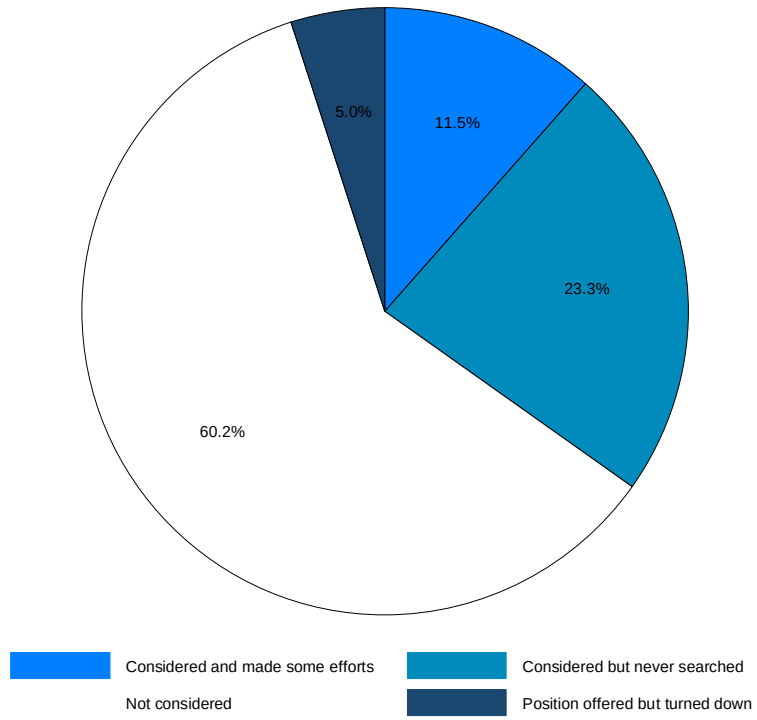


Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:

- Only R2, R3 and R4 researchers.
- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (2016: n=8,824; 2012: n=8,357)

40% of the researchers who have never worked abroad as a researcher for 3 months or more since completing their highest educational degree have considered engaging in mobility for 3 months or more (Figure 84). 12% have undertaken some effort to become mobile and 5% was even offered a position in another country but turned it down. The remaining 23% never sought out a position.

Figure 84: Level of consideration of international post-PhD >3 months mobility among the non-mobile researchers (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Distribution of non-mobile researchers in post-PhD career over levels of consideration of mobility in post-PhD career.
- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 81: "You have never worked abroad as a researcher for 3 months or more since completing your higher education (PhD or other). However, did you ever take this into consideration?"
- (n=4,758)

Country level: Table 22 shows the country variations for levels of consideration of >3 month mobility for R2, R3 and R4 researchers. In Malta and Germany, 30% or less of the non-mobile researchers have ever considered becoming internationally mobile. On the other end are Bulgaria, Latvia and Hungary where of the non-mobile R2, R3 and R4 researchers, over 60% considered becoming mobile.

In Latvia, 36% of all R2, R3 and R4 researchers have considered to become >3 month mobile but have never actually looked for a concrete opportunity. In Bulgaria, Poland and Czech Republic, more than 20% have undertaken some effects to become >3 month mobile. There are also some researchers who were offered a position in another country but turned it down, in the Netherlands, Belgium and Romania this concerns between 5% and 10% of all the researchers.

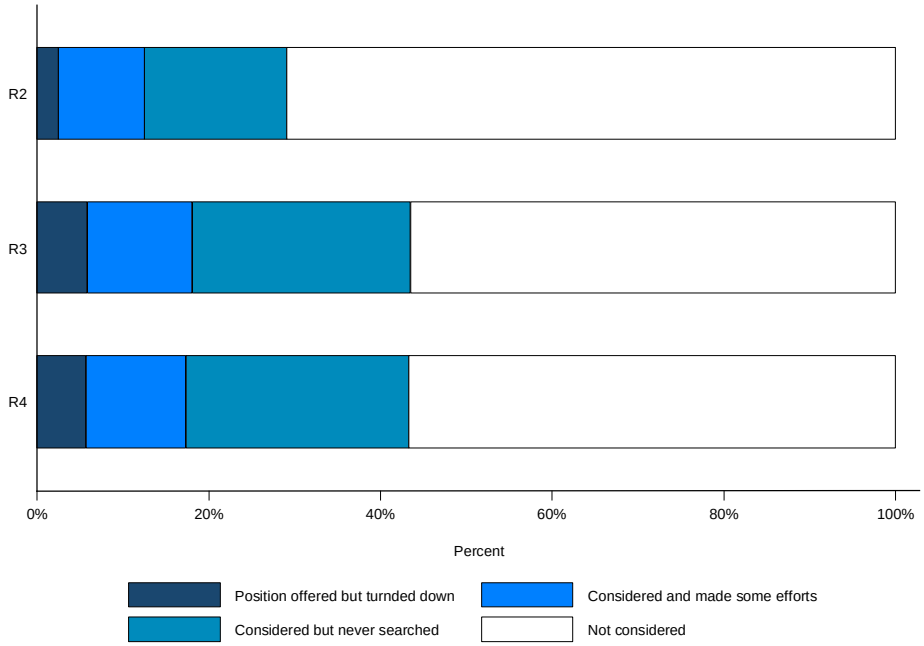
Table 22: Level of consideration of international post-PhD >3 months mobility among the non-mobile researchers, by country

Country	Not considered	Considered but never searched	Considered and made some effort	Position offered but turned down
	(non-mobile researchers)			
Austria	67.2%	19.6%	8.4%	4.8%
Belgium	57.5%	21.6%	5.5%	15.5%
Bulgaria	38.5%	31.9%	24.0%	5.5%
Switzerland	66.0%	23.1%	4.5%	6.4%
Cyprus	56.4%	31.1%	9.3%	3.3%
Czech Republic	53.1%	20.6%	20.2%	6.0%
Germany	70.0%	20.5%	6.8%	2.7%
Denmark	49.2%	31.9%	10.1%	8.8%
Estonia	53.4%	25.0%	18.2%	3.3%
Greece	48.2%	32.4%	11.6%	7.8%
Spain	57.3%	26.6%	9.1%	7.0%
Finland	56.8%	25.8%	14.4%	3.0%
France	66.9%	22.2%	6.5%	4.3%
United Kingdom	61.8%	20.8%	13.5%	3.9%
Croatia	50.9%	29.4%	15.8%	3.9%
Hungary	46.1%	30.3%	17.3%	6.2%
Ireland	66.2%	16.2%	9.7%	7.8%
Iceland	68.5%	16.3%	8.8%	6.4%
Italy	50.9%	31.5%	9.6%	8.0%
Lithuania	39.7%	36.4%	18.8%	5.1%
Luxembourg	65.2%	10.2%	16.1%	8.6%
Latvia	59.8%	26.5%	11.6%	2.2%
Malta	73.7%	14.7%	8.2%	3.5%
The Netherlands	56.8%	21.3%	10.8%	11.1%
Norway	46.7%	30.8%	17.2%	5.4%
Poland	53.0%	19.1%	22.9%	5.0%
Portugal	59.3%	28.0%	10.2%	2.5%
Romania	67.1%	15.4%	4.8%	12.7%
Sweden	62.8%	23.5%	11.4%	2.3%
Slovania	60.7%	22.6%	11.5%	5.2%
Slovakia	54.3%	26.5%	14.8%	4.5%
EU28	**60.1%**	**23.3%**	**11.5%**	**5.0%**

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Distribution of non-mobile researchers in post-PhD career over levels of consideration of mobility in post-PhD career.
- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 81: "You have never worked abroad as a researcher for 3 months or more since completing your higher education (PhD or other). However, did you ever take this into consideration?"
- (n=5,075)

Career stage: Non-mobile R3 and R4 researchers are very similar when it comes to the level of consideration of post-PhD >3 month mobility. There are less non-mobile R2 researchers who have considered becoming mobile than there are R3 and R4 researchers. The difference is visible in each of the categories (considered but did not search, considered and made some efforts and was offered a position but turned it down).

Figure 85: Share of non-mobile researchers in post-PhD career per career stage



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Distribution of non-mobile researchers in post-PhD career over levels of consideration of mobility in post-PhD career per current career stage.
- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=4,758)

Gender: 41% of the male researchers have considered mobility versus 38% female researchers. A slightly higher share of male researchers considered it to the extent that they were offered a position but turned it down (6% versus 4%) and considered it but never searched for a position (24% versus 22.3%)

Family status: The overall extent of consideration is similar between researchers living in couple and single researchers. A slightly higher share of single researchers were offered a position in another country and turned it down compared to researchers in couple (5% versus 6%).

This section on international long-term mobility to this point has given an overview of the stock of mobility and non-mobility and its characteristics. In the remainder of this section we focus on the long-term mobile in the last ten years only, and specify the flows, motives, barriers and effects found for this type of mobility, reflecting thereby the structure of the survey questionnaire.

8.1.1.2. Flows and moves

8.1.1.2.1. Destination countries

In total, 3,249 moves are registered for 1,986 researchers (who all currently work in the EU28+3). 61% of these moves took place to EU28 Member States and 6.9% to the Associated Countries. The remaining 32% concerns mobility to countries outside EU28+3.

The main destination of EU28 researchers (by citizenship) who have been mobile in the last ten years of their post-doctoral career are the United States (16%) followed by Germany (11%) and the United Kingdom (11%) (cf. Table 23).

Table 23: The main destination countries for >3 month post-PhD mobility (EU28 citizens)

Destination	Share (%)	Cum. share (%)	Origin1 (citizenship)	Origin2 (citizenship)	Origin3 (citizenship)
United States	15.5%	15.5%	Greece 9.6%	Germany 9.1%	Italy 8.9%
Germany	11.2%	26.7%	Spain 7.6%	Italy 7.3%	Poland 6.3%
United Kingdom	11.0%	37.7%	Greece 14.8%	Germany 10.3%	Italy 6.1%
France	6.6%	44.3%	Italy 13.4%	France 8.1%	Germany 7.5%
Italy	5.0%	49.3%	Spain 12.8%	Italy 11.3%	Greece 10.6%
Switzerland	4.3%	53.6%	Germany 22.0%	Italy 15.4%	France 8.1%
Spain	3.2%	56.8%	Italy 16.7%	Portugal 11.1%	Greece Belgium 8.9%
Belgium	3.1%	60.0%	France 14.6%	Italy 13.5%	Spain 10.1%
Sweden	3.1%	63.0%	Finland 19.5%	Estonia 12.6%	Germany 10.3%
Austria	2.8%	65.8%	Germany 21.5%	Italy 17.7%	Austria Hungary 7.6%

Source: MORE3 EU HE survey (2016)
Reading note: Of the total number of researchers who currently work in the EU but who were mobile to the US for more than three months during post-doctoral career stages, 9.6% are Greek, 9.1% are German and 8.9% are Italian citizens.
Notes:
- Only R2, R3 and R4 researchers.
- An important difference in the question between MORE2 and MORE3 is the number of moves a researcher can register: in MORE2 this was 8 and in MORE3 this was 3. MORE3 thus focuses on the most recent mobility only. In MORE2 however, only 5.4% of the respondents indicated that they had 4 moves or more, limiting the difference between MORE2 and MORE3.
- Based on question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your research career after your PhD up to (but excluding) your current position in which you are employed."
- (n=3,249)

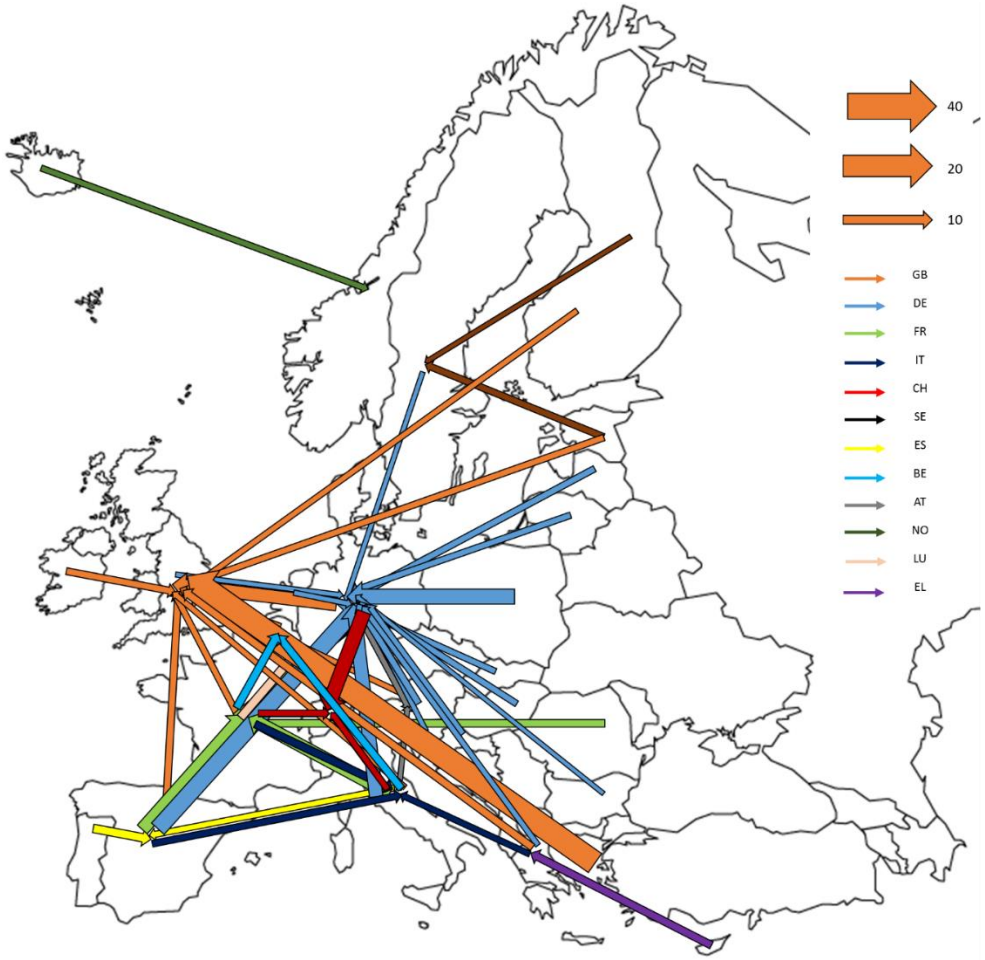
Within this group of EU28 citizens, Table 23 further shows that the Greek, the German and the Italian constitute the largest group of incoming researchers for most of these top 10 destinations. This is also confirmed by Figure 86 which presents the main flows of mobility in terms of individual moves within the EU: also here, the main originating countries in terms of citizenship are Italy (9%), Germany (8%), Greece (7%), Spain (6%) and France (6%).

The flows are interesting to interpret from the destination side (Figure 86):
- The United Kingdom and Germany are important destinations for all regions in Europe;

- France is also an important destination, mainly for Italian, German and Spanish researchers;
- Bulgaria, Croatia and Romania are only receiving a limited amount of other EU researchers. The same counts for the smaller EU countries such as Latvia, Lithuania, Estonia and Malta.

The global perspective (Figure 87) shows that North America (mainly the USA) is the most frequent destination (60%) followed by Asia (17%), Oceania (9%) and South America (7%). The top 5 destination countries are the same as in MORE2.

Figure 86: Map of >3 month international mobility flows in post-PhD career stages within the EU28+3



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers currently working in EU28+3 and only flows of 10 moves or more are shown.
- Count of moves between countries in the EU28+3.
- 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 researchers.
- With country of departure equal to country of citizenship.
- An important difference in the question between MORE2 and MORE3 is the number of moves a researcher can register: in MORE2 this was 8 and in MORE3 this was 3. MORE3 thus focuses on the most recent mobility only. In MORE2, however, only 5.4% of the respondents indicated that they had 4 moves or more, limiting the difference between MORE2 and MORE3.
- Based on question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your research career after your PhD up to (but excluding) your current position in which you are employed."
- (n= 2,069)

Figure 87: Map of >3 month international mobility flows in post-PhD career stages from the EU to other continents

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers currently working in EU28+3 and only flows of 10 moves or more (aggregated per continent) are shown.
- Count of moves between EU8+3 and other continents.
- 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.
- With country of departure equal to country of citizenship.
- An important difference in the question between MORE2 and MORE3 is the number of moves a researcher can register: in MORE2 this was 8 and in MORE3 this was 3. MORE3 thus focuses on the most recent mobility only. In MORE2 though, only 5.4% of the respondents indicated that they had 4 moves or more, limiting the difference between MORE2 and MORE3.
- Based on question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your research career after your PhD up to (but excluding) your current position in which you are employed."
- (n=1,015)

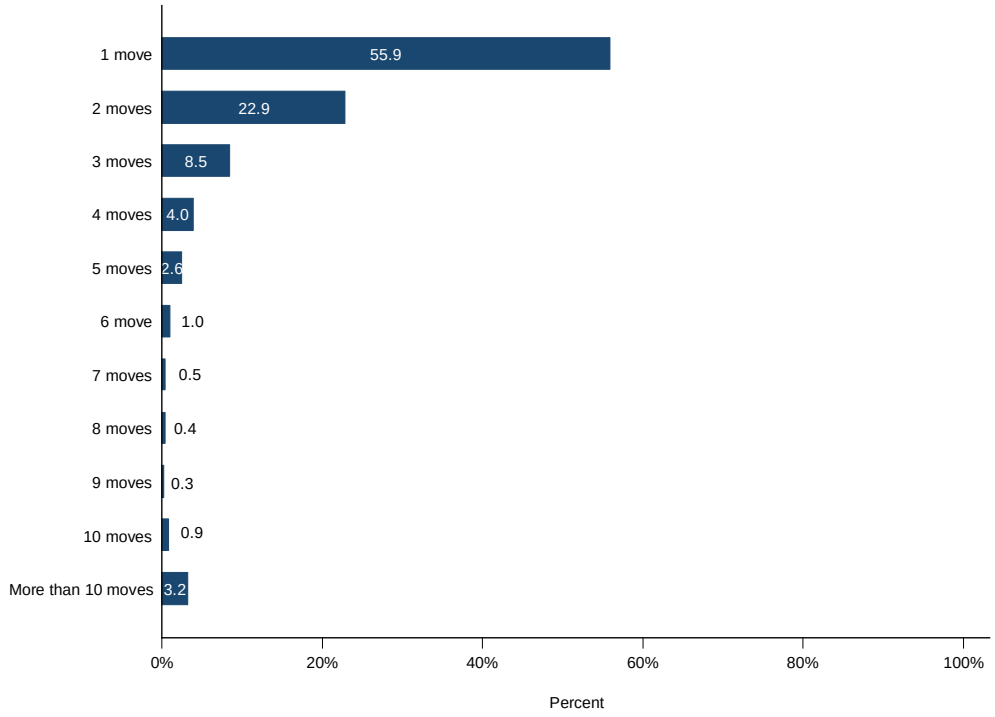
8.1.1.2.2. Mobility frequency

Figure 88 provides an overview of the number of moves that the mobile EU researchers made on average in the last ten years. 56% of the mobile researchers have moved only once. The average number of moves in the last ten years per mobile researchers – defined as having undertaken 1 move or more – is 2.15.

- **Gender:** Next to the slightly higher rate of mobility among men, also their average number of moves in the last ten years is somewhat higher: 2.19 moves compared to 2.07 for female researchers.
- **Career stage:** R4 researchers have a slightly higher average number of moves (2.53) compared to R2 (1.96) and R3 researchers (1.99), which can be explained due to the generally longer research career of R4 researchers.
- **Field of science:** No large differences are observed among the different fields of science. Mobile researchers in Medical Sciences have the lowest average number of moves (2.06) and Humanities the highest (2.29). This is in line with the overall mobility patterns of the fields as described in section 8.1.1.1.1.

- Researchers whose partner also works as a researcher have a higher average number of moves (2.52) than researchers whose partner does not work in research (2.13).

Figure 88: Frequency of >3 month international mobility in post-PhD career stages, in the last ten years (EU28)



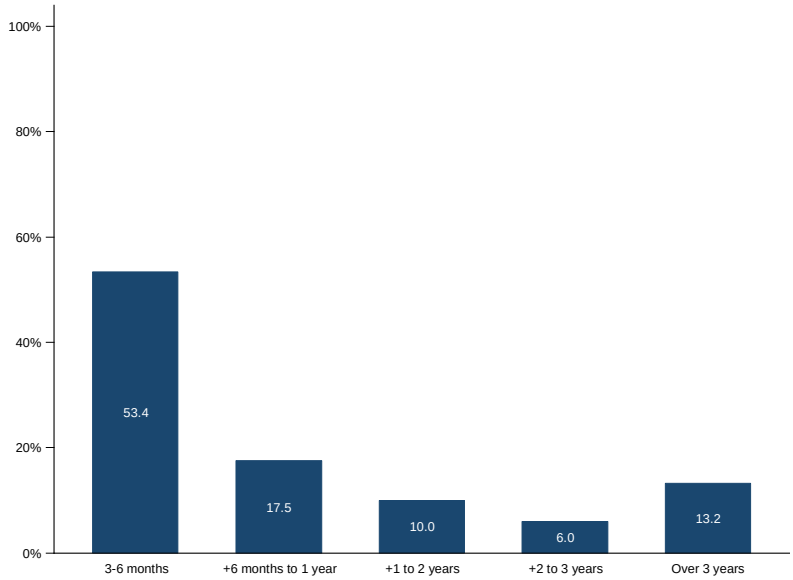
Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of R2, R3 or R4 researchers who have worked abroad for 3 months or more at least once in the last ten years over the number of moves per researcher in the last ten years (2006-2016).
- Based on question 65: "How many times did you work abroad for more than 3 months in the last ten years (2006-2016)?"
- (n=1,838)

8.1.1.2.3. Mobility duration[117,118]

Share of moves that fall within the duration range *Of all moves by R2, R3 and R4 researchers with >3 month international mobility experience in the last ten years*					
	3 months to 6 months	**6 months to 1 year**	**1 year to 2 years**	**2 years to 3 years**	**More than 3 years**
2012 (n=2,654)	44.5%	16.1%	8.0%	8.6%	17.7%
2016 (n=2,804)	53.4%	17.5%	10%	6%	13.2%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 68: "What was the duration of each step?"

Figure 89: Duration per move for >3 month international post-PhD mobility, in the last 10 years (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of moves by R2, R3 or R4 researchers who have worked abroad for 3 months or more at least once in the last ten years over duration categories.
- Based on question 68: "What was the duration of each step?"
- (n=2,804)

[117] An important difference in the question between MORE2 and MORE3 is the number of moves a researcher can register: in MORE2 this was 8 and in MORE3 this was 3. MORE3 thus focuses on the most recent mobility only. In MORE2, however, only 5.4% of the respondents indicated that they had 4 moves or more, limiting the difference between MORE2 and MORE3. The same remark is applicable to the subsequent sections on contract, destination sector and career progression.

[118] For analysis at the level of the move, the sample is not weighted because no information on the relative population of moves is available for FOS or country. Furthermore, weighting might create a larger imbalance in the information on moves than looking at the sample shares only.

53% of the registered international moves of more than 3 months have lasted for 3 to 6 months (see Figure 89). The share decreases with each increase in duration, except for the longest category: 13.2% of the moves took more than 3 years. **Error! Not a valid bookmark self-reference.** shows that the duration per move is on average longer for moves with an employer change than for those without - an intuitive result.

Table 24: Duration per move for >3 month international post-PhD mobility with and without employer change, in the last 10 years (EU28)

	No employer change	Employer change	Total
3-6 months	69.5%	21.1%	53.4%
+6 months to 1 year	17.2%	18.1%	17.5%
+1 to 2 years	5.5%	18.9%	10.0%
+2 to 3 years	2.8%	12.3%	6.0%
Over 3 years	5.0%	29.6%	13.2%

Source: MORE3 EU HE survey (2016)
Notes:
- Share of moves per duration category, for moves without and with an employer change and in total.
- With moves being defined as international steps in the last ten years of R2, R3 and R4 researchers to work abroad for 3 months or more.
- Based on question 69: "Did you change employer?"
- (n=2,804; n=935 for employer change)

8.1.1.2.4. Mobility conditions: contract

Share of moves with a specific contract type
Of all moves by R2, R3 and R4 researchers with >3 month international mobility experience in the last ten years (n=2,804)

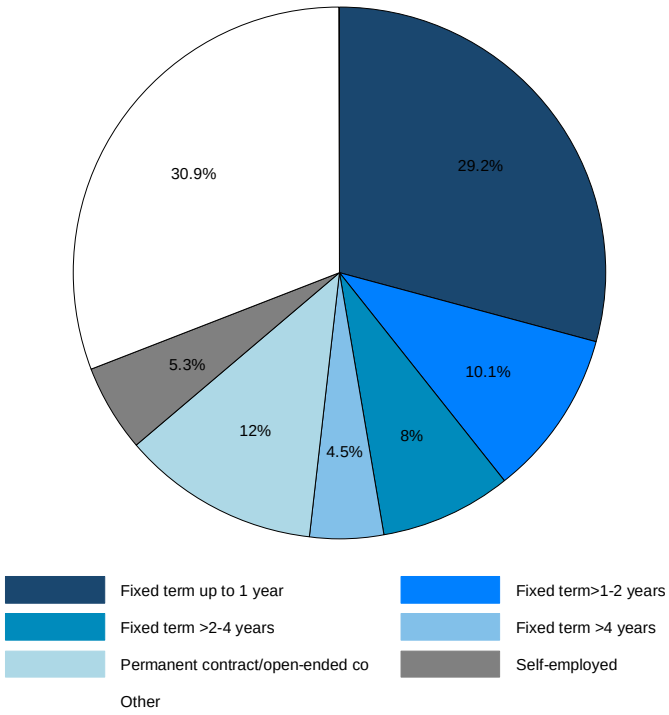
	Fixed term contract	Permanent or open ended contract	Self-employed	Other
2012 (n=2,705)	58%	14.5%	2.7%	24.0%
2016 (n=2,804)	51.8%	12%	5.3%	30.9%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 70: "What was the type of contract?" The answer option in MORE2 "Open ended contract" was changed to "permanent or open ended contract" in MORE3.

Regarding the types of contract that researchers sign when moving to other countries, the picture is ta a large extent stable compared to MORE2. The largest share of moves is associated with other types of contracts (31%). This might be related to the fact that most of the moves have a relatively short duration (less than one year) and, of these, most do not entail a change of employer (87%).

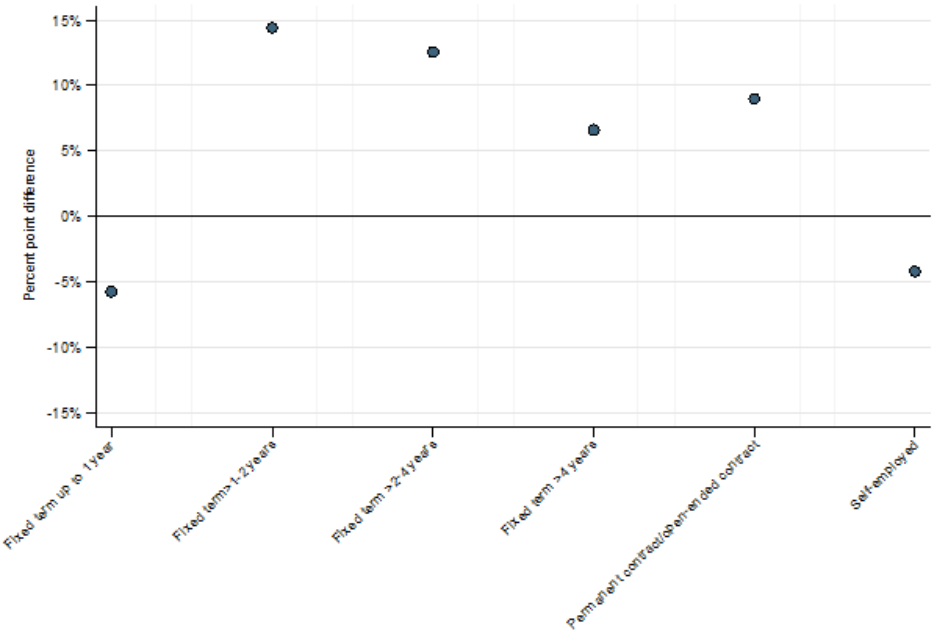
Among those moves that are related to the signature of a contract, we find that most of the contracts are fixed-term with a maximum duration of a year (29%), followed by permanent contracts (12%). The figures on fixed term and permanent/open ended contracts are coherent with the results of MORE2 – (58% and 52% for fixed term contracts and 15% and 12% for permanent/open ended contracts respectively) and also with the declared duration of the moves where those with a duration between one and two years predominate over longer moves.

Figure 90: Contract type per move for >3 month international post-PhD mobility, in the last 10 years (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of moves indicated by R2, R3 or R4 researchers who have worked abroad for 3 months or more at least once in the last ten years over contract types.
- Based on question 70: "What was the type of contract?"
- (n=2,804)

Figure 91: Contract type per move for >3 month international post-PhD mobility with an employer change, in the last 10 years (EU28)



	No employer change	Employer change	Total
Fixed term up to 1 year	31.1%	25.3%	29.2%
Fixed term>1-2 years	5.3%	19.7%	10.1%
Fixed term >2-4 years	3.8%	16.4%	8.0%
Fixed term >4 years	2.3%	8.9%	4.5%
Permanent contract/open-ended contract	9.0%	18.0%	12.0%
Self-employed	6.7%	2.5%	5.3%

Source: MORE3 EU HE survey (2016)
Reading note: Moves with employer change more frequently include a permanent contract/open-ended contract (18%) than moves without an employer change (9%).
Notes:
- Difference between percentage of moves including an employer change per contract type and percentage of moves without employer change per contract type.
- With moves being defined as international steps in the last ten years of R2, R3 and R4 researchers to work abroad for 3 months or more.
- Based on question 70: "What was the type of contract?" and question 69: "Did you change employer?"
- (n=2,804; n=935 for employer change)

8.1.1.2.5. Mobility conditions: destination sector

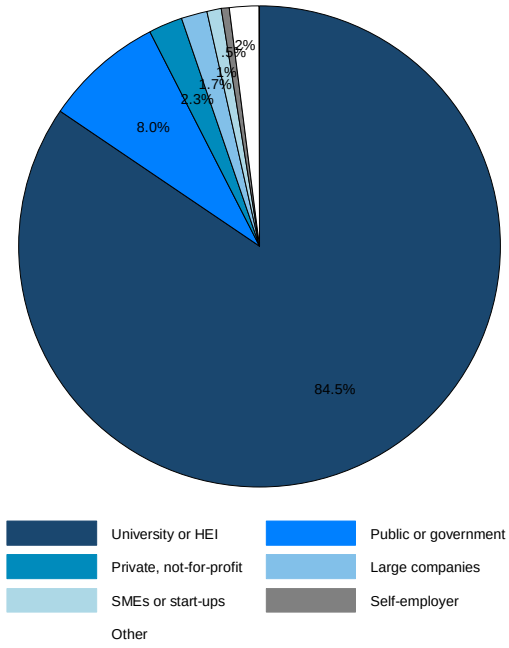
Share of moves to a specific destination sector
Of all moves by R2, R3 and R4 researchers with >3 month international mobility experience in the last ten years (n=2,804)

	University or HEI	Public/ government	Private, not-for-profit	Large companies	SMEs start-ups	Self-employed	Other
2012 (n=2,705)	82.7%	9.3%	4.4%	2.6%		0.3%	0.8%
2016 (n=2,804)	84.5%	8%	2.3%	1.7%	1%	0.5%	2%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 71: "What was the destination sector?"; The questionnaire in 2012 did not differentiate between large and small companies.

The vast majority of international moves are undertaken within the academic sector (85%), a similar figure as that found MORE2 (83%). The second most popular sector of destination is the public sector (8%). The number of moves to the private non-profit sector has seen a small decline but the low number of moves registered leads us to interpret this decline with caution. The share of international moves to work in the private sector is stable when comparing MORE2 and MORE3 results, remaining close to 3% respectively. It is important to take into account that the MORE2 questionnaire did not differentiate between large companies and SMEs. Therefore, the two categories in MORE3 need to be taken jointly into consideration for the comparison between the two studies.

Figure 92: Destination sector per move for >3 month international post-PhD mobility, in the last 10 years (EU28)

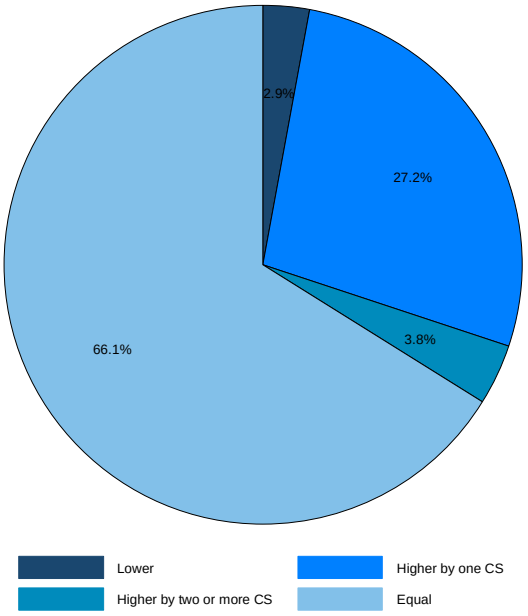


Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of moves indicated by R2, R3 or R4 researchers who have worked abroad for 3 months or more at least once in the last ten years over destination sector.
- Based on question 71: "What was the destination sector?"
- (n=2,804)

8.1.1.2.6. Mobility conditions: career progression

For 66% of the researchers' moves, the end position equals the start position (We do not compare the results with MORE2 as in MORE2 both start and end function were included while in MORE3 only the start function was asked for.
Figure 93). 27% of the moves include a career progression with one step and 4% with two steps. Career progression by one step is more frequent when a move concerns a change of employer compared to a move which does not involve a change of employer. We do not compare the results with MORE2 as in MORE2 both start and end function were included while in MORE3 only the start function was asked for.

Figure 93: Career progression per move for >3 month international post-PhD mobility, in the last 10 years (EU28)



	No employer change	Employer change	Total
New function lower than previous function	2.8%	3.0%	2.9%
New function one career stage higher than previous function	25.4%	30.8%	27.2%
New function two or more career stages higher than previous function	4.2%	3.0%	3.8%
New function equal to previous function	67.6%	63.2%	66.1%

Source: MORE3 EU HE survey (2016)
Notes:
- Distribution of moves indicated by R2, R3 or R4 researchers who have worked abroad for 3 months or more at least once in the last ten years over career stage.
- Based on question 72: "What was your career stage at the start of each move?"
- (n=2,804; n=935 for employer change)

8.1.1.3. Motives

This section discusses the motives of researchers when deciding to be internationally mobile. These analyses refer to those researchers that have been internationally mobile for more than 3 months during their post-PhD career stages. First, this section presents the motives related to escape, expected and exchange mobility. Second, it analyses the importance of motives for the last move made to an EU country. The last sections are devoted to the analysis of the main motive for each of the individual moves and of the main motives for employment change.

A list of 15 factors were presented for each type of mobility (plus the 'other' category). In a similar way as was undertaken in Section 6 on researchers´ satisfaction with working conditions and on section 7 on Mobility and collaboration during PhD stage, several categories of factors are analysed. We can differentiate between 1) motives related to remuneration and other non-science related factors, 2) motives related to scientific knowledge production, and 3) motives related to career progression.

The first set encompasses to two main categories: Financial security and satisfaction at work.

- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Another category encompasses those motives that refer to non-work related reasons such as culture, personal or family reasons and other non-specified factors.

The second main group of motives – related to conditions to create scientific knowledge - is formed by financial support, intellectual support, and time constraints.

- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance and research autonomy includes research autonomy and balance between teaching and research time.

Finally, the last group makes reference to those factors related to career progression.

8.1.1.3.1. Escape, expected and exchange mobility

As explained in section 3.2.4.3, a number of results in the MORE2 study raised questions about the extent to which mobility can be forced and, therefore, whether it could entail negative effects instead of positive effects. With the objective of providing empirical evidence to address this question, the MORE3 EU HE survey directly asked mobile researchers about the degree of freedom they had in their decision to become mobile. We distinguish between escape, expected and exchange mobility as defined in section 3.2.4.3.

Escape mobility occurs when a researcher is 'pushed' away from his or her environment because of lack of funding, of 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. In this sense, it is worth highlighting that 9% of the researchers who have been mobile for more than 3 months in the last ten years indicated that they felt forced to move because there were no options for a research career in their home country. Another 7% felt forced because international mobility is a requirement for career progression in their home country.

The term expected mobility is used for those cases where mobility is perceived as a 'natural' step in a research career but researchers do not feel obliged to move. The

results of the survey indicate that 17% of researchers who have been mobile for more than 3 months made this decision because of the expected benefits of the move in terms of career progression when returning to their home country, even though it was not required. Similarly, 15% of the long-term mobile researchers chose to be mobile in order to improve their working conditions compared to their home country.

Finally, exchange mobility refers to those situations 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. This group is the largest: 44% of the researchers indicated that they decided to move because of the opportunities derived from international mobility in terms of networking and knowledge exchange.

EU versus non-EU moves: Table 25 shows that the degree of freedom is higher for decisions to move outside the EU: 51% of the non-EU moves was undertaken for reasons related to knowledge exchange and networking, compared to 38% of the EU moves. Self-chosen moves to improve one's working conditions are more common among EU moves. Regarding escape mobility, in 19% of the cases, researchers felt forced to move within the EU, compared to 12% for non-EU moves.

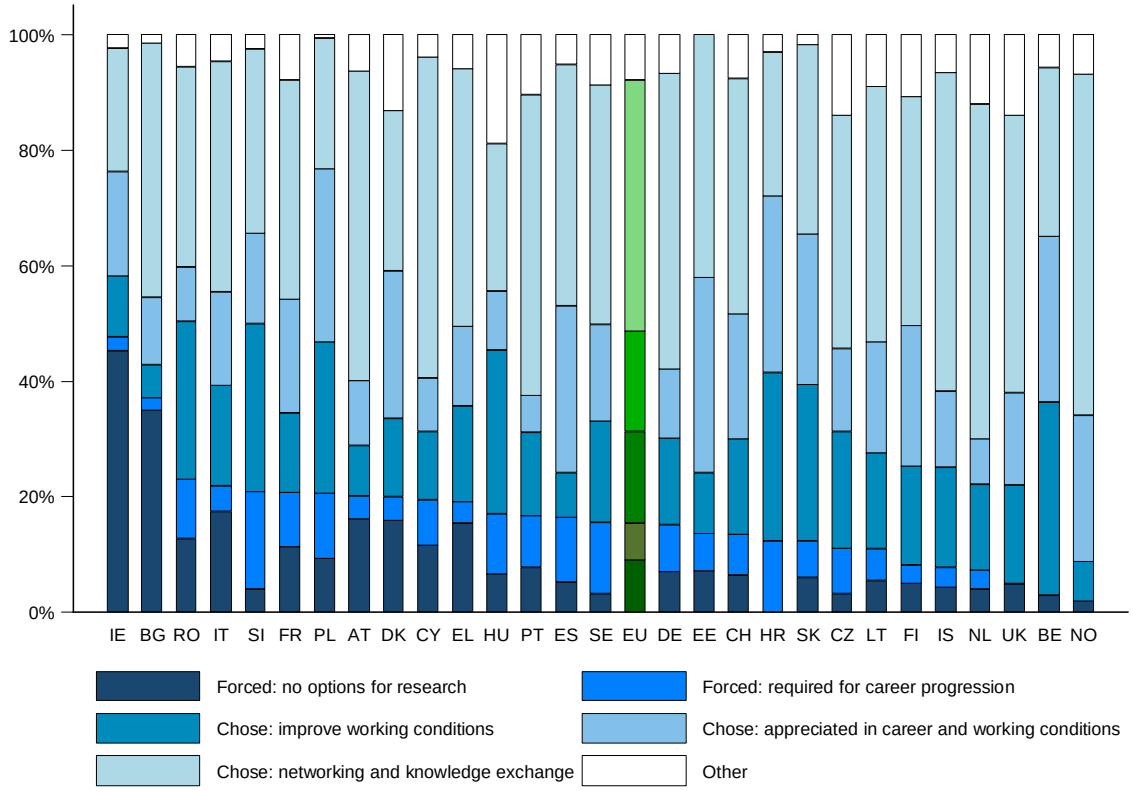
Table 25: Escape, expected and exchange mobility (EU28)

	EU moves	Non-EU moves	Total
Forced: no options for research	12.5%	4.4%	9.1%
Forced: required for career progression	6.4%	7.9%	7.0%
Chose: improve working conditions	17.6%	12.2%	15.3%
Chose: appreciated in career and working conditions	15.5%	18.6%	16.8%
Chose: networking and knowledge exchange	38.5%	51.0%	43.7%
Other	9.5%	5.9%	8.0%

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Distribution of >3 month mobile researchers in post-PhD career over applicable situation for their last instance of mobility, for EU and non-EU moves.
- Based on question 74: "Which of the following situations would you say is most applicable to your last instance of mobility?" and question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your research career after your PhD up to (but excluding) your current position in which you are employed."
- (n=1,704)

Country of citizenship: Figure 94 shows that the highest shares of forced mobility among researchers who have been mobile for more than 3 months are found among citizens from Ireland and Bulgaria, with shares significantly above the EU average (48% and 37% respectively). The lowest shares of forced mobility are observed among citizens from Norway, Belgium and the United Kingdom. In the latter cases, mobility as a requirement for career progression does not seem to play a role.

Figure 94: Escape, expected and exchange mobility, by country of citizenship (EU28)

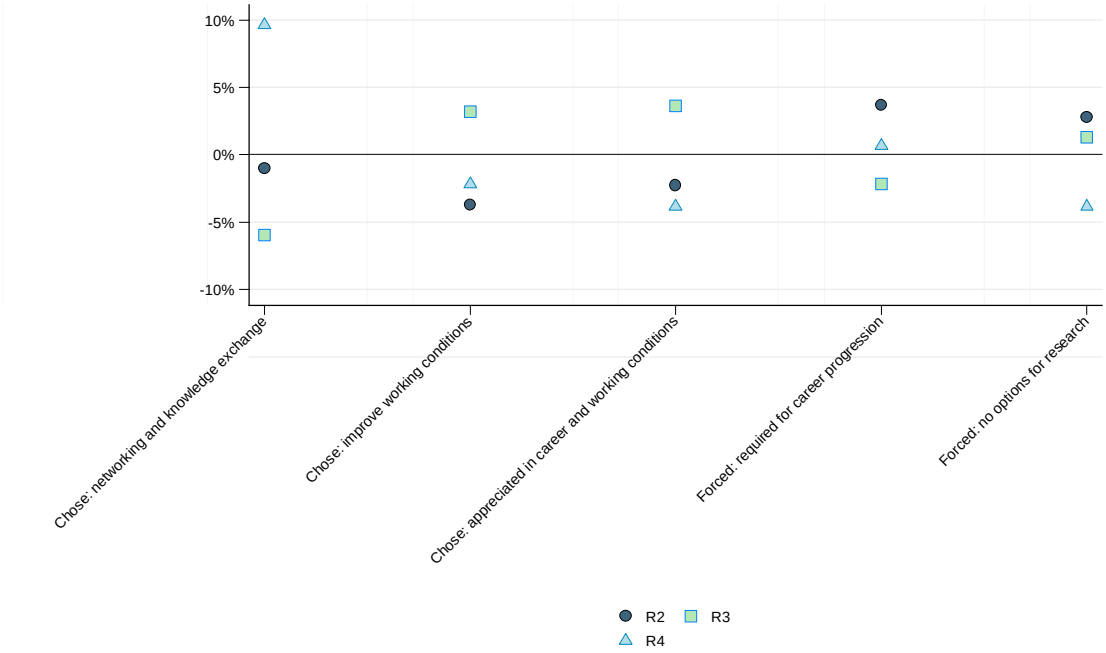


Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Share of researchers who have been >3 month mobile in post-PhD career and that experienced a specific degree of freedom in their decision to become mobile.
- Countries with <30 observations are excluded: this is the case for Malta, Latvia and Luxembourg.
- Based on question 74: "Which of the following situations would you say is most applicable to your last instance of mobility?"
- (n=1,989)

Career stage: Figure 95 shows that R2 researchers constitute the group in which a higher share of individuals felt forced to move (their last move). R4 mobile researchers tend to have felt less frequently forced to move due to lack of options for a research career in their home country (5%) compared to R2 and R3 (12% and 10% respectively). R3 mobile researchers feel less frequently forced to move as a requirement for career progression in their home country (5%) compared to R2 (11%) and R4 researchers (8%).

Researchers in higher career stages tend to have more freedom in their decisions to be mobile. A higher share of R3 researchers state that they moved to improve their working conditions (19% versus 12% for R2 and 13% for R4) and to see their career and working conditions improved in their home country (20%) - versus 14% for R2 and 13% for R4. Mobile R4 researchers seem to choose to move for reasons of networking and knowledge exchange (53%) more frequently than R2 (43%) and R3 (38%).

Figure 95: Escape, expected and exchange mobility, by (current) career stage (EU28)



	R2	R3	R4	Total
I chose to move: networking and knowledge exchange	42.7%	37.8%	53.4%	43.7%
I chose to move: appreciated in career and working conditions in home country	14.5%	20.4%	12.9%	16.8%
I chose to move: improve my working conditions compared to home country	11.6%	18.5%	13.2%	15.3%
I felt forced to move: no options for a research career in home country	11.9%	10.4%	5.3%	9.1%
Other	8.6%	8.0%	7.6%	8.0%
I felt forced to move: requirement for career progression in home country	10.7%	4.9%	7.7%	7.0%

Source: MORE3 EU HE survey (2016)
Reading note: The share of R4 who indicate that they chose to move for the opportunities international mobility offers in terms of networking and knowledge exchange exceeds the share or R2 and R3 by resp. 11pp and 16pp. The share for R4 is 53.4% whereas the share for R3 is 37.8% and for R2 is 42.7%.
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Difference between share of researchers who have been >3 month mobile in post-PhD career per current career stage about their mobility situation and the total share of researchers that have been >3 month mobile.
- Based on question 74: "Which of the following situations would you say is most applicable to your last instance of mobility?" and question 515: "In which career stage would you currently situation yourself?"
- (n=1,704)

Gender: The degree of forced mobility seems more or less equal between female and male researchers, but the reasons for feeling forced differ. Female researchers having been mobile (more than 3 months) state that they were driven by the lack of options for a research career in their home country (13% compared 7% among male researchers). On the contrary, for male researchers, career progression in their home country seems to be a more important motive - 8% versus 5% among female researchers. A larger share of male researchers also declares to be motivated by the desire to improve their working conditions (17% compared to 12% among female researchers).

Family status: Considering only those researchers that have been mobile for more than three months (as in the rest of the section), some differences are observed when marital status is taken into account. Single researchers feel forced to move more frequently than researchers in couple. The former declare themselves more driven – on average - by the lack of options for a research career in their home country (18% versus 7%).

On the contrary, researchers living in a couple indicate more frequently that they chose to move for reasons of networking and knowledge exchange (46% versus 28% among single researchers). On the other hand, compared to single researchers, the decisions of those living in couple are less related to some factors, such as career progression or improving working conditions (16% versus 21%).

We observe some notable differences in the impact of family composition on the motives for mobility. Mobile researchers without children feel more frequently forced to move because of the lack of options for a research career in their home country compared to researchers with children (14% versus 7%). On the other hand, they are less driven by networking and knowledge exchange (39% versus 44%).

There are no large differences between researchers whose partner works in research and those whose partner works in another sector.

These findings seem to suggest that single researchers and those without children face more pressure to be mobile than those living in couple or who have children. In other words, single researchers are more likely to be in a situation in which they enjoy less freedom to decide whether to be mobile or not. Several explanations can account for these differences. They might point to the fact that researchers in couple or with children tend to have reached higher career stages. As a result, they are more likely to have more stable working conditions and, hence, face less pressure to be mobile. These differences can also be derived from the idea that researchers in couple who face problems related to a lack of career options or poor working conditions, instead of deciding to move to another country, might opt to leave the academic research career. Individuals in the latter situation would not be included in the target group of the MORE3 EU HE survey. As such, these explanations should be taken with caution since there is no empirical evidence to fully support these claims.

8.1.1.3.2. Motives for >3 month post-PhD mobility: Motives last EU move

In this section, the importance of researchers´ motives for their last move of more than three months within the EU is analysed. Table 26 shows the shares of researchers who identify each motive as being important for their last move to the EU. The most frequently indicated motive is international networking (83%), followed by career progression 80%) and working with leading scientists (79%). Results follow a similar pattern as the findings obtained in MORE2, where career progression and working with experts were the main motives for this type of move (international networking was not included in MORE2).

The share of researchers declaring that they were driven by research autonomy has strongly increased since 2012 (from 47% to 76%). The share of researchers indicating that remuneration is a motive for their last move to the EU has also increased (from 41% in MORE2 to 53% in MORE3) (see Table 26). Social security and other benefits (41%) are more frequently indicated as a motive for the last EU move than is a pension plan (32%).

Table 26: Importance of motives for >3 month international mobility in post-PhD career stages, last EU move (2012-2016, EU28)

Share of respondents that indicate this motive as one of the motives for their last EU move	2012 (n=1002)	2016 (n=1,097)
International networking	/	83.30%
Career progression	83.10%	80.00%
Working with leading scientists	74.70%	78.80%
Research autonomy	46.70%	76.40%
Access to research facilities and equipment	69.30%	74.70%
Availability of research funding	70.30%	68.20%
Quality of training and education	59.00%	67.90%
Availability of suitable positions	68.70%	65.10%
Culture and/or language	58.10%	57.40%
Balance between teaching and research time	/	55.70%
Remuneration	40.60%	53.30%
Personal/family reasons	46.70%	45.50%
Job security	30.10%	39.40%
Social security and other benefits	21.60%	41.40%
Pension plan		32.10%
Working conditions	56.00%	

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Note:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?"

In Table 27, the motives are grouped according to the categories defined above and the average share of researchers finding the motives in this category important is indicated. Career progression (80%) and the search for Intellectual support (77%) are the most frequently cited categories. Researchers are driven least by financial security (49%) or satisfaction at work (50%).

Table 28 shows the average scores per country of citizenship for each category of motives. In Germany, Poland, and Romania the averages of the shares of researchers considering these motives important are higher than EU28 average for all or most of the categories. On the contrary, in Portugal, Sweden, Denmark, and Spain the average shares of researchers for most of these factors are lower than the EU28 average.

Career stage: R2 researchers tend to give more importance to factors related to career progression (93%) than other career stages (84% in R3 and 62% in R4). A similar pattern is found for the category of motives related to intellectual support, which is considered important by 80% of R2, 77% of R3 and 72% of R4 researchers.

However, when the items are analysed individually, there is a large heterogeneity across career stages for most of the motives. Compared to other career stages, R2 researchers seem to attribute a greater importance to career progression, social security and other benefits, international networking, the availability of research funding, access to research facilities and equipment, and the quality of training and education. For R3 researchers other factors seem to play a more relevant role: the availability of suitable positions, remuneration, research autonomy, job security, culture and/or language and personal and family reasons. The shares of R4 researchers are lower than for the rest of the career stages in almost all the factors, except for the item referring to the balance between teaching and research time.

Table 27: Importance of categories of motives for >3 month international mobility in post-PhD career stages, last EU move (EU28)

Average share of respondents that indicate the motives in this category as one of the motives for their last EU move *Of mobile R2, R3 and R4 researchers (n=1,097)*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
Financial security	41.5%	R2: 42.1% R3: 43.9% R4: 36.6%	MED: 40.0% NAT: 43.1% SOC: 42.6%	F: 41.8% M: 41.4%
Satisfaction at work	51.4%	R2: 41.6% R3: 55.9% R4: 51.5%	MED: 46.5% NAT: 56.2% SOC: 54.6%	F: 52.8% M: 50.6 %
Financial support	69.3%	R2: 71.0% R3: 73.0% R4: 61.1%	MED: 71.2% NAT: 73.3% SOC: 66.1%	F: 71.1% M: 68.3%
Intellectual support	76.7%	R2: 80.3% R3: 77.4% R4: 72.1%	MED: 73.5% NAT: 80.3% SOC: 78.5%	F: 78.5% M: 75.6%
Time balance	66.0%	R2: 61.6% R3: 68.1% R4: 65.8%	MED: 63.5% NAT: 57.7% SOC: 71.8%	F: 64.6% M: 66.9%
Career progression	80.0%	R2: 92.8% R3: 83.6% R4: 61.8%	MED: 81.7% NAT: 82.5% SOC: 77.5%	F: 79.3% M: 80.5%

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Share of researchers who were >3 months international mobile in post-PhD career stages that find the motive important (versus not important) for their most recent EU move.
- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Satisfaction at work refers to culture, and personal or family reasons.
- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance includes research autonomy and balance between teaching and research time.
- Based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?"

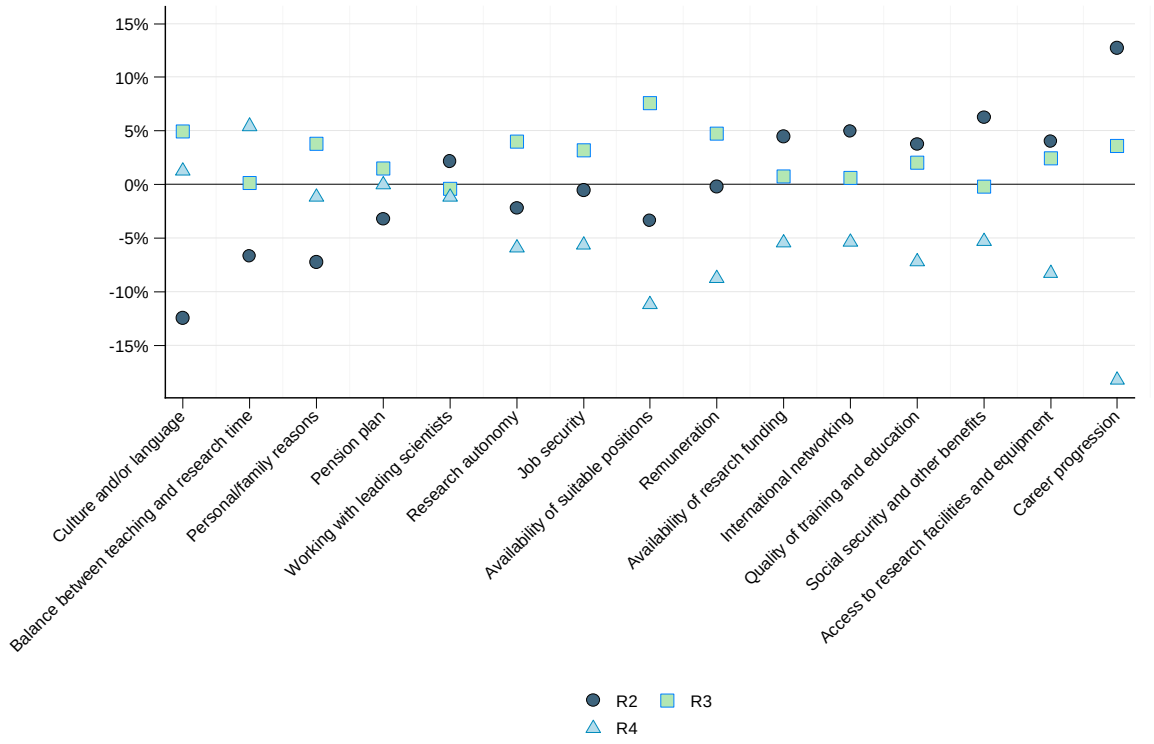
Table 28: Importance of categories of motives for >3 month international mobility in post-PhD career stages, last EU move, by country of citizenship (EU28)

Country	Financial security	Satisfac-tion at work	Financial support	Intellec-tual support	Time balance	Career progres-sion
Austria	33.6%	36.9%	59.5%	64.2%	44.0%	68.2%
Belgium	16.4%	39.5%	52.5%	66.1%	52.9%	92.5%
Bulgaria	58.3%	50.2%	85.9%	87.3%	77.5%	86.8%
Croatia	35.5%	57.6%	80.4%	91.8%	73.0%	88.4%
Cyprus	44.7%	59.6%	68.4%	76.5%	86.4%	95.3%
Czech Republic	25.9%	34.2%	65.2%	83.7%	56.8%	75.6%
Denmark	14.5%	27.9%	73.1%	60.5%	48.1%	48.8%
Estonia	53.6%	51.6%	74.7%	81.5%	63.8%	83.2%
Finland	37.3%	60.5%	68.3%	68.2%	76.7%	81.7%
France	47.5%	58.2%	65.4%	71.7%	66.2%	74.5%
Germany	50.3%	54.2%	71.3%	81.9%	75.6%	98.3%
Greece	37.4%	25.0%	78.5%	86.3%	81.4%	94.1%
Hungary	31.0%	66.4%	67.9%	71.9%	49.4%	82.4%
Ireland	49.9%	22.0%	70.4%	29.8%	87.0%	98.2%
Italy	47.4%	46.4%	77.4%	79.8%	54.6%	70.5%
Latvia	33.0%	71.4%	85.9%	83.3%	39.8%	60.0%
Lithuania	46.8%	52.7%	76.0%	77.0%	65.5%	77.4%
Malta	58.8%	60.9%	67.3%	92.4%	63.7%	88.2%
Poland	61.9%	63.0%	75.9%	82.6%	78.8%	73.2%
Portugal	39.3%	25.8%	48.1%	69.6%	61.3%	71.1%
Romania	40.3%	47.1%	71.4%	83.9%	74.0%	82.1%
Slovakia	28.6%	39.7%	59.0%	81.9%	52.1%	73.5%
Slovenia	49.5%	47.8%	74.5%	77.6%	66.2%	73.5%
Spain	23.2%	46.5%	67.0%	80.5%	70.3%	71.7%
Sweden	21.8%	46.6%	39.3%	61.5%	57.1%	80.6%
The Netherlands	47.4%	52.2%	52.1%	51.9%	69.1%	75.8%
United Kingdom	30.4%	59.6%	68.2%	80.5%	55.9%	72.3%
EU28	39.9%	50.1%	68.6%	76.9%	65.7%	79.5%

Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Share of researchers who were >3 months international mobile in post-PhD career stages that find the motive important (versus not important) for their most recent EU move
- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Satisfaction at work refers to culture, and personal or family reasons.
- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance includes research autonomy and balance between teaching and research time.
- Norway, Switzerland and Luxembourg are not included in the table because these countries had fewer than 30 observations.
- Based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?" and question 5: "What is your country of citizenship?"
- (n=1,097)

Figure 96: Importance of motives for >3 month international mobility in post-PhD career stages, last EU move, by current career stage (EU28)



	R2	R3	R4	Total
International networking	88.2%	84.0%	77.9%	83.3%
Career progression	92.8%	83.6%	61.8%	80.0%
Working with leading scientists	81.0%	78.5%	77.7%	78.8%
Research autonomy	74.2%	80.4%	70.5%	76.4%
Access to research facilities and equipment	78.7%	77.1%	66.4%	74.7%
Availability of research funding	72.7%	69.0%	62.8%	68.2%
Quality of training and education	71.6%	69.9%	60.7%	67.9%
Availability of suitable positions	61.7%	72.7%	53.9%	65.1%
Culture and/or language	45.0%	62.4%	58.7%	57.4%
Balance between teaching and research time	49.1%	55.9%	61.2%	55.7%
Remuneration	53.1%	58.0%	44.6%	53.3%
Personal/family reasons	38.3%	49.4%	44.4%	45.5%
Social security and other benefits	47.7%	41.2%	36.1%	41.4%
Job security	38.9%	42.6%	33.8%	39.4%
Pension plan	28.8%	33.6%	32.1%	32.1%

Source: MORE3 EU HE survey (2016)
Reading note: The share of R2 researchers that have been mobile >3 months in the EU in post-PhD career who finds career progression important exceeds the total share of researchers that have been mobile >3 months in the EU in post-PhD career and that find this important is 13pp. The total share is 80% whereas the share of R2 researchers is 93%.
Notes:

- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Difference between share of researchers who have been >3 month mobile in post-PhD career and that find a specific motive important for their last EU move per current career stage and the total share of researchers that have been >3 month mobile and that find this motive important for their last EU move.
- Based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?"
- (n=1,704)

Gender: With respect to gender, there are no large differences across categories of motives. However, we find that women consider access to research facilities and equipment (+6pp), working with leading scientists (+4pp) and job security (+4pp) more important than men. On the contrary, research autonomy (-6pp) and remuneration (-4pp) are less important motives for female researchers than for men.

Family status: Family status is related to the researchers´ motives to be mobile. On the one hand, we observe that researchers with children consider research autonomy more important than researchers without children (+8pp). On the other hand, researchers without children consider quality of training and education (+13pp), career progression (+9pp) and availability of suitable positions (+10pp) more important. This observation can be further related to the average age and career stage of researchers with and without children.

Regarding marital status, the results indicate that, compared to single researchers, researchers in couple consider culture and/or language (+13pp) and personal family reasons (+11pp) to be more relevant. Single researchers, on the other hand, are more motivated by items of financial security, namely pension plans (+18pp), job security (+14pp), social security and other benefits (+13pp) and remuneration (+9pp), than researchers in couple.

Researchers whose partner does not work in research consider the quality of training and education (+17pp), career progression (+15pp), job security (13pp), remuneration (11pp) and international networking (+10pp) more important for their last EU move than researchers whose partner works in academia. Researchers who have a partner working in research consider personal/family reasons a more important motive for their last move to the EU. This points to the influence of the mobility decisions of the partner on the respondents´ mobility.

8.1.1.3.3. Motives for >3 month post-PhD mobility: Main motives per move

Next to the question to indicate all motives for the last EU move, the MORE survey also contained a question for researchers to indicate the one main motive for each of the international >3 month moves in post-PhD stage. Table 29 does not present the share of respondents, but the share of moves for which the motive was mentioned as being the most important. Among the most frequent motives, we find that 23% of these are related primarily to career progression, 20% by working with leading scientists and 17% by research autonomy. It is therefore the scientific knowledge production factors that stand out as main motives. Career progression and working with leading scientists were also indicated in MORE2 as the main motives for concrete moves.

Table 30 summarises the information by aggregating these items in each of the pertinent categories defined above. The most frequently mentioned category of motives is intellectual support (30%), followed by career progression (23%) and time balance (19%). Interestingly, financial security, which includes remuneration, job security, social security and other benefits and pension plan, is only mentioned as the main motive for 2% of the international moves. Also in MORE2, job security and social security were the least often mentioned items.

Table 29: Importance of motives for >3 month international mobility in post-PhD career stages, main motive per move (2012-2016, EU)

Share of moves for which the motive was indicated as the main one	2012 (n= 2,703)	2016 (n=2,804)
Career progression	16.5%	22.9%
Working with leading scientists	10.9%	19.6%
Research autonomy	1.6%	16.8%
International networking	/	6.3%
Availability of suitable positions	7.7%	5.5%
Availability of research funding	7.9%	5.2%
Personal/family reasons	3.2%	4.5%
Quality of training and education	1.1%	3.8%
Access to research facilities and equipment	3.2%	2.9%
Balance between teaching and research time	/	2.1%
Remuneration	1.2%	1.6%
Culture and/or language	0.7%	1.0%
Job security	0.6%	0.7%
Social security and other benefits	0.3%	0.1%
Pension plan		0.0%
Working conditions	0.9%	/

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Notes:

- Only R2, R3 and R4 researchers.
- An important difference in the question between MORE2 and MORE3 is the number of moves a researcher can register: in MORE2 this was 8 and in MORE3 this was 3. MORE3 thus focuses on the most recent mobility only. In MORE2 however, only 5.4% of the respondents indicated that they had 4 moves or more, limiting the difference between MORE2 and MORE3. The same remark is applicable to the subsequent sections on contract, destination sector and career progression.
- Based on question 69: "And what was your main motive to move to each of these countries?"

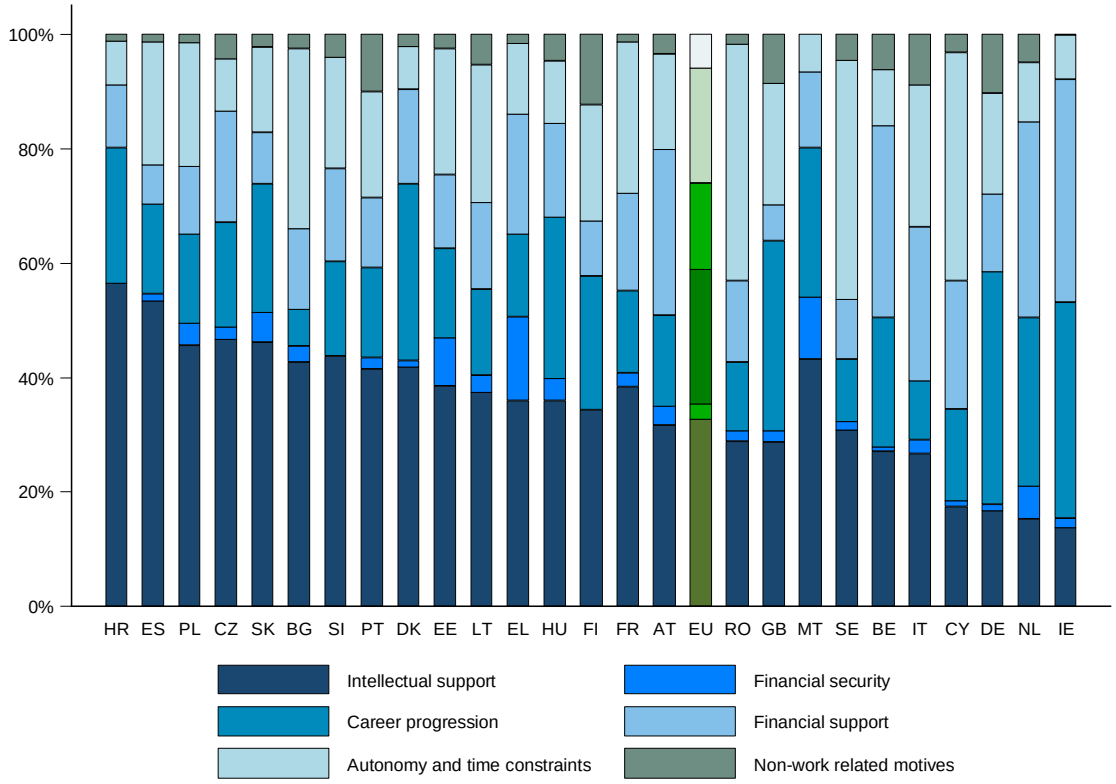
Table 30: Importance of categories of motives for >3 month international mobility in post-PhD career stages, main motive per move (EU28)

Average share of respondents that indicate a motive in this category as the main motive for one of their moves *Of mobile R2, R3 and R4 researchers (n=2,804)*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
Financial security	2.4%	R2: 3.2% R3: 2.2% R4: 2.2%	MED: 2.5% NAT: 0.9% SOC: 2.9%	F: 2.9% M: 2.1%
Satisfaction at work	5.6%	R2: 10.2% R3: 4.8% R4: 3.8%	MED: 4.0% NAT: 9.5% SOC: 5.4%	F: 5.3% M: 6.1%
Financial support	13.6%	R2: 11.8% R3: 14.3% R4: 13.6%	MED: 14.0% NAT: 8.2% SOC: 15.4%	F: 12.0% M: 14.3%
Intellectual support	29.6%	R2: 27.3% R3: 24.1% R4: 38.7%	MED: 34.0% NAT: 27.9% SOC: 26.1%	F: 29.0% M: 29.9%
Time balance	18.9%	R2: 16.7% R3: 18.6% R4: 20.6%	MED: 15.5% NAT: 15.8% SOC: 23.4%	F: 17.0% M: 19.8%
Career progression	22.9%	R2: 26.2% R3: 27.4% R4: 14.5%	MED: 26.0% NAT: 23.6% SOC: 19.5%	F: 26.2% M: 21.2%

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Share of researchers who were >3 months international mobile in post-PhD career stages for which the motive is indicated as main motive.
- Financial security includes remuneration, job security, social security and other benefits and pension plan.
- Satisfaction at work refers to culture, and personal or family reasons.
- Financial support includes availability of research funding and of suitable positions, and access to research facilities and equipment.
- Intellectual support refers to working with leading scientists, the quality of education and training, and international networking.
- Time balance includes research autonomy and balance between teaching and research time.
- Based on question 69: "And what was your main motive to move to each of these countries?"

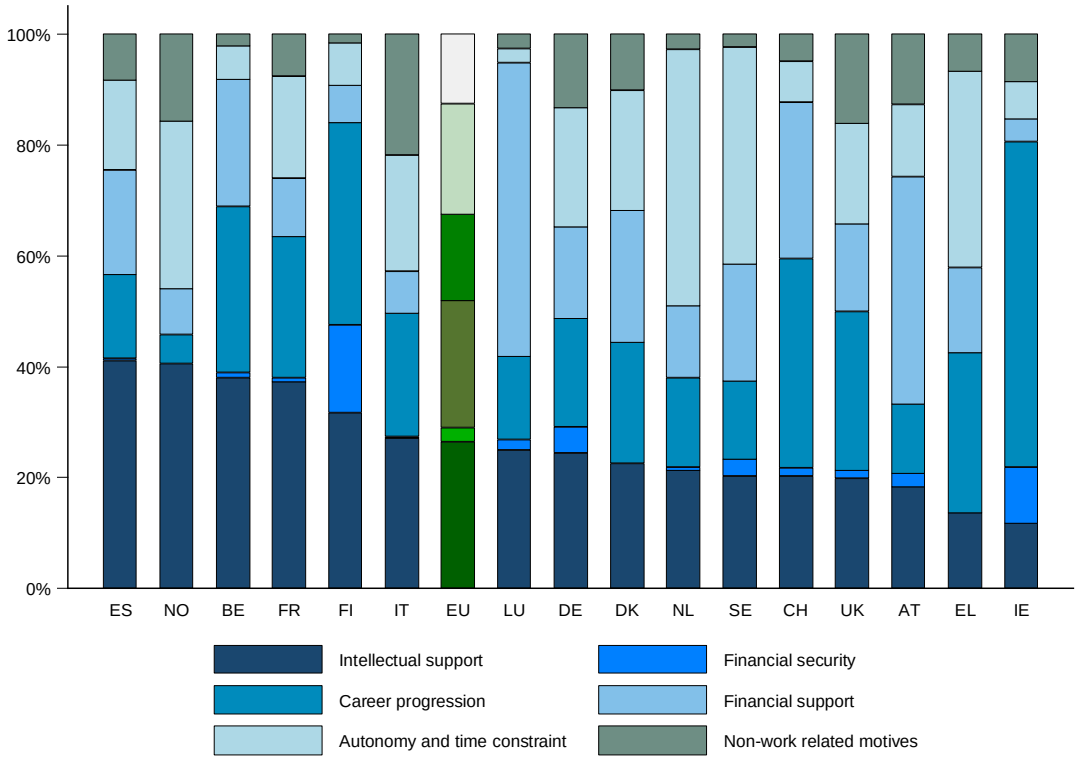
Country level: In Figure 97, the motives per citizenship of the researchers (as a proxy for origin) are analysed. Researchers from Eastern and Southern European countries are more driven by intellectual support. In Western European countries researchers tend to be more driven by factors related to career progression and financial support. Greece and Malta stand out for the importance given to financial security, 6% and 5% respectively, hence doubling the EU28 average.

Figure 97: Importance of categories of motives for >3 month international mobility in post-PhD career stages, main motive per move, by country of citizenship (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Share of individual post-PhD career mobility steps for which the motive is indicated as main motive per country of citizenship.
- Countries with less than 30 observations are omitted: Switzerland, Luxembourg, Latvia, Iceland and Norway.
- Based on question 69: "And what was your main motive to move to each of these countries?"
- (n= 2,653)

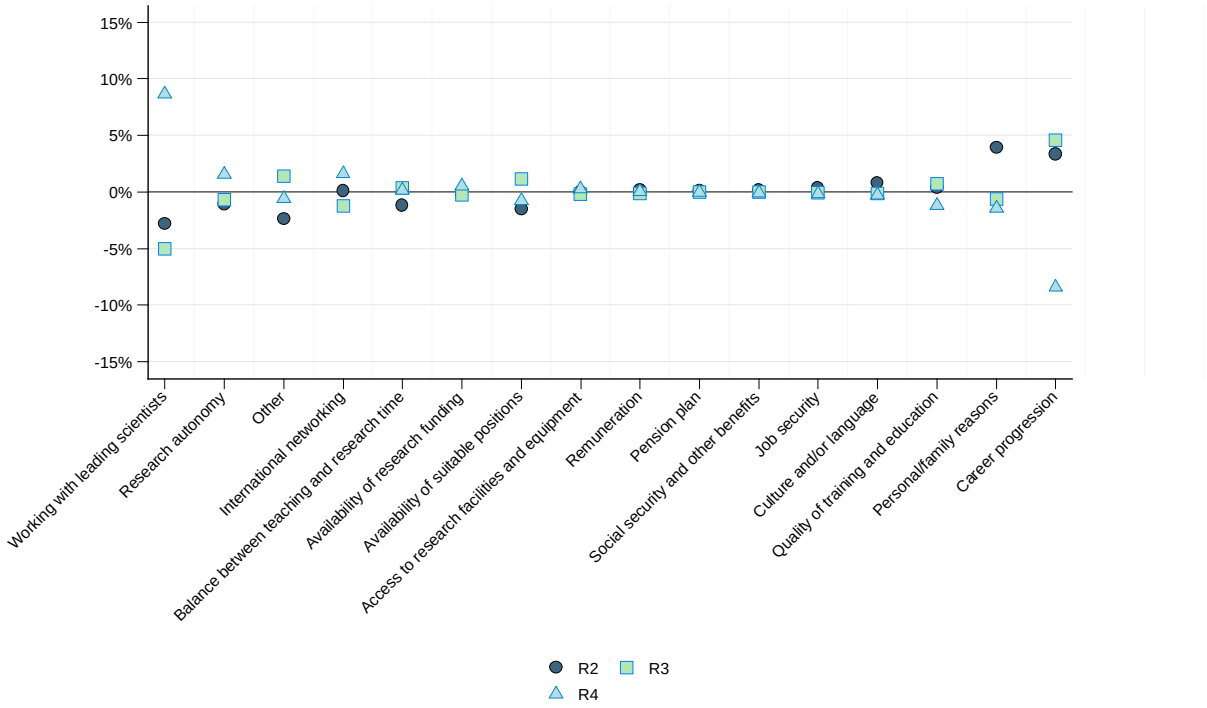
Figure 98: Importance of categories of motives for >3 month international mobility in post-PhD career stages, main motive per move, by destination country (EU28)



Source: MORE3 EU HE survey (2016)
Note:
- Only R2, R3 and R4 researchers.
- Share of individual post-PhD career mobility steps for which the motive is indicated as main motive per destination.
- Countries with less than 30 observations are omitted: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Poland, Iceland, Portugal, Romania, Slovakia, Slovenia, Latvia, Malta, and Lithuania.
- Based on question 69: "And what was your main motive to move to each of these countries?" and question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your researcher career after your PhD up to (but excluding) your current position in which you are employed."
- (n=1,911)

Career stage: Financial security, financial support and time balance are the categories for which smaller differences across career stages are found. However, other motives for mobility show more heterogeneity across career stages. Career progression is the main reason for specific moves for earlier career stages: 26% among R2 and 27% among R3, compared to 14% in the R4 category. On the opposite, intellectual support seems to be a more relevant motive for R4 researchers (39%) versus 24% among R3 and 27% among R2 researchers. Figure 99 shows the shares by career stage of the main motivation underlying respondents´ moves. It shows per career stage the differences between the percentage of mobility steps for which the motive was identified as being the most important and the total percentage of mobility steps in which the motive was also the most important one. The differences across career stages remain limited.

Figure 99: Importance of motives for >3 month international mobility in post-PhD career stages, main motive per move, by career stage (EU28)



	R2	R3	R4	Total
Career progression	26.2%	27.4%	14.5%	22.9%
Working with leading scientists	16.7%	14.6%	28.3%	19.6%
Research autonomy	15.8%	16.2%	18.4%	16.8%
Other	4.7%	8.5%	6.6%	7.1%
International networking	6.4%	5.1%	7.9%	6.3%
Availability of research funding	4.9%	4.9%	5.7%	5.2%
Availability of suitable positions	3.9%	6.7%	4.7%	5.5%
Personal/family reasons	8.4%	3.9%	3.1%	4.5%
Quality of training and education	4.1%	4.5%	2.6%	3.8%
Access to research facilities and equipment	2.9%	2.7%	3.2%	2.9%
Balance between teaching and research time	0.9%	2.4%	2.2%	2.1%
Remuneration	1.8%	1.5%	1.7%	1.6%
Culture and/or language	1.8%	0.9%	0.8%	1.0%
Job security	1.0%	0.6%	0.5%	0.7%
Social security and other benefits	0.2%	0.1%	0.0%	0.1%
Pension plan	0.1%	0.0%	0.0%	0.0%

Source: MORE3 EU HE survey (2016)
Reading note: The share of R2 researchers that have been mobile >3 months in the EU in post-PhD career who finds career progression important exceeds the total share of researchers who have been mobile >3 months in the EU in post-PhD career and that find this important is 3.3pp. The total share is 26.2% whereas the share of R2 researchers is 22.9%.
Notes:

- Only R2, R3 and R4 researchers.
- Difference between share of individual moves in post-PhD career for which the motive is indicated as main motive per current career stage and the total share of individual moves in post-PhD for which the motive is indicated as main motive.
- With '>3 month international mobility' defined as moves to work abroad in at least ten years for three months or more.
- Based on question 69: "And what was your main motive to move to each of these countries?" and question 15: "In which career stage would you currently situation yourself?"
- (n=2,804)

Fields of science: The largest differences across fields of science are observed in the motives referring to financial support, intellectual support and time balance (see Table 30). Researchers in the Natural Sciences (8%) are less driven by motives related to financial support, than those in other fields: 14% in Medical Sciences and 15% in Social Sciences. Intellectual support motives are more frequently cited among researchers in the Medical field (34%) compared to the Natural and Social Sciences (28% and 26% respectively). Regarding time balance, this seems to be a more relevant motive for mobility in the Social Science field (23%), than in the Medical and in the Natural Sciences (16% in each of them).

Gender: Interestingly, the main motives for the last move do not vary significantly between male and female researchers. Only for career progression is the difference slightly larger: women attribute a larger importance to career progression than men (5pp difference). When analysing individual items, it is observed that research autonomy is more frequently cited as a motive for specific moves among male researchers than among female researchers.

Family status: We observe that there are no large differences between the motives identified by researchers living in couple and by single researchers. Only researcher autonomy seems to be a factor driving to a larger extent the mobility of researchers in a couple compared to single researchers (similar observations were made when looking at all motives for the last EU move).

Researchers with children are more frequently driven by researcher autonomy and working with leading scientists than those without children. Career progression, on the other hand, is a stronger motive for the mobility of researchers without children.

There are no major differences between those researchers whose partner works in academia and those whose partner works in other sectors: only career progression is 6pp higher for those who do not have a partner working in research.

8.1.1.3.4. Motives for >3 month post-PhD 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, more related to the position and financial security, from motives to move temporarily. Availability of suitable positions has indeed become more important: 12% of moves with employer change are inspired mainly by this, which is more than double the total share for all moves (see Table 31 compared to Table 29). The same applies to career progression, the main motive for mobility overall, which is even more important in a move that involves change of employer (23% versus 38%).

Table 31: Importance of motives for >3 month international employer mobility in post-PhD career stages, main motive per move (2012-2016, EU)

Share of moves including an employer change, for which the motive was indicated as the main one *Of mobile R2, R3 and R4 researchers*	2012 (n=1,193)	2016 (n=935)
Career progression	23.5%	38.0%
Availability of suitable positions	15.3%	12.0%
Research autonomy	1.5%	10.3%
Working with leading scientists	6.3%	8.6%
Personal/family reasons	5.9%	6.8%
Availability of research funding	8.1%	4.5%
International networking	/	3.1%
Quality of training and education	1.3%	3.0%
Remuneration	1.3%	2.9%
Job security	<1%	1.5%
Balance between teaching and research time	/	1.2%
Culture and/or language	<1%	0.9%
Access to research facilities and equipment	1.6%	0.7%
Social security and other benefits	<1%	0.1%
Pension plan		0.1%
Working conditions	<1%	/

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Note:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Based on question 69: "And what was your main motive to move to each of these countries?"

Career stage: R2 researchers consider that the availability of a suitable position is a less relevant motive for employer mobility than R3 and R4 researchers. They appear to be more driven by research autonomy, and availability of research funding, and to a smaller extent by international networking. R3 researchers are comparatively more driven by the availability of positions, career progression and, surprisingly, by quality of training and education. Finally, the R4 are to some extent closer to the R2 profiles in terms of motives for employer mobility, putting the most emphasis on research autonomy.

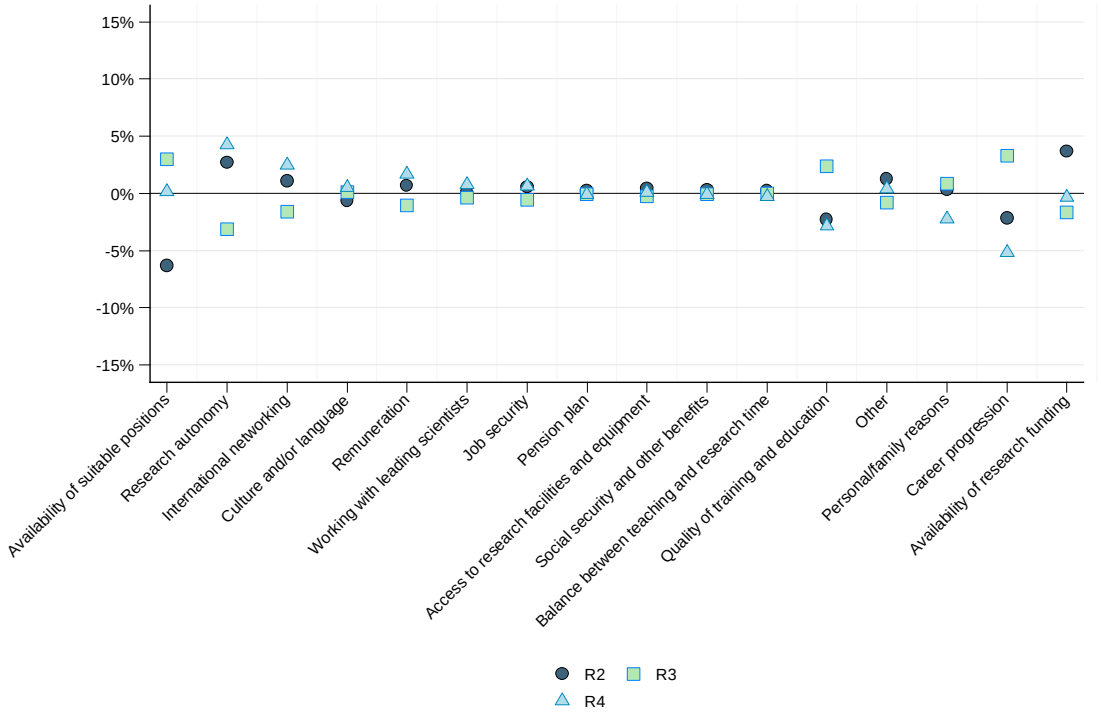
Gender: There are no important differences for gender. Working with leading scientists is slightly more important in an employer move for male than female researchers (+5pp).

Family status: As in the total, for employer moves researchers living in a couple consider that research autonomy, working with leading scientists and career progression are more important drivers for employer mobility than single researchers. On the contrary, single researchers value the availability of research funding and of suitable positions more than do researchers in couple.

With respect to family composition, the results indicate that, when engaging in employer mobility, researchers with children are more often driven by researcher autonomy and working with leading scientists than those without children. Career progression, on the other hand, is a stronger motive for the mobility for researchers without children. This pattern is also similar to the one found in the analysis of the overall mobility.

No major differences are observed with respect to the motives put forth by researchers whose partner works in research and those whose partner works in other sectors with respect to the motives for employer mobility.

Figure 100: Importance of categories of motives for >3 month international employer mobility in post-PhD career stages, main motive per move, by career stage (EU28)



	R2	R3	R4	Total
Career progression	35.9%	41.3%	32.9%	38.0%
Availability of suitable positions	5.7%	15.0%	12.2%	12.0%
Research autonomy	13.0%	7.2%	14.6%	10.3%
Working with leading scientists	8.6%	8.2%	9.3%	8.6%
Personal/family reasons	7.1%	7.6%	4.6%	6.8%
Other	7.7%	5.6%	6.8%	6.4%
Availability of research funding	8.1%	2.8%	4.1%	4.5%
International networking	4.1%	1.5%	5.6%	3.1%
Quality of training and education	0.7%	5.4%	0.2%	3.0%
Remuneration	3.5%	1.8%	4.6%	2.9%
Job security	2.1%	1.0%	2.2%	1.5%
Balance between teaching and research time	1.5%	1.2%	1.0%	1.2%
Culture and/or language	0.2%	1.0%	1.4%	0.9%
Access to research facilities and equipment	1.1%	0.4%	0.8%	0.7%
Pension plan	0.3%	0.0%	0.0%	0.1%
Social security and other benefits	0.4%	0.0%	0.0%	0.1%

Source: MORE3 EU HE survey (2016)

Reading note: The share of R2 researchers that have been mobile >3 months including an employer change in the EU in post-PhD career who finds career progression important exceeds the total share of researchers that have been mobile >3 months with an employer change in the EU in post-PhD career and that find this important is 3.3pp. The total share is 26.2% whereas the share of R2 researchers is 22.9%.

Notes:

- Only R2, R3 and R4 researchers.
- Difference between share of individual moves with employer change in post-PhD career for which the motive is indicated as main motive per current career stage and the total share of individual moves with employer change in post-PhD for which the motive is indicated as main motive.
- With '>3 month international mobility' defined as moves to work abroad in at least ten years for three months or more.
- Based on question 69: "And what was your main motive to move to each of these countries?"
- (n=1,704)

8.1.1.4. Barriers

The MORE2 study had a section specifically devoted to the analysis of the barriers to mobility. In order to track possible changes in researchers´ perceptions of the difficulties when moving or not to another country, the MORE3 survey also explicitly asked about the barriers to EU mobility, among the mobile and among the non-mobile. Respondents were presented with a list of items which can be summarised under the following main categories:

- Professional factors: obtaining funding for the (return) mobility/research; potential loss of contact with the professional network; finding a suitable (research) position; quality of training and education; access to facilities and equipment for research; obtaining funding for return mobility; level of remuneration.
- Practical factors: logistical problems (finding adequate accommodation, child-care or schooling for children).
- Personal factors: personal and family reasons; language for teaching and for contacting or collaborating with colleagues; culture; finding a job for their partner.
- Administrative or formal/legal factors: obtaining a visa or work permit; transferring research funding to another country; transferring pension or social security rights.

We analyse these barriers from three angles:

- First, we present the main barriers experienced by non-EU researchers currently working in the EU when they moved to the EU.
- Second, we analyse the barriers experienced as important to overcome by researchers – EU and non-EU nationals - in their last move.
- Third, we show the main barriers that prevent researchers from being internationally mobile.

8.1.1.4.1. Barriers for non-EU researchers moving to EU

Table 32 shows the percentage of non-EU28 researchers currently working in the EU (28+3 candidate countries) for which the specific factor was a difficulty in his/her move to Europe, both in 2012 and 2016. Again, the results in terms of ranking of barriers seem stable over time. In 2016, about 30% of the researchers identify obtaining a visa or work permit as being the most difficult factor facing them in a move to Europe. This is a decrease compared to 2012 (-4pp). In 2012, language was the most frequent barrier (38%). In 2016, language is still an important barrier, but the percentage has decreased: a distinction is made between language as a barrier for teaching (27%) and language as a barrier for contact or for collaboration with colleagues (23%). Obtaining funding for return mobility (4%), quality of training and education (6%) and transferring research funding to another country (7%) are least frequently indicated as barriers to EU mobility.

Table 32: Importance of barriers for non-EU researchers moving to EU (2012-2016)

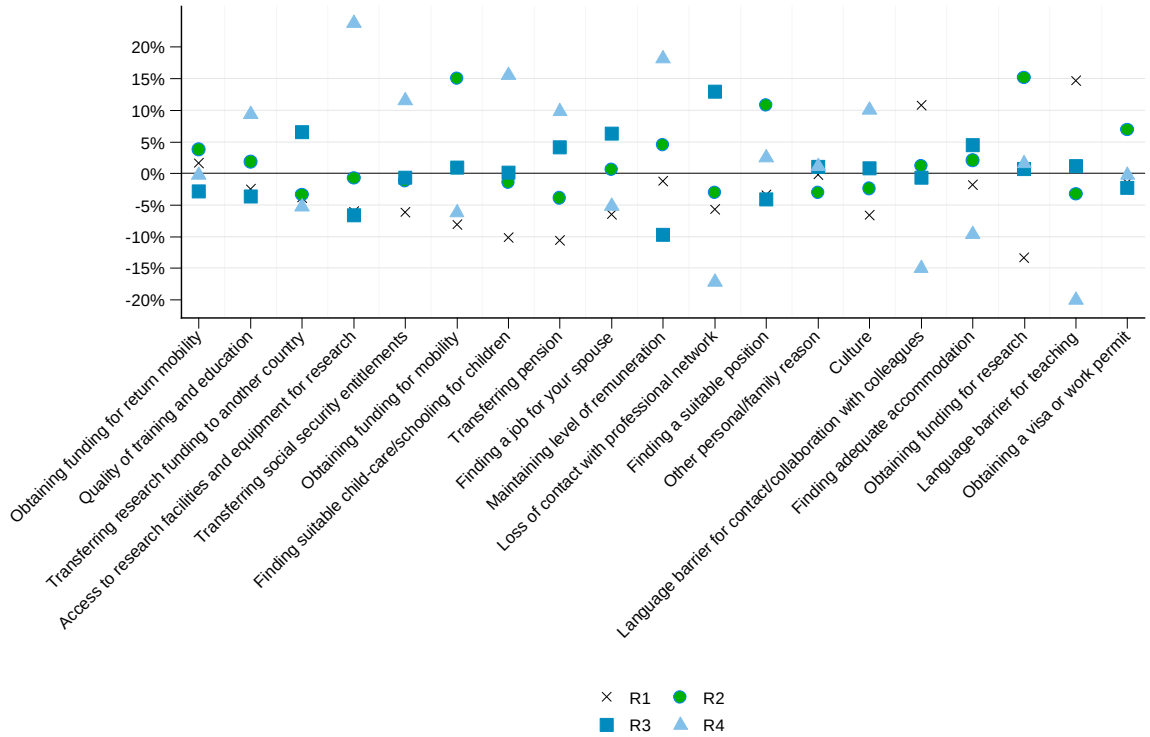
Barriers for non-EU researchers moving to EU *Of all non-EU researchers*	2012 (n=481)	2016 (n=340)
Obtaining a visa or work permit	34.4%	30.1%
Language barrier for teaching	38.4%	27.3%
Language barrier for contact/collaboration with colleagues	/	23.1%
Obtaining funding for research	27.6%	25.4%
Finding adequate accommodation	28.1%	23.9%
Culture	/	21.8%
Other personal/family reason	/	20.9%
Finding a suitable position	21.6%	18.2%
Loss of contact with professional network	/	17.5%
Maintaining level of remuneration	21.5%	15.4%
Finding a job for your spouse	18.6%	14.6%
Transferring pension	/	13.6%
Finding suitable child-care/schooling for children	10.4%	11.8%
Obtaining funding for mobility	/	11.7%
Transferring social security entitlements	13.9%	9.5%
Access to research facilities and equipment for research	8.4%	9.3%
Transferring research funding to another country	9.5%	6.6%
Quality of training and education	/	5.6%
Obtaining funding for return mobility	13.2%	4.5%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Notes:
- Share of non-EU28 researchers (citizenship) currently working in the EU28 or candidate countries for who the specific factor was a difficulty in their move to the EU.
- Multiple barriers per respondent are possible.
- Based on question 46: "Which difficulties have you faced in your move to Europe?"

Career stage: Figure 102 shows the differences found in the perception of barriers across career stages. First, language, used for teaching and for communicating with colleagues, is perceived as a barrier very differently across career stages: they show the largest variations among the analysed barriers. Those researchers in higher career stages perceive language as being less problematic than do those in earlier stages. This might be related to a greater propensity to move among earlier career stages due to factors related to career progression. This is related to another of the barriers, obtaining funding for research. This barrier is perceived foremost by R2 researchers, a career stage in which the need to develop a reputation and build a career in research is often accompanied by a larger need to be internationally mobile. In this sense, the greater barriers for this group are those related to funding and employability: finding suitable positions, getting access to funding for return mobility or, as abovementioned, funding for research.

More experienced researchers (R4) tend to put greater importance on barriers related to maintaining the status quo for their current position. They are concerned about access to research facilities, but most of the main barriers are related to maintaining the level of remuneration, transferring pension and social security, finding suitable child-care or schooling for children, and facing a different culture.

Figure 101: Importance of barriers for non-EU researchers moving to EU28+3, by career stage



	R1	R2	R3	R4	Total
Obtaining a visa or work permit	28.6%	37%	27.9%	29.9%	30.1%
Language barrier for teaching	42%	24%	28.5%	7.2%	27.3%
Obtaining funding for research	12.1%	40.5%	26.1%	27.1%	25.4%
Finding adequate accommodation	22.2%	26%	28.4%	14.3%	23.9%
Language barrier for contact/collaboration with colleagues	33.9%	24.3%	22.4%	8.2%	23.1%
Culture	15.2%	19.5%	22.6%	31.9%	21.8%
Other personal/family reason	20.8%	17.9%	22%	22.1%	20.9%
Finding a suitable position	14.8%	29%	14.1%	20.6%	18.2%
Loss of contact with professional network	11.8%	14.4%	30.5%	0.3%	17.5%
Maintaining level of remuneration	14.2%	19.9%	5.8%	33.6%	15.4%
Finding a job for your spouse	8.1%	15.2%	20.9%	9.4%	14.6%
Transferring pension	3.1%	9.8%	17.8%	23.4%	13.6%
Finding suitable child-care/schooling for children	1.6%	10.3%	11.9%	27.3%	11.8%
Obtaining funding for mobility	3.6%	26.7%	12.6%	5.5%	11.7%
Transferring social security entitlements	3.3%	8.2%	8.8%	21%	9.5%
Access to research facilities and equipment for research	3.3%	8.5%	2.7%	33%	9.3%
Transferring research funding to another country	2.7%	3.2%	13.1%	1.3%	6.6%
Quality of training and education	3.1%	7.4%	2%	15%	5.6%
Obtaining funding for return mobility	6.1%	8.3%	1.7%	4.2%	4.5%

Source: MORE3 EU HE survey (2016)
Reading note: The share of non-EU28 researchers currently working in the EU28+3 in R4 career stage and for whom access to research facilities and equipment was a difficulty in their move to the EU exceeds the total share by 24pp. The total share is 9.3% whereas the share for R4 is 33%.
Notes:
- Share of non-EU28 researchers (citizenship) currently working in the EU28 and candidate countries for which the specific factor was a difficulty in their move to the EU.
- Multiple responses are possible.
- Based on question 46: "Which difficulties have you faced in your move to Europe?"
- (n=340)

Gender: Male researchers tend to be more concerned about their language skills for contact/collaboration with colleagues (27%) and for teaching (30%) as barriers to mobility than are female researchers (resp. 20% and 22%). In a similar way, they also tend to consider obtaining visa and work permits (35% male researchers versus 20% female researchers), and finding accommodation (26% versus 19%) as being more important barriers compared to women. On the contrary, the quality of training and education (13% female researchers versus 2% male researchers) and personal or family reasons (29% versus 17%) are the barriers for which the shares of women largely surpass those of men.

Family status: Personal or family reasons (30% for couples and 6% for singles; 29% for researchers with children and 16% for those without), finding a job for spouse (22% for couples and 1% for singles; 22% for researchers with children and 9% for those without) and suitable child-care schooling (17% couple and 2% single; 23% for researchers with children and 2% for researchers without children) are the most frequently cited barriers among those researchers living in a couple and among those with children, compared to single researchers and with those without children. This reflects the importance of family composition and marital status in deciding to undertake an international move.

8.1.1.4.2. Barriers to >3 month post-PhD mobility: Barriers last EU move

In this section, we take into account the population of researchers working currently in the EU, disregarding their nationality: they can be EU or non-EU nationals. The perceived importance of barriers to mobility for internationally mobile researchers during the post-PhD career stages (concerning their last >3 month move) who have worked abroad for more than three months at least once in the last ten years is illustrated in Table 32, for both 2012 and 2016.

The most frequently indicated barriers to the last move are finding a suitable position (38%), obtaining funding for research (38%) and obtaining funding for mobility (36%). Also in MORE2, finding a suitable position, and obtaining funding for research and mobility were among the most important barriers.

On the contrary, the items that are less frequently mentioned are the ones referring to transferring social security and pension, being indicated by only 20% and 17% of the >3 month mobile researchers.

Table 33: Importance of barriers for >3 month international mobility in post-PhD career stages, last EU move (2012-2016)

Share of respondents that indicate this barrier as one of the barriers for their last EU move		
Of mobile R2, R3 and R4 researchers		
	2012 (n=1,660)	**2016** (n=1,704)
Finding a suitable position	34.8%	38.3%
Obtaining funding for research	43.4%	37.6%
Obtaining funding for mobility	/	36.3%
Logistical problems	36.3%	33.3%
Access to research facilities and equipment for research	27.9%	32.5%
Other personal/family reason	26.5%	28.3%
Quality of training and education	21.1%	28.1%
Loss of contact with professional network	25.1%	28.0%
Maintaining level of remuneration	/	26.2%
Transferring research funding to another country	16.3%	23.5%
Culture	23.8%	23.7%
Language barrier for contact/collaboration with colleagues		22.7%
Language barrier for teaching		20.8%
Obtaining a visa or work permit	/	22.8%
Transferring social security entitlements	/	19.6%
Transferring pension	/	16.8%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Notes:
- Only R2, R3 and R4 researchers.
- Share of mobile researchers who indicate the specific barrier as being important to their last move.
- With 'mobility' defined as having worked abroad for more than three months at least once in the last ten years.
- Based on question 75: "Please consider again your last instance of mobility. Which of the following barriers were important to overcome in making this move?"

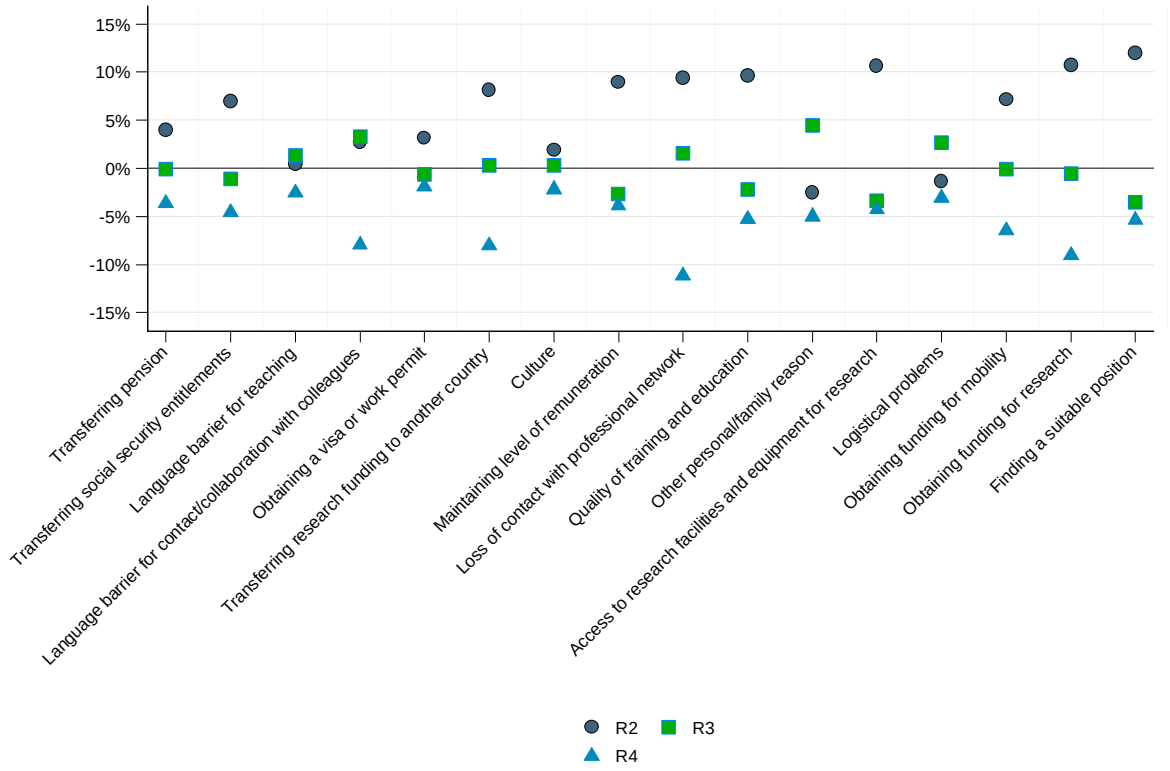
Career stage: The career stage shows a very consistent pattern: R2 researchers overall declare that they have encountered more barriers than R3 and R4 researchers in their last move. The only exceptions were personal and family reasons, and logistical problems. R4 researchers are the group that, in general, indicates encountering less barriers in their last move compared to R2 and R3 researchers.

Gender: Male researchers consider that maintaining their level of remuneration (29%) and personal and family reasons (30%) to be a barrier for mobility to a greater extent compared to female researchers (resp. 21% and 25%). On the contrary, female researchers (40%) encounter more barriers with respect to logistical problems than male researchers (30%).

Family status: Researchers living in a couple state that they are more affected by barriers related to culture and to the transfer of pensions compared to single researchers. The latter feel more hindered by language, both in the context of teaching and of contacting and collaborating with colleagues.

The transfer of social security and personal and family reasons appear to be the most important barrier for researchers with children. In contrast, those without children tend to be more affected by obtaining visa or work permits, which might indicate the differences in the country of destination chosen by researchers with and without children, the latter being able to be less risk-averse in their mobility decisions.

Figure 102: Importance of barriers to >3 month international mobility in post-PhD career stages, last EU move, by career stage (EU28)



	R2	R3	R4	Total
Finding a suitable position	50.3%	34.8%	32.9%	38.3%
Obtaining funding for research	48.3%	37%	28.6%	37.6%
Obtaining funding for mobility	43.5%	36.3%	29.9%	36.3%
Logistical problems	32%	36%	30.2%	33.3%
Access to research facilities and equipment for research	43.1%	29.2%	28.2%	32.5%
Other personal/family reason	25.8%	32.8%	23.3%	28.3%
Quality of training and education	37.8%	25.9%	22.9%	28.1%
Loss of contact with professional network	37.4%	29.6%	16.8%	28%
Maintaining level of remuneration	35.1%	23.5%	22.3%	26.2%
Culture	25.6%	24%	21.6%	23.7%
Transferring research funding to another country	31.6%	23.8%	15.4%	23.5%
Obtaining a visa or work permit	25.9%	22.1%	20.9%	22.8%
Language barrier for contact/collaboration with colleagues	25.5%	26.1%	14.8%	22.7%
Language barrier for teaching	21.2%	22.1%	18.3%	20.8%
Transferring social security entitlements	26.5%	18.4%	15%	19.6%
Transferring pension	20.8%	16.7%	13.2%	16.8%

Source: MORE3 EU HE survey (2016)
Reading note: The share of mobile R2 researchers who indicate finding a suitable position as an important barrier for their last EU move exceeds the share of R3 and R4 researchers by resp. 16% and 17%.
Note:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Difference between share of movile researchers who indicate the specific barrier for their last EU move per current career stage and total share for all R2, R3 and R4 researchers.
- Based on question 75: "Please consider again your last instance of mobility. Which of the following barriers were important to overcome in making this move?"
- (n=1,704)

8.1.1.4.3. Barriers to >3 month post-PhD mobility: Non-mobile

A considerable number of researchers (54%) have never been mobile for more than three months. This section disentangles the main reasons behind this decision not to move to another country for this group of non-mobile researchers.

Personal and family reasons were ranked as the most important barrier when asking for the explicit reasons for non-mobility (see Table 34). Although it was also the most important barrier in MORE2, its importance has grown since then (77% in MORE3 compared to 67% in MORE2). It is important to note that this evolution should be interpreted with caution since the question in MORE3 included a larger number of items.

Obtaining funding for research and mobility, as well as finding a suitable position are also important reasons for non-mobility. As indicated in the previous section, these three factors are also important among the most relevant barriers to mobility among mobile researchers (see Table 33).

Table 34: Importance of barriers to >3 month international mobility in post-PhD career stages, for the non-mobile (2012-2016)

Share of respondents that indicate this barrier as one of the barriers as one of the factors keeping them from >3 month international post-PhD mobility	2012 (n=2,303)	2016 (n=1,403)
Other personal/family reason	67.4%	77.1%
Obtaining funding for research	55.9%	48.6%
Obtaining funding for mobility		49.7%
Finding a suitable position	49.9%	49.4%
Logistical problems	52.0%	44.4%
Maintaining level of remuneration	/	33.0%
Transferring social security entitlements	/	31.9%
Transferring pension	/	29.5%
Transferring research funding to another country	26.4%	28.9%
Loss of contact with professional network	28.0%	27.6%
Access to research facilities and equipment for research	21.4%	25.7%
Quality of training and education	21.7%	25.8%
Language barrier for teaching		27.2%
Language barrier for contact/collaboration with colleagues	24.9%	23.2%
Culture		12.6%
Obtaining a visa or work permit	11.7%	15.8%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Reading note: Green = high compared to the average of the column; Red = low compared to the average of the column.
Notes:

- Only R2, R3 and R4 researchers who have considered working abroad as a researchers for more than 3 months since completing their higher education (PhD or other) but never were mobile.
- Share of non-mobile researchers who indicate that the specific barrier is important in discouraging them from becoming internationally mobile and pursuing this path further.
- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 82: "Which of the following factors were important in ultimately discouraging you from becoming internationally mobile and pursuing this path further?

Career stage: The reasons for international non-mobility in post-PhD career per career stage are very scattered over the different career stages (see Figure 64). Consistent with the findings on the barriers for mobile researchers, we observe that, when compared to other career stages, R4 researchers are the group that seem to be less affected by most of the barriers for mobility. R2, on the contrary, and to a lesser extent, R3, tend to

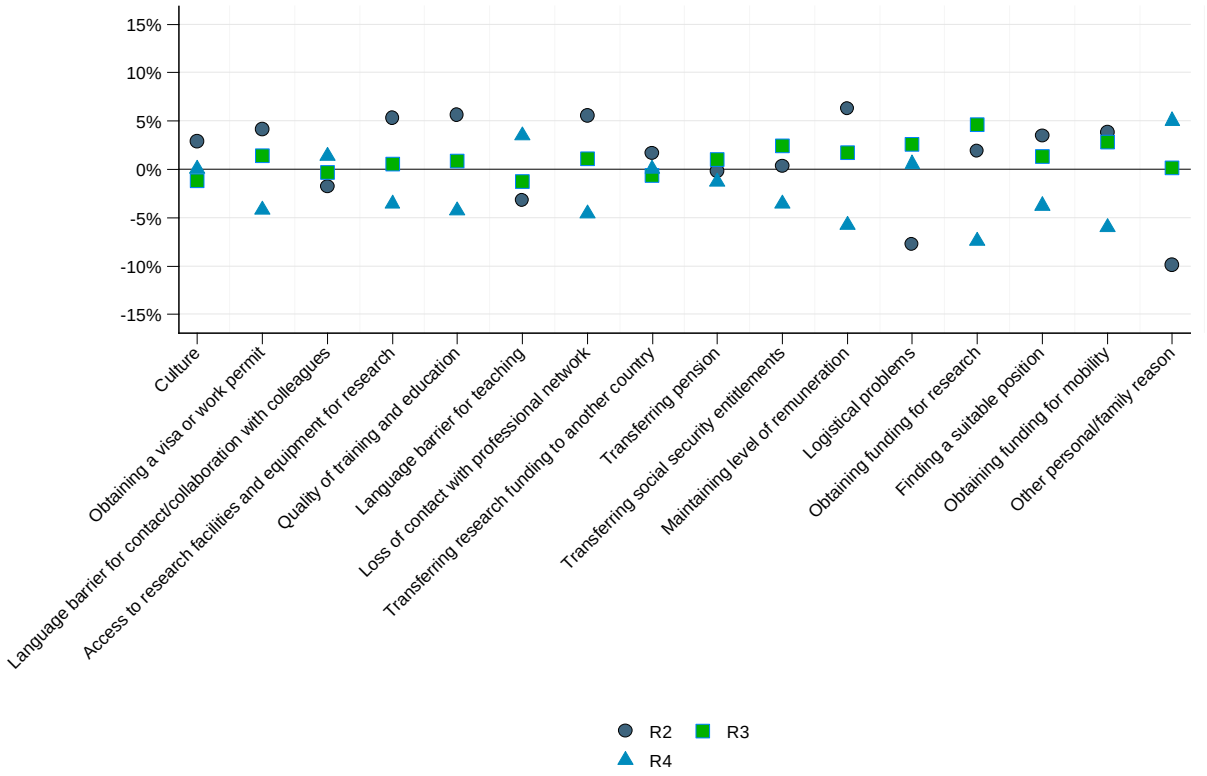
indicate to a larger degree factors that matter in their decision not to move. The only factors for which this pattern is reversed is regarding language for teaching and other personal and family reasons, which constitute more important factors for R4 than for R2.

Gender: We observe that female researchers indicate more reasons for being non-mobile than do male researchers. For female researchers, obtaining funding for mobility (57%), the quality of training and education (31%) and logistical problems (49%) are cited more frequently as reasons for non-mobility compared to male researchers (resp. 46%, 23% and 42%). Coherent with the factors mentioned in the analysis of mobile researchers, language is also among the factors in which there is larger difference between men and women. The former tend to be more concerned about language, both in the context of contacting and collaborating with colleagues (24% for male researchers whereas 21% for female researchers) and of teaching (29% for male researchers whereas 25% for female researchers).

Family status: Family composition stands out as a relevant factor when it comes to explaining differences in the reasons behind non-mobility. Regarding marital status, obtaining funding for mobility is more frequently mentioned as a reason for non-mobility among single researchers than among researchers in a couple. On the contrary, personal/family reasons and logistical problems are cited more often as a reason for non-mobility for researchers in a couple.

Having children also plays a role in determining the barriers for mobility for the non-mobile researchers. Logistical problems and personal and family reasons are the most frequently indicated factors for non-mobility among researchers with children. Obtaining funding for mobility, finding a suitable position and the loss of contact with the professional network are the most often mentioned reasons explaining their reluctance to be mobile among those researchers without children.

Figure 103: Importance of barriers to >3 month international mobility in post-PhD career stages, for the non-mobile, by career stage (EU28)



	R2	R3	R4	Total
Other personal/family reason	67.2%	77.3%	82.1%	77.1%
Obtaining funding for mobility	53.6%	52.5%	43.7%	49.7%
Finding a suitable position	52.8%	50.8%	45.7%	49.4%
Obtaining funding for research	50.4%	53.2%	41.2%	48.6%
Logistical problems	36.6%	47%	44.9%	44.4%
Maintaining level of remuneration	39.3%	34.7%	27.2%	33%
Transferring social security entitlements	32.2%	34.4%	28.4%	31.9%
Transferring pension	29.3%	30.5%	28.2%	29.5%
Transferring research funding to another country	30.5%	28.2%	28.9%	28.9%
Loss of contact with professional network	33.2%	28.8%	23.1%	27.6%
Language barrier for teaching	24%	25.9%	30.7%	27.2%
Quality of training and education	31.4%	26.7%	21.5%	25.8%
Access to research facilities and equipment for research	31%	26.2%	22.1%	25.7%
Language barrier for contact/collaboration with colleagues	21.4%	23%	24.6%	23.2%
Obtaining a visa or work permit	19.9%	17.2%	11.6%	15.8%
Culture	15.5%	11.4%	12.7%	12.6%

Source: MORE3 EU HE survey (2016)
Reading note: The share of non-mobile R2 researchers who indicate personal/family reasons as an important barrier in discouraging them from becoming internationally mobile is lower than the total share by 9.9pp. The share for R2 is 67.2% whereas the total share is 77.1%.
Notes:
- Only R2, R3 and R4 researchers who have considered working abroad as a researchers for more than 3 months since completing their higher education (PhD or other) but never were mobile.
- Difference between the share of non-mobile researchers who indicate that the specific barrier is important in discouraging them from becoming internationally mobile and pursuing this path further and the total share for all R2, R3 and R4 career stages.

- With 'non-mobility in post-PhD career stages' defined as not having undertaken international mobility of more than three months during post-PhD career stages, either in the last ten years or before.
- Based on question 69: "And what was your main motive to move to each of these countries?" and question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your researcher career after your PhD up to (but excluding) your current position in which you are employed."
- Based on question 82: "Which of the following factors were important in ultimately discouraging you from becoming internationally mobile and pursuing this path further?"
- (n=1,403)

8.1.1.5. Effects

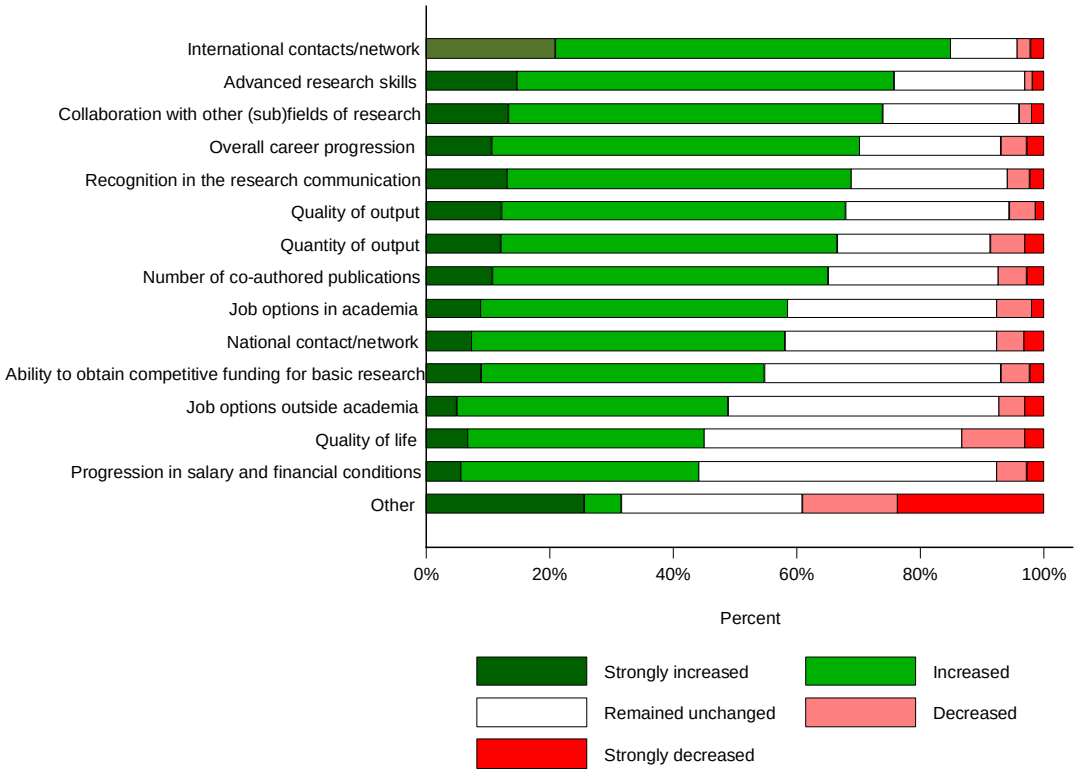
In order to analyse the effects of mobility, a list of 14 items were included in the questionnaire. Respondents could indicate the extent to which they had experienced these effects using a five-point scale. The items can be divided broadly in 5 main groups:

- *Output effects.* These refer to the quantity and quality of output, the number of co-authored publications, and research skills.
- *Career-related effects.* In this category we can find those effects related to career progression, job options in academia and job options outside of academia.
- *Financial effects.* Aspects, such as progression in salary and financial conditions; ability to obtain competitive research funding for basic research are considered in this group of effects.
- *Network effects.* This category encompasses different aspects related to collaboration with other (sub)fields of research, national and international contacts, and recognition in the research community.
- *Personal effects.* This last category includes those effects that are related to the quality of life.

8.1.1.5.1. Effects of >3 month post-PhD mobility

Figure 104 presents the R2, R3 and R4 researchers' perceptions regarding the effects of their mobility experience. These statistics refer to researchers who have worked abroad for more than three months during the last ten years. On the one hand, mobility is perceived as having a strong impact on researchers´ international contacts and network, as well as on their collaboration with other (sub)fields. Consistent with the results of MORE2, mobility experiences are also considered to have a positive effect on research output. On the other hand, quality of life (personal effects), the salary and financial conditions (financial effects) and job options outside academia (career-related effects) receive lower scores.

Figure 104: Effects of entire mobility experience on the research career (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Share of mobile researchers who indicated the effect of the entire mobility experience on a specific aspect of their career to be a (strong) increase, (strong) decrease or unchanged.
- Based on question 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?"
- (n=1,704)

Country level: There is a large variation across countries on the overall perception of the effects of mobility (see Figure 105). Mobile researchers tend to have a more positive perspective about the mobility effects in some countries, such as Iceland, Luxembourg and Romania. On the contrary, researchers from other countries tend to have a less optimistic vision of the effects of their mobility experiences. This is most notably the case for Spain and Denmark.

When comparing the country averages of each individual country, output and networking effects are important in the majority of the countries, whereas personal effects are below average in most countries. These are the main findings from a cross-country comparison:

- The output effects are highest in Croatia, Iceland, Romania, Luxembourg, and Bulgaria. The lowest scores are found in Spain, Estonia, Germany, Latvia and Denmark.
- The career-related effects are perceived as being more important in Iceland, Greece, Romania, Luxembourg and Austria while they are lowest in Spain and Italy.
- The highest financial effects are found in Luxembourg, Iceland, Romania and Switzerland and the lowest are observed in Spain and Denmark.
- The networking effects are considered to be more important in Romania, Iceland, Greece and Portugal and less in Spain and Denmark.

- Romania, Luxembourg and Hungary display the highest values regarding personal effects, and Spain and Slovakia show the lowest values for these items.

However, a within-country comparison also provides interesting insights. Figure 106 shows the difference between the average country value for a specific effect and the average country value for all the effects. Negative values indicate that the item is more perceived as having a positive effect than the average of all the items. This allows us to see the set of effects that predominate in each country, and to compare the situation across countries.

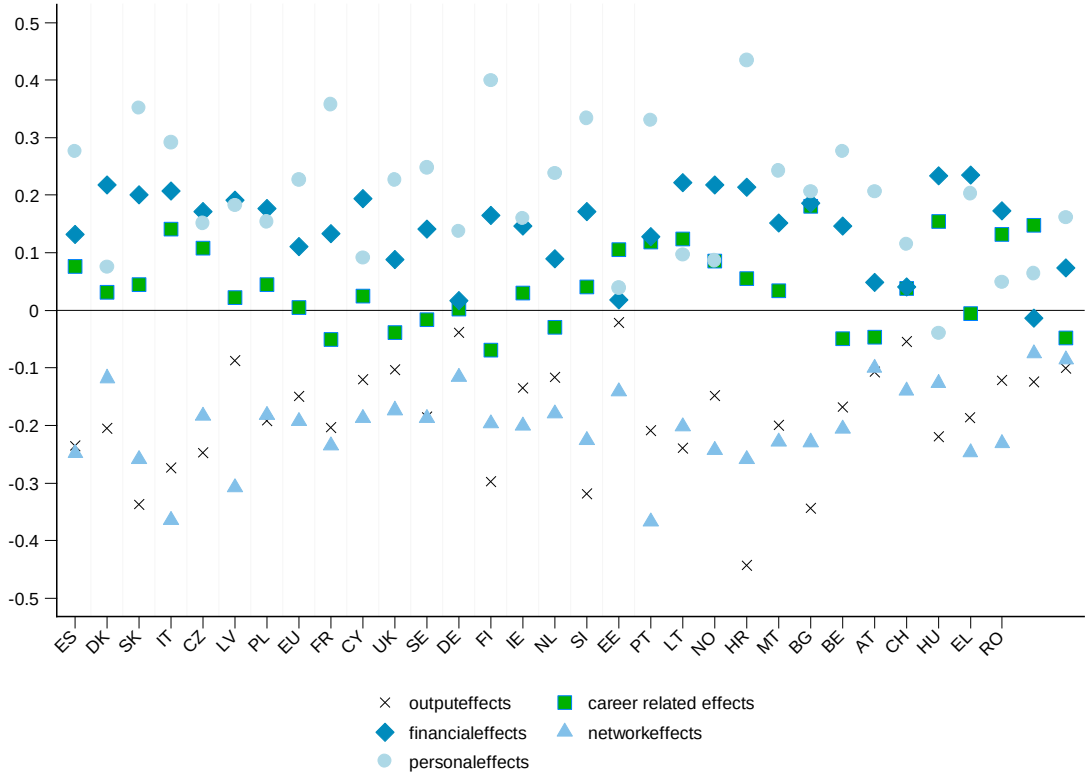
- Regarding output effects, Croatia and Bulgaria stand out for the relative importance that researchers attribute to them. These type of effects always score more highly than the average, indicating that it is perceived to be among the most relevant effects for researchers in each country.
- There is some heterogeneity regarding the role of career related effects within countries. In some countries, such as United Kingdom, Finland, or Austria, this type of effects are larger than the average. In others, such as Italy or Czech Republic, these effects are less relevant.
- Personal effects. These effects predominate in Croatia, Finland and France, whereas they play a much more minor role in Hungary or Estonia.
- Networking effects predominate in Southern European countries, such as Portugal, Italy or Spain. In other countries, such as Germany, Austria or Iceland, this type of factor is perceived as having relatively less importance.
- Financial effects score below average in all the countries, except for Luxembourg.

Figure 105: Effects of entire mobility experience on the research career, by country: a cross-country comparison (EU28)

	Output effects	Career-related effects	Financial effects	Network effects	Personal effects	Average
Iceland	1.05	0.99	0.87	1.03	0.79	0.95
Luxembourg	1.04	0.77	0.93	0.99	0.85	0.92
Romania	1.04	0.78	0.74	1.15	0.87	0.92
Greece	0.97	0.79	0.55	1.03	0.58	0.78
Hungary	0.99	0.62	0.54	0.90	0.81	0.77
Switzerland	0.80	0.70	0.70	0.88	0.63	0.74
Austria	0.83	0.77	0.67	0.82	0.52	0.72
Belgium	0.86	0.74	0.55	0.90	0.42	0.69
Bulgaria	1.03	0.50	0.50	0.91	0.48	0.68
Malta	0.87	0.63	0.51	0.89	0.42	0.67
Croatia	1.10	0.60	0.44	0.91	0.22	0.65
Norway	0.80	0.57	0.44	0.90	0.57	0.65
Lithuania	0.89	0.52	0.43	0.85	0.55	0.65
Portugal	0.85	0.52	0.51	1.01	0.31	0.64
Estonia	0.66	0.53	0.62	0.78	0.60	0.64
Slovenia	0.95	0.59	0.46	0.86	0.30	0.63
The Netherlands	0.74	0.65	0.54	0.80	0.39	0.62
Ireland	0.76	0.60	0.48	0.83	0.47	0.62
Finland	0.92	0.69	0.46	0.82	0.23	0.62
Germany	0.66	0.62	0.61	0.74	0.49	0.62
Sweden	0.80	0.63	0.47	0.80	0.36	0.61
United Kingdom	0.71	0.64	0.52	0.78	0.38	0.60
Cyprus	0.71	0.56	0.39	0.77	0.50	0.59
France	0.79	0.64	0.45	0.82	0.23	0.58
Poland	0.77	0.53	0.40	0.76	0.42	0.58
Latvia	0.66	0.55	0.38	0.88	0.39	0.58
Czech Republic	0.82	0.46	0.40	0.75	0.42	0.57
Italy	0.81	0.39	0.33	0.90	0.24	0.53
Slovakia	0.85	0.47	0.32	0.77	0.16	0.52
Denmark	0.67	0.43	0.24	0.58	0.39	0.46
Spain	0.52	0.20	0.15	0.53	0.00	0.28
EU	**0.73**	**0.58**	**0.47**	**0.77**	**0.35**	**0.58**

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- 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 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?"
- (n=1,989)

Figure 106: Effects of entire mobility experience on the research career, by country: a within country comparison (EU28)

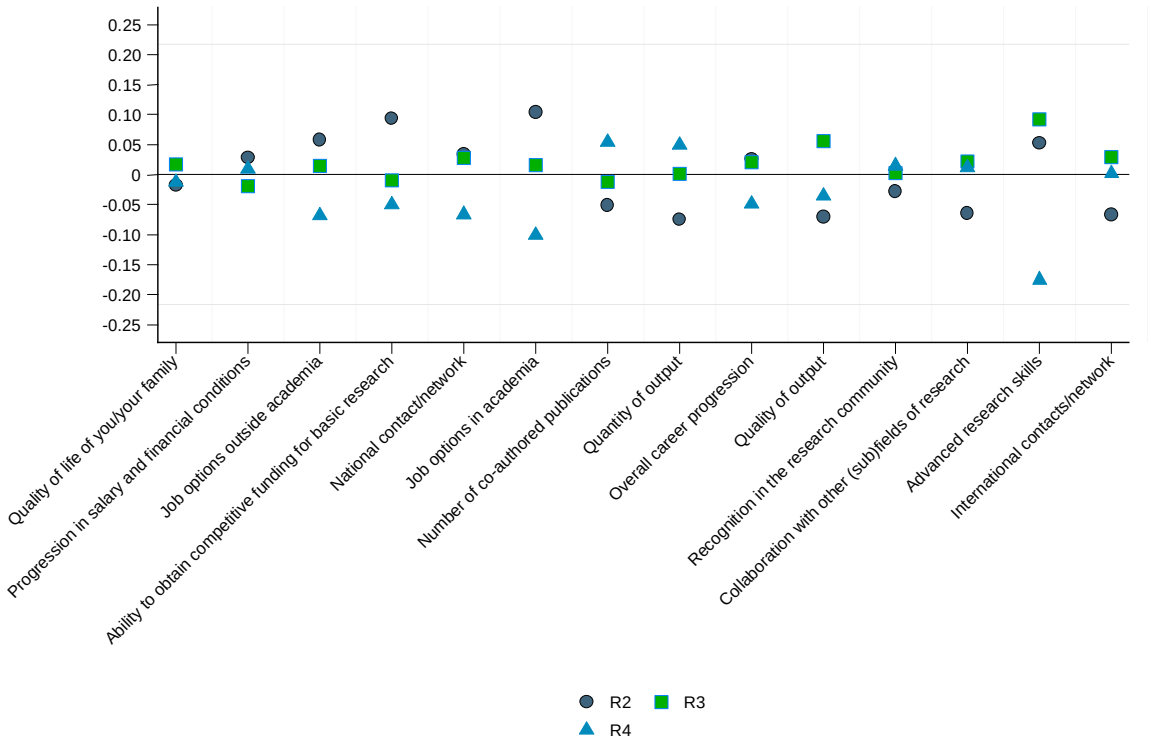


Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Difference between the average country value for a specific effect and the average country value for all effects (n=1,989).
- With the average calculated by assigning values to each category: 2 = strongly increased; 1 = increased; 0 = unchanged; -1 = decreased; -2 = strongly decreased.
- Countries with less than 30 observations are omitted: Latvia and Malta.
- Based on question 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?"
- (n=1,950)

Career stage: Figure 106 shows that effects are not the same for researchers in different career stages. For R2 and R3 researchers, the effect of mobility on advanced researcher skills and job options in academia is larger than for R4 researchers. On the other hand, R4 researchers seem to benefit more from the positive effects of mobility on the number of co-authored publications and on the quality of the output compared to R2 and R3 researchers.

Gender: In general terms, mobility has a lower effect for women researchers than for men. This is especially found in those items reflecting the quantity of output, the number of co-publications, the job options in non-academia. Interestingly, a large share of female researchers indicated that they had experienced other effects apart from those included in the questionnaire.

Figure 107: Effects of entire mobility experience on the research career, by career stage (EU28)



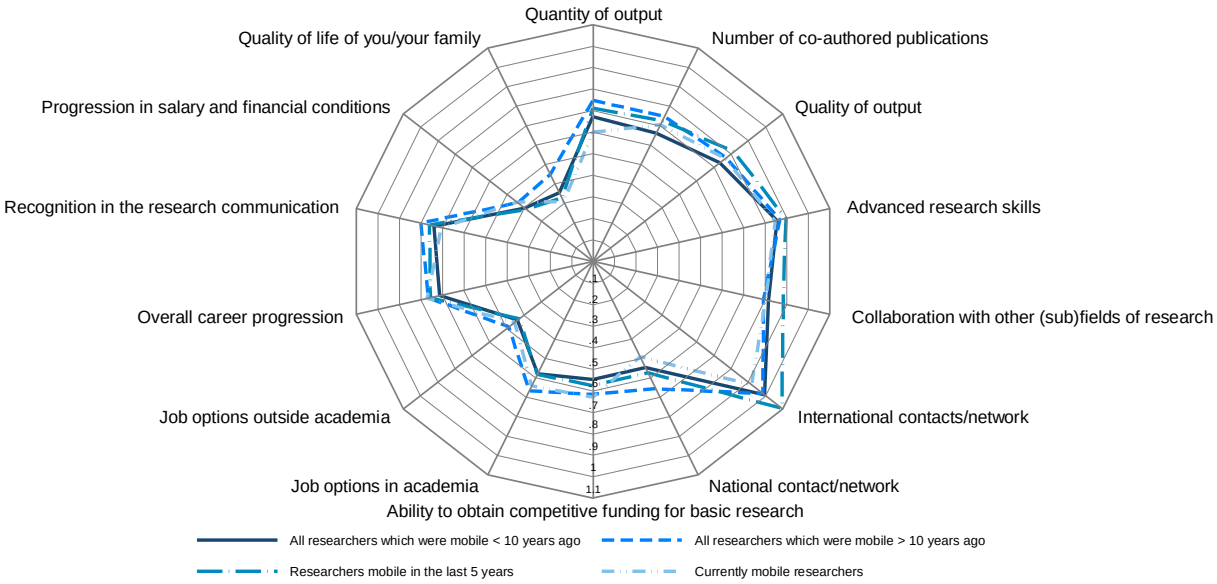
	R2	R3	R4	Total
Quality of life of you/your family	0.34	0.37	0.34	0.35
Progression in salary and financial conditions	0.42	0.38	0.41	0.40
Job options outside academia	0.50	0.45	0.37	0.44
Ability to obtain competitive funding for basic research	0.64	0.54	0.50	0.55
National contact/network	0.58	0.58	0.48	0.55
Job options in academia	0.68	0.59	0.48	0.58
Number of co-authored publications	0.61	0.65	0.71	0.66
Quantity of output	0.60	0.67	0.72	0.67
Overall career progression	0.74	0.73	0.66	0.71
Quality of output	0.67	0.79	0.70	0.74
Recognition in the research communication	0.71	0.74	0.75	0.74
Collaboration with other (sub)fields of research	0.75	0.84	0.83	0.82
Advanced research skills	0.91	0.95	0.68	0.86
International contacts/network	0.93	1.02	1.00	1.00

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Difference between the average career stage value for a specific effect and the average career stage value for all effects.
- 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 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?"
- (n=1,704)

8.1.1.5.2. Effects of >3 month post-PhD mobility: recent mobility

Figure 108 provides an overview of the effects of the entire mobility experience according to the time passed since the mobility occurred, differentiating between those that have been mobile more than ten years ago, those that moved less than ten years ago, those that have done so less than 5 years ago and those that are currently mobile. The patterns across different profiles are very similar. Most effects are slightly less pronounced for those that are currently mobile, indicating that effects are not automatic and that it might take some time for researchers to experience them.

Figure 108: Effects of entire mobility experience on the researcher's career for the recently mobile (EU28)

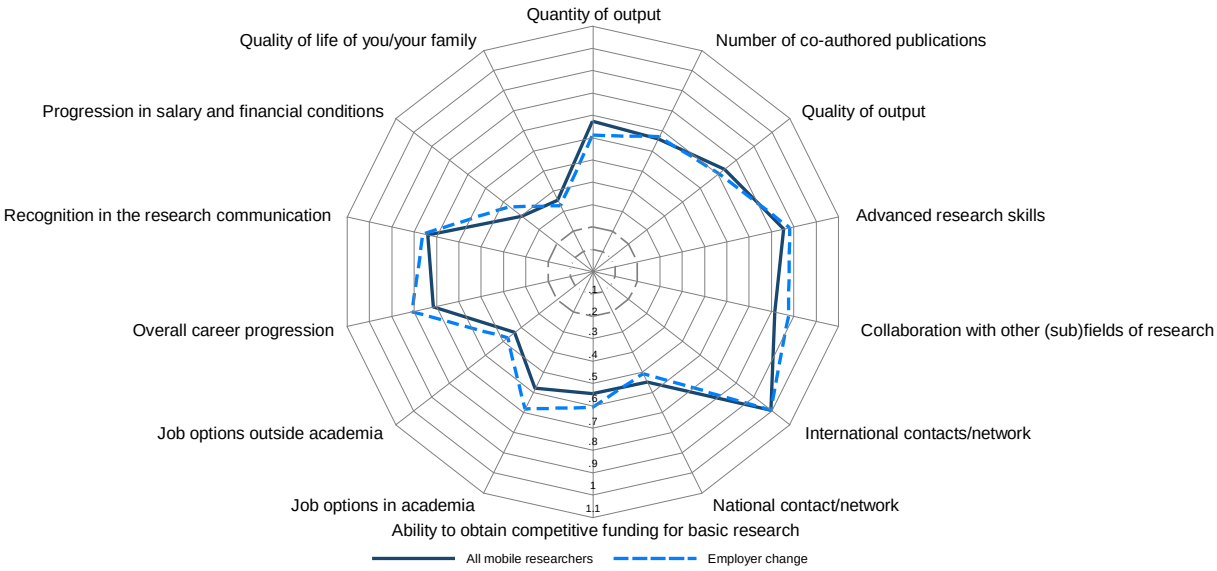


Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years or before.
- Average effect on the specific aspect of career for the groups of all mobile researchers < 10 years, all mobile researchers > 10 years ago, currently mobile and recent mobile (in the last five years).
- 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 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?" and question 66: "Please indicate the 3 most recent international steps/moves in the last 10 years of your researcher career after your PhD up to (but excluding) your current position in which you are employed."
- (n=3,027).

8.1.1.5.3. Effects of >3 month post-PhD mobility: employer mobility

The effects of entire mobility experience on the researcher's career are slightly more pronounced when researchers undertake a change of employer. It is especially the effects on career progression, collaboration with other (sub)fields, and the job options in academia which are more strongly perceived by those who have changed employer. The effect on keeping and developing national contacts and networks is the most positive effect for those who have changed employer and for those who have not.

Figure 109: Effects of entire mobility experience on the researcher's career when at least one change in employer (EU28)



Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Average effect on the specific aspect of career for the groups of all mobile researchers in the last ten years versus researchers with at least once employer mobility (n=1,704).
- 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 77: "Please indicate below the effects, if any, of your entire mobility experience on your career to date?" and question 69: "Did you change employer?"
- (n=1,704)

8.1.2. International short-term mobility of <3 months

Next to the moves of three months or longer, the EU HE survey also covered shorter-term moves of less than three months. In this section the main findings in terms of short-term mobility stock, the characteristics of the short-term moves and the relation to longer-term mobility profiles are presented.

8.1.2.1. Stock of <3 month international mobility

Share of researchers with <3 month international mobility experience *Of all R2, R3 and R4 researchers*			
	<3 month mobile less than ten years ago	**<3 month mobile more than ten years ago**	**Never <3 month mobile**
2012 (n=7,131)	41.0%	13.4%	45.6%
2016 (n=8,073)	37.2%	11.6%	51.2%

Share of researchers with <3 month international mobility experience in the last ten years *Of all R2, R3 and R4 researchers*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n=7,131)	41.0%	R2: 35.8% R3: 41.0% R4: 45.1%	MED: 36.5% NAT: 42.3% SOC: 41.0%	F: 37.0% M: 43.3%
2016 (n=8,073)	37.2%	R2: 31.0% R3: 37.8% R4: 40.1%	MED: 34.9% NAT: 37.8 % SOC: 37.4%	F: 35.1% M: 38.4%

Share of researchers with <3 month international mobility experience more than ten years ago *Of all R2, R3 and R4 researchers*				
	EU total	**Per career stage**	**Per FOS**	**Per gender**
2012 (n=7,131)	13.4%	R2: 8.9% R3: 12.0% R4: 18.5%	MED: 15.6% NAT: 13.9% SOC: 11.3%	F: 13.0% M: 13.6%
2016 (n=8,073)	11.6%	R2: 8.7% R3: 9.0% R4: 16.8%	MED: 11.8% NAT: 12.2 % SOC: 10.6%	F: 10.4% M: 12.3%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 79: "Short term mobility (<3 months)"

37% of post-PhD researchers in the EU28 have worked abroad as researchers for less than 3 months at least once in the last ten years. This is a small decrease of 4 pp compared to 2012. 12% of the post-PhD researchers in the EU28 have been mobile for less than 3 months but more than ten years ago. In total, 49% has experienced short-term mobile while the other 51% of the post-PhD researchers has never engaged in this type of mobility.

Country level: At the country level it is noted that most countries are around the EU average of 37% (see Figure 110 and Table 74 in Annex). In Slovenia (49%), Italy (46%) and Hungary (44%), researchers have been slightly more short-term mobile in the last ten years. At the other end of the spectrum Croatia (30%), Luxembourg (29%) and Romania (22%) have less short-term mobile researchers. In 2012, the indicator values per country were more divergent, ranging from 29.1% of researchers in Poland to 60.8% of researchers in Hungary having undertaken a <3 month move in the last ten years.

Comparing the values per country over the two points in time shows that the patterns are not stable. Romania and Luxembourg, now at the lower end of the spectrum, had fourth (55%) and seventh (51%) highest positions respectively for this indicator in 2012. The end of the European social fund and sectoral operational programme human resources development that supported researchers substantially up to 2015 could be a possible explanation why the share has decreased in Romania. Italy, now at the higher end of the spectrum, had the fourth lowest value in 2012 (37%).

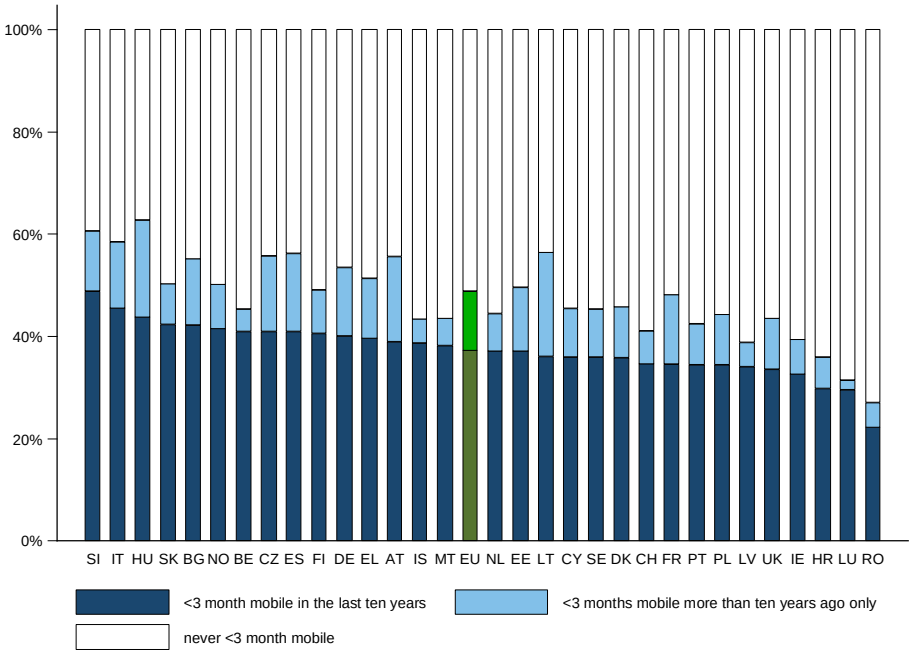
Career stage: The proportion of researchers who were <3 month mobile during the last ten years varies along the career stages: 31% in R2, 38% in R3 and 40% in R4 (see Figure 111). This increasing pattern is logical when considering that on average age increases with career stage and thus researchers in a later career stages will have had more time and opportunities to engage in (short-term) mobility. It is also visible in the short-term mobility of more than ten years ago. The same was observed in MORE2, but the values were then slightly higher in each of the career stages (36% in R2, 41% in R3 and 45% in R4).

Field of science: When comparing the various scientific disciplines little differences are observed: the highest degree of researchers undertaking short-term mobility is 39% in the Humanities, the lowest is 34.5% in the Medical Sciences (see Figure 112). The values have dropped slightly in all fields compared to the 2012 values.

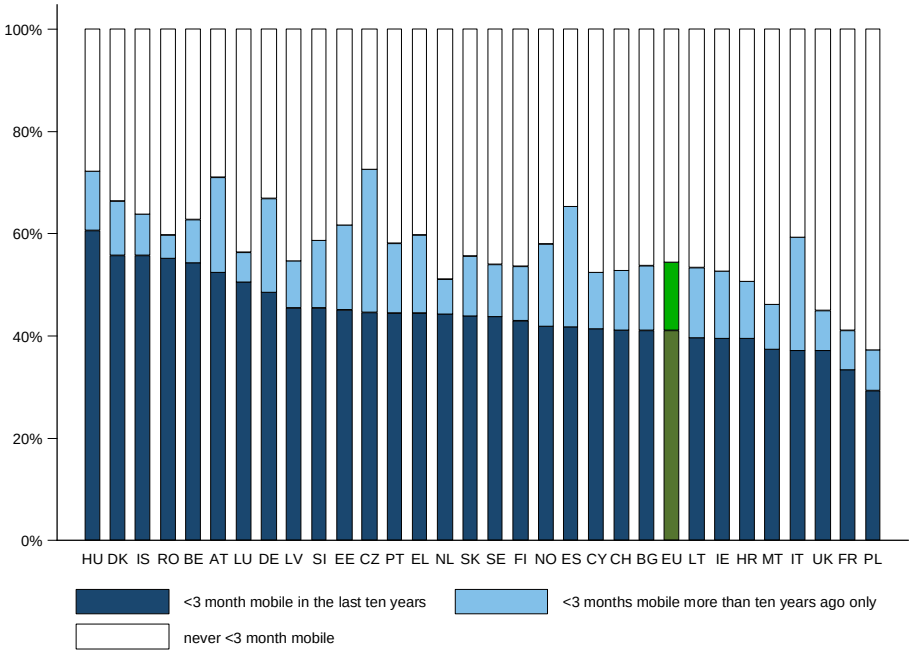
Gender: At the EU-level, there has been a 3.3pp difference in mobility in the last ten years and 1.9pp difference in mobility longer ago between male and female researchers. The difference in mobility in the last ten years is comparable to MORE2, where a 4.2 percentage point difference was observed (37% versus 43%). Bigger differences occur at country level (see Figure 113), where in particular in Cyprus and Hungary <3 month mobility in the last ten years is 19pp and 18pp higher for female compared to male researchers. Slovakia, Spain and Denmark are at the upper end with more male researchers in short-term mobility (difference around 10%).

Figure 110: <3 month international mobility in post-PhD career stage, in the last ten years, by country (2012-2016)

2016:

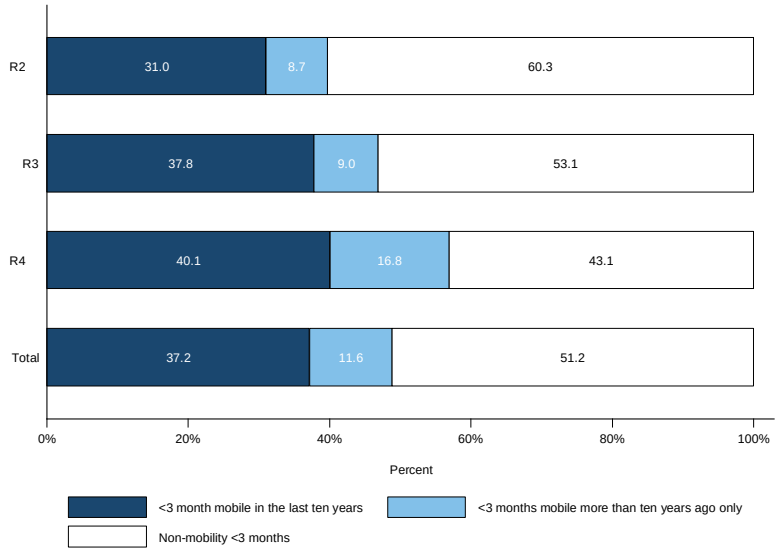


2012:



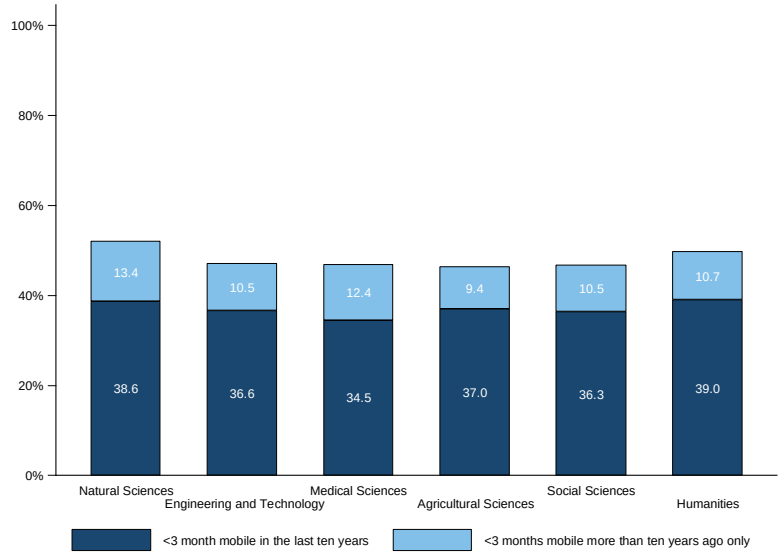
Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Only R2, R3 and R4 researchers.
- Percentage of R2, R3 and R4 researchers who have worked abroad for under 3 months at least once in the last ten years, per country.
- Based on question 79: "Short term mobility (<3 months)"
- (2016: n=8,824; 2012: n = 8,357)

Figure 111: <3 month international mobility in post-PhD career stage, in the last ten years, by (current) career stage (EU28)



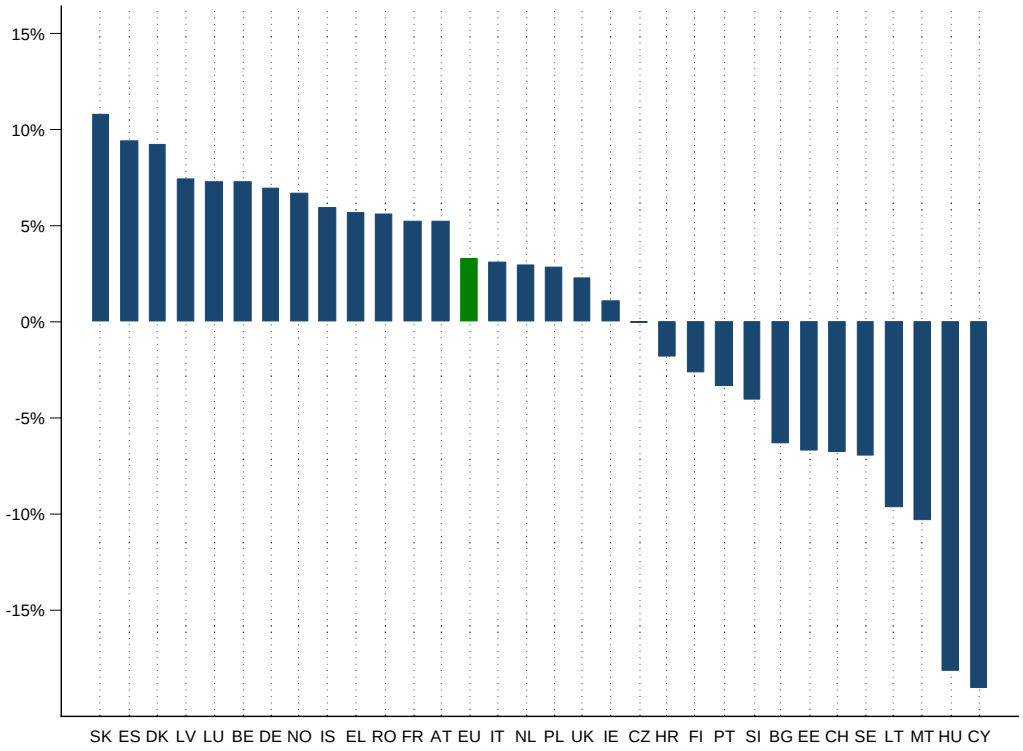
Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Percentage of R2, R3 and R4 researchers who have worked abroad for under 3 months at least once in the last ten years, per career stage.
- Based on question 79: "Short term mobility (<3 months)"
- (n=8,073)

Figure 112: <3 month international mobility in post-PhD career stage, in the last ten years, by field of science (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Percentage of R2, R3 and R4 researchers who have worked abroad for under 3 months at least once in the last ten years, per field of science.
- Based on question 79: "Short term mobility (<3 months)"
- (n=8,073)

Figure 113: <3 month international mobility in post-PhD career stage, in the last ten years, by gender and country



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Difference between percentage of male and female researchers in R2, R3 and R4 career stage who have worked abroad for <3 months at least once in the last ten years.
- Based on question 79: "Short term mobility (<3 months)"
- (n = 8,073)

8.1.2.2. Relation to >3 month international mobility

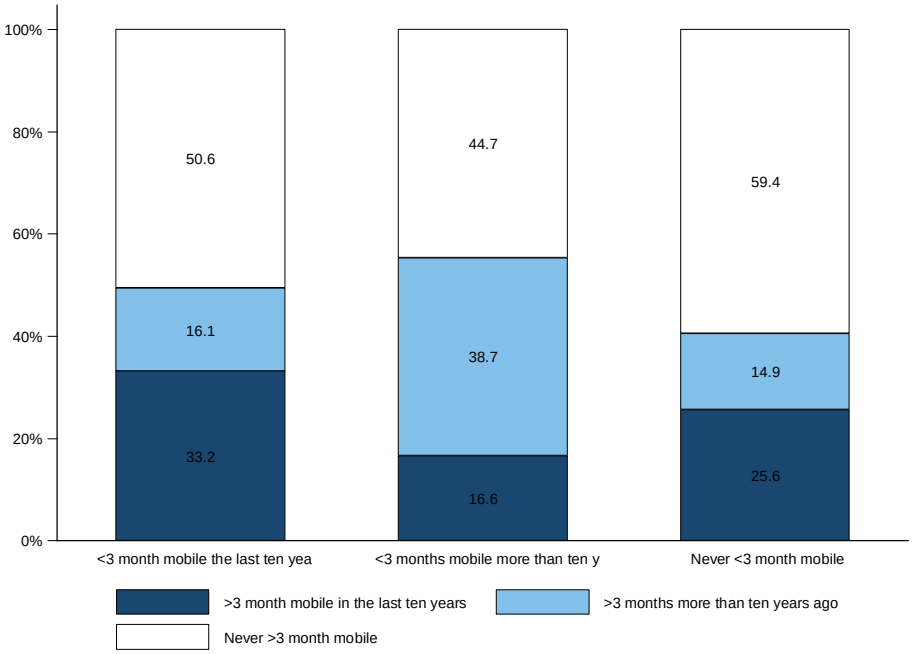
There is a strong interrelation between short (<3 months) and longer term (>3 months) mobility (see Figure 114):

- 60% of the researchers who have never been short-term mobile have not been long-term mobile either.
- Of the researchers who have been short-term mobile more than ten years ago, 39% have been long-term mobile more than ten years ago. 45% have never been long-term mobile.
- 33% of the researchers who have been short-term mobile in the last ten years have also been long-term mobile in the last ten years.
- These are each time also the highest shares compared to the other short-term mobility profiles.

An exception to the pattern is that 27% of the researchers who have never worked abroad for a short-time period have been abroad for a long-time period in the last ten years.

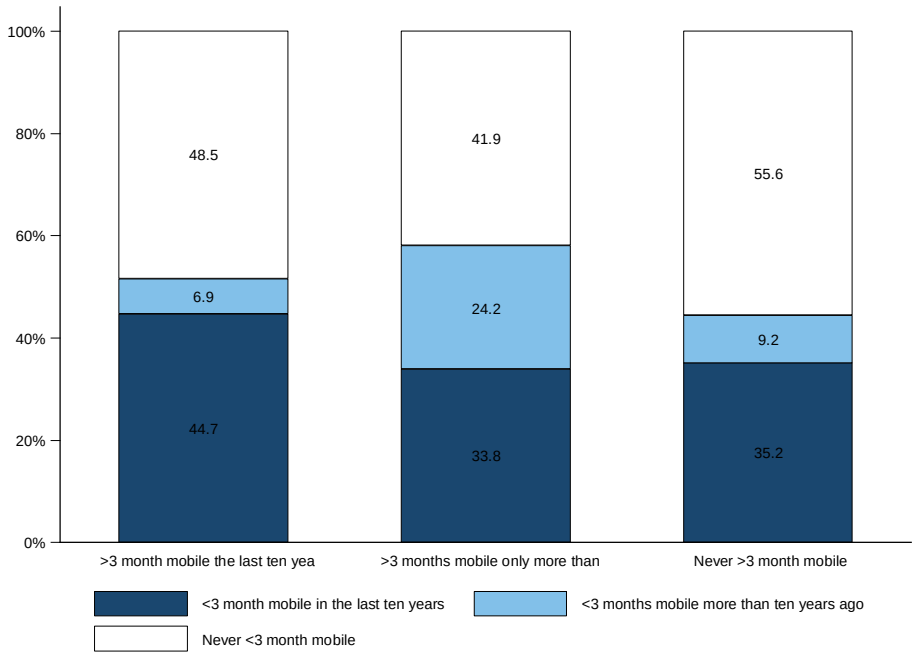
The alternative presentation is shown in Figure 115. Researchers who were >3 month mobile in the last ten years are more inclined to undertake <3 month mobility compared to the researchers who have never been long-term mobile.

Figure 114: >3 month international mobility in post-PhD career stages, by <3 month mobility profile (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Distribution over >3 month mobility categories of R2, R3 or R4 researchers per <3 month mobility category.
- Based on question 79: "Short term mobility (<3 months)" and question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

Figure 115: <3 international month mobility in post-PhD career stages, by >3 month mobility profile (EU28)



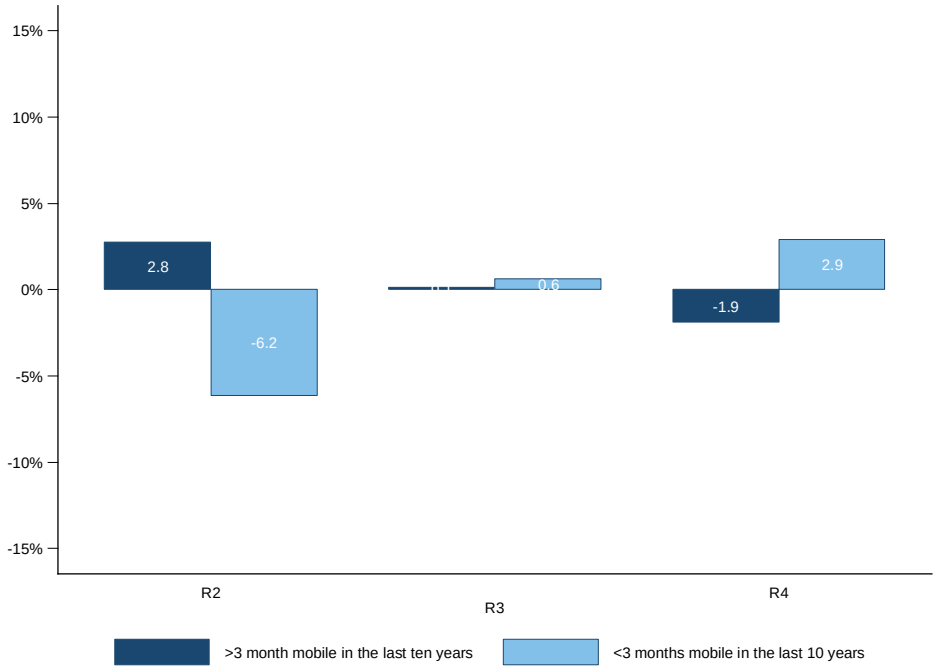
Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Distribution over <3 month mobility categories of R2, R3 and R4 researchers per >3 month mobility category.
- Based on question 79: "Short term mobility (<3 months)" and question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

Career stage: For R2 researchers, >3 month mobility occurs relatively more often than the average, while <3 month mobility is less common. For R4 researchers, the pattern is reversed; >3 month mobility occurs relatively less often than the average, while <3 month mobility occurs more (Figure 116).

Gender For male researchers, >3 month mobility as well as the <3 month mobility occurs relatively more often than the average, while for the females both >3 month and <3 month mobility is less common.

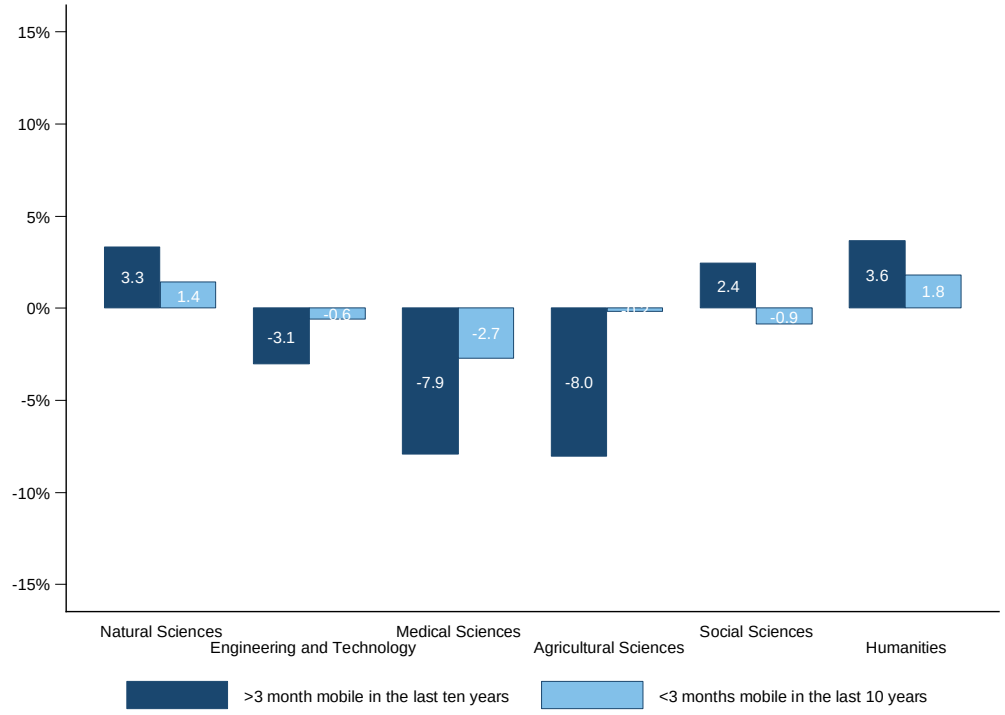
Field of science: In Natural Sciences, Social Sciences and Humanities >3 month mobility occurs relatively more often than the average, while <3 month mobility is less common. For Engineering and Technology, Medical Sciences and agriculture, the pattern is reversed; >3 month as well as <3 month mobility occurs relatively less often than the average (see Figure 117).

Figure 116: Comparison of <3 month and >3 month international mobility rates in post-PhD career stages, by (current) career stage (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Difference between percentage of researchers who were <3 month respectively >3 month mobile per career stage and the total share of <3 month respectively >3 month mobile researchers (n=8,073).
- With '<3 month mobility' defined as international steps in the last ten years of R2, R3 or R4 researchers to work abroad for under 3 months.
- With '>3 month mobility' defined as international steps in the last ten years of R2, R3 or R4 researchers to work abroad for more than 3 months.
- Based on question 79: "Short term mobility (<3 months)" and question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

Figure 117: Comparison of <3 month and >3 month international mobility rates in post-PhD career stages, by field of science (EU28)



Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers.
- Difference between percentage of researchers who were <3 month respectively >3 month mobile per field of science and the total share of <3 month respectively >3 month mobile researchers.
- With '<3 month mobility' defined as international steps in the last ten years of R2, R3 or R4 researchers to work abroad for under 3 months.
- With '>3 month mobility' defined as international steps in the last ten years of R2, R3 or R4 researchers to work abroad for more than 3 months.
- Based on question 79: "Short term mobility (<3 months)" and question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

8.1.3. International collaboration

8.1.3.1. Stock[119]

International collaboration *All researchers (n=9,412)*	EU total	Per (current) career stage	Per FOS	Per gender
Researchers in your country	62.9%	R1: 51.2% R2: 54.4% R3: 63.1% R4: 73.7%	NAT: 67.0% ENG: 64.1% MED: 61.9% AGR: 61.3% SOC: 60.6% HUM: 60.4%	F: 62.2% M: 63.4%
Researchers in EU countries	63.2%	R1: 39.5% R2: 48.3% R3: 67.7% R4: 78.2%	NAT: 70.0% ENG: 65.1% MED: 56.0% AGR: 60.0% SOC: 60.9% HUM: 65.3%	F: 60.1% M: 65.2%
Researchers in non-EU countries	45.9%	R1: 22.9% R2: 31.0% R3: 47.1% R4: 64.8%	NAT: 56.6% ENG: 43.1% MED: 40.4% AGR: 47.2% SOC: 42.7% HUM: 44.4%	F: 40.5% M: 49.3%

Source: MORE3 EU HE survey (2016)
Notes:
- Multiple collaboration types per respondent are possible.
- Based on question 88: "Please indicate with whom you collaborate in your research"

One of the objectives of the European Research Area is the development of a critical mass of researchers in Europe able to face the challenges ahead in terms of technological innovation and development. However, in order to do so, international mobility is not the only or most important requirement. Indeed, the degree to which researchers collaborate with other researchers is also paramount. In a context of increasing specialisation, the establishment of cross-border networks of researchers is a necessary condition for the development of excellent research. At the EU level, the main policy frameworks – e.g. the European Research Area, the Innovation Union, the three O´s – all aim at fostering this type of collaboration by promoting the exchange of knowledge across countries.

The survey included questions to unveil the patterns of collaboration along two main dimensions: sectoral collaboration and international collaboration. These questions were asked to all researchers. This section addresses international collaboration, disregarding the sector with which researchers collaborate -academic or non-academic. The latter is analysed in-depth in section 8.3.2. In general terms, a similar share of researchers collaborate with other researchers in the same country and with researchers located in other EU countries (63% and 63% respectively). Working with colleagues from non-EU countries is less common, but nevertheless it constitutes nearly one half of the total population.

[119] Changes in the wording of this question compared to the MORE2 study do not allow to compare the evolution of these indicators over time.

Country level: There is a large heterogeneity with regard to these types of collaboration across country. The shares of those engaging in national collaboration range from 38% in Poland or 46% in the Czech Republic to 80% in Romania or even 84% in Croatia. The level of heterogeneity is somewhat smaller for international collaboration, especially with non-EU researchers. With respect to collaboration within the EU, the larger West-European countries display relatively low shares: Germany (49%), Switzerland (53%), France (53%), Spain (62%), Italy (64%), and United Kingdom (68%). A completely different situation is found in a number of small countries: in Estonia and Malta a vast a majority of researchers work with colleagues in other EU countries (82% and 84% respectively). In Latvia, Iceland, Cyprus and Luxembourg a higher-than-average rate is also observed (80%, 77%, 72% and 72% respectively).

When analysing the extent to which collaboration with others located in non-EU countries occurs, we observe a slightly different geographical pattern. It is the least frequent option in some of the Eastern European countries, such as Czech Republic (27%), Romania (33%), Poland (34%) or Hungary (36%), and it is clearly more common in Anglo-Saxon and Scandinavian Europe: United Kingdom (58%), Denmark (58%), Ireland (54%), the Netherlands (53%), Norway (53%) and Sweden (53%). This is not surprising and can be explained by the focus of these systems on transatlantic cooperation with the United States of America. The other large countries are in the average (Spain, 47%) or lower range (Italy, France and Germany with 41%, 38% and 37% respectively). Also here, a number of smaller countries pop up in the upper half of the table: Iceland (53%), Luxembourg (51%), Belgium (50%) but this pattern is less explicit than in the EU level collaboration.

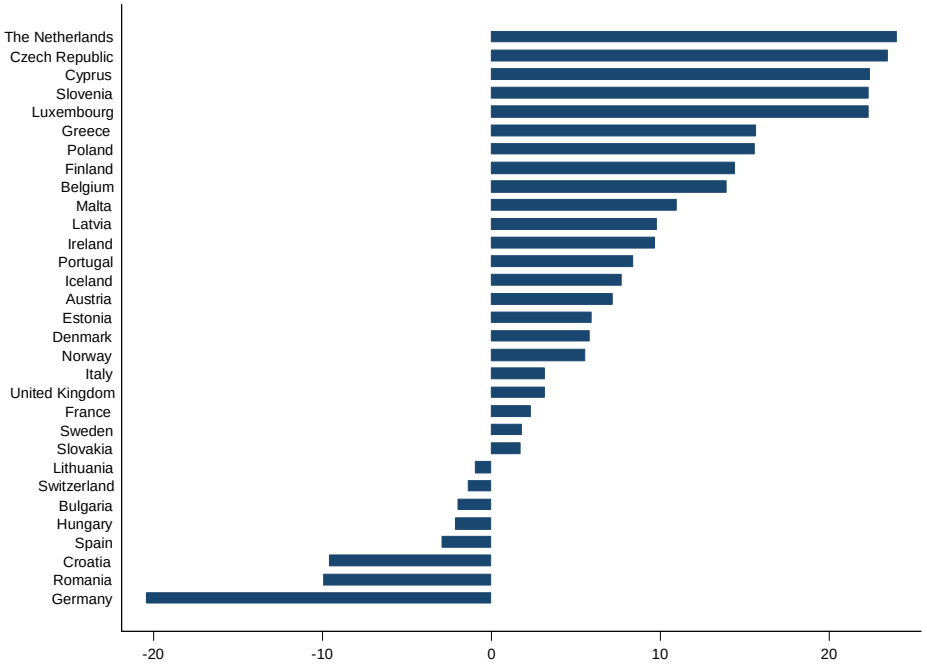
Across the three types of (national and international) collaboration, a number of countries have low rates for all three: Poland, France, Switzerland, Czech Republic, Bulgaria, Italy, and Lithuania. In Germany, international collaboration is low but national collaboration is relatively high. Countries with systematic high rates of collaboration are: Denmark, Croatia, Malta, Norway, Ireland, Iceland, Greece and Portugal. In most countries international collaboration within the EU is higher than national collaboration (see Figure 118).

Table 35: Types of collaboration per country

	Your country	EU countries	Non-EU countries
Austria	63.0%	70.1%	47.1%
Belgium	55.7%	69.6%	50.4%
Bulgaria	61.6%	59.6%	40.7%
Croatia	84.4%	74.8%	47.2%
Cyprus	49.7%	72.1%	46.9%
Czech Republic	45.8%	69.2%	27.2%
Denmark	72.6%	78.4%	57.5%
Estonia	76.0%	82.0%	44.2%
Finland	56.5%	70.9%	48.5%
France	50.7%	53.0%	38.2%
Germany	69.3%	48.9%	37.4%
Greece	64.3%	79.9%	50.5%
Hungary	66.9%	64.8%	36.3%
Iceland	69.6%	77.3%	53.0%
Ireland	66.8%	76.4%	54.4%
Italy	60.6%	63.8%	40.6%
Latvia	70.0%	79.8%	40.6%
Lithuania	66.1%	65.1%	36.7%
Luxembourg	49.3%	71.6%	51.2%
Malta	73.4%	84.3%	45.0%
Norway	69.7%	75.3%	53.3%
Poland	38.3%	53.9%	33.7%
Portugal	68.7%	77.1%	47.4%
Romania	79.7%	69.7%	32.6%
Slovakia	71.9%	73.6%	36.4%
Slovenia	56.7%	79.0%	50.0%
Spain	64.5%	61.5%	47.2%
Sweden	66.6%	68.5%	53.1%
Switzerland	54.1%	52.7%	42.8%
The Netherlands	52.1%	76.1%	53.4%
United Kingdom	65.5%	68.7%	57.7%
EU28	62.9%	63.2%	45.9%

Source: MORE3 EU HE survey (2016)
Notes:
- Multiple collaboration types per respondent are possible. Darker colours reflect higher shares.
- Based on question 88: "Please indicate with whom you collaborate in your research"
- (n=10,394)

Figure 118: Difference between EU and national collaboration



Source: MORE3 EU HE survey (2016)
Notes:
- Difference between the share of researchers that collaborate with other researchers in EU countries and the share of those that collaborate with researchers in the same country. In the countries with a larger bar to the left, collaboration within the same country predominates. In the countries with a large bar to the right it is collaboration with EU researchers the most frequent.
- Based on question 88: "Please indicate with whom you collaborate in your research"
- (n=10,394)

Career stage: Collaboration with other researchers is highly dependent on career stage, being higher for those researchers in higher career stages. This pattern is similar for collaboration with researchers located in the same country and for those from other countries – both EU and non-EU countries. However, there are some differences that are worth mentioning.

First, collaboration with national researchers tends to be higher than collaboration with colleagues from the EU for researchers in earlier career stages (R1 and R2). However, the pattern is reversed for more experienced researchers: both R3 and R4 show higher shares of researchers collaborating with their EU counterparts. 63% and 73% of R3 and R4 researchers respectively collaborate within their country and 68% and 78% work with researchers located in EU countries.

Collaboration with non-EU researchers is less frequent across all career stages but it shows the same pattern with regards to career stage: this type of collaboration is more common among more experienced researchers, ranging from 23% for R1 to 65% for R4.

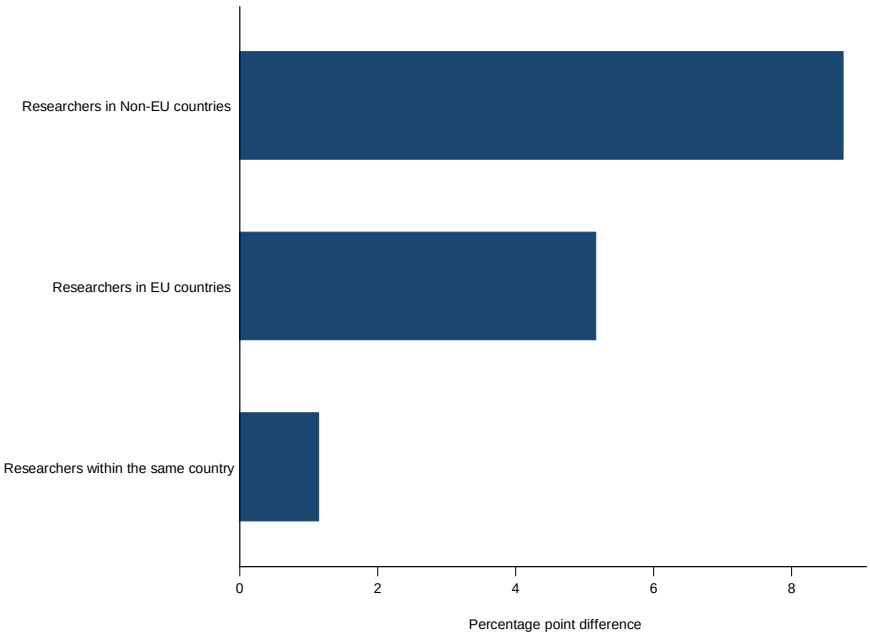
Field of science: When analysing the types of collaboration across fields of science we observe that there is more heterogeneity in international collaboration than in national collaboration. The shares of researchers working with others located in the same country are very similar across the different fields. 60% of the researchers in the Social Sciences and Humanities engage in some type of national collaboration. The shares are slightly

higher for those working in the Agricultural Sciences (61%) Medical field (62%), Engineering and Technology (64%) and in the Natural Sciences (67%).

With respect to international collaboration, researchers in the Medical Sciences are confirmed to be the least prone to work with colleagues located in other countries, either in the EU (56%) or outside the EU (40%). The field with a higher tendency to work internationally with others is that of the Natural Sciences: 70% within the EU, and 56% in third countries. Overall, researchers in the Natural Sciences are thus the most collaborative both nationally and internationally.

Gender: Gender differences depend on the type of collaboration that is analysed. National collaboration is roughly the same for male and female researchers. However, the differences are larger regarding collaboration in EU countries: 65% of male researchers compared to 60% of the female researchers. The largest gap is found for collaboration with researchers located in non-EU countries: 49 % and 40% of male and female researchers respectively. Given that female researchers are less represented in the later career stages, this observation is related to the findings per career stage.

Figure 119: Difference between male and female researchers in each type of collaboration



Source: MORE3 EU HE survey (2016)
Notes:
- The figures correspond to the difference between the share of female researchers and the share of male researchers declaring to do each type of collaboration.
- Based on question 88: "Please indicate with whom you collaborate in your research"
- (n=9,412)

8.1.3.2. Collaboration as a result of mobility

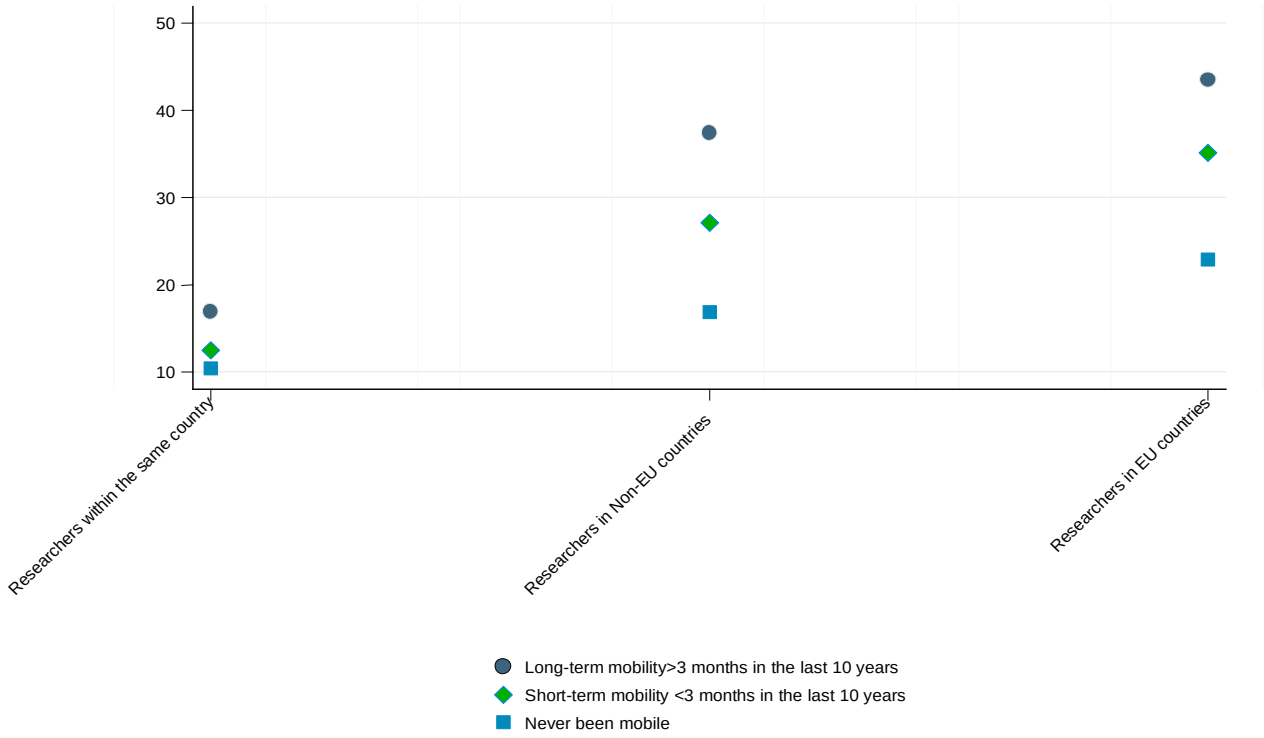
Some forms of collaboration are more related to mobility experiences than others. When this is the case, collaboration with colleagues in foreign countries tends to be associated to a larger extent to mobility experiences compared to collaboration with researchers located in the same country.

Among those who collaborate in some way with other researchers, the share of individuals considering that their collaboration activities in their own country are the

result of a previous mobility experience barely reaches 11%. However, when considering collaboration with researchers in other countries, the percentages are higher. Indeed, mobility is felt as the cause of collaboration with EU researchers for 26%. The relationship between having been mobile and collaboration with non-EU researchers is perceived by 20% of the "collaborative" researchers.

The length of the mobility experience also seems to matter. Researchers having been long-term mobile (i.e. for more than three months) in the last ten years, tend to attribute collaboration to mobility to a greater extent than those who have been short-term mobile (<3 months) or those who have never been mobile. This occurs in all types of collaboration: in the one taking place within the same country, but the strongest differences are found in the collaboration with researchers located in the EU and in non-EU countries.

Figure 120: Relation between collaboration as a result of mobility, types of collaboration, and length of the mobility experience



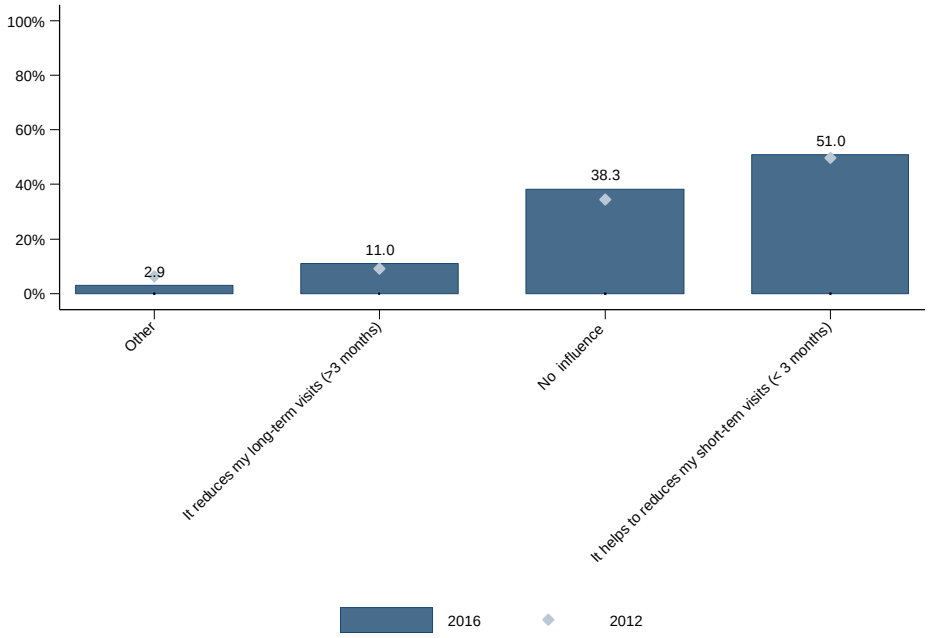
Source: MORE3 EU HE survey (2016)
Notes:
- Shares of mobile and non-mobile researchers indicating that this is the result of a previous mobility experience among those engaging in each type of collaboration.
- Based on question 85: "Which of these collaborations was the result of a previous mobility experience (of 3 months or more, in or outside the EU)?"
- (long-term mobile: n= 1,572; short-term mobile: n=2,594; non-mobile: n=4,581).

8.1.4. International virtual mobility

The use of web-based tools can facilitate collaboration between researchers located in different places. However, the extent to which this virtual collaboration impacts on researchers´ mobility decisions depends strongly on the context characteristics of country, career stage, field etc. In general terms, the responses to the survey indicate that virtual mobility has a greater impact on reducing short-term mobility (51% of the researchers that collaborate with international partners) than on reducing long-term mobility (11%).

A comparison with the MORE2 survey, indicates that there is a slightly greater effect of virtual technology on international mobility decisions in 2016 than in 2012. Whereas in 2012 50% of the researchers considered that these technologies contributed to reduce the number of short-term visits, four years later this percentage reaches 51%[120]. A similar change is observed for long-term visits: while the percentage was 9% in 2012, in 2016 it reaches 11%. However, in parallel to this (weak) positive trend, the data suggest that virtual technologies are increasingly normalised in the sense that mobility decisions are increasingly seen as independent from the use of virtual technologies (35% in 2012 compared to 38 % in 2016 declare that it does not have any influence).

Figure 121: Influence of web-based or virtual technology on international behaviour and decisions (EU28)



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Only respondents who collaborate with international partners.
- Multiple options per respondent are possible.
- Based on question 86: "How does the use of web-based or virtual technology in international collaboration influence your mobility behaviour and decisions?"
- (n=6,967)

Country level: Virtual mobility is seen to a larger extent as having no influence at all in researchers´ mobility decisions in large and affluent Western European countries, such as the United Kingdom, France and Germany. Among the smallest shares of researchers considering that virtual mobility has no impact (i.e. countries where large shares of researchers do see an impact of virtual mobility on international mobility) we can observe most of the Southern European countries, such as Portugal, Italy, Cyprus, Spain and Malta.

[120] Note that shares in all categories increase, except for 'other' where the share decreases from 2012 to 2016. However, as multiple options could be chosen by the respondent, the shares per category can still be compared over years as being the share of all researchers who have chosen this option, regardless of any other options they may have chosen at the same time.

Table 36: Influence of web-based or virtual technology on international behaviour and decisions, per country (EU28)

Country	It reduces short-term mobility	It reduces long-term mobility	Other effects	No influence
Austria	47.6%	11.8%	1.8%	40.0%
Belgium	55.7%	6.8%	1.8%	38.5%
Bulgaria	49.2%	15.2%	5.2%	37.9%
Croatia	48.3%	9.3%	0.0%	43.6%
Cyprus	51.7%	21.8%	1.4%	29.3%
Czech Republic	53.0%	11.3%	2.8%	34.3%
Denmark	39.6%	8.2%	5.2%	50.9%
Estonia	46.3%	13.3%	2.6%	41.5%
Finland	59.1%	18.6%	5.5%	25.2%
France	47.2%	3.9%	7.2%	43.4%
Germany	38.7%	8.3%	1.7%	54.1%
Greece	57.0%	16.3%	2.8%	30.2%
Hungary	53.8%	19.2%	3.7%	31.5%
Ireland	55.0%	7.3%	4.5%	35.8%
Italy	50.9%	8.4%	3.2%	38.3%
Latvia	60.3%	16.9%	5.5%	22.0%
Lithuania	57.2%	11.0%	3.6%	29.0%
Luxembourg	51.0%	20.6%	2.3%	36.4%
Malta	55.9%	8.0%	4.4%	36.9%
Poland	52.2%	15.4%	5.0%	28.0%
Portugal	53.7%	10.7%	4.9%	38.5%
Romania	57.5%	9.7%	0.8%	34.0%
Slovakia	74.9%	14.4%	0.9%	15.6%
Slovenia	59.4%	23.3%	1.5%	18.5%
Spain	50.3%	10.9%	1.1%	42.0%
Sweden	47.9%	9.5%	1.1%	43.0%
The Netherlands	56.0%	18.0%	4.8%	24.7%
United Kingdom	58.8%	10.7%	2.7%	32.2%
EU28 total	**51.0%**	**11.0%**	**2.9%**	**38.3%**

Source: MORE3 EU HE survey (2016)
Notes:
- Only respondents who collaborate with international partners.
- Multiple options per respondent are possible.
- Darker colours reflect higher shares of researchers within each item.
- Based on question 86: "How does the use of web-based or virtual technology in international collaboration influence your mobility behaviour and decisions?"
- (n=6,967)

Field of science: There is a significant consensus across field of science regarding the effects of virtual technology on long-term mobility: only a minority of researchers within each field of science consider that it has a significant impact on it (between 9 and 13%). There are larger differences in respect to its impact on short-term mobility. In Agricultural sciences, researchers declare that it has a larger effect than in the rest of fields (61% versus the average of 50%). The lowest share of researchers indicating that they see any influence at all are found in Agricultural Sciences and Engineering and Technology (32% in each field).

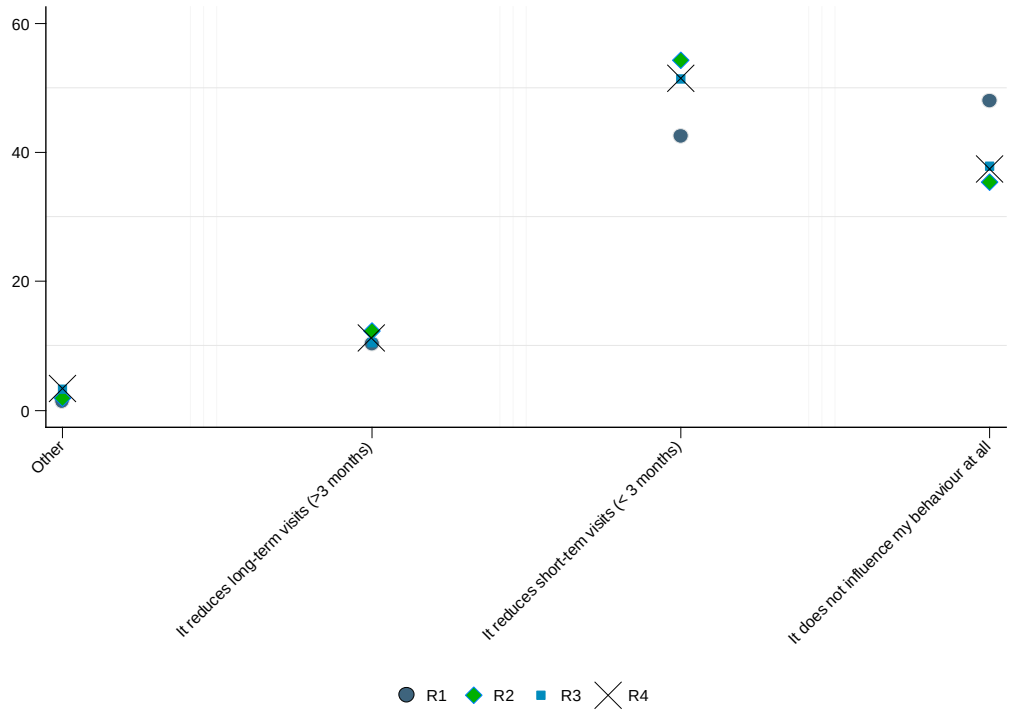
Table 37: The effects of virtual mobility per field of science (EU28)

Field of science	It reduces short-term mobility	It reduces long-term mobility	Other effects	No influence
Natural Sciences	49.1%	10.5%	2.3%	40.3%
Engineering and Technology	55.1%	13.3%	3.4%	31.8%
Medical Sciences	47.2%	9.4%	1.6%	43.8%
Agricultural Sciences	61.4%	12.7%	4.2%	31.6%
Social Sciences	54.2%	11.2%	4.3%	34.7%
Humanities	47.6%	10.7%	3.1%	41.1%

Source: MORE3 EU HE survey (2016)
Notes:
- Only respondents who collaborate with international partners.
- Multiple options per respondent are possible.
- Based on question 86: "How does the use of web-based or virtual technology in international collaboration influence your mobility behaviour and decisions?"
- (n=6,967)

Career stage: Results are very similar with respect to career stage. Opinions tend to be rather similar across career stages with respect to the impact of virtual technology on long-term mobility. R1 researchers differ from the higher career stages in that researchers in this stage consider to a lesser extent that this type of collaboration reduces short-term mobility: 42% of R1 researchers versus 54% of R2, and 51% of R3 and R4 respectively). One reason for this difference can be related to the different perspective of the younger researchers, who have grown up in the digital era and consider digitalisation as the standard. In that respect, they probably already use both approaches in their collaboration and see only a small degree of interchangeability remaining between both approaches.

Figure 122: Different perceptions on the effect of virtual technologies on career stage (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only respondents who collaborate with international partners.
- Multiple options per respondent are possible.
- Based on question 86: "How does the use of web-based or virtual technology in international collaboration influence your mobility behaviour and decisions?"
- (n=6,967)

Gender: There are no major differences between male and female researchers regarding the effect of virtual technology on their mobility behaviour. A similar share of male researchers and 51% of female researchers declare that it helps to reduce short-term mobility. 11% of both men and female consider that virtual technology reduces long-term mobility. 39% of male researchers state that it has no influence at all. The same opinion is held by 37% of female researchers.

International mobility: Interestingly, perceptions on the effect of virtual mobility are not contingent upon the extent to which researchers are mobile. For the purposes of this analysis, long-time mobile researchers are defined as those that have been mobile for more than three months in the last ten years. Short-time mobile researchers are the ones that have been mobile for less than three months in the same period. Non-mobile researchers are defined as those who have never been mobile. Table 38 shows that the shares for the different mobility types are very similar, thus that there is no relationship between the mobility profile of researchers and their opinions on the effect of virtual technology.

Table 38: Perceptions of the effect of virtual technology on mobility among the internationally mobile and non-mobile researchers (EU28)

	Long-term mobile researchers	Short-term mobile researchers	Non-mobile researchers
It reduces or replaces short-term visits	51.1%	49.5%	51.3%
It reduces or replaces long-term visits	11.2%	9.4%	11.1%
No influence at all	37.0%	41.2%	37.8%
Other	4.3%	4.1%	2.5%

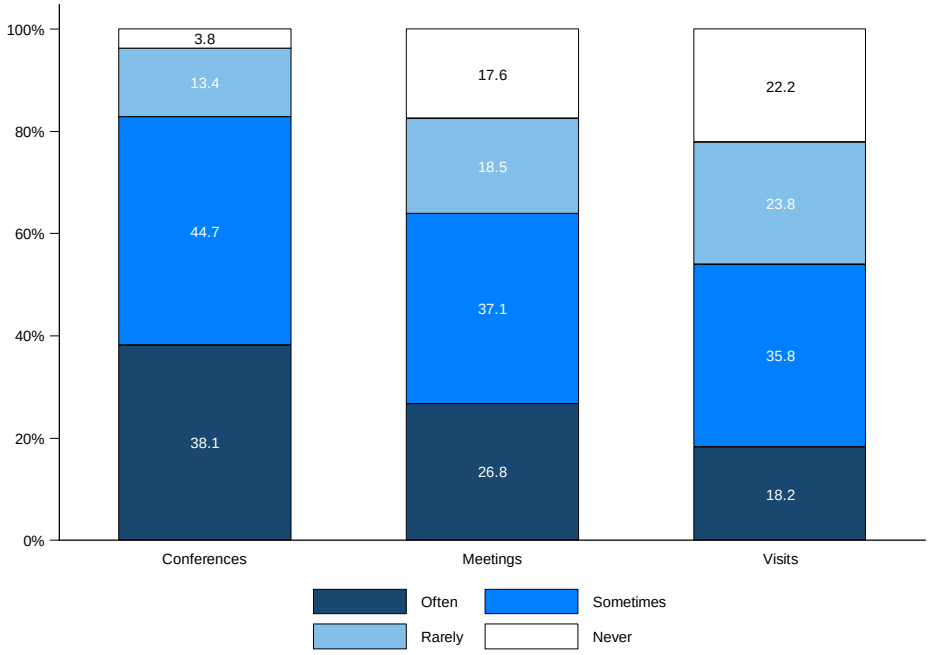
Source: MORE3 EU HE survey (2016)
Notes:
- Only respondents who collaborate with international partners.
- Multiple options per respondent are possible.
- Based on question 86: "How does the use of web-based or virtual technology in international collaboration influence your mobility behaviour and decisions?"
- (long-term mobile: n= 1,572; short-term mobile: n=2,594; non-mobile: n=4,581).

8.1.5. Short travel for conferences, meetings and visits

Of all R2, R3, R4 researchers, 1,133,079 went to conferences or events, 970,367 to meetings with supervisors, partners or collaborators and 915,856 moved for study visits, research visits or fieldwork. Conferences are very common, only 4% has never visited a conference or event, whereas this is 18% for meetings and 22% for visits.

Frequency: The largest share of researchers indicates that they have undertaken these types of short moves 'sometimes', i.e. once or twice a year (45%, 37% and 36% respectively), and another important part indicates that the moves took place 'rarely', i.e. less than once a year (38%, 27% and 18% respectively). Among the researchers that were abroad for visits, 24% said these take place 'often', i.e. 3 times a year or more. This means that overall, the chance of a researcher undertaking visits is smaller than for the other types (22% indicated 'never'). However, if the researcher engages in this type of moves, the frequency is relatively higher than for other types of short moves. The opposite holds for conferences and events. These findings are fully consistent with the results in MORE2 (2012).

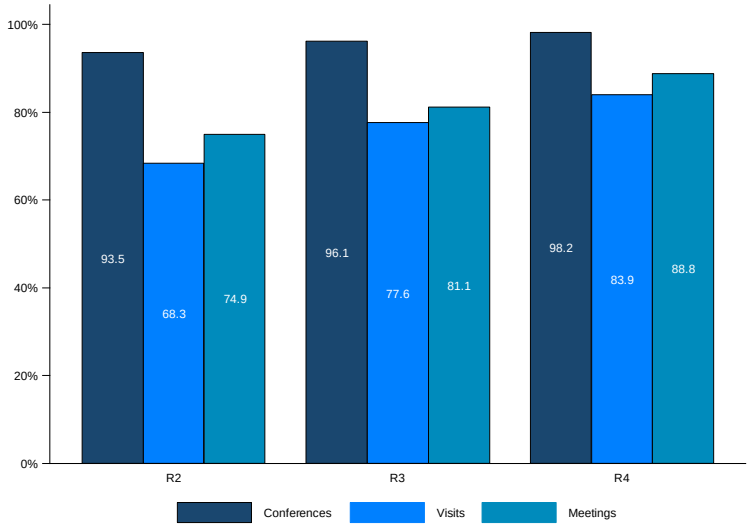
Figure 123: Participation in conferences, visits and meetings, by frequency (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Percentage of R2, R3 and R4 researchers, distributed over types of <3 month mobility and their duration.
- Per type, the respondent could only indicate one frequency category.
- Based on question 80: "What types of work-related international travel have you undertaken during your research career (but after you PhD)?"
- (n=7,746 for conferences, n =6,628 for meetings and n =6,456 for visits)

Career stage: Conferences, visits and meetings are very much related to research seniority: those in higher career stages report to assist more than younger researchers. However, whereas the differences between R2 and higher career stages are quite reduced in the case of conferences, much larger differences are found for the other two types of short-term activities. The share of R4 researchers that assists to meetings is 14pp higher than that of R2 researchers. The percentage point difference found in the case of study visits is even larger (16pp).

Figure 124: Participation in conferences, visits and meetings, by career stage (EU28)



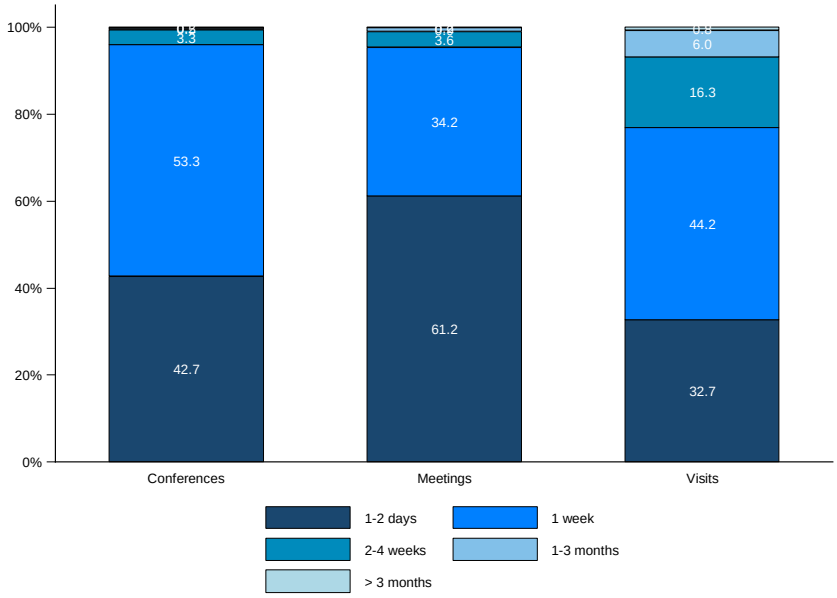
Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Percentage of researchers in R2, R3 or R4 career stage, distributed over types of <3 month mobility and career stage.
- Based on question 80: "What types of work-related international travel have you undertaken during your research career (but after you PhD)?"
- (n=7,746 for conferences, n =6,628 for meetings and n =6,456 for visits)

Field of Science: Researchers across the different fields of science show a similar tendency to go to conferences. Between 95% and 97% undertake this type of short-term moves in each field of science. There are larger differences in the case of study visits. These can refer to visits to do research, receive training or to do fieldwork. They are more common in Agricultural Sciences (85%) and in Humanities (81%), followed by Natural Sciences, Engineering and Technology and the Social Sciences (79%, 78%, and 77% respectively). Meetings seem to be more frequent in Agricultural Sciences (88%), Medical Sciences (86%), Natural Sciences (85%), and Engineering and Technology (84%). Going to these activities is less common in the Social Sciences (78%) and Humanities (76%).

Gender: Similar shares of male and female researchers go to conferences (96% each) and do study visits (78% and 77% respectively). There is a 4pp difference for meetings (84% among men and 80% among women researchers).

Duration: The vast majority of international conferences, meetings and visits last up to one week. Meetings more often take only one to two days, while visits tend to last longer. A group of 16% of researchers who undertook visits indicate that this visit lasted 2 to 4 weeks and another 6% state that it lasted 1 to 3 months. This is a similar pattern as that found in the MORE2 study (2012), where the duration of international visits also have a different pattern compared to that of conferences and meetings.

Figure 125: Participation in conferences, visits and meetings, by duration (EU28)



Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers.
- Percentage of researchers in R2, R3 or R4 career stage, distributed over types of <3 month mobility and their duration.
- Per type, the respondent could only indicate one duration category.
- Based on question 80: "What types of work-related international travel have you undertaken during your research career (but after you PhD)?"
- (n=7,746 for conferences, n =6,628 for meetings and n =6,456 for visits)

8.2. Interdisciplinary mobility and collaboration in post-PhD stage

This section discusses the interdisciplinary mobility related to the post-PhD stage. This type of mobility is, together with international and intersectoral mobility, one of the cornerstones of European science policy and programmes. Indeed, programmes such as the Marie Skłodowska-Curie actions[121] or the European Research Council granting schemes[122] stress the importance of this type of mobility. In a context where knowledge economies are at the forefront of economic and technological evolution this comes as no surprise. Interdisciplinary mobility has been said to foster certain skills that are of key importance for researchers today. Entrepreneurial skills[123], an increased ability to effectively communicate beyond the frontiers of one´s own field, and a greater capacity of adaptation to ever-changing environments are some of the advantages related to this type of mobility. The analysis is structured as follows:

- Interdisciplinary mobility (section 8.2.1), including the stock of interdisciplinary researchers and the effects for recruitment and career progression;
- Interdisciplinary collaboration (section 8.2.2);
- Interdisciplinary virtual mobility (section 8.2.3).

8.2.1. Interdisciplinary mobility

8.2.1.1. Stock

Share of researchers who have switched to another (sub)field during their academic career
Of all researchers (n=9,412)

	EU28 total	Per career stage	Per FOS	Per gender
2016	34.3%	R1: 28.9% R2: 29.5% R3: 33.6% R4: 40.9%	NAT: 35.5% ENG: 36.8% MED: 32.5% AGR: 34.2% SOC: 37.2% HUM: 28.7%	F: 34.2% M: 34.4%

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 14: "Did you switch to another (sub)field of research during your academic career?"

Based on a direct question in the survey, over one third of all researchers have switched to another field or subfield of research during their academic career (34%). This was not part of the MORE2 EU HE survey, so comparison to 2012 cannot be made in this section.

Country level: There are important differences across countries in the extent to which researchers move across disciplines during their academic careers. Some countries, such

[121] 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
[122] 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
[123] 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

as Bulgaria (60%), Slovenia (54%) or Lithuania (50%) stand out for their high shares of researchers having moved at least once in to another field in the past. In other countries, such as Italy (18%), Belgium (21%) or Iceland (26%), researchers are less likely to have undertaken this type of interdisciplinary move.

Career stage: The likelihood of having switched to another field of science is highly contingent upon the time researchers have spent in the research profession. Higher career stages show slightly higher shares of researchers with multidisciplinary moves in their careers than the younger cohorts: 41% of R4 and 34% of R3 versus 29% of R1 and R2 researchers.

Field of science: No important differences are observed when comparing the shares of researchers having undertaken an interdisciplinary move in their career in the different fields of science. The shares of this type of researchers range between 35% and 37% in all the fields of science, except for Humanities which displays a smaller share (29%).

Gender: It is important to note that the shares of male and female researchers having switched to another field or subfield of science during their research career are very similar (34% versus 34% respectively).

Table 39: Share of researchers having switched to another field during their research careers, per country

Country	Percentage	Country	Percentage
Austria	33.4%	**Latvia**	44.7%
Belgium	21.3%	**Lithuania**	49.7%
Bulgaria	60.2%	**Luxembourg**	32.9%
Croatia	41.0%	**Malta**	37.2%
Cyprus	38.8%	**Norway**	42.2%
Czech Republic	27.9%	**Poland**	28.3%
Denmark	38.1%	**Portugal**	28.7%
Estonia	33.9%	**Romania**	32.3%
Finland	42.3%	**Slovakia**	41.3%
France	29.4%	**Slovenia**	54.1%
Germany	37.5%	**Spain**	30.9%
Greece	42.5%	**Sweden**	39.1%
Hungary	44.0%	**Switzerland**	33.9%
Iceland	26.2%	**The Netherlands**	40.1%
Ireland	36.2%	**United Kingdom**	37.1%
Italy	17.5%	**EU28**	**34.3%**

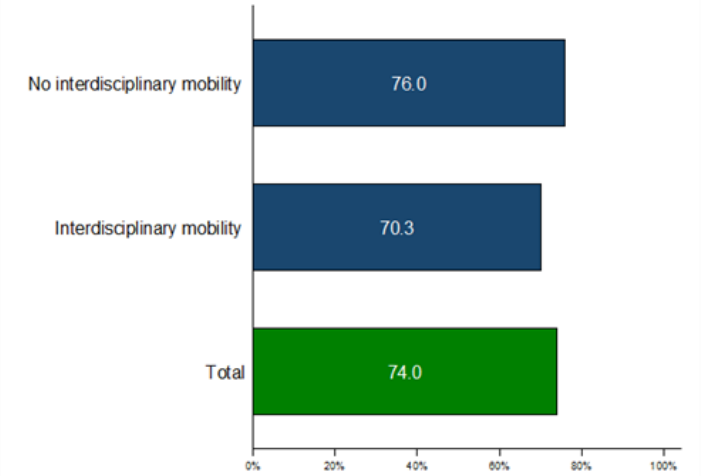
Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 14: "Did you switch to another (sub)field of research during your academic career?"
- (n=10,394)

8.2.1.2. Effects

Interestingly, we observe that interdisciplinary mobility is perceived as having a different effect on recruitment and on career progression depending on whether researchers have previously been interdisciplinary mobile (see also section 5.3.2). Figure 126 shows how those who have worked in other disciplines tend to have a less positive view of the impact of this type of mobility on recruitment: the difference is of 4 pp with the total

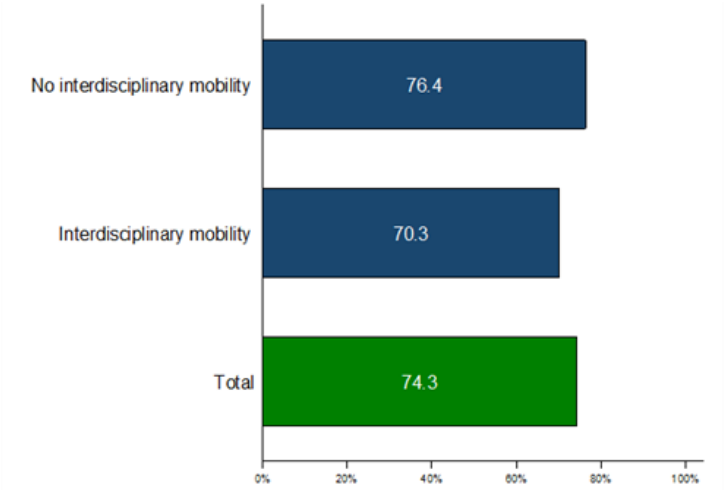
population, and of nearly 6 pp with those that have never worked in other fields of science. Figure 127 reflects that a similar pattern is found for the perceptions of the effect of this type of mobility on career progression. Those who have worked in other fields tend to have a less sanguine opinion of the impact of this type of experience on career progression in their home institution. The differences with those who have not been mobile and with the general population are similar to the ones found in the analysis of the effects on recruitment.

Figure 126: Perceptions of the effects on recruitment according to different profiles of interdisciplinary mobility (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 14: "Did you switch to another (sub)field of research during your academic career?" and question 42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=9,412)

Figure 127: Perceptions of the effects on career progression according to different profiles of interdisciplinary mobility (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 14: "Did you switch to another (sub)field of research during your academic career?" and question 43: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?"
- (n=9,412)

8.2.2. Interdisciplinary collaboration[124]

Share of researchers who have collaborated with or worked in more than one field in their current position *Of all researchers (n=9,412)*				
	EU28 total	**Per career stage**	**Per FOS**	**Per gender**
2016	73.5%	R1: 66.2% R2: 73.7% R3: 73.2% R4: 77.5%	NAT: 74.4% ENG: 75.5% MED: 76.2% AGR: 84.7% SOC: 67.7% HUM: 71.6%	F: 74.0% M: 73.2%

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 88: "Please indicate with whom you collaborate in your research"

Based on a direct question in the survey, 74% of the researchers collaborated with or worked in more than one field in their current position. One of the factors that can explain the willingness to collaborate with other fields stems from the extent to which researchers themselves have previously worked in other fields. In this group, most of the researchers (80%) collaborate with other fields in their current position - a much higher share than in the group that has never worked in other disciplines (70%) and is accordingly higher than in the overall population (74%).

Table 40: Researchers that collaborate with other researchers in another field or discipline (EU28)

Interdisciplinary collaboration				
	EU28 total	**Per (current) career stage**	**Per FOS**	**Per gender**
Within the same institute	59.7%	R1: 53.9% R2: 56.7% R3: 60.1% R4: 63.8%	NAT: 61.9% ENG: 61.3% MED: 63.2% AGR: 70.7% SOC: 52.8% HUM: 58.0%	F: 61.0% M: 58.9%
Other universities/research institutes	56.6%	R1: 42.8% R2: 54.4% R3: 54.6% R4: 67.3%	NAT: 60.3% ENG: 57.5% MED: 54.7% AGR: 65.3% SOC: 52.7% HUM: 58.0%	F: 55.5% M: 57.2%
Researchers from the non-academic sector	30.7%	R1: 19.6% R2: 28.0% R3: 30.1% R4: 38.6%	NAT: 33.0% ENG: 38.6% MED: 30.4% AGR: 40.8% SOC: 26.4% HUM: 22.8%	F: 28.4% M: 32.1%

Source: MORE3 EU HE survey (2016)
Note:
- Multiple collaboration types per respondent are possible.
- Based on question 88: "Please indicate with whom you collaborate in your research"
- (n=9,412)

[124] No specific question on interdisciplinary collaboration was included in the MORE2 study.

The different types of interdisciplinary collaboration that were included in the questionnaire made cross-reference to the location of the researchers with whom respondents collaborate. Hence, the survey asked whether researchers worked with colleagues working in the same institute, in other institutes or if their collaborators worked at the non-academic sector. Collaboration with researchers working in academic institutes is much higher than that with researchers in the non-academic sector (60% in the same institute and 57% in other universities or research institutes, versus 31% in the non-academic sector).

Country level: The patterns of collaboration differ across countries. Belgium, Switzerland, Luxembourg, and France display the largest differences between the share of researchers collaborating within the same institute and the share of those who work with colleagues from other institutes (respectively 17, 18, 19 and 23 pp difference). Meanwhile, Finland, Poland, Cyprus and Austria show a higher share of researchers working with colleagues in other institutes than the share of those collaborating with colleagues within their own institutes (13, 10, 8, 5 pp difference respectively). The highest share of researchers working with researchers in other fields and outside academia are found in Romania (48%), Malta (44%) and Czech Republic (43%), whereas in France (17%), Switzerland (19%) and Norway (20%), this is much less common.

Career stage: All types of interdisciplinary collaboration are increasing with career stage. The higher the career stage, the more likely the researchers will collaborate with researchers in other disciplines, whether he or she is working in the same or another institute in academia, or outside academia. The difference is the largest for the researchers in another university or research institute: only 43% of R1 researchers indicate this kind of interdisciplinary collaboration, while R2 to R4 researchers have shares of 54%, 55% and 67% respectively.

Field of science: Agricultural Sciences show the highest shares of multidisciplinary collaboration across the different types of collaboration. On the contrary, the Social Sciences stand out for being the discipline with lower-than-average shares in each of the categories. Humanities also has shares below the average for interdisciplinary collaboration in the same institution and with non-academics.

Gender: Overall, male researchers tend to work with or collaborate more (54%) in other fields than do female researchers (50%). Only in what concerns interdisciplinary collaboration in their own institute, do female researchers have higher shares (above average) than male researchers (61% versus 59%).

Table 41: Types of interdisciplinary collaboration per country

Country	Researchers in another discipline but within the same institute	Researchers in another discipline and working at other institutes	Researchers in another discipline and working in the non-academic sector
Austria	52.2%	57.2%	33.2%
Belgium	61.6%	45.1%	23.2%
Bulgaria	71.7%	62.1%	34.0%
Croatia	69.9%	64.5%	35.9%
Cyprus	45.5%	53.1%	24.6%
Czech Republic	65.0%	62.2%	42.9%
Denmark	66.5%	65.1%	38.0%
Estonia	58.7%	55.0%	31.3%
Finland	45.9%	59.2%	26.0%
France	67.1%	44.2%	17.2%
Germany	50.9%	46.8%	24.2%
Greece	62.6%	67.0%	38.5%
Hungary	62.3%	47.9%	31.7%
Iceland	66.1%	55.5%	30.1%
Ireland	59.8%	59.9%	40.4%
Italy	69.1%	68.9%	38.8%
Latvia	71.0%	68.7%	41.0%
Lithuania	60.6%	51.3%	26.1%
Luxembourg	62.1%	42.8%	26.2%
Malta	69.8%	58.0%	43.6%
Norway	58.2%	58.7%	19.7%
Poland	61.2%	70.8%	37.8%
Portugal	70.0%	66.5%	23.2%
Romania	81.4%	74.9%	48.1%
Slovakia	57.9%	57.8%	33.3%
Slovenia	69.3%	65.6%	37.2%
Spain	57.6%	52.7%	27.4%
Sweden	64.6%	62.8%	36.0%
Switzerland	60.7%	42.7%	19.0%
The Netherlands	62.3%	58.6%	33.0%
United Kingdom	58.3%	59.3%	35.4%
EU28	**59.7%**	**56.6%**	**30.7%**

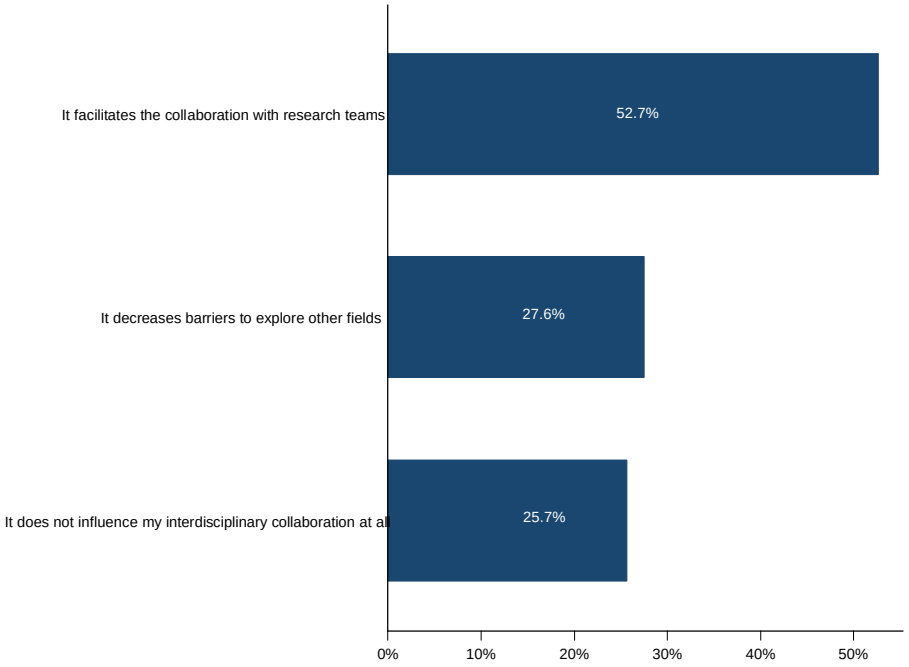
Source: MORE3 EU HE survey (2016)
Notes:
- Multiple collaboration types per respondent are possible.
- Darker colours reflect higher shares of researchers within each type of collaboration
- Based on question 88: "Please indicate with whom you collaborate in your research"
- (n=10,394)

8.2.3. Interdisciplinary virtual mobility

As for international mobility and collaboration, virtual tools can also facilitate interdisciplinary interaction between researchers. The extent to which this virtual collaboration has an impact on researchers´ interdisciplinarity is surveyed for the first time in the MORE3 EU HE survey (2016). It is analysed in the following paragraphs for those researchers that collaborate across disciplines. In general terms, the responses to the survey indicate that virtual mobility has a greater impact on facilitating collaboration

with research teams (53% of the researchers collaborating across disciplines) than on decreasing barriers in order to exploit other fields (28%). For about a quarter of the respondents the web-based tools did not influence their interdisciplinary collaboration.

Figure 128: Influence of web-based or virtual technology on interdisciplinary collaboration (EU28)



Source: MORE3 EU HE survey
Note:
- Only respondents who collaborate with partners in other disciplines.
- Multiple options per respondent are possible.
- Based on question 87: "How does the use of web-based or virtual technology influence your interdisciplinary collaboration?"
- (n=7,085)

Country level: We see again significant differences across European countries, such as only 57% of researchers in Denmark, 59% in The Netherlands and 61% in Germany admitting an influence of web-based tools on their interdisciplinary collaboration. In Southern European countries like Portugal (91%), Spain (89%) and Italy (88%) we find the opposite, as well as in a number of Eastern European countries like Romania (90%) and Bulgaria (86%).

Career stage: Differences across career stages are small with R1 seeing the smallest influence of virtual technology on interdisciplinary collaboration. Surprisingly, 31% of R2 researchers indicate that it decreases the barriers to collaborate with other disciplines, compared to an average of 27.6%.

Field of science: While researchers in Agricultural Sciences are more inclined to collaborate with other disciplines, virtual technologies are less a supporting tool in this than in other fields (31% compared to 26% on average does not see an effect of virtual technologies on their interdisciplinary collaboration). Also in Natural Sciences and Humanities, the effect is below average (28% and 27% respectively see no effect).

Gender: There is no significant difference between male and female researchers.

8.3. Intersectoral mobility and collaboration in post-PhD stage

This section discusses the intersectoral mobility related to the post-PhD stage. This dimension of mobility is strongly related to what has been called the "European paradox"; that is, the difficulties faced in Europe "to sufficiently turn research results into globally competitive products"[125]. The fact that there were not enough researchers working in the industry has been pointed out as one of the reasons behind this "European Paradox", and as something that was also hindering European economic development and innovation[126]. In this context, one of the objectives of the European Research Area has always been the consolidation of a critical mass of researchers that would be sufficiently large to be able to develop the R&D that Europe needs to foster its competitiveness on a global level. This section of the report shows the main figures and trends related to this type of mobility among researchers working in HEI and shows a situation of overall stability over time. The analysis is structured as follows:

- Intersectoral mobility (section 8.3.1), including the stock of intersectoral researchers and the effects on recruitment and career progression;
- Intersectoral collaboration (section 8.3.2).

8.3.1. Intersectoral mobility

Share of researchers with intersectoral post-PhD degree mobility
Of all R2, R3 and R4 researchers

	EU total	Per (current) career stage	Per FOS	Per gender	Per destination sector
2012 (n=7,131)	30.0%	R2: 27.3% R3: 28.9% R4: 33.3%	NAT: 28.6% ENG: 34.0% MED: 26.6% AGR: 44.9% SOC: 33.0% HUM: 26.3%	F: 28.1% M: 31.0%	Public sector:15.5% Private sector: 17.8%[127]
2016 (n=8,073)	24.8%	R2: 22.1% R3: 24.5% R4: 26.7%	NAT: 22.8% ENG: 29.9% MED: 18.5% AGR: 33.2% SOC: 29.6% HUM:19.4%	F: 23.5% M: 25.4%	Public sector:12.7% Private sector: 15.7%

Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Note:
- Based on question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?"

8.3.1.1. Stock

If we analyse the group of researchers formed by R2, R3 and R4 researchers, we observe that one out of five have worked in non-academic sectors at some point during their career (23%). Men tend to be slightly more intersectorally mobile than women: 25% of

[125] European Commission (2006), Mobility of Researchers between Academia and Industry. 12 Practical Recommendations. http://ec.europa.eu/euraxess/pdf/research_policies/mobility_of_researchers_light.pdf
[126] Vandevelde, K (2014). Intersectoral Mobility. Report from the 2014 ERAC mutual learning workshop on Human Resources and Mobility.
[127] The share of private sector mobility includes the private not-for-profit sector.

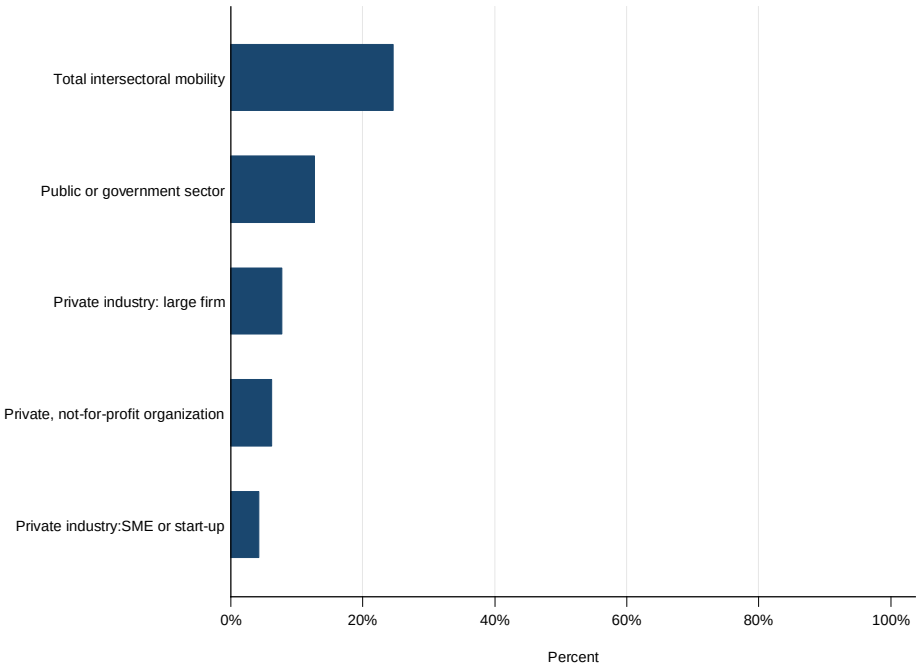
men compared to 23% of women. However, this difference seems to be related to the fact that researchers are more likely to have had the opportunity to work in other sectors when they have longer careers. Since men are overrepresented among R4 researchers, this might explain the differences in the degree to which men and women are intersectorally mobile.

Overall, the figures are lower than in 2012, where a total of 30% of EU28-based researchers experienced an intersectoral move in their post-PhD career stages. The decline has an effect on all categories in the different dimensions (career stage, FOS, gender and destination sector).

8.3.1.2. Flows and moves

The survey also provides information on the non-academic sectors in which researchers have worked. The sector that attracts a higher number of researchers is the public sector (13%). In total, private industry is also successful in attracting 16% of researchers: 8% go to large firms and 4% go to SMEs or start-ups. Another 6% goes to private not-for-profit organisations.

Figure 129: Intersectoral mobility (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- The graph does not reflect data for 2012 because the questionnaire in 2012 did not differentiate between large and small companies.
- The total share of intersectoral mobility is not equal to the sum of the rest of the categories because multiple options were possible per respondent.
- Based on question 89: "Please indicate in which sector(s) you have worked that were not a university or higher education setting"
- (n=8,073)

As mentioned, we see a decline in the share of intersectorally mobile researchers compared to the MORE2 study but at the same time, there seems to be certain stability in the destination patterns. We have observed that 18% of the researchers have worked in the private sector according to the MORE3 data, while the MORE2 estimate for this

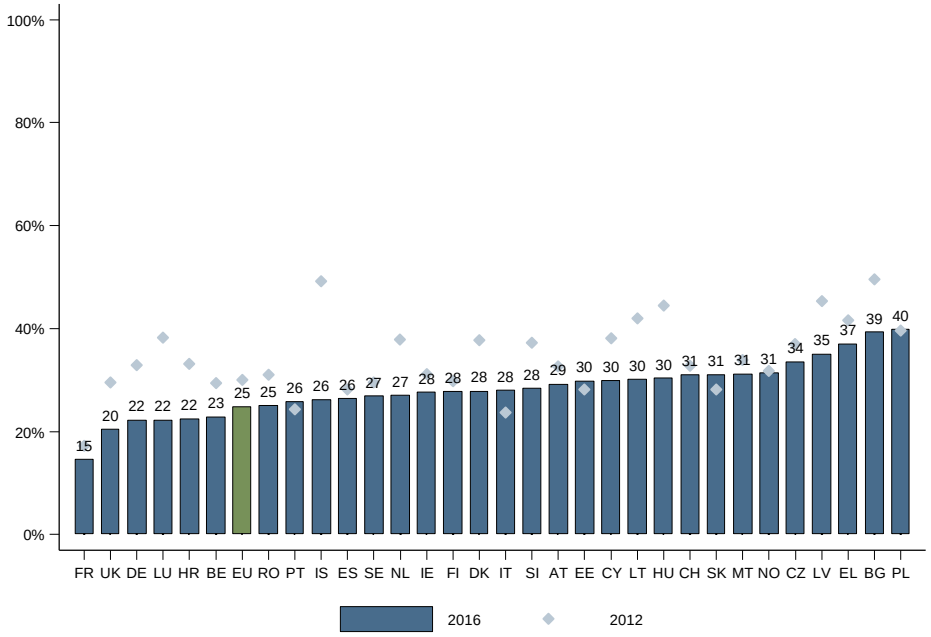
share was 19% and the MORE1 estimate was 17%. Whereas these figures conceal a significant variation across countries, there are some similarities between MORE2 and MORE3. Some countries continue to have lower-than-average shares of mobile researchers, such as France and Belgium, whereas other countries still display shares higher than the EU28 average. This is the case of Bulgaria, Greece and Poland.

Figure 130: Share of researchers having been intersectorally mobile

Country	Total intersectoral mobility	To public/ government sector	To private not-for-profit sector	To private sector: large industry	To private sector: SMEs and start-ups
Austria	29.2%	13.0%	6.9%	5.8%	6.9%
Belgium	22.8%	10.6%	4.7%	8.3%	3.5%
Bulgaria	39.3%	18.2%	18.5%	14.0%	9.8%
Croatia	22.5%	11.6%	9.6%	7.3%	6.6%
Cyprus	29.9%	17.1%	13.3%	5.9%	3.7%
Czech Republic	33.5%	18.0%	11.9%	11.9%	4.0%
Denmark	27.8%	12.9%	10.9%	7.3%	6.4%
Estonia	29.8%	14.2%	7.8%	6.3%	8.8%
Finland	27.8%	13.0%	7.0%	8.8%	6.0%
France	14.6%	6.7%	5.5%	3.9%	2.1%
Germany	22.2%	8.8%	3.5%	8.8%	3.5%
Greece	37.0%	18.0%	9.3%	13.2%	5.1%
Hungary	30.4%	18.8%	14.2%	10.8%	9.2%
Iceland	26.2%	15.7%	10.0%	3.5%	5.7%
Ireland	27.7%	12.3%	7.0%	10.3%	7.3%
Italy	28.0%	16.0%	6.6%	9.3%	3.9%
Latvia	35.0%	20.5%	13.2%	4.6%	7.3%
Lithuania	30.1%	20.7%	10.6%	4.7%	6.6%
Luxembourg	22.2%	9.7%	4.2%	9.7%	3.5%
Malta	31.1%	20.6%	13.7%	3.7%	4.8%
Norway	31.4%	14.2%	13.8%	6.1%	5.0%
Poland	39.8%	21.7%	14.0%	8.0%	4.2%
Portugal	25.9%	16.9%	7.6%	6.2%	5.3%
Romania	25.0%	16.6%	8.2%	3.4%	2.1%
Slovakia	31.0%	19.3%	8.5%	7.5%	5.6%
Slovenia	28.4%	15.6%	9.2%	6.4%	6.0%
Spain	26.4%	14.6%	7.4%	8.0%	5.6%
Sweden	26.9%	14.3%	7.9%	5.4%	5.7%
Switzerland	31.0%	14.6%	7.9%	14.0%	1.8%
The Netherlands	27.0%	10.4%	5.9%	11.1%	3.3%
United Kingdom	20.4%	10.8%	3.3%	7.4%	3.6%
EU28	**24.8%**	**12.7%**	**6.3%**	**7.7%**	**4.3%**

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 89: "Please indicate in which sector(s) you have worked that were not a university or higher education setting"
- (n=8,073)

Figure 131: Evolution of intersectoral mobility (2012-2016)



Source: MORE3 EU HE survey (2016) and MORE2 EU HE survey (2012)
Notes:
- Only for R2, R3 and R4 researchers.
- Based on question 89: "Please indicate in which sector(s) you have worked that were not a university or higher education setting"
- (n=8,073)

8.3.1.2.1. Dual position

Intersectoral mobility can refer to cases in which individuals work exclusively in another sector and it can also make reference to those cases in which individuals work simultaneously in the academic and in another sector. We refer to this situation as 'dual positions' and the survey included questions to ascertain the degree to which researchers in Europe were employed in this kind of dual positions. Overall, 36.9% of the researchers having worked in other sectors in the last ten years have been engaged in a dual position during that period, the share of female researchers (35%) being only slightly below that of male researchers (38%).

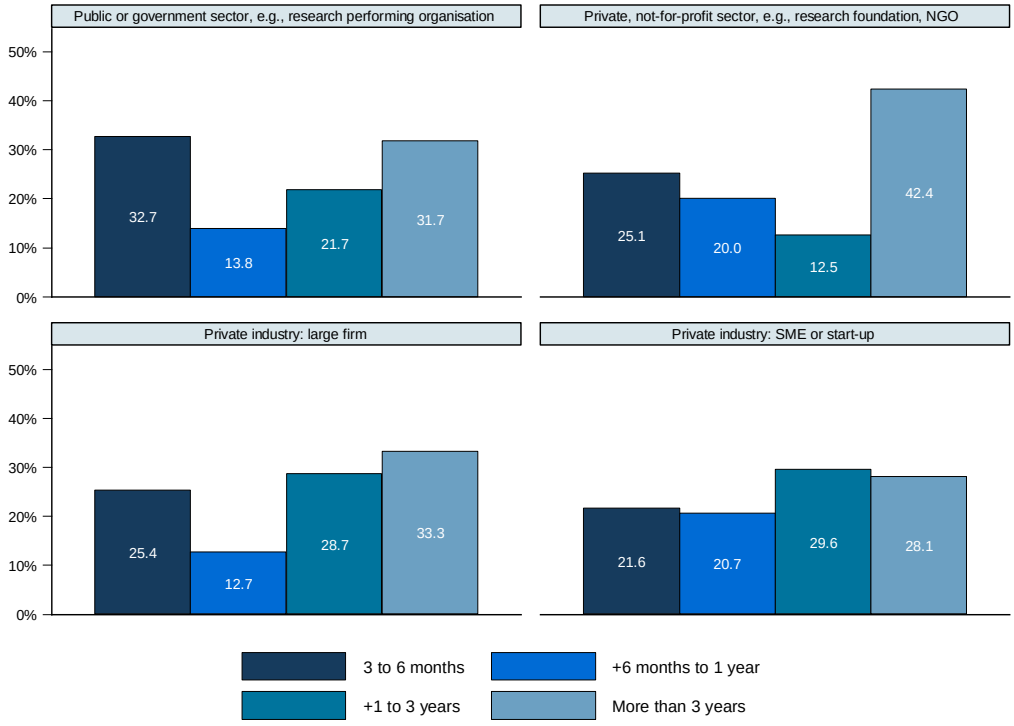
Dual positions are more frequent in the Medical Sciences (42%) and in the Social Sciences (40%) than in the other fields, although the shares for all fields remain higher than 31%[128]. In addition, having held a dual position is related to the researchers´ career stage. As such, when asked about the career stage in which they were when they undertook the dual position, it appears that leading researchers (47%) engage in these positions more than those in lower career stages: R3 (39%), R2 (34%) and R1 (29%).

[128] Natural Sciences (34%), Engineering and Technology (31%), Agricultural Sciences (31%), Humanities (39%).

8.3.1.2.2. Types and duration of contract

When looking at intersectoral mobility in general, Figure 132 displays the differences in the duration of the contracts held in each sector. Important differences can be observed, especially when comparing the not-for-profit sector with the rest. The largest share of researchers holding long-lasting (of more than 3 years) positions can be found among those having worked at NGOs and other not-for-profit organisations. The patterns of the duration of contracts are rather similar among those researchers working in the public sector and those working in large companies. In both sectors two options - very short (less than 6 months) and rather long contracts (more than a year) - predominate over medium-term contracts (between 6 months and a year). In SMEs and start-ups, medium-term contracts are more common than in the other private sector types.

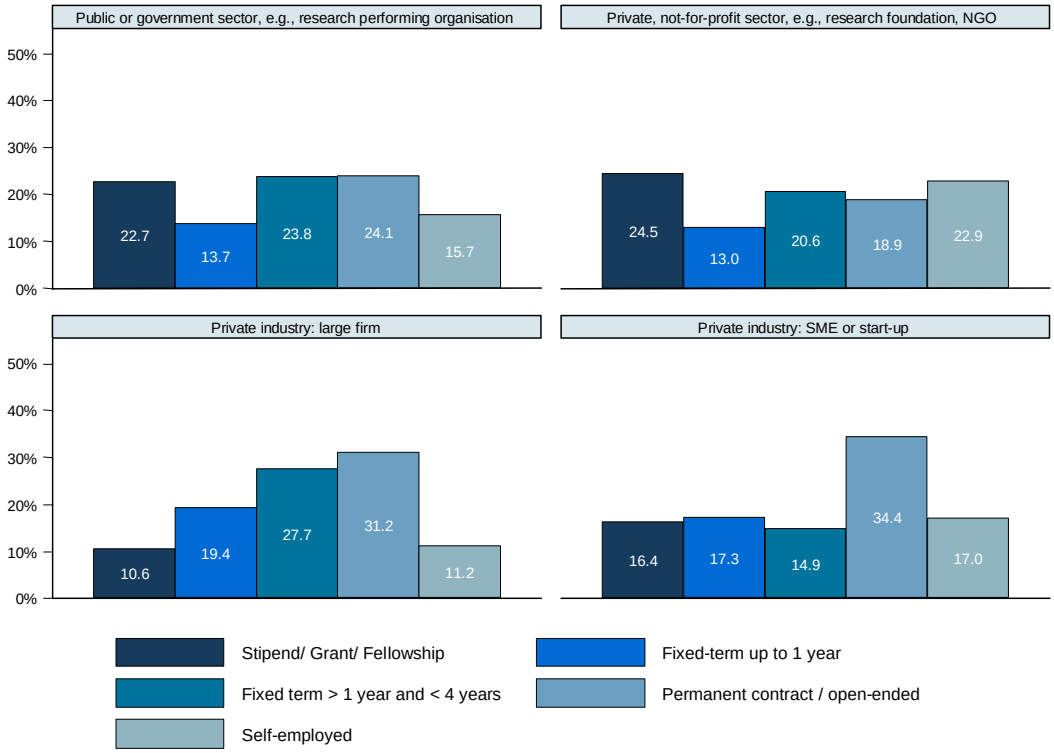
Figure 132: Duration of contracts in each sector (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Based on question 94: "Duration"
- (n=1,333)

The types of contract researchers have when employed outside the academic sector is highly dependent on the sector in which they are hired. In the public sector and in the not-for-profit sector the distribution of types of contracts is balanced with a higher-than-average use of stipends/grants. However, in the not-for-profit sector self-employment is more common than in any other sector. In the industry sectors, on the other hand, permanent contracts are more frequently used, but here we observe differences between large companies and SMEs. In the former, the shares are higher as the length of the contract grows. In SMEs, there is a clear predominance of permanent contracts, with a rather uniform distribution across the other types of contracts.

Figure 133: Types of contract in each sector (EU28)

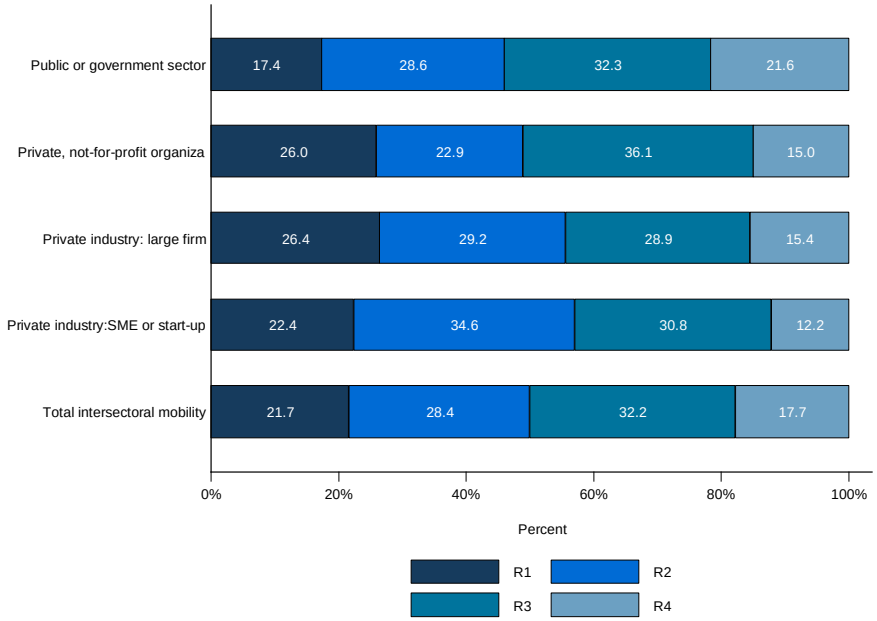


Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Based on question 97: "Type of contract"
- (n=1,333)

8.3.1.2.3. Career paths

Not all sectors attract researchers at the same level of career development. The experience and skills researchers have in each career stage might be more or less suited for the needs of each sector. Figure 134 shows how researchers in the established stage (R3) are more inclined to move to any sector, and in particular to the public sector or not-for-profit organisations. Recognised researchers (R2) constitute the largest group in private industry, both in large companies and in SMEs. Interestingly, the younger cohorts (R1) are the least common group of researchers with positions in the government sector. This sector seems, however, much more interested in attracting leading researchers (R4) than the other sectors.

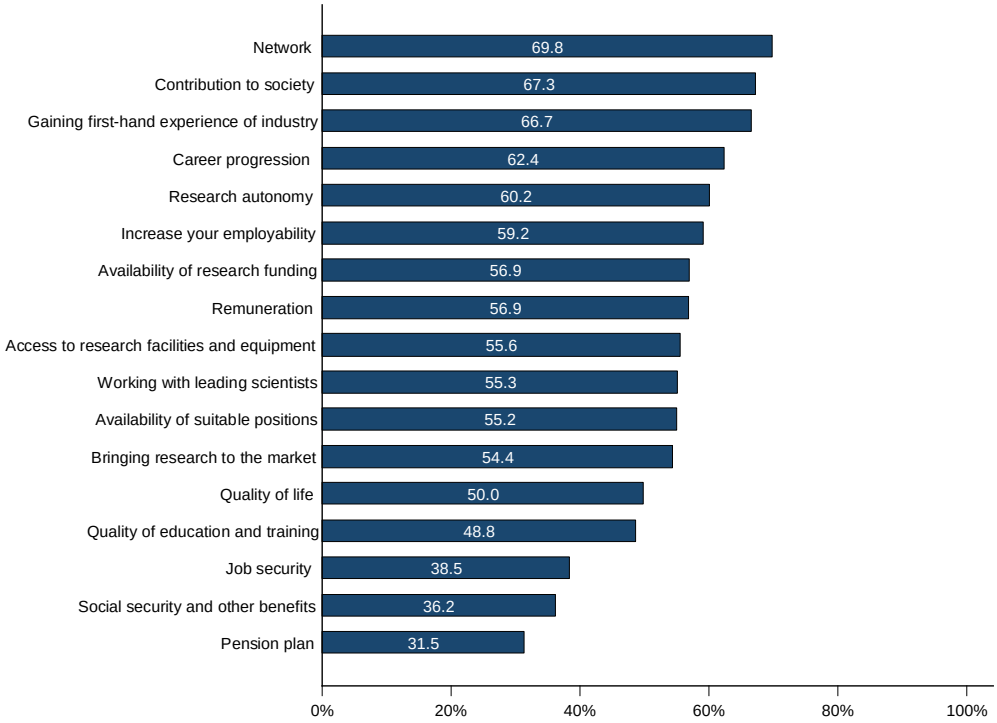
Figure 134: Career stages at the start of the intersectoral move per sector



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Based on question 98: "What was your career stage at the start of this research position/employment?"
- (n=1,333)

8.3.1.3. Motives

Figure 135: Motives for intersectoral mobility (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Share of intersectorally mobile researchers who consider the factor important over those who consider it important or not important (total minus 'NA' category).
- Based on question 99: "Which of the following factors were important in your decision to undertake this move?"
- (n=1,333)

Researchers give different importance to the motives regarding why they decided to work in a non-academic sector. Building a network stands out as a motive that is mentioned across the four main sectors analysed in the survey: public sector, not-for-profit organisations, large companies and SMEs. However, there are important differences for the other motives. The will to contribute to society is one of the top three motives for those working in the public sector and in not-for-profit organisations. Among those working in the industry sector, the desire to gain industry-specific experience is the most relevant motive.

Table 42: Three most frequently cited motives for mobility (EU28)

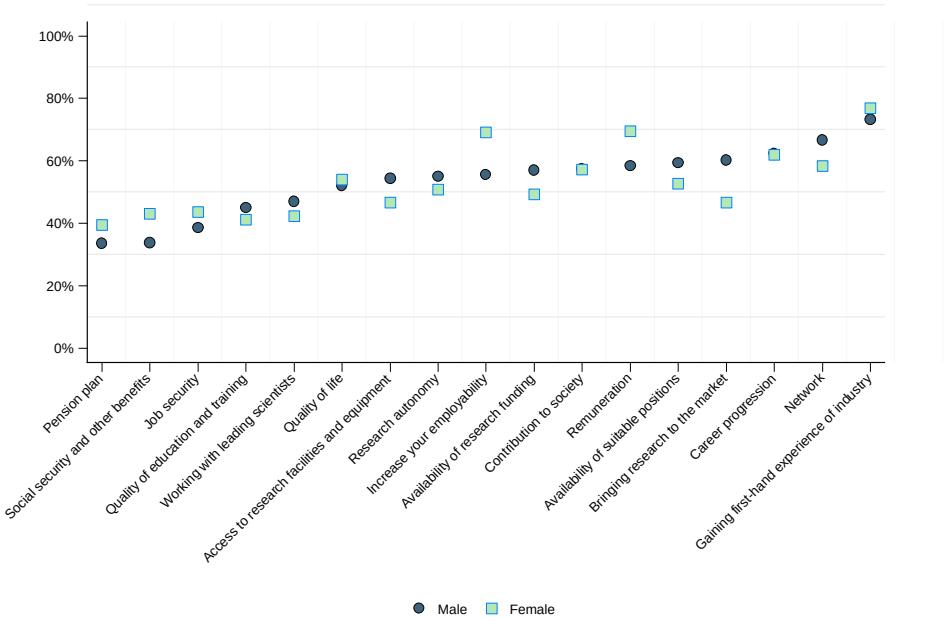
Top three motives for intersectoral mobility per current sector of employment *Only R2, R3, R4 researchers who have undertaken an intersectoral move in the last ten years*	
Public sector or government organisation	Network (73.1%) Contribution to society (72.6%) Career progression (64.3%)
Private, not for profit sector	Contribution to society (71.9%) Network (71.7%) Research autonomy (69.9%)
Private sector: large companies	Gaining first-hand experience of industry (72%) Remuneration (66.3%) Career progression (64.5%)
Private sector: SMEs and start-ups	Gaining first-hand experience of industry (77.71%) Network (73%) Bringing research to the market (59.7%)

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 99: "Which of the following factors were important in your decision to undertake this move?"
- (n=1,333)

In terms of gender-related differences, Figure 136 displays the shares of male and of female researchers considering each of the factors important. Female researchers appear to be more driven by the desire to foster their employability and improve their financial working conditions (remuneration, pension, social security and job security). Male researchers, on the other hand, tend to value more than women those working conditions that are research related: training, access to research facilities or working with leading scientists.

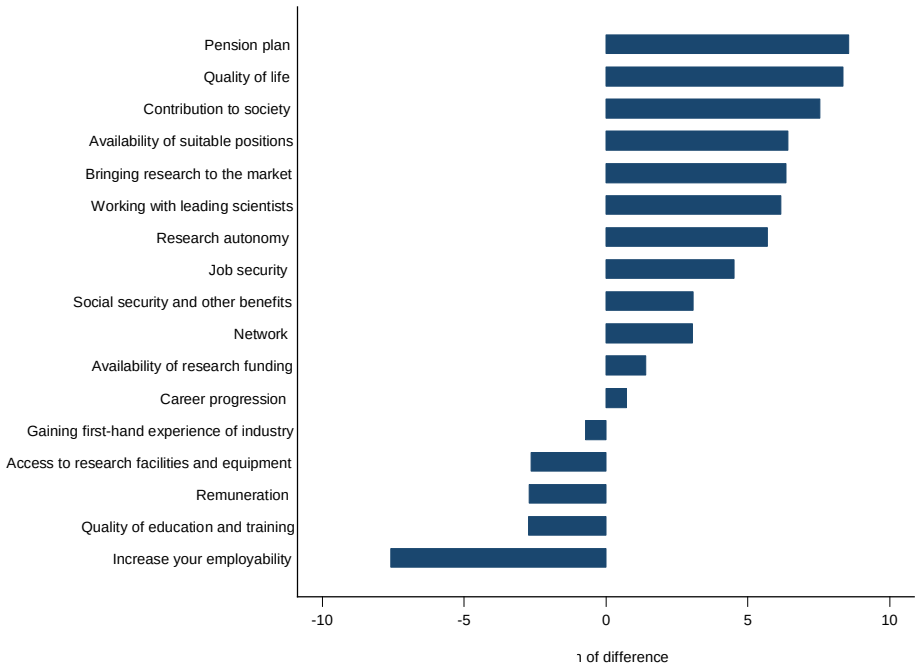
Figure 137 shows the differences between the share of researchers with children currently working in the private sector, that consider each factor important for intersectoral mobility versus those without children in the same circumstances. It can be observed that those having children tend to give a greater importance to factors related to family and broader society, such as pension plan, quality of life, or contribution to society. Those without children tend to emphasise more those aspects that are related to employability and research careers, such as training, remuneration and access to research facilities. This comes as no surprise since most of the researchers without children are also in the earlier career stages and therefore are in the process of starting building their own research career.

Figure 136: Motives for intersectoral mobility among those that are currently working in the private sector per gender (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who are currently working in the private sector.
- Based on question 99: "Which of the following factors were important in your decision to undertake this move?"
- (n=441)

Figure 137: Differences in the motives for intersectoral mobility depending on family status (EU28)



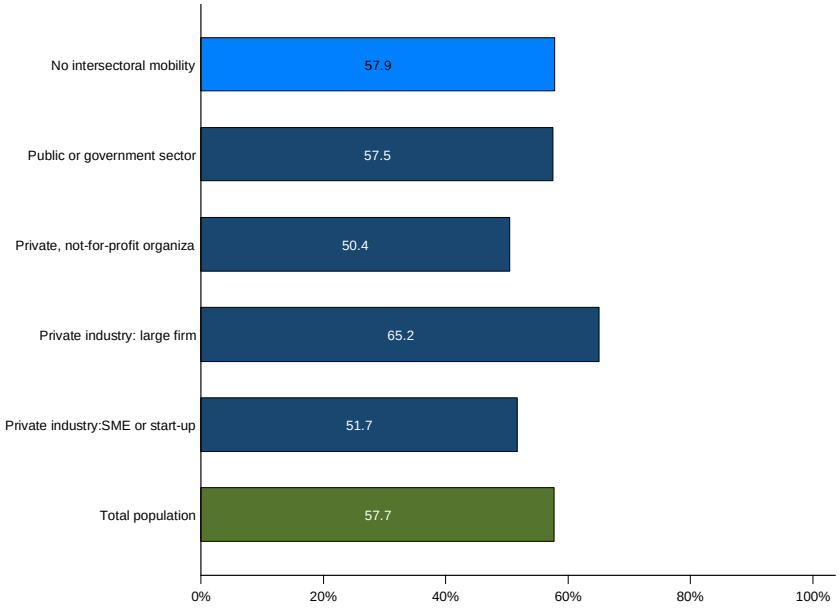
Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Difference between the shares of intersectorally mobile researchers with children versus those without children who consider the factor important. This graph does not provide information on the ranking of the different motives, only on the percentage point differences between researchers with children and those without children.
- Based on question 99: "Which of the following factors were important in your decision to undertake this move?"
- (n=1,160)

8.3.1.4. Effects

Recruitment and intersectoral mobility: Interestingly, there are no major differences between researchers who have been intersectorally mobile and those who have not in terms of whether they consider intersectoral mobility as a positive factor for recruitment (Figure 138 and see also section 5.3.2). This is the case even when looking at the sectors in which they have been mobile. Those having worked for the private industry sector seem to consider to a larger extent that this factor is important for recruitment. On the opposite, those having worked in the non-profit sector and in SMEs are somewhat less positive about this factor than the average in the population.

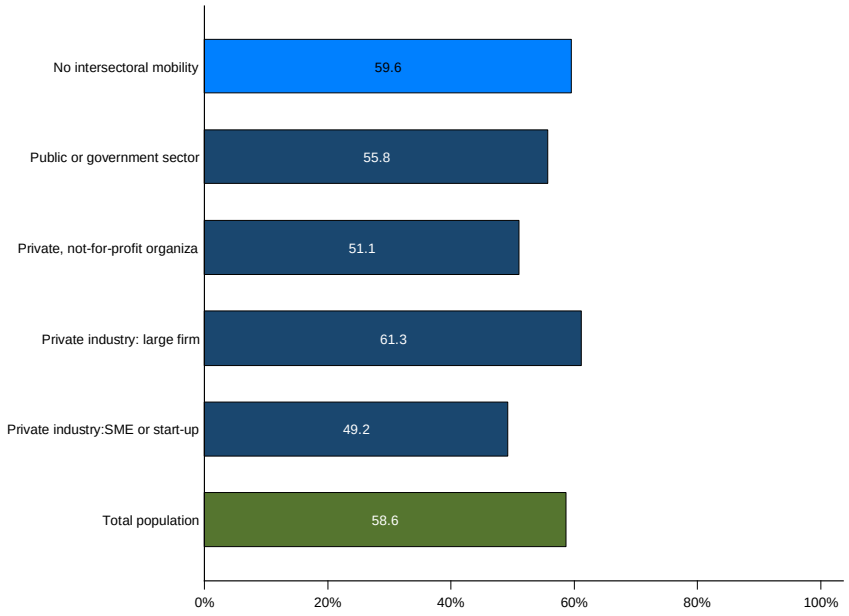
Figure 138: Agreement with intersectoral mobility as positive factor for recruitment depending on destination sector



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?" and question 89: "Please indicate in which sector(s) you have worked that were not a university or higher education setting"
- (n=8,483)

Career progression and intersectoral mobility: Whether or not a researcher is intersectorally mobile does not seem to have a significant impact on the extent to which they believe it to be important for their career progression. Figure 139 shows how the pattern is similar to that found in the analysis for recruitment. These analyses point to the idea that not all types of intersectoral mobility are equally valued in the academic sector. Although there is not enough empirical evidence in the survey to fully support this claim, the partial evidence suggests that working for SMEs and for non-for-profit organisations are at the least valued options within the academic sector both for recruitment and career progression.

Figure 139: Agreement with intersectoral mobility as positive factor for career progression depending on destination sector



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 43: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?", and question 89: "Please indicate in which sector(s) you have worked that were not a university or higher education setting"
- (n=8,551)

Satisfaction with intersectoral mobility: When asked about the differences between working in the HEI sector compared to working outside, it is important to note that the HEI sector seems to fare worse than the non-academic sectors in a wide range of dimensions: the shares of researchers considering that the different aspects are worse in academia tend to be higher than 50%. Only research autonomy is an exception here at 46%.

In addition, there are some notable differences depending on the sector researchers currently work in. In spite of the fact that the question was asked to the researchers who have been intersectorally mobile, those that are currently working for the private sector tend to appreciate this sector even more than those who are currently working in the HEI sector (but who had a previous intersectorally mobile experience). The differences between those who currently work in academia and those who work in the private sector are larger for some factors, such as career perspectives, pension plan, social security, and access to research facilities and research funding. The difference between the two groups of researchers are minimal regarding factors concerning job security, social status and research autonomy.

Figure 140: Share of researchers considering that working outside HE institutions is better to working inside applying different criteria (EU28)

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were intersectorally mobile in the last ten years.
- Based on question 100: "How does working as a researcher outside the HEI sector compare to working in the HEI sector?"
- (Ongoing academic position: n=1,163. Ongoing position in the private industry sector: n=170.)

8.3.2. Intersectoral collaboration

8.3.2.1. Collaboration with academic and non-academic partners

Intersectoral collaboration[129] *All respondents (n=9,412)*				
	EU total	**Per (current) career stage**	**Per FOS**	**Per gender**
Academic	80.2%	R1: 66.8% R2: 71.3% R3: 81.2% R4: 91.0%	NAT: 85.9% ENG: 80.8% MED: 73.9% AGR: 80.0% SOC: 79.5% HUM: 81.0%	F: 78.6% M: 81.2%
Non-academic	35.5%	R1: 24.6% R2: 25.6% R3: 35.3% R4: 47.3%	NAT: 41.0% ENG: 44.5% MED: 34.5% AGR: 43.0% SOC: 29.2% HUM: 26.4%	F: 30.5% M: 38.7%

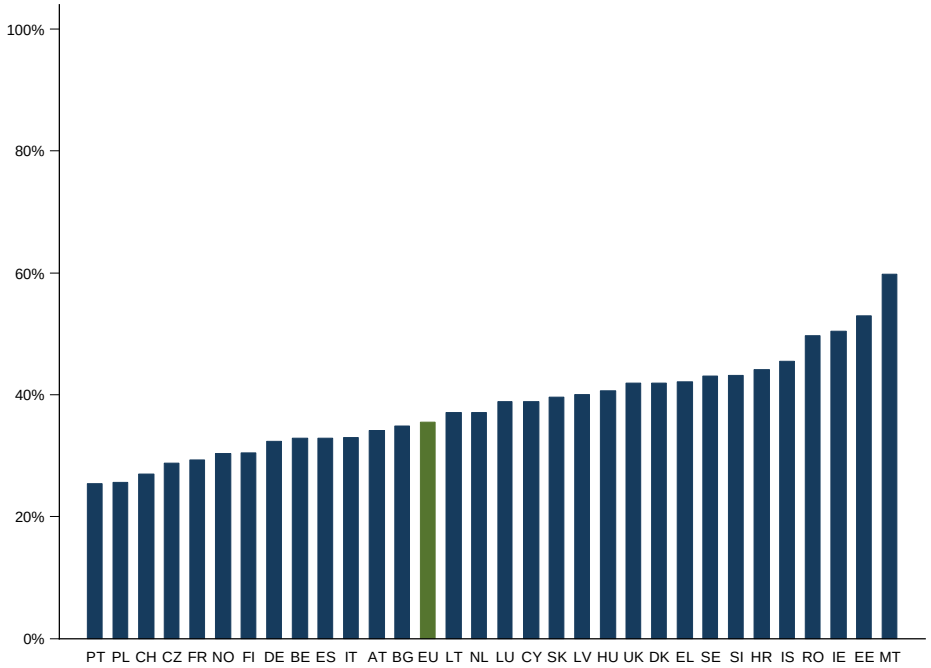
Source: MORE3 EU HE survey (2016)
Note:
- Based on question 84: "Please indicate with whom you collaborate in your research (e.g., joint projects, joint papers, etc)"

Although overall 81% of the researchers in the EU Member States are or were involved in some type of academic or non-academic collaboration, the large majority of the collaborations are undertaken within the academic sector (80%). 35% of the researchers state that they collaborate with the non-academic sector. This reflects that only a very small minority exclusively works with non-academic partners: 1% of the researchers in EU Member States.

Country level: Non-academic collaboration is still somewhat rare in European countries. Only in two countries do over half of researchers collaborate with the non-academic sector: Malta (60%) and Estonia (53%). Portugal (25%) and Poland (26%) are the countries where a lower share is found. In spite of these differences, the type of institutional system does not seem to be related to the extent to which researchers collaborate with others beyond academic boundaries.

[129] The MORE2 EU HE survey (2012) included a similar question on collaboration, but with less categories of collaboration partners. The data are not sufficiently comparable to include the MORE2 results as comparison basis here.

Figure 141: Non-academic collaboration per country



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 84: "Please indicate with whom you collaborate in your research (e.g., joint projects, joint papers, etc)"
- (n=10,394)

Career stage: As it occurs with interdisciplinary and international collaboration, career stage is a factor that determines to a large extent intersectoral collaboration. For both academic and non-academic collaboration, more experienced researchers (R3 and R4) display larger shares compared to researchers in earlier career stages (R1 and R2). As with all types of mobility and collaboration, this is in part related to the career length effect.

Field of science: Collaboration with academic partners is common in all fields, with shares ranging from 86% in Natural Sciences to 74% in Medical Sciences. Regarding collaboration with the non-academic sector, Engineering and Technology (44%), Agricultural Sciences (43%), and Natural Sciences (41%) show the highest shares. Non-academic collaboration is considerably lower in Social Sciences (29%) and Humanities (26%).

Gender: Male and female researchers collaborate to a similar degree in the academic sector (81% and 79% respectively). However, male researchers tend to collaborate more with others in the non-academic sector than female researchers, being a difference of 8 percentage points (39% versus 31%).

8.3.2.2. Intersectoral collaboration as a result of a previous mobility experience

When analysing the group of researchers that collaborate, we observe that 38.8% of them consider academic collaboration the result of a previous international mobility experience (of 3 months or more, in or outside the EU). A much lower, but still

substantial share of researchers within this group state that collaboration with the non-academic sector is the result of this type of experience (16%).

Gender: Male researchers tend to attribute collaboration to mobility experiences to a larger extent than do their female counterparts. While 41% of the male researchers consider that academic collaboration is the result of a previous mobility experience, the share of women with the same opinion is 35%. A similar difference is observed with respect to non-academic collaboration: 17% of the male researchers consider it the consequence of having been mobile compared to 13% of the female researchers.

Internationally mobile researchers: Regarding academic collaboration, it is important to note that the link between collaboration and a previous mobility experience is highly dependent on whether researchers have been mobile or not and on the length of this mobility period. The researchers who have been mobile for more than three months in the last ten years are those who consider that their collaboration with other researchers in academia is related to having been mobile to a greater extent (58%). The share of those that have been mobile for less than three months in the past ten years goes down to 44% and it reaches a minimum among those who have never been mobile (30%).

The situation is slightly different when non-academic collaboration is analysed. For this type of collaboration, the differences between the three types of researchers – long-term mobile, short-term mobile and non-mobile - are smaller (16%, 11%, 11% respectively) though interestingly, also in this case, internationally long-term mobile researchers relate their intersectoral collaboration to their international mobility experiences more than short-term mobile researchers and those who have never been mobile.

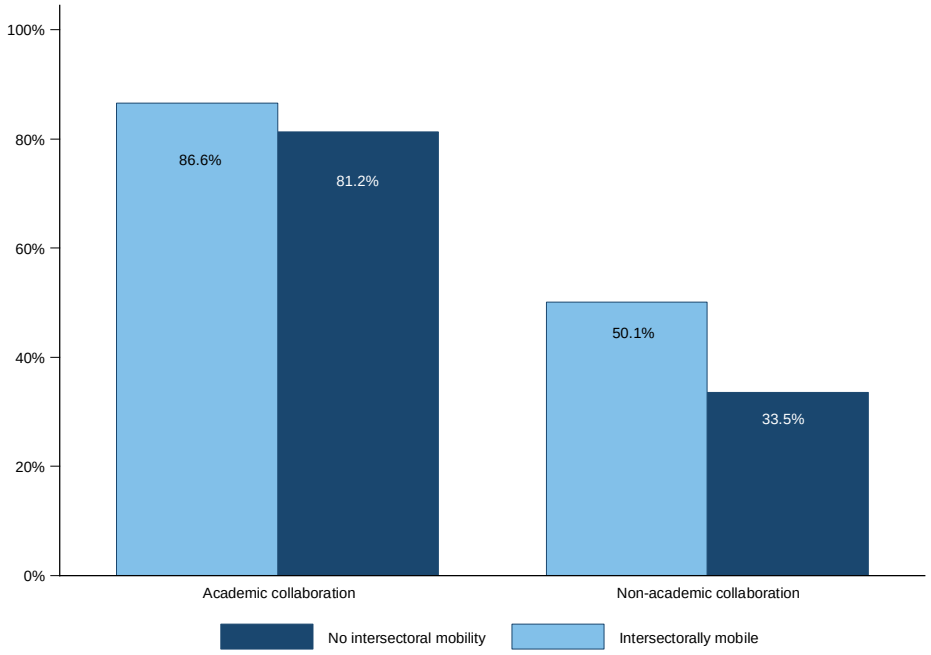
Figure 142: Intersectoral collaboration as result of mobility experiences according to mobile and non-mobile researchers (EU28)

Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- The question is only asked to those that declare to collaborate in their research.
- Based on question 84: "Please indicate with whom you collaborate in your research (e.g., joint projects, joint papers, etc)"
- (long-term mobile: n= 2,116; short-term mobile: n=3,207; non-mobile: n=6,433.)

Intersectoral mobility and collaboration: Figure 143 shows how those researchers who have worked in the non-academic sector tend to collaborate more both with academics and with non-academics than those without this type of working experience. The difference is rather limited in terms of academic collaboration (81% for non-mobile researchers versus 87% among mobile researchers). However, as expected, having an intersectoral working experience has a strong correlation with the extent to which researchers collaborate with the non-academic sector: 33% of the non-sectorally mobile researchers compared to 50% of the mobile researchers.

Based on this, we see evidence that mobility and collaboration go hand in hand and influence each other positively for a substantial proportion of researchers.

Figure 143: Intersectoral mobility and intersectoral collaboration (EU28)



Source: MORE3 EU HE survey (2016)
Note:
- Only R2, R3 and R4 researchers.
- Based on question 84: "Please indicate with whom you collaborate in your research (e.g., joint projects, joint papers, etc)" and question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?"
- (n=8,073)

8.4. Combined mobility in post-PhD stage

Combined forms of mobility *Only R2, R3 and R4 researchers (n=8,073)*	EU total	Per (current) career stage	Per FOS	Per gender
Short-term international mobility AND intersectoral mobility	5.3%	R2: 5.4% R3: 5.4% R4: 5.2%	NAT: 5.8% ENG: 5.2% MED: 2.8% AGR: 5.8% SOC: 6.6% HUM: 6.4%	F: 4.8% M: 5.7%
Long-term international mobility AND intersectoral mobility	3.8%	R2: 5.5% R3: 3.4% R4: 3.2%	NAT: 3.9% ENG: 3.3% MED: 3.3% AGR: 3.2% SOC: 5.1% HUM: 3.0%	F: 3.8% M: 3.8%
Intersectoral mobility AND interdisciplinary mobility	6.0%	R2: 7.0% R3: 6.1% R4: 5.4%	NAT: 5.7% ENG: 7.8% MED: 4.2% AGR: 6.5% SOC: 8.5% HUM: 4.0%	F: 6.4% M: 5.8%
Short-term international mobility AND interdisciplinary mobility	14.8%	R2: 11.0% R3: 14.5% R4: 17.4%	NAT: 15.3% ENG: 16.2% MED: 13.4% AGR: 18.6% SOC: 15.5% HUM: 12.3%	F: 14.0% M: 15.2%
Long-term international mobility AND interdisciplinary mobility	9.9%	R2: 10.3% R3: 9.3% R4: 10.5%	NAT: 10.3% ENG: 11.1% MED: 7.7% AGR: 11.6% SOC: 11.4% HUM: 8.6%	F: 9.2% M: 10.3%

Source: MORE3 EU HE survey (2016)
Note:
- Based on question 79: "Short term mobility (<3 months)", question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?", question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?" and question 14: "Did you switch to another (sub)field of research during your academic career?"

This section investigates the link between different types of mobility: short-term and long-term international mobility, intersectoral mobility and interdisciplinary mobility. International and intersectoral mobility only refer in this section to those experiences that have taken place in the last ten years. The analyses only consider researchers in a post-PhD stage: R2, R3 and R4.

There is relatively little overlap across the different types of mobility. The type in which there is a larger overlap is between international and interdisciplinary mobility (15% when short-term mobility is considered, and 10% when long-term mobility is taken into account).

Country level: Table 43 shows the share of researchers within each country who have experienced each type of mobility combinations. This show that some countries perform better than the EU28 average in all the different types of mobility. This is the case of Bulgaria, Hungary, and Norway, and to a lesser extent, of Greece, Germany and Spain.

Italy, on the contrary, consistently performs worse than the EU28 average in each of the combinations, followed by Romania and, to a lesser extent, United Kingdom.

Table 43: Share of researchers with each type of combined mobility

Country	Short-term international and intersectoral mobility	Long-term international and intersectoral mobility	Sectoral and inter-disciplinary mobility	Short-term international and inter-disciplinary mobility	Long-term international and inter-disciplinary mobility
Austria	4,6%	3,7%	6,2%	10,9%	13,5%
Belgium	5,7%	6,0%	4,6%	10,6%	10,2%
Bulgaria	16,9%	8,1%	24,5%	26,2%	12,2%
Croatia	7,6%	1,3%	8,9%	14,1%	8,2%
Cyprus	6,7%	7,1%	7,5%	15,6%	13,6%
Czech Republic	11,5%	4,3%	5,5%	13,6%	5,3%
Denmark	6,8%	4,4%	5,3%	14,4%	11,8%
Estonia	8,9%	7,9%	11,2%	11,4%	9,2%
Finland	5,5%	4,1%	7,0%	18,1%	14,1%
France	2,9%	1,5%	2,8%	13,8%	8,2%
Germany	5,3%	4,1%	6,9%	16,9%	11,0%
Greece	8,1%	5,0%	8,0%	19,7%	12,9%
Hungary	13,8%	6,8%	15,6%	30,7%	22,4%
Iceland	8,0%	5,7%	8,6%	13,0%	10,5%
Ireland	5,9%	4,6%	5,8%	13,0%	14,5%
Italy	4,0%	3,7%	2,2%	10,0%	5,9%
Latvia	15,6%	1,2%	16,2%	24,0%	5,7%
Lithuania	10,0%	3,3%	13,4%	21,9%	8,9%
Luxembourg	7,5%	8,3%	9,7%	17,4%	26,9%
Malta	13,0%	2,9%	11,1%	18,2%	5,9%
Norway	11,0%	9,2%	7,3%	19,7%	19,1%
Poland	10,3%	3,6%	9,2%	11,6%	4,5%
Portugal	5,8%	3,1%	7,5%	13,9%	6,4%
Romania	2,8%	1,7%	7,4%	9,0%	5,0%
Slovakia	8,1%	5,0%	11,1%	18,0%	8,0%
Slovenia	10,9%	4,7%	9,3%	29,1%	14,1%
Spain	6,4%	4,4%	7,1%	15,2%	11,1%
Sweden	6,7%	6,0%	9,1%	19,6%	12,8%
Switzerland	4,4%	10,5%	6,2%	13,2%	25,1%
The Netherlands	6,7%	2,6%	6,0%	19,6%	13,8%
United Kingdom	2,7%	3,5%	4,1%	13,5%	10,4%
EU28	**5.3%**	**3.8%**	**6.0%**	**14.8%**	**9.9%**

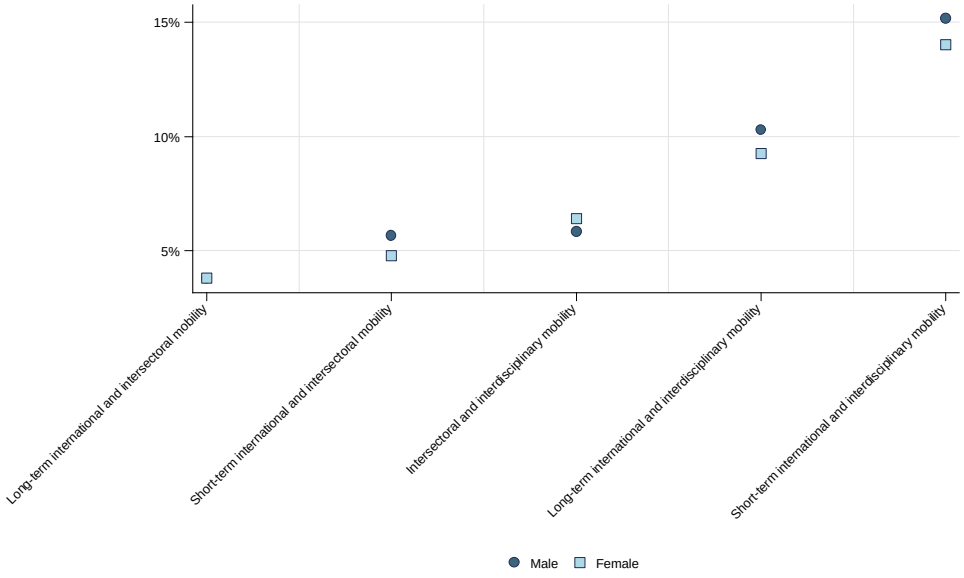
Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Darker colours reflect higher shares of researchers within each combination of mobility types
- Based on question 79: "Short term mobility (<3 months)", question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?", question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?" and question 14: "Did you switch to another (sub)field of research during your academic career?"
- (n=8,824)

Career stages: When each type of mobility is analysed individually, in general terms, we observe that mobility is more frequent among higher career stages. The main reason for this is probably the fact that these researchers have simply had more time than younger researchers to have this type of experiences. However, when the combination of different types of mobility is considered, this pattern is not found for some of the combinations. Interestingly, there is a negative relationship between career stage and having had long-term international mobility AND intersectoral mobility experiences: 6% of R2 researchers compared to 3% of R3 and of R4 researchers respectively. A similar finding is observed for intersectoral mobility AND interdisciplinary mobility: whereas 7% of R2 researchers have experienced both types of mobility, the shares drop to 6% among R3 and to 5% among R4 researchers.

Field of science: Medical Sciences and Humanities are the fields in which there are lower shares of researchers in each of combination of mobility types. Humanities only fare comparatively well when short-term international mobility AND intersectoral mobility is considered (6%), the share being only lower than the one found in the Social Sciences. On the opposite, Social Sciences and Engineering and Technology are the fields in which combined mobility tends to be more frequent.

Gender: There are no large differences between male and female researchers regarding the combination of different types of mobility. In general terms, men are slightly more likely to be represented in these mobility combinations than women. However, there is an important exception to this: the share of female researchers is higher than that of men for intersectoral mobility AND interdisciplinary mobility.

Figure 144: Combined mobility and gender (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 79: "Short term mobility (<3 months)", question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?", question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?" and question 14: "Did you switch to another (sub)field of research during your academic career?"
- (n=8,073)

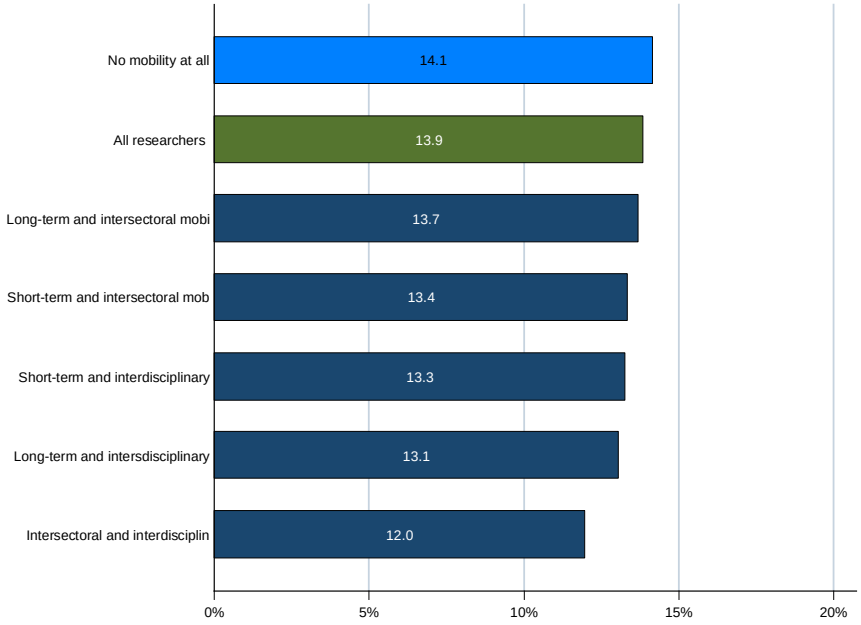
Satisfaction with current position: The experiences researchers have in terms of the different types of mobility they undertake can have an impact on the way in which they evaluate and perceive their current position. Indeed, mobile researchers might have a more diverse range of experiences with which to compare their actual position. Mobility experiences can also help in improving researchers´ working conditions and, hence, affect the overall degree of satisfaction. Figure 145: Combined mobility and satisfaction with current position (EU28) reflects the average number of factors researchers are satisfied with in their current position. The maximum number of factors for which respondents could indicate whether they were satisfied or not was 18[130].

Although the differences are not very large, it is interesting to note that those researchers that have never experienced any type of mobility – international, interdisciplinary, nor intersectoral – report an average level of satisfaction (14.1) that is aligned with the population average (13.9). However, this is higher than the satisfaction that is reported among those that have done some type of combination of mobility types.

Among the researchers that have experienced more than one type of mobility, those who have been intersectorally and interdisciplinary mobile are those who show a lower level of satisfaction. This might be due to several factors. First, the fact that these researchers have a broader set of experiences in other fields and sectors might entail that they have a more critical viewpoint than other researchers with respect to their position and to academia in general. Second, this finding might be related to the fact that intersectoral mobility and, to a lesser extent, interdisciplinary mobility are the types of mobility that are perceived as having a smaller positive impact on career progression and recruitment. These researchers, feeling that their background is not sufficiently valued in the academic environment, might be less satisfied than other types of mobile and non-mobile colleagues.

[130] Intellectual challenge, dynamic work environment, research autonomy, contribution to society, level of responsibility, working with leading scientists, balance between teaching and research time, access to research facilities and equipment;, quality of training and education, availability of research funding, career perspectives, mobility perspectives, social status, reputation of employer, social security and other benefits, pension plan, job security and quality of life.

Figure 145: Combined mobility and satisfaction with current position (EU28)



Source: MORE3 EU HE survey (2016)
Notes:

- Only R2, R3 and R4 researchers.
- Based on question 79: "Short term mobility (<3 months)", question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?", question 88: "Have you ever worked as a researcher (excluding PhD) in the non-university/higher education sector (e.g. companies, NGOs, charities, non-university research institutes, governmental bodies/agencies)?" and question 14: "Did you switch to another (sub)field of research during your academic career?"
- (n=8,073)

9. Attractiveness of the European Research Area

The analysis of the attractiveness of the European Research Area is preliminary, as the information from task 2 – the global survey – is missing, particularly from EU researchers currently working outside the EU who will be asked in task 2 to compare their experience of working outside the EU with working inside the EU. On the other hand, the EU is heterogeneous, so issues of individual country attractiveness can also partly be judged from the point of view of EU researchers mobile within the EU. Following the analysis based on MORE2, we have a clear picture of what drives attractiveness among researchers in academia (Janger - Nowotny, 2016; Janger - Strauss - Campbell, 2013[131]). Attractiveness is driven by research job characteristics related to remuneration, pensions and job security ("financial" working conditions) and other non-science related conditions, and by those influencing a researcher's scientific productivity, such as research autonomy, career paths and working with high quality peers (cf. also section 6 on working conditions).

"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 (in particular for early stage researchers, "tenure track model", i.e. perspective of tenured employment conditional on performance only) are cross-cutting working conditions, as they influence both financial conditions and scientific knowledge production.

To this, 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 4 and 6). International, intersectoral or interdisciplinary mobility may be driven by perceptions of varying attractiveness. In turn, mobility indicators (see section 7 and 8), 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 EU HE survey analysed in this report, we can thus provide some preliminary evidence on how researchers perceive attractiveness. We use the following information from the survey:

- Perception of attractiveness of current academic position;
- Direct comparison of research systems;
- Comparison of barriers and motives for mobility.

Based on this analysis, Table 44 presents an overview of the findings of the MORE3 EU HE survey along the criteria "shaping attractiveness" as presented at the top of this

[131] Janger, J., Strauss, A., Campbell, D., (2013) Academic careers: a cross-country perspective, WWWforEurope.

section. The features which are perceived as attractive are marked in green, and those which are perceived to be less attractive or dissatisfying are in red; features with substantial country variation or heterogeneity within the EU, or when the EU is on par with non-EU, are marked in orange. This table indicates the biggest gaps in what researchers perceive to be attractive, according to the MORE3 EU HE survey. It is important to note that this analysis is based on **perceptions** of researchers as revealed through the MORE 3 survey.

Most relevant for the perception of the attractiveness of ERA is the direct comparison of the EU versus non-EU research systems by researchers. Here, researchers who have been to a non-EU OECD country or an EU associated country, i.e. to advanced research systems, generally perceive working outside the EU to be "better" than working inside the EU for a number of working conditions and career path features of researchers.

Otherwise, including the analysis on motives for geographical mobility, the EU generally fares better regarding working conditions in terms of financial and social security or quality of life. Regarding working conditions relevant for scientific knowledge production, researchers are generally less satisfied, particularly in terms of research funding, working with leading scientists and career paths/progression. However, as in the chapters of this report, the attractiveness of the ERA can only be understood by reference to its constituent countries. Substantial heterogeneity across national research areas also influences perceptions of the attractiveness of the ERA, as shown in the analysis.

In order to help make the EU more attractive for researchers, a clear finding in line with previous analyses is that researchers move overwhelmingly for reasons of scientific productivity, rather than issues such as salary, social security or quality of life (see section 7 and 8). This means that addressing the attractiveness of ERA would mainly work through improving the conditions for scientific knowledge production, above all: clear career paths; research funding and access to research facilities; research autonomy and providing perspectives for international mobility (as international collaboration is usually positive for the quality of research). Once these conditions become best practice in Europe, the EU will succeed in attracting increasing numbers of leading scientists, creating positive feedback loops as more leading scientists attract more leading scientists.

Table 44: Perception of ERA attractiveness: a preliminary assessment based on MORE3 data on…

	…satisfaction in current academic position	…comparison between research systems in and outside EU*	…motives for international mobility to EU versus non-EU: main motive	…motives for international mobility to EU versus non-EU: important motives
Financial and social conditions				
Salary				
Job Security		na		
Social Security				
Pension Plan		na		
Individual job satisfaction, quality of life			na	na
Conditions for scientific productivity				
Research funding				
Access to research facilities				
Working with leading scientists				
Career paths and progression				
Career perspectives				
Recruitment		na	na	na
Mobility perspectives, international networking				na
Research autonomy				
Balance research teaching				
Administrative burden	na		na	na
Quality of training and education				na
Engagement with society and industry				
Engagement with society		na	na	na
Engagement with industry	na		na	na

Source: MORE3 EU HE survey (2016), Janger and Nowotny, 2016 (analysis of attractiveness based on MORE2 data)[132]

Notes:

- Satisfaction in current academic position based on question 36: "Please indicate your satisfaction with each factor as it relates to your current position"
- Comparison between research systems in and outside EU is based on question 47: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better outside the EU than in the EU." and question 76: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better than in the EU." Comparison is made with non-EU OECD systems and EU associated countries (Iceland, Norway, Switzerland); when comparing with less advanced systems such as the BRICS, results would be more positive for the EU.
- Motives for international mobility to EU versus non-EU: main motive is based on question 69: "And what was your main motive to move to each of these countries?"
- Motives for international mobility to EU versus non-EU: important motives is based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?"

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

9.1. Attractiveness based on perceptions in the current academic position

Here we refer to the information on the (dis)satisfaction of researchers with their current academic position analysed in section 6 on working conditions, which (in the survey's methodology) is an EU position. We also refer to the perception of career paths and recruitment in 5. While not directly relevant for a comparison with a non-EU research position, this analysis is used to provide an insight into the relative strength of different aspects of the EU research system. The relevant findings of these sections are summarised here, based on the overall summary of MORE3 findings. Overall, regarding non-science related conditions, high levels of social (security and environmental) and individual (job content) satisfaction can be seen to compensate for dissatisfaction with pay when compared to outside academia. Satisfaction with working conditions relevant for scientific knowledge production is lowest for research funding, the balance between teaching and research time and career perspectives, but high for research autonomy (see Table 44).

9.1.1. Financial and social working conditions

While on average in the EU 2 out of 3 researchers perceive salaries to be reasonable, this
i) masks large country variation along lines of economic development and performance and
ii) does not hold up by comparison with outside academia, where on average close to 60% of researchers in the EU feel less well paid than their counterparts outside academia.

By contrast, satisfaction with financial and social security is high, with close to 80% of researchers satisfied with job security, 85% with social security and 70% with pension plans. Country variation for the latter is, however, large. 89% of all EU researchers are satisfied with their contribution to society, 86% with their social status and 89% with the reputation of their current employer.

More than 4 out of 5 EU researchers are satisfied with their individual working conditions in terms of intellectual challenge, dynamic work environment, and level of responsibility or quality of life. Overall, high levels of social (security and environmental) and individual (job content) satisfaction – on average in the EU – can be seen to compensate dissatisfaction with pay when compared with outside academia. Researchers are willing to trade-off salary against other aspects of their job, as previous studies show (Janger and Nowotny, 2016[133]).

9.1.2. Conditions affecting scientific productivity

On average, 42% of researchers in the EU28 are satisfied with the availability of research funding and 76% with access to research facilities. Possibly linked to overall economic conditions, Western and Northern European researchers are more satisfied than their colleagues in Southern and Eastern Europe. About 83% of researchers in the EU28 are satisfied with their opportunities to work with leading scientists. Country variation is large - between 94-61% - and corresponds roughly to the performance of countries in research excellence.

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

According to the MORE3 data, about 67% of researchers in the EU28 are satisfied with the balance between teaching and research time. It is highest among early-stage R1 and recognised R2 researchers, particularly in western (84%) and northern European (74%) countries. In contrast, less than 51% of established researchers in southern European countries are pleased with the balance between their research and teaching responsibilities.

About 89% of all researchers in the EU28 are satisfied with their level of research autonomy, with leading R4 researchers particularly satisfied, while early stage researchers are – not surprisingly - somewhat less satisfied.

Career perspectives also include relevant working conditions, as they influence the time horizon available for implementing research agendas, and mobility perspectives can shape collaboration opportunities. MORE3 finds that on average, 2 out of 3 researchers in the EU are satisfied with their career perspectives, and close to 3 out of 4 researchers are satisfied with their mobility perspectives. This masks again strong country variation (with only half of researchers in Southern European countries reporting satisfaction with career perspectives, in contrast to more than three quarters in Northern Europe).

While career paths are seen as relatively transparent on average (71%), in some countries there is a significant share of researchers who disagree on this (e.g. Hungary: 52%, Romania: 84%). The assessment of merit-based career progression is less positive on average in the EU28, with 1 out of 3 researchers stating that it is not merit-based. This is particularly true of researchers from Southern European countries (Spain, Portugal, France, Italy are between 52-60%). Researchers from some Eastern and Northern European countries are more positive (70-80%). Almost the same pattern is true for the assessment of whether obtaining a tenured contract only based on researchers' performance is common practice at their home institution.

Moreover, it is more attractive to undertake a research career when the early stages of a research career (R1 and R2) do not take a long time, as they are usually characterised by reduced research autonomy, fixed-term contracts and lower salaries. Average time in the EU28 to reach R3 is 9.7 years, ranging from 7.4-8.3 (France, Luxembourg, Romania) to 11.9 (Greece), 12.4 (Italy) and 15.4 (Poland) years.

Most researchers (EU28: 80%) are of the opinion that recruitment in their home institutions is sufficiently publicly advertised; but there are country differences regarding the assessment of researchers whether recruitment at their home institution is generally merit-based and transparent. In particular, researchers in some Southern (e.g. Italy 60%, Portugal 61%) and Eastern European countries (e.g. Hungary 55%) think that this is less the case than on average in the EU28 (77%).

All in all, satisfaction with working conditions relevant for scientific knowledge production is lowest for research funding, the balance between teaching and research time and career perspectives.

9.2. Attractiveness based on direct comparison of research systems

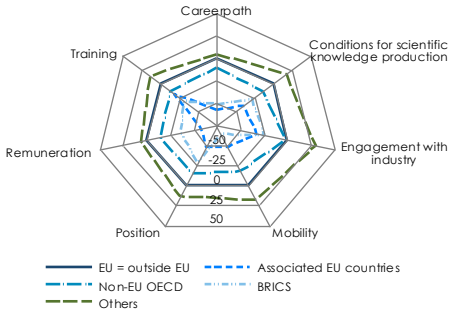
We analyse the information gained from the directly targeted questions 47 and 76 of the EU HEI survey which compare a number of aspects of the research system outside and inside the EU. Researchers eligible to respond to these questions are:

- Researchers with non-EU citizenship currently working in the EU; and
- Researchers with EU citizenship who indicate that one of their long-term international moves was to a country outside the EU.

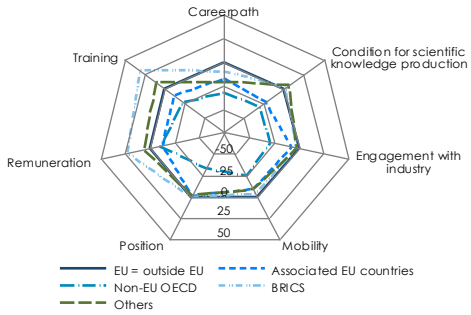
Overall, whether researchers in the target groups for direct comparison of research systems (both EU citizens who previously worked outside the EU and non-EU citizens who currently work inside the EU) appreciate the non-EU research system as being either better or worse than the EU system regarding various aspects depends heavily on their experience, i.e. which system they know, confirming the picture of heterogeneity.

Figure 146: Comparison between working outside the EU and working inside the EU as a researcher[134]

By citizenship: Non-EU citizens in EU position



By mobility experience: EU citizens with non-EU mobility experience



Source: MORE3 EU HE Survey (2016)
Notes:

- Non-EU researchers working in the EU are grouped by country of citizenship, EU researchers with mobility experience by their mobility destination country.
- Working conditions are bundled together (see footnote 134); for a full picture, see annex.
- Based on question 47: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better outside the EU than in the EU." and question 76: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better than in the EU."
- (left graph: n=339, right graph: n=805)

Figure 146 contrasts the share of researchers assessing the EU 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" – "worse in the EU" in percentage points), and the line where better and worse are equally balanced is shown explicitly as the line "EU = outside EU". The panel on the left is based on responses from those researchers currently working in the EU but having non-EU citizenship, while the right panel focuses on researchers who had at least one mobility experience outside the EU within the last 10 years[135]. The responses of the interviewees are clustered into 4 country groups based on stages of economic development outside the EU: 1) Iceland, Norway and Switzerland as EU associated countries, 2) OECD countries outside the EU, 3) the BRICS countries (Brazil, Russia, India, China and South Africa), and 4) other non-EU countries. Unfortunately a more precise comparison (i.e. by countries) is not possible given the too

[134] The graphs summarise more detailed indicators (for a more detailed graph see Figure 167 and Figure 168 in the annex): 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.

[135] If a researcher had more than one stay abroad (i.e. outside the EU), the most recent stay was used to assign her to the non-EU country groups.

low observation numbers. Nevertheless, the results provide some first insights into the attractiveness of the EU28 countries. Table 75 and Table 76 in the annex provide an overview of the detailed shares.

Overall, both groups of surveyed researchers, who are either citizens of or have working experience in non-EU OECD countries or the EU associated countries, assess the EU as less attractive than non-EU countries. For the group of EU associated countries, on average across all surveyed aspects, the share of researchers assessing working inside the EU as better than outside the EU is significantly lower than the share of researchers who assess it as worse (45pp for citizens of these countries and 15pp for those with mobility experience there). In more detail[136], for instance, 67% of the researchers with citizenship of an EU associated country indicated that working as a researcher outside the EU in terms of attractive career paths is better than inside the EU. Yet only 9% say that it is worse (a net difference of almost 60pp). A similarly large difference is found for remuneration and other material factors (68% versus 10%). The difference is less severe in quality of training and education (24% versus 6%).

However, when researchers already had experience of working as a researcher in this country group, working inside the EU is less often seen as worse than outside the EU. For this group the net difference drops from almost 60pp in some factors (remuneration, attractive career paths) to 20pp or less. For instance, regarding attractive career paths, 31% say it is better to work as a researcher outside the EU compared to 13% who say the opposite. When assessing remuneration and other material factors it is 30% versus 17%. However, the difference between the 'citizens'-group and the 'mobility-experience'-group is lowest for quality of education and training. The share of mobility-experienced researchers assessing the EU better than non-EU countries is only slightly higher than the respective share of citizens of this country group. These differences indicate perception biases in the quality of research systems, with researchers showing a "home bias" in that they tend to rate the system they come from higher than the destination country. However, even in the latter case of EU researchers who have been abroad, the balance of answers is mostly negative for the EU.

Regarding the comparison with non-EU OECD countries, the net difference between the share assessing working inside the EU as better than working outside the EU and the respective share assessing it worse is 13pp for citizens of these countries and 24pp for researchers with working experience there. Again, working as a researcher outside the EU is seen more attractive, with one interesting exception, which is ease of commercialisation of research results. This may be linked to IPR rules at universities, in which some European countries give rights to IPR to the academic inventor rather than to university management.

Regarding the group of researchers who are related to BRICS-countries, the EU is seen as more attractive for some of the surveyed factors. This holds in particular for training and education as well as remuneration and other financial factors seen by those researchers who already worked in the BRICS countries. While more than 1 out of 3 of these researchers (38% in the case of remuneration, 36% for quality of training and education) assess working outside the EU as worse than inside the EU, it is only 16% (remuneration) and 5% (quality of training and education) who say it is better outside the EU. For other factors, the picture is mixed. Remarkably, among the group of BRICS-citizens more researchers assess the EU less attractive.

[136] A detailed overview of the respective shares is summarised in Table 75 and Table 76 in the annex.

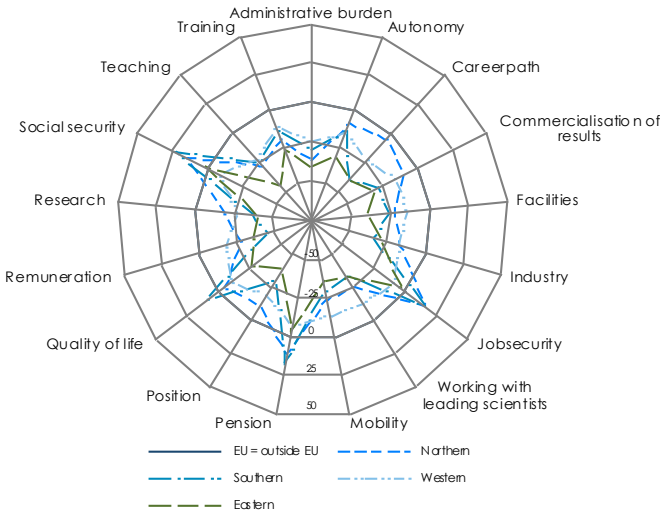
Finally, the group of researchers who are linked to other countries tend to assess the working conditions inside the EU as more attractive than outside the EU. This holds in particular for the group of citizens from these countries but also for those having work experience there. However, there exist also some factors where the latter group assesses the EU as less attractive. For instance, career paths are seen as more attractive outside the EU by 46% of these researchers, while only 26% think career paths are more attractive inside the EU.

Summarising, on average the EU tends to be seen as less attractive than other high-income countries by researchers. This holds, on average, particularly for the attractiveness of career paths. This could indicate a lack of proper tenure track models which are rated as very attractive (Janger and Nowotny, 2016[137]) and commonplace in the US, but not often present in the EU. On the other hand, the EU's attractiveness is less often below the attractiveness of non-EU countries regarding education and training. However, non-EU OECD countries as well as the EU associated countries are still assessed as more attractive. Regarding remuneration and other financial aspects, the EU outperforms the BRICS and the residual group of other countries (mainly including developing and catching-up countries) but is still less attractive than high-income countries.

As a robustness analysis, we also show in Figure 147 the perception of EU attractiveness by mobile EU researchers grouped by their current country of employment, which will be indicative of how these researchers asses the attractiveness of their home country relative to the country which they visited for their mobility experience. While in general, working outside the EU is rated better than inside, it is clear that this perception depends on the quality of the system researchers know – researchers from Northern and Western European countries tend to be less negative, particularly as regards conditions relevant for scientific productivity, while researchers from Southern Europe show a good rating of the EU as regards quality of life, social security and job security. This is most likely related to a high quality of life in these countries and a high share of tenured contracts (see section 5 on career paths). Researchers from Eastern Europe are on balance most critical, which is plausible as they tend to be catching-up research systems. This analysis is confirmed by the mobility indicators of sections 7 which show that destination countries for mobility are mostly well-performing research systems such as the US, UK and Switzerland.

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

Figure 147: Perception of EU attractiveness by mobile researchers grouped by their current country of employment



Source: MORE3 EU HE Survey (2016)
Notes:
- Only EU researchers who have worked outside the EU, grouped by their current country of employment in the EU.
- Based on question 76: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better than in the EU."
- (n= 805)

9.3. Attractiveness based on analysis of motives for, effects of and barriers to mobility

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 8.1.1.3.1 for an analysis on this). While motives for mobility reflect the expectations of a researcher towards the research system he or she is going to move to/or moved from, effects of mobility mirror outcomes of the mobility stint and can be seen as a kind of reality check for the expectations associated with mobility, e.g. whether expectations of attractiveness 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 hinder this. 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.

9.3.1. Motives for mobility

We compare the general motives to move to an EU versus a non-EU destination for the subgroup which was mobile in or outside the EU:

- By main motive to move to a country within or outside the EU, for the last three mobility steps;
- By important motive for the most recent mobility move.

Asking only about the main motive to move (for the last three mobility steps) forces researchers to focus on one motive which was particularly important. The advantage of this approach is that fewer motives will stand out, providing more policy guidance as to

the crucial factors determining country attractiveness or mobility. The disadvantage is that often, mobility is driven by more than just one factor and as a result the information by main motive may be too stylised. This is why we also show the results when researchers are asked about a range of different motives for their last mobility episode only.

Table 45 below shows that three reasons stand out across all destinations when it comes to motives for mobility: working with leading scientists, career progression and research autonomy, all relevant for scientific knowledge production. These are exactly the three factors which were found in the analysis by Janger and Nowotny (2016)[138] to be most influential for job choice among early stage researchers. Working with leading scientists is a particular motive for moving to a non-EU OECD country (30%), but also in general for moving outside the EU (25%, versus 20% for moving to a destination within the EU). Career progression and research autonomy are about as equally important as the motive to move within the EU or to move outside the EU, also confirming the picture of large heterogeneity among EU research systems.

The availability of suitable positions mirrors "escape" mobility (see section 8.1.1.3.1) and is particularly important for moving to the associated EU countries (Iceland, Switzerland, Norway) but also for moving within the EU itself. When research funding and the access to research facilities is taken together, this important condition affecting scientific productivity would be comparable or slightly more important as a main motive to move than the availability of a suitable position. International networking is another factor relevant for scientific productivity, while personal or family reasons are the first non-productivity related motive at about 5%.

This is in line with the analysis in MORE and with Janger and Nowotny (2016)[139] and Stephan - Franzoni - Scellato, 2015[140]: researchers move abroad both within the EU and outside the EU for career progression, research autonomy, working with leading scientists, research funding and gaining an international network. These are factors related to scientific productivity, whereas other factors such as remuneration and personal reasons play a lesser role. These factors hence clearly determine attractiveness of a research system. Moves outside the EU are less motivated by material working conditions such as social security, pensions or other personal reasons – people are more motivated to move outside Europe for career reasons or reasons related to scientific productivity, rather than for other factors.

[138] Janger, J., Nowotny, K., (2016) "Job choice in academia", Research Policy, 45(8), pp. 1672–1683.
[139] Ebd.
[140] Stephan, P., Franzoni, C., Scellato, G., (2015) "Global competition for scientific talent: evidence from location decisions of PhDs and postdocs in 16 countries", Ind. Corp. Change, 2015, p. dtv037.

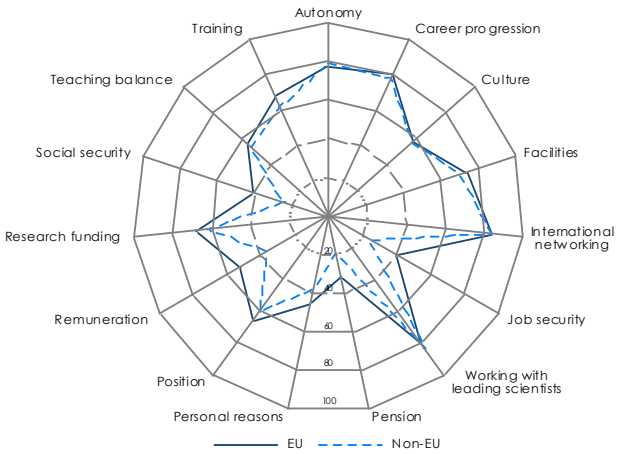
Table 45: Main motive to move to a different country, within or outside the EU

	EU	Non-EU	EU associated	OECD non-EU	BRICS	Other
Observations	1,985	1,267	225	780	99	150
Working with leading scientists	19.5%	24.7%	15.6%	30.0%	24.2%	10.0%
Career progression	19.4%	19.1%	23.1%	19.5%	6.1%	19.3%
Research autonomy	15.3%	15.7%	14.7%	15.9%	19.2%	15.3%
Availability of suitable positions	8.0%	6.0%	13.8%	4.9%	4.0%	2.0%
International networking	7.0%	7.7%	4.0%	7.7%	14.1%	8.0%
Availability of research funding	5.3%	3.7%	6.2%	3.3%	0.0%	4.7%
Personal/family reasons	5.3%	3.2%	6.7%	1.9%	5.1%	3.3%
Other	5.1%	6.6%	3.1%	4.5%	8.1%	20.7%
Quality of training and education	4.5%	2.8%	2.7%	3.3%	2.0%	1.3%
Access to research facilities and equipment	4.1%	4.3%	2.7%	4.6%	5.1%	4.7%
Balance between teaching and research time	2.7%	2.1%	2.2%	1.8%	4.0%	2.7%
Remuneration (salary, other financial incentives etc.)	1.7%	2.1%	3.1%	1.5%	2.0%	3.3%
Job security	1.0%	0.7%	1.8%	0.5%	0.0%	0.7%
Culture and/or language	0.7%	1.4%	0.4%	0.5%	6.1%	4.0%
Social security and other benefits	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%
Pension plan	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: MORE3 EU HE Survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 69: "And what was your main motive to move to each of these countries?"
- (n=3,252)

The analysis of differences in important motives to move to an EU country vs. a non EU-country yields essentially the same picture, with research autonomy, working with leading scientists, research funding and gaining an international network counting as important motives for researchers who moved within the EU or outside the EU. Financial, social security and personal reasons are less important, but are mentioned more often as important motives to move to an EU country than a non-EU country.

Figure 148: Important motives for >3 month international mobility in the last ten years to destinations in and outside the EU, most recent move



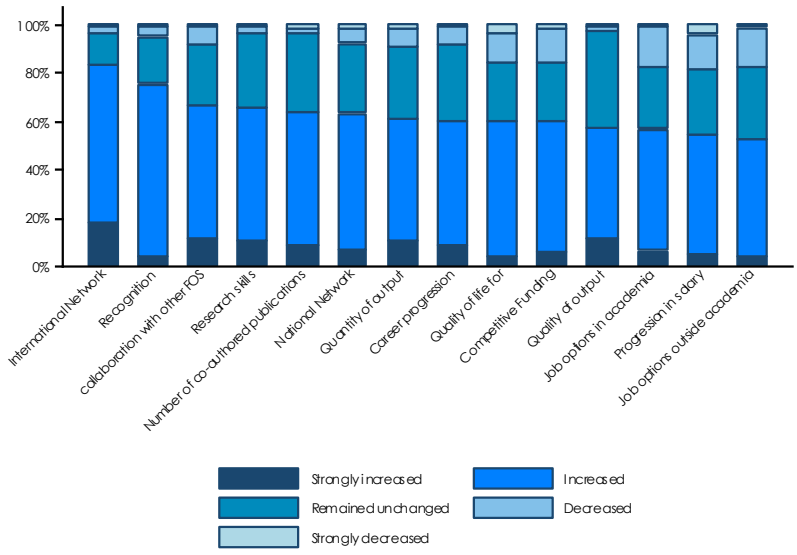
Source: MORE3 EU HE Survey (2016)
Notes:
- Only R2, R3 and R4 researchers who were >3 month mobile in the last ten years.
- Based on question 73: "Please consider your last instance of mobility. Which of the following factors were important motives to make this move?"
- (n=1,989)

In summary, the analysis of motives to move does not reveal big differences between the main motives to move outside the EU or within the EU, with the exception of working with leading scientists and factors related to financial and social security.

9.3.2. Effects of mobility

Effects of mobility have been analysed more in depth in section 8.1.1.5. In terms of effects of mobility, or of the effects of a stay in Europe by non-EU researchers, the most important effects are gaining an international network and recognition in the research community, similar to MORE2. Overall, expectations – motives for mobility – seem to correspond to effects, as scientific productivity related factors such as international networks, research funding and career progression all seem to have benefitted from mobility to the EU. There is not much difference between the other effects; for a final interpretation, this needs to be contrasted with the effects of EU researchers who are currently staying outside the EU.

Figure 149: Effects of current stay in Europe for non-EU researchers



Source: MORE3 EU HE Survey (2016)
Notes:
- Only non-EU researchers currently working in the EU.
- Based on question 45: "You are a non-EU researcher currently working in the EU. Please indicate below the effects, if any, of your current stay in Europe."
- (n=315)

9.3.3. Barriers to mobility

Barriers to mobility have been analysed in depth in section 8.1.1.4. It was shown that among the non-mobile, in particular barriers related to funding, in terms of both funding for a position to be able to return, and to transfer funding or to gain access to research facilities, are important to keep them from being mobile. The pattern is similar for the mobile in their last move, indicating that these expectations come true in reality. Transfer of pension and social security also plays a role, and this in particular for the non-mobile, as well as personal reasons such as childcare or finding a job for the spouse. For the non-EU, visa and work permits as well as language barriers were top-ranked as barriers for their move to EU. These were followed by funding for research, adequate

accommodation, culture and personal reasons. The practical and personal barriers are thus more important for researchers coming from outside the EU.

9.4. Estimation of the number of non-EU researchers in the EU

Share of non-EU researchers in EU28 countries *Of all researchers (n=9,412)*				
	EU28 total	**Per career stage**	**Per FOS**	**Per gender**
2016	4.3%	R1: 7.6%% R2: 4.5% R3: 3.9% R4: 2.9%	MED: 5.9% NAT: 3.0% SOC: 3.4%	F: 3.4%% M: 4.8%%

Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 5: "What is your country of citizenship?"
- (n= 9,412).

On the basis of the MORE3 data it is possible to estimate the number of non-EU researchers working in the European countries included in the survey: 4% of the researchers working in EU28 countries come from non-EU countries.

Country level: The estimate of the number of non-EU researchers is contingent upon having a sufficient number of respondents at country level in order to obtain a sufficiently robust indicator. Table 46 displays the shares of non-EU researchers in those countries in which the number of non-EU respondents is higher than 20. These figures show that there is a large heterogeneity across countries.

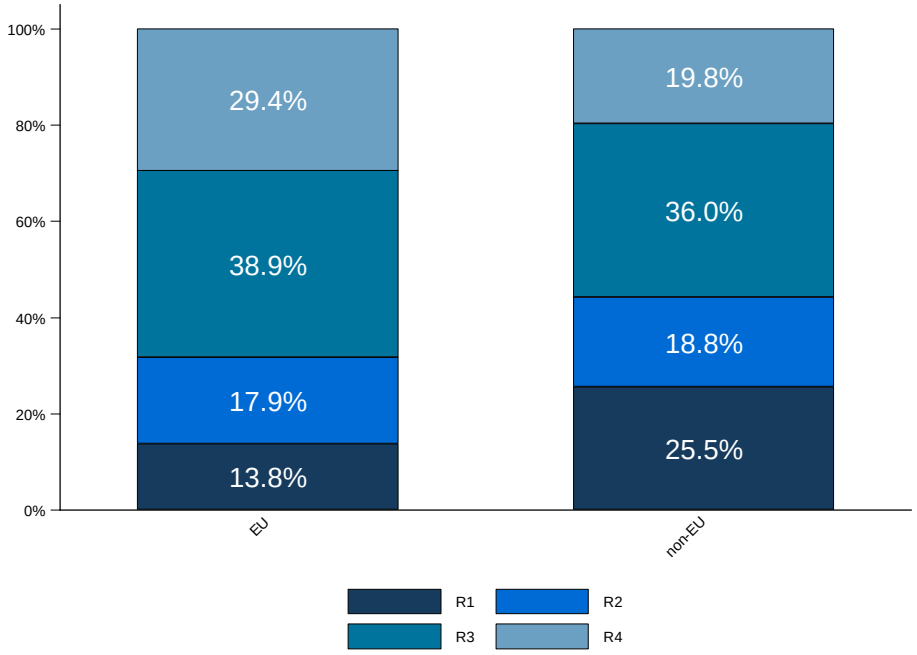
Table 46: Share of non-EU researchers, by country

	Share of non-EU researchers
Denmark	10,3%
Germany	4,9%
Iceland	87,2%
Ireland	6,3%
Luxembourg	16,6%
Norway	73,1%
Sweden	11,9%
Switzerland	47,7%
The Netherlands	7,6%
United Kingdom	7,3%
EU28	**4,3%**

Source: MORE3 EU HE survey (2016)
Notes:
- The countries included in the table are those for which there are more than 20 non-EU respondents.
- Based on question 5: "What is your country of citizenship?"

Career stage: Figure 150 shows that non-EU researchers are more likely to be in earlier career stages: the share of non-EU researchers in the R1 career stage (26%) is nearly twice as large as the share of researchers in that same career stage among EU researchers (14%). While the share of researchers in R2 is similar among EU and non-EU researchers, logically the share of researchers in R3 and in R4 is lower among non-EU researchers.

Figure 150: Share of researchers per career stage, by EU versus non-EU origin (EU28)

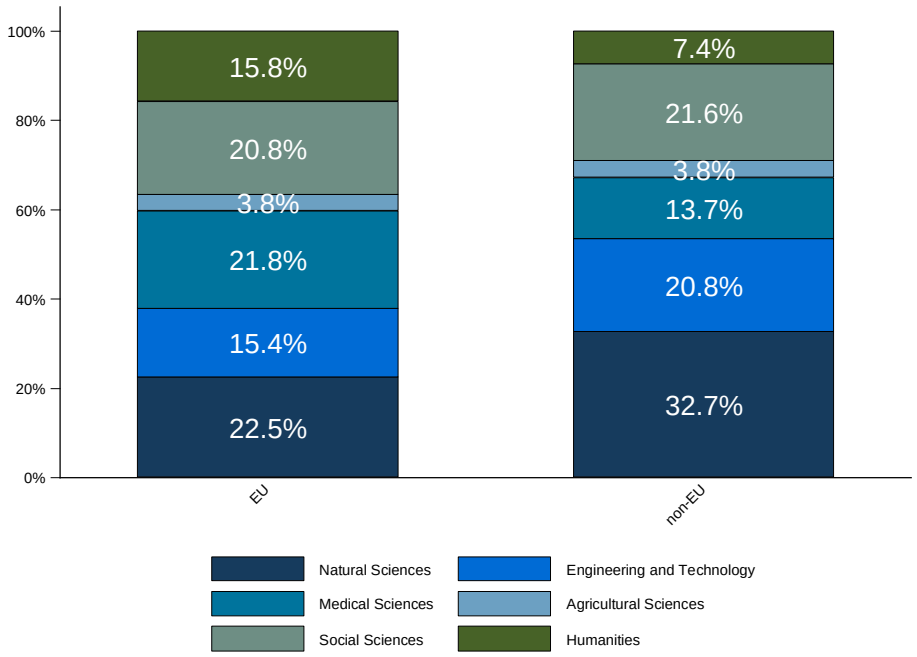


Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 5: "What is your country of citizenship?"
- (n=9,412)

Fields of science: Figure 151 displays the shares of researchers in each field of science depending on their origin, i.e. EU and non-EU countries. Compared to EU researchers, non–EU researchers are more likely to work in the Natural Sciences, in Engineering and Technology: 10 pp and 5 pp difference respectively.

Gender: The gender gap is larger among non-EU researchers than among EU researchers: female representation among non-EU researchers working in EU28 countries is 8 pp lower than among EU researchers.

Figure 151: Share of researchers in each field of science, by EU versus non-EU origin (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 5: "What is your country of citizenship?"
- (n=9,412)

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

Researchers move and are attracted to other research systems mainly because of working conditions influencing their scientific productivity, rather than because of issues such as salary, social security or quality of life. This means that addressing the attractiveness of ERA would mainly work through improving the conditions for scientific knowledge production. Uppermost here are clear career paths, research funding and access to research facilities, research autonomy and providing perspectives for international mobility as international collaboration is usually positive for the quality of research. Once these conditions become best practice in Europe, the EU will succeed in attracting increasing numbers of leading scientists, creating positive feedback loops as more leading scientists attract more leading scientists.

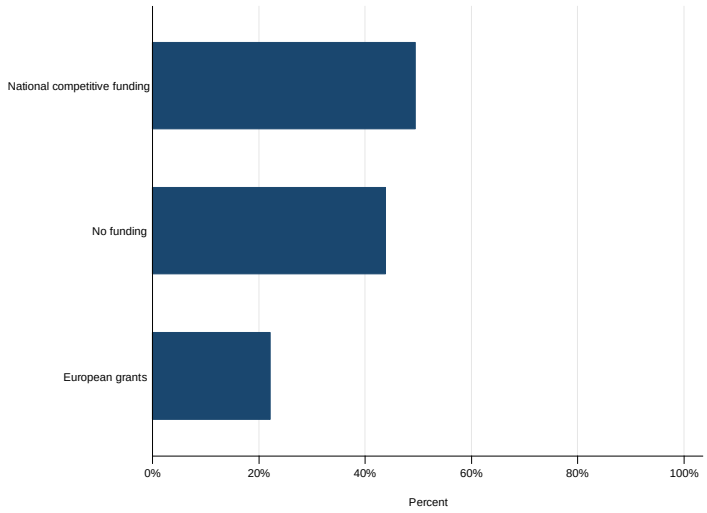
The EU has introduced a series of policy instruments to strengthen the quality of European research, and to promote researchers´ mobility and the quality of working conditions in the research profession: Euraxess, the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers as well as different funding schemes.

In EU28 countries, only 16% of researchers know Euraxess[141]. The awareness of this service is comparable across career stages. Awareness is slightly lower among R1 (14%), R4 (15%) and R2 (15%). Only R3 researchers have a larger share (18%). Knowing the service does not automatically entail that researchers use it: only 16% of those who know the service make use of it. The differences of use across career stages are small and perfectly mirror those of the awareness of the service; that is, lower use among R1 (14%) and higher use among R3 researchers (18%). However, MORE3 only asks researchers, and there is no information on how HEI have changed their recruitment policies as a result of the awareness building measures promoted by the EU. As the data on perception of public advertisement of vacancies indicate, there has been a major improvement.

Regarding the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers, nearly one out of five researchers are aware of these instruments (22%). Similarly to Euraxess, awareness of the Charter and Code is larger among the higher career stages: 30% among R4 leading researchers compared to just 10% among R1 doctoral researchers.

Obtaining funding for research from EU and national sources is a major element of research careers. As such, it is important to note that 56% of the researchers declare having obtained this kind of funding. The largest group is the one formed by those who have obtained funding from national funding schemes (50%). European grants of different types have been obtained by 22% of the researchers, with a large focus on funding under the Research and Innovation Framework Programmes.

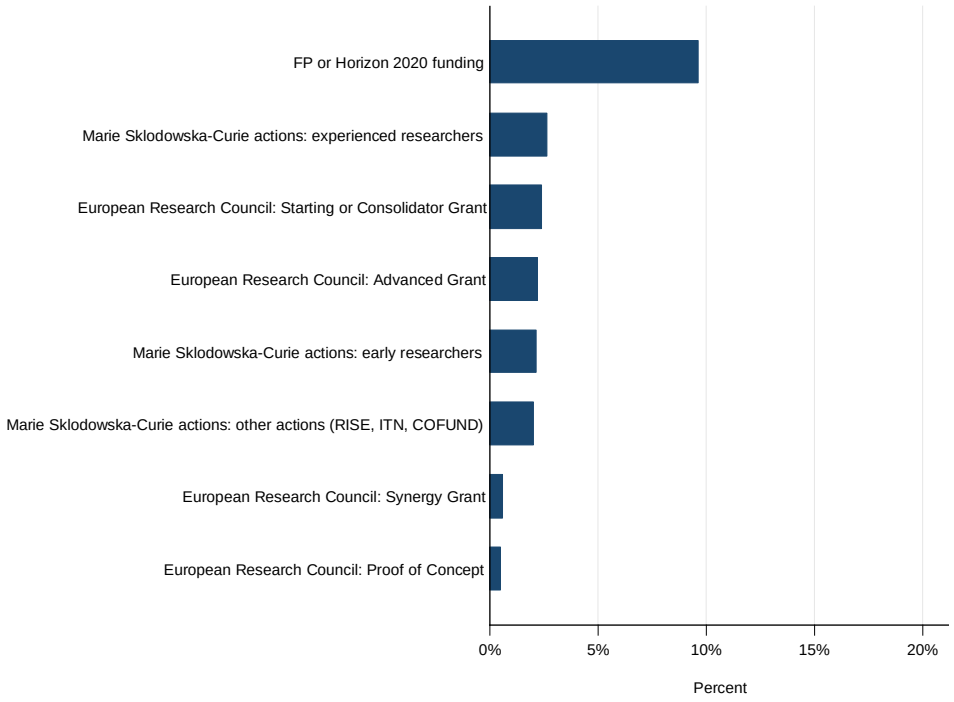
Figure 152: Competitive funding (EU28)



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 105: "Have you obtained competitive funding for basic research (based on peer review) from one or more of the following sources?"
- (n=9,412)

[141] n=9,412

Figure 153: European competitive funding (EU28)

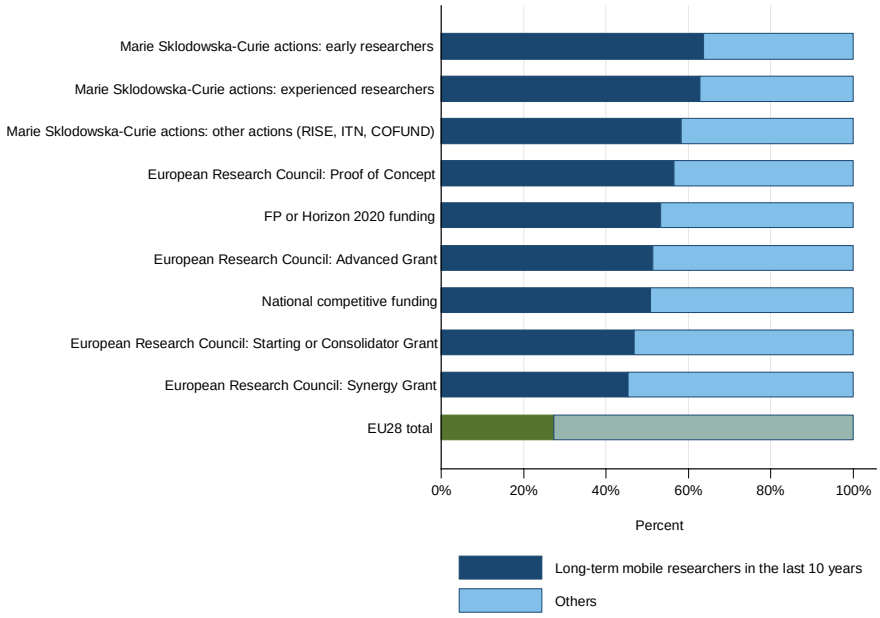


Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 105: "Have you obtained competitive funding for basic research (based on peer review) from one or more of the following sources?"
- (n=9,412)

The survey allowed for multiple choices when answering this question. In terms of number of grants, it is important to note that 69% of the competitive grants obtained by researchers come from national funding schemes. The remaining 31% comes from EU programmes, such as the Marie Sklodowska-Curie Actions, which are also very relevant for PhD training, or the FP, Horizon 2020, or ERC granting schemes.

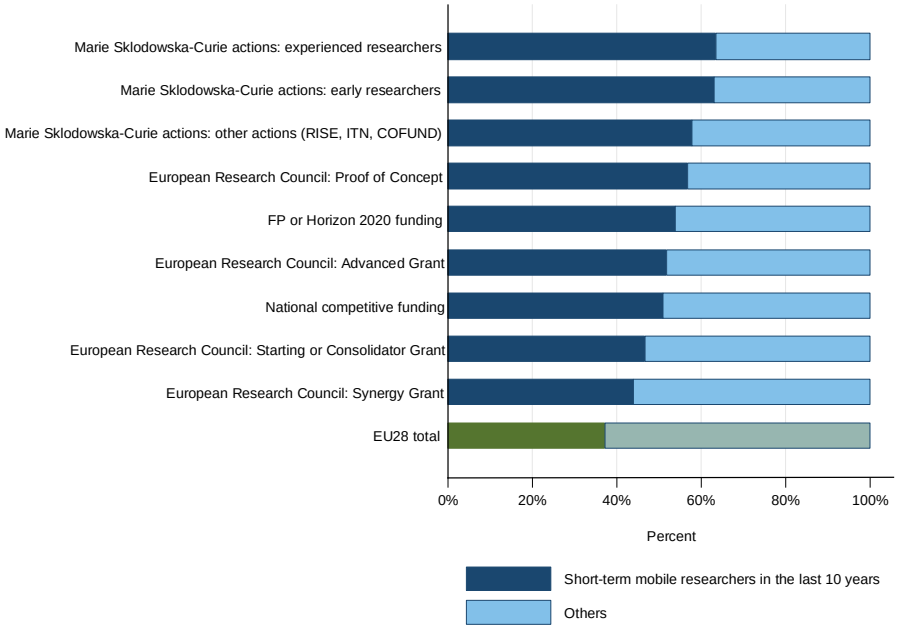
Both national and international schemes are positively associated with researchers´ mobility profiles. Figure 154 shows the distribution of researchers that have engaged in long term mobility (>3 months) in the past ten years and the rest of the population of researchers. It can be seen that, whereas in the overall population the share of mobile researchers is 27.4%, within each funding scheme the shares of mobile researchers are larger. Similarly, the share of short-term mobile (<3 months) researchers that obtain competitive funding is also higher than in the general population (Figure 155). Whether research funding causes mobility or more able researchers are more likely to both obtain competitive funding and be mobile cannot be answered by MORE3 data. However, European research funding not only plays a role for improving the working conditions of researchers, and hence of the attractiveness of the EU, but also in fostering mobility, which in turn affects scientific productivity.

Figure 154: Distribution of >3 months mobile researchers within each type of funding



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 105: "Have you obtained competitive funding for basic research (based on peer review) from one or more of the following sources?"
- (n=8,073)

Figure 155: Distribution of <3 month mobile researchers within each type of funding



Source: MORE3 EU HE survey (2016)
Notes:
- Only R2, R3 and R4 researchers.
- Based on question 105: "Have you obtained competitive funding for basic research (based on peer review) from one or more of the following sources?"
- (n=8,073)

Based on this short discussion of EU policies and MORE3 findings, there seem to be three potential directions for policies:

- Continue working on the quality of PhD studies as the main point of entry into research careers, e.g., through the Marie Sklodowska-Curie Actions; foster more structured training and doctoral schools through sharing best practice and providing competitive grants to innovative doctoral school projects across the EU. Only approximately 10% of PhD-students are aware of the principles of innovative doctoral training. Some of this funding could be earmarked for countries struggling with current economic conditions or which come from far behind as is the case for some Eastern European countries.
- Continue and renew the focus on research funding and on economic conditions for researchers in countries struggling with the economic crisis; most of the basic research funding of the EU (Horizon2020, ERC) now is distributed on the basis of excellence, with good reason, so that primarily countries with well-performing research systems benefit. One way to combine "efficiency and equity" may be to locate large research facilities in struggling countries, which would still be open to researchers from across the EU, so that they could serve as European platforms, while still generating positive local spillovers.
- Diffuse best practice as to how to structure recruitment policies, career paths and conditions for scientific knowledge production, to spread excellence from existing centres in the EU to wider areas of the EU; this needs to be tailor-made for the heterogeneous situation of the EU and address country specific issues, such as the balance between teaching and research in some Eastern European countries, transparent and merit-based recruitment and career paths in some Southern European countries and the high share of fixed-term contracts in countries such as Germany. The evidence from comparative higher education to do this is increasingly available, including from the MORE projects.

In the following section we first summarise all findings from the analysis and then link these back to the policy context in a broader sense.

10. Summary of the main findings

10.1. Sociodemographic information

NO EVOLUTION IN GENDER DISTRIBUTION OF RESEARCHERS: 39% ARE WOMEN

GENDER IMBALANCE PERSISTS IN PARTICULAR IN TECHNOLOGICAL FIELDS AND WOMEN RESEARCHERS STILL FACE A GLASS CEILING TO REACH THE HIGHER CAREER STAGES

According to Eurostat information, there is an increase in the number of researchers in Europe since 2009 by more than 130,000.

The gender distribution remains at about 39% women researchers compared to 61% men researchers. Among R4 researchers we observe a decline in the share of female researchers: from 29.0% in MORE2 to 25.2% in MORE3. Female representation is smaller in later career stages (25% in R4) and in the field of Engineering and Technology (26%).

SIMILAR CAREER STAGE DISTRIBUTION

Overall, the career stage distribution is similar to the 2012 data, with a slightly larger group of R3 researchers and a slightly lower group of R1 researchers.

DUAL CAREERS ARE COMMON: 27% OF RESEARCHERS LIVING IN COUPLE HAVE A PARTNER WHO ALSO WORKS AS A RESEARCHER

Most researchers live in couple (76%) and/or have children (63%). Interestingly, the partners of nearly one third of those who live in a couple in EU28 countries also work as researchers (27%). Female researchers are less likely to live in couple than male researchers (72% versus 79%), or to have children (56% versus 68%).

10.2. Education and Training: PhD studies

PHD REMAINS THE MAIN POINT OF ENTRY INTO RESEARCH CAREERS: 92% OF RESEARCHERS HOLD A PHD

About 92% (2012: 91%) of EU researchers hold a PhD, while 61% of R1 researchers (2012: 87%) are currently enrolled in a PhD programme, which means that PhD studies are the main point of entry into research careers and that their quality matters not just for attracting researchers into research careers, but also affects scientific productivity in the EU.

ROOM FOR FURTHER PROFESSIONALISATION OF PHD TRAINING: 56% OF PHD CANDIDATES ARE STILL SUPERVISED BY A SINGLE RESEARCHER

More than half of PhD candidates (56%) are supervised by single researchers, supervisory committees (29%) or doctoral schools (15%) remain a minority which indicates that there is room for further professionalisation in European PhD training, or an increase in structured PhD training. There is large variation at the country level, with 81% of Czech PhD-students supervised by single researchers and approx. 40% in Denmark, Finland and Sweden.

PhD candidates in Anglo-Saxon and Nordic Systems (e.g. Sweden: 75%) perceive their studies as more attractive than Continental or Southern European (e.g. Cyprus: 32%)

ones; besides Malta (which has a very high share, 84%), the Anglo-Saxon and Nordic system seem also to be more transparent and accountable than the Southern and Continental system. The lowest shares can be found in Austria (22%), France (24%), Portugal (26%), Romania (28%), and Hungary (29%).

ALMOST ONE THIRD OF PHD CANDIDATES RECEIVE TRANSFERABLE SKILLS TRAINING, AND THIS TRAINING FOCUSES ON SKILLS RELATED TO CORE RESEARCH ACTIVITIES

On average in the EU, 33% of PhD candidates receive training in transferable skills such as research skills, people and project management. This compares unfavourably with the share of researchers that thinks that such skills have an important influence on career progression (81% in the EU28). It varies widely among EU countries, with again the Anglo-Saxon and Nordic countries faring better at around 50% of PhD-students receiving training, possibly linked to more structured PhD training, while other countries such as Austria (9%), Germany and France (below 27%) achieve much lower shares.

Training in transferable skills focuses on skills more closely related to core research activities, such as research skills, communication and presentation skills, decision making and problem solving, and critical and autonomous thinking (73-90%). Skills such as engagement with society (46%) and entrepreneurship (38%) are less frequently part of transferable skills training.

ONLY 9% OF R1 AND 11% R2 RESEARCHERS ARE AWARE OF THE INNOVATIVE DOCTORAL TRAINING PRINCIPLES. ALSO HERE, RESEARCH-ORIENTED PRINCIPLES ARE CONSIDERED MORE IMPORTANT

A similar picture is found when asking PhD-students about the most important principles for PhD training: principles more closely related to the research endeavour are deemed to be essential or very important (research excellence: 79%, followed by attractive working conditions such as research independence and career development opportunities: 75%). Yet industry funding (31%) and inter-sectoral collaboration (50%) are at the bottom of principles deemed important for PhD training. This is mirrored in the share of researchers receiving industry funding (EU: 8%, with Croatia at 2% and the Czech Republic at 27%; in engineering, the share is higher at 14%).

A similar pattern is found for internships and work placements. In the EU, 14% of R1 and R2 researchers undertook a work placement or internship in the public sector, while about 2-3% experienced one in the private sector.

10.3. Career paths

10.3.1. Recruitment

IMPROVEMENTS IN SATISFACTION WITH OPEN, MERIT-BASED AND TRANSPARENT RECRUITMENT COMPARED TO 2012

Most researchers (EU28: 80%) are of the opinion that recruitment in their home institutions is sufficiently publicly advertised; but there are country differences regarding the assessment of researchers whether recruitment at their home institution is generally merit-based (EU: 77%) and transparent (EU28:74%). In particular researchers in some Southern (e.g. Italy 60%, Portugal 61%) and Eastern European countries (e.g. Hungary 55%) think that merit-based recruitment is less standard than on average in the EU28s. Comparison with 2012 needs to be made with caution, as the wording of the questionnaire changed slightly. There is significant improvement: in 2012 only 60% of the researchers stated that vacancies were sufficiently publicly advertised. In some

countries there were changes requiring external advertising of vacancies, while other countries cite increasing competition for open positions as drivers of increased external advertising. For merit-based and transparent recruitment, changes are smaller but still significantly positive (2012: 66 and 65%, respectively).

INTERNATIONAL EXPERIENCES AND TRANSFERABLE SKILLS ARE MORE IMPORTANT FOR RECRUITMENT IN A HEI THAN INTERSECTORAL MOBILITY

The perception of researchers of which non-standard factors such as publication record count positively for recruitment yields a clear picture, in that an international mobility experience is seen as most positive (EU28: 88%), followed by transferable skills such as grant writing (81%), non-publication forms of research output (76%) and an interdisciplinary mobility experience (74%). An intersectoral mobility experience to the private sector is seen as positive by 58%, or 30 percentage points lower than an international mobility experience.

There are differences between countries in particular for intersectoral mobility, which is perceived as a positive factor for recruitment especially by researchers in Latvia (83%) and by researchers in the Czech Republic (72%), while only about one out of two researchers in Spain (47%) and France (50%) would perceive this as a positive factor. But also the perception of alternative forms of research output varies widely, with 88% of researchers in Luxemburg and 87% of researchers in Belgium believing that they are positively affecting recruitment, while only 61% of Italian and 66% of Spanish researchers would agree.

10.3.2. Characteristics of career paths

STRUCTURAL HETEROGENEITY IN CAREER PATHS ACROSS EUROPE

The heterogeneity of higher education systems across the EU leads to heterogeneous careers, affecting the distribution of researchers over the career stages R1-R4. Countries with hierarchical chair-based systems and few tenured positions such as in Germany tend to have a smaller share of R4 and R3 researchers (40%). Yet southern European systems such as Spain, Greece and Italy feature higher shares of tenured R3 and R4 researchers (69-89%). This leads to a comparatively lower share of R1 and R2 researchers (in Southern European systems, the problem is "getting in"; in hierarchical systems, the problem is "getting up"). Such structural features of higher education systems take many years to change.

Researcher characteristics across career stages keep their established patterns from previous analyses (MORE2). Researchers in the career stages R1 and R2 are younger (below 44 - R1: 78%, R2: 66%), more likely to be on a fixed-term contract (share of permanent contract: R1: 28%, R2: 49%) and have less research autonomy; R3 and R4 are more likely to be on a permanent contract (R3: 83%, in R4 93%), male (share of female researchers in R1: 50%, in R4: 25%), and have more research autonomy but also higher teaching loads.

THE USE OF FIXED-TERM CONTRACTS SEEMS TO SLOW DOWN: 26% IN 2016 COMPARED TO 34% IN 2012

There are positive trends with respect to MORE2, with fewer researchers now on fixed-term contracts (EU28 2012: 34%, 2016: 26%), marking an opposite development to the USA when judging by the recent literature. However, fewer fixed-term contracts may also be a result of less research funding.

DUAL POSITIONS (IN MORE THAN ONE INSTITUTION) ARE RARE AND COUNTRY DIFFERENCES DIVERGE: 10% IN HEI ONLY AND 0.8% COMBINING HEI AND PRIVATE INDUSTRY POSITIONS

The share of researchers combining positions in more than one institution either inside or outside the higher education sector (dual positions) continues to be rare in the EU28 at about 10% of R2-R4 researchers, of which mostly are at career stage R3 and or R4 researchers; dual positions between HEI and non-HEI (3.3%) and, in particular, between HEI and industry (0.8%) are even rarer, at only 0.8%, which is not surprising, given that it is often not regarded as a positive factor for recruitment. However, in some smaller, particularly Eastern and South-eastern European countries, dual positions in all sectors (either combined positions in more than one HEI or combined position in a HEI and in another sector) reach up to 40% of all positions. This is probably due to working conditions, in particular salaries.

10.3.3. Career progression

CAREER PATH FROM R1 TO R4 TAKES AROUND 15-25 YEARS IN EUROPE

The time necessary from going from the earliest career stage R1 to R4 differs across countries between approximately 14 (Germany, Luxembourg, Portugal) and 24 (Poland) years. It is more attractive to undertake a research career when the early stages of a research career (R1 and R2) do not take a long time. Early stages are usually characterised by reduced research autonomy, fixed-term contracts and lower salaries. Average time in the EU28 to reach R3 is 10 years, ranging from 7-8 (France, Luxembourg, Romania) to 12 (Greece and Italy) and 15 (Poland) years.

CAREER PATHS ARE CONSIDERED TRANSPARENT BY 71% OF RESEARCHERS, BUT LESS MERIT-BASED (65%). THERE ARE LARGE DIFFERENCES ACROSS COUNTRIES, POINTING AGAIN AT THE HETEROGENEITY OF EUROPEAN RESEARCH CAREERS.

While career paths are seen as relatively transparent on average (71%), in some countries there is a significant share of researchers who disagree on this (e.g., Hungary: 52%, Romania: 84%). The assessment of merit-based career progression is less positive on average in the EU28, with more than 1 out of 3 researchers stating that it is not merit-based. In particular researchers from Southern European countries (Spain, Portugal, France, Italy are between 52-56%), while researchers from some Eastern and Northern European countries are more positive (70-80%). Almost the same pattern is true for the assessment of whether obtaining a tenured contract only based on researchers' performance is common practice at their home institution.

SAME FACTORS ARE POSITIVE FOR CAREER PROGRESSION AS FOR RECRUITMENT: INTERNATIONAL EXPERIENCES AND TRANSFERABLE SKILLS, INTERSECTORAL MOBILITY LESS SO

Positive factors for career progression are very similar to recruitment: On average, in the EU28 researchers perceive international mobility (85%) and transferable skills (81%) as positive for their career progression, while a mobility experience to the private sector is perceived to have the weakest positive impact (58%) and the highest negative impact (11%), again with the exception of some Eastern European countries. 7% of researchers in the EU28 think that interdisciplinary mobility has a negative impact on their career progression.

In terms of skills seen important for career progression in HEI, skills at the core of an academic research career are most valued, such as regarding decision-making and problem solving, critical and autonomous thinking, communication and presentation,

networking and grant and/or proposal writing (95%); entrepreneurship (67%) and dealing with IPR are on average deemed to be less important for career progression in a HEI, but there are differences between disciplines, with e.g. researchers in Medicine and Agricultural Sciences stating that IPR skills (77% and 83%) are important.

76% OF RESEARCHERS IN THE EU HEI SECTOR FEEL CONFIDENT ABOUT THEIR FUTURE CAREER:

With respect to future confidence in their careers, the majority of researchers in the EU28 feel very or somewhat confident about their future research career (2016:76%, 2012: 78%). Large differences across countries are observable and Northern European researchers dominate the group of the most optimistic ones (e.g. Iceland, Sweden, Norway 93-86%). By contrast, in Southern European countries, particularly in Portugal, Italy and Spain (54-64%), researchers are the least confident about their professional future. In general, a higher share of female researchers lacks or lacks very much confidence in their future career than their male colleagues (31 versus 20%).

10.4. Satisfaction with working conditions

ACROSS THE BOARD, SATISFACTION WITH WORKING CONDITIONS IS HIGHER IN 2016 THAN IN 2012.

This holds for academic aspects such as intellectual challenge (2012: 89%, 2016: 91%), in particular for employment aspects such as job security or salary (2012: 60%, 2016: 78%; however the question on salary in MORE3 was more detailed), personal aspects such as contribution to society (2012: 84%, 2016: 87%) and career-related aspects (2012: 63%, 2016: 70%).

10.4.1. Remuneration and financial security

OVERALL SATISFACTION WITH REMUNERATION MASKS LARGE COUNTRY VARIATION

Among working conditions related to financial remuneration and other non-science related ones, on average in the EU 2 out of 3 researchers perceive salaries to be reasonable. This masks large country variation along lines of economic development and performance, with countries such as Luxembourg and Switzerland reporting close to 90% of at least reasonably paid researchers, and some Eastern European countries and Greece at the bottom, approaching only a share of 25% of reasonably paid researchers. Female researchers report on average more frequently to be somewhat less well paid (by 2-5% depending on the career stage), but it is likely that this figure understates the true wage gap as female and male perceptions of identical salary levels are known to deviate systematically.

By comparison with outside academia, on average close to 60% of researchers in the EU feel less well paid than their counterparts outside academia, with later stage researchers more likely to report this than early stage researchers. In France and Italy, this reaches 71-80%, which makes research careers in academia less attractive than outside options. Close to 10% feel better paid on average, with some countries such as Romania (above 40%) and some other countries which joined the EU in 2004 reporting higher shares of researchers being better paid than their non-academic counterparts.

SATISFACTION WITH JOB SECURITY REFLECTS DIFFERENCES IN HIGHER EDUCATION SYSTEMS

MORE3 findings on other financial security features such as job security are not only linked to economic conditions, but also reflect different higher education system

structures, with researchers in Germany (71%) on par with Greek researchers in terms of levels of satisfaction with job security (Germany features a high share of fixed-term researchers due to their chair-based organisation in universities). In the EU, on average, there are rather high levels of satisfaction with financial security, with close to 80% of researchers satisfied with job security, 85% with social security and 70% with pension plans. Country variation for the latter is however large (Denmark: 95, Greece: 26%).

Part-time researchers working more than 50% of full-time are on similar levels as full-time researchers in terms of satisfaction with remuneration (around 70%). On the other hand, there is a clear gap in terms of satisfaction with job security (82 % vs. 63%). There is also significant country variation, with part-time researchers in Southern European countries experiencing much less satisfaction with financial security such as pension plans than do full-time researchers (20% vs. 54%). Possibly linked to the issue of dual labour markets, where full-time, permanent positions feature good social security but fixed-term, part-time jobs are much more precarious. In Northern European countries, there is much less of a difference between full- and part-timers (less than 10 percentage points).

10.4.2. Social environment

HIGH SATISFACTION WITH CONTRIBUTION TO THE SOCIAL ENVIRONMENT IN THE ACADEMIC RESEARCH POSITIONS (86-89%)

The satisfaction of researchers with their social environment related to their current job position is high on average in the EU28. 89% of all EU researchers are satisfied with their contribution to society, 86% with their social status and 89% with the reputation of their current employer, with researchers in Southern and Eastern Europe less satisfied than in Northern Europe. Later stage researchers and researchers from the Medical Sciences also report more satisfaction with the social environment.

10.4.3. Individual satisfaction

HIGH SATISFACTION WITH INDIVIDUAL SITUATION IN THE ACADEMIC RESEARCH POSITIONS (85-95%)

More than 4 out of 5 EU researchers are satisfied with their individual working conditions in terms of intellectual challenge, dynamic work environment, and level of responsibility or quality of life. 95% of researchers in the EU28 are satisfied with their intellectual challenge in their current position, 92% with their level of responsibility, 85% with their dynamic work environment, and 85% with their quality of life. Again, researchers from Northern Europe as well as R4 researchers report higher satisfaction.

ATTRACTIVENESS OF ACADEMIC RESEARCH CAREERS: TRADE-OFF BETWEEN SOCIAL AND INDIVIDUAL FACTORS AND REMUNERATION

High levels of social (security and environmental) and individual (job content) satisfaction – on average in the EU – can be seen to compensate dissatisfaction with pay when compared with outside academia, making research careers attractive. Researchers are willing to trade-off salary against other job features, as previous studies show.

10.4.4. Working conditions affecting scientific knowledge production

PERSISTING MIXED PATTERN FOR SCIENTIFIC KNOWLEDGE PRODUCTION FACTORS: LOWER SATISFACTION REGARDING AVAILABILITY OF FUNDING (42%), TEACHING TIME (67%) AND CAREER PERSPECTIVES (67%) BUT HIGHER SATISFACTION REGARDING WORKING WITH LEADING SCIENTISTS (83%) AND RESEARCH AUTONOMY (89%).

On average, 42% of researchers in the EU28 are satisfied with the availability of research funding and 76% with the access to research facilities (financial support for researchers). Possibly linked to overall economic conditions, Western and Northern European researchers (49 and 45% for research funding; 84 and 85% for access to research facilities) are more satisfied than their colleagues in Southern and Eastern Europe (21 and 41% for research funding; 53 and 66% for access to research facilities). Levels of satisfaction with research funding are much lower than for other working conditions.

On the other hand, about 83% of researchers in the EU28 are satisfied with their opportunities to work with leading scientists. Country variation is between 61%-94% and corresponds roughly to the performance of countries in research excellence. Researchers working in Anglo-Saxon and Nordic higher education systems, like Denmark, the Netherlands or the U.K., are on average more satisfied with their opportunities to work with leading scientists (87%) than researchers working in Continental (approximately 82%) or Southern European (80%) higher education systems.

According to the MORE3 data, about 67% of researchers in the EU28 are satisfied with their balance between teaching and research time. This level is highest among early-stage R1 and recognised R2 researchers, particularly in western (84%) and northern European (74%) countries. In contrast, less than 51% of established researchers in southern European countries are happy with their shares of research and teaching.

About 89% (2012: 87%) of all researchers in the EU28 are satisfied with their level of research autonomy, with leading R4 researchers particularly satisfied, while early stage researchers are somewhat less satisfied.

Career perspectives are also relevant working conditions, as they influence the time horizon available for implementing research agendas, and mobility perspectives can shape collaboration patterns. MORE3 finds that on average 2 out of 3 researchers in the EU are satisfied with their career perspectives (2012: 62%), and close to 3 out of 4 researchers are satisfied with their mobility perspectives (2012: 64%). This masks however country variation, with only half of researchers in Southern European countries reporting satisfaction with career perspectives, in contrast to more than three quarters in Northern Europe; a similar pattern holds for mobility perspectives.

All in all, satisfaction with working conditions relevant for scientific knowledge production is lowest for research funding, the balance between teaching and research time and career perspectives.

10.5. Mobility and collaboration during PhD stage

10.5.1. Mobility during PhD stage

INDICATIONS OF INCREASING PHD DEGREE MOBILITY

At EU level there is a similar share of PhD candidates that engage in PhD degree mobility (16%) and that engage in >3 month mobility during their PhD (but returning to their home country to finish the PhD, 18%). The current R1 researchers are more inclined towards PhD degree mobility than the current R2 researchers were at the time of their PhD (20% versus 15%). For the category of during PhD mobility we see an opposite effect. The R2 share of PhD degree mobility is slightly higher in 2016 compared to 2012 (15% versus 12%), which may be an indication of an increasing trend set since then.

Family status is an important determinant of mobility in PhD stage, as is whether or not the researcher's partner is also a researcher. The probability of mobility is also higher when the partner is also a researcher. This effect is more important with respect to PhD degree mobility than to mobility during PhD.

Citizens from Romania, Greece, Iceland, Ireland, Malta and Cyprus, are most PhD degree mobile (35% or more). Belgium, Bulgaria and Sweden are least PhD degree mobile (below 6%). Small, open countries, as well as the Anglo-Saxon systems have the highest proportion of foreign researchers among their PhD candidates.

Researchers who will/did obtain their PhD in Spain, Denmark and Italy are considerably more mobile during their PhD to another country for over months than the EU average (between 40% and 60% compared 18%). Slovenia, Slovakia and Iceland are also ranked high for this indicator, with values over 30%. Researchers who obtain(ed) their PhD in Ireland, United Kingdom, Luxembourg, Germany and Sweden were less frequently engaged in during PhD mobility (10% or below). This is in part due to other types of mobility being more prevalent in these countries, such as the PhD degree mobility or Master mobility. The main destination countries for >3 month mobility during PhD are the United States (12%), the United Kingdom (12%) and Germany (11%). This top three is the same as in MORE2. The top 10 destination countries for during PhD mobility are often visited by R1 and R2 researchers from Southern European countries (Italy, Spain, Greece, and Portugal).

PHD DEGREE MOBILITY IS NOT OFTEN COMBINED WITH MOBILITY DURING PHD

4% of the R1-R2 researchers combined the two forms of PhD mobility, while 70% did not engage in either of them. In most countries, the values of PhD degree mobility and during PhD mobility mirror each other: mobility of one form is linked to a lower probability of mobility of the other form.

MASTER MOBILITY IS AN INDICATION OF THE INTERNATIONAL ORIENTATION DURING PHD

Interestingly, the share of researchers moving during their PhD is considerably higher among researchers who already moved in their Masters: 33% versus 18% in total. Their Master mobility can thus be considered an early indication of their international orientation.

TWO THIRDS OF EU28 R1 AND R2 RESEARCHERS WAS NOT MOBILE FOR OR DURING PHD

70% of EU28 R1 and R2 researchers was not mobile for or during their PhD. PhD candidates in the larger West-European countries are more non-mobile, in particular in

Germany (80%). South-European countries and small, open countries have lower shares of non-mobility in PhD. Researchers who obtain there PhD in these countries are thus in other words more inclined to undertake mobility during their PhD or to be foreign citizens who moved to obtain their PhD there.

10.5.1.1. Motives for PhD mobility

STABLE PATTERN AND CONVERGENCE IN IMPORTANCE OF THE MOTIVES FOR PHD MOBILITY: WORKING WITH LEADING SCIENTISTS, QUALITY OF TRAINING AND EDUCATION AND CAREER PROGRESSION ARE THE TOP 3 MOTIVES

Overall, a very similar ranking of the motives is obtained in 2016 compared to 2012. Working with leading scientists, quality of training and education, career progression, availability of suitable PhD positions and international networking are the top 5 motives in 2016, each of which were already in the same regions in 2012. Only pension plan is indicated by less than 50% of the PhD degree mobile R1-R2 researchers as a motive. There is thus a stable pattern in the motives why researchers engage in PhD degree mobility.

All aspects have been ticked more often by the researchers as motives for their PhD degree mobility in 2016 compared to 2012. The main differences occur for aspects at the lower end, thus resulting in convergence of the importance of the different motives. Examples are: social security and other benefits (28pp difference), personal or family reasons (25pp difference), remuneration (20pp difference) and job security (18pp difference).

A similar stability in the motives pattern is observed for during PhD mobility, with similar motives ranked top. However, logically, less importance is attached to position or contract-related motives and personal reasons.

FAMILY STATUS IS AN IMPORTANT DETERMINANT OF THE MOTIVES FOR MOBILITY IN PHD STAGE, BUT THE IMPORTANCE OF, FOR EXAMPLE, PERSONAL REASONS, CULTURE AND INTERNATIONAL NETWORKING AND AVAILABILITY IS AGAIN REDUCED WHEN THE PARTNER IS ALSO A RESEARCHER

One dimension that determines the motives for PhD mobility substantially is that of family status of the researcher (current, not necessarily at the time of the move). The largest difference between those living in a couple versus those that are single is found for personal and family reasons (23.1pp difference) and for culture and/or language (12.1pp difference). Also the availability of a position, working with leading scientists and international networking are more important for researchers in a couple (9.9pp, 8.4pp and 7.7pp difference respectively), but job security is less important (11.7pp difference). Interestingly, the motives that become more important for researchers in couple, are again reduced in importance when the partner is also a researcher. Research autonomy and remuneration on the other hand, are more important when the partner is a researcher (10.2pp and 6.3pp difference respectively). (Much) less important are social security, career progression, quality of training and education and job security (16.6pp, 15.8pp, 15.5pp and 11.8pp difference respectively).

Also for during PhD mobility, family status determines the extent to which family and security related factors are found important. Those in a couple attach higher importance to social security but less on job security and remuneration. Those with children similarly attach more importance to social security, pension plan and personal reasons.

10.5.1.2. Barriers to PhD mobility

STABLE PATTERN OF BARRIERS TO PHD MOBILITY, WITH EMPHASIS ON PERSONAL REASONS AND FINDING POSITIONS OR FUNDING

The main barriers for PhD mobility indicated by the non-mobile researchers are personal or family related (58%), the ability to obtain funding for mobility (44%) or for research (43%) and finding a suitable position (42%). It are thus mainly research-related practical matters that worry the PhD researchers. Move-related practical matters such as culture, obtaining a visa or language are not considered that important. This pattern is stable compared to 2012. Not surprisingly, the further one explored mobility (but finally not engaging in it), the more practical barriers are mentioned (e.g. funding and language of teaching and PhD programme).

R1 show the same, but more pronounced pattern than the average in total. The general pattern is also more pronounced for female researchers. Family status again determines the barriers, with researchers in a couple paying more attention to logistics, remuneration and personal/family reasons. Funding and network are more important to single researchers and to researchers without children.

10.6. Mobility and collaboration in post-PhD career stages

10.6.1. International long term mobility (>3 month) in post-PhD career stages

The share of researchers who have been long-term mobile in the last ten years has decreased from 31% in 2012 to 27% in 2016. On the opposite, there is an increase in those who have never been mobile: from 52% to 54%

LONG-TERM MOBILITY IS LESS COMMON IN SOUTHERN AND EASTERN EUROPEAN COUNTRIES AND REDUCING IN SOME OF THE TECHNOLOGICALLY-ADVANCED MEMBER STATES

Overall the patterns of mobility at country level remain stable when comparing 2016 and 2012. Very significant drops are observed in Denmark (from 53% to 30%), Iceland (from 49% to 31%) and Finland (from 42% to 25%).

THE LONG-TERM MOBILITY OF FEMALE AND MALE RESEARCHERS IS CONVERGING BUT FAMILY COMPOSITION STILL MATTERS

Male researchers continue to be more mobile than female researchers: 29% versus 25%, but the gap has decreased from a 9 pp difference in 2012 to a 3.6 pp difference in 2016. This convergence is also observed at country level. Family situation is found to have an important effect on mobility: having a partner and having children reduce the likelihood of being mobile.

Among those who have never been mobile, most have never considered it (60%), but some did consider it but have never searched for a position (24%), 11% made some effort and 5% was offered a position but turned it down.

10.6.1.1. Motives for international long term mobility in post-PhD career stages

ONE OUT OF FIVE EUROPEAN RESEARCHERS HAVE FELT FORCED TO MOVE TO ANOTHER EU COUNTRY

When considering mobility to EU and non-EU countries, 9% of researchers that have been mobile for more than 3 months indicated that they felt forced to move because there were no options for a research career in their home country. Another 7% felt forced because international mobility is a requirement for career progression in their home country. Ireland and Bulgaria have the highest shares of researchers feeling forced to move to another EU country (48% and 37% respectively). Norway, Belgium and the United Kingdom have the lower shares. Interestingly, in these cases, mobility is not perceived either as a requirement for career progression.

RESEARCHERS IN EARLIER CAREER STAGES FEEL MORE FREQUENTLY FORCED TO MOVE

Forced mobility is more frequent among R2 career stages than in higher career stages (23% compared to 15% and 16% for R3 and R4 respectively). Consistent with these results, forced mobility is also more common among single researchers and those without children. The motives for mobility among R3 and R4 tend to be focused around the expansion of their network and exchange of knowledge, and to a lesser extent around factors related to the improvement of career progression and working conditions.

INTERNATIONAL NETWORKING AND WORKING WITH LEADING SCIENTISTS ARE THE MAJOR DRIVERS FOR MOBILITY WITHIN THE EU

The most frequently indicated motive to move to another EU country is international networking (83%), followed by career progression 80%) and working with leading scientists (79%). There has been an increase in the shares of researchers declaring themselves driven by research autonomy (from 47% in MORE2 to 76%) and in those who have been motivated by remuneration (from 41% in MORE2 to 53% in MORE3).

Motives for intellectual support are important (>35%) for researchers whose destination is Spain, Norway, Belgium or France. Motives with respect to career progression are more relevant for researchers who are mobile towards Ireland, Switzerland and to Finland (between 35% and 60%). Financial support motives are important for researchers whose destination is Luxembourg (53%) and Austria (41%) while financial security motives are overall less important with the exception of researchers whose destination is Finland (16%) and Ireland (10%). Researchers who move to Italy, the UK and Norway value non-work related motives (between 15 and 22%) than others.

VARIATION IN MOTIVES FOR MOBILITY IS LOWER AMONG RESEARCHERS IN HIGHER CAREER STAGES

R2 researchers are more inclined to be driven by career progression, working with leading scientists and international networking when deciding whether or not to be mobile to an EU country. These motivations are lower in higher career stages: among R3 and, especially, among R4 researchers.

Male researchers value more research autonomy (-6pp) and remuneration (-4pp), while female researchers give more importance to research facilities and equipment (+6pp), and to working with leading scientists (+4pp).

LARGE HETEROGENEITY OF THE MOTIVATIONS TO MOVE ACROSS EUROPEAN COUNTRIES

Different countries value different factors when opting to move. Croatian, Spanish and researchers are more driven by intellectual motives (45-50%). Motives related to career progression play a role in moving for German, Irish and UK researchers. Non-work related factors play a role of approximately 37% of researchers with citizenship from Malta and 18% for researchers from Italy and Sweden.

CONSISTENTLY WITH THE RESULTS OF MORE2, CAREER PROGRESSION (23%) AND WORKING WITH LEADING SCIENTISTS (20%) ARE THE MOST IMPORTANT REASON TO MOVE

Career progression is also the most frequently indicated factor as a motive for employer mobility (38%), followed by the availability of suitable positions (12%) and research autonomy (10%). Career progression is more relevant for R2 and R4 than for R3 researchers.

10.6.1.2. Barriers during international long term mobility in post-PhD career stages

ONE OUT OF THREE NON-EUROPEAN RESEARCHERS INDICATES THAT OBTAINING A VISA WAS A SIGNIFICANT BARRIER TO UNDERTAKING A LONG-TERM MOVE TO THE EU

Language is also still an important barrier, when considering it for teaching (27%) and for contact or for collaboration with colleagues (23%). Interestingly, this factor is a more relevant barrier for male researchers, and also for R2 researchers compared to R4, and to a lesser extent to R3 researchers. In this sense, the most relevant barriers for the R2 group are those related to funding and employability: finding suitable positions, getting access to funding for return mobility or, as abovementioned, funding for research.

More experienced researchers (R4) tend to give a greater importance to barriers related to maintaining the status quo of their position. They are concerned about access to research facilities, but most of the main barriers are related to maintaining the level of remuneration, transferring pension and social security, finding suitable child-caring or schooling for children, and facing a different culture.

R2 RESEARCHERS TEND TO ENCOUNTER MORE BARRIERS FOR LONG-TERM MOBILITY THAN R3 AND R4 RESEARCHERS

The most important barriers for mobility for EU and non-EU researchers are finding a suitable position (38%), obtaining funding for research (38%) and obtaining funding for mobility (36%). R2 researchers overall stated that they have encountered more barriers than R3 and R4 researchers in their last move; the only exceptions being personal and family reasons, and logistical problems. R4 researchers are the group that, in general, indicates that they have encountered less barriers in their last move compared to R2 and R3 researchers.

PERSONAL AND FAMILY REASONS ARE THE MOST IMPORTANT MOTIVES TO DECIDE NOT TO MOVE, TO A GREATER EXTENT THAN IN 2012 (77% IN MORE3 COMPARED TO 67% IN MORE2)

Obtaining funding for research and mobility, as well as finding a suitable position are also important reasons for non-mobility. In this sense, the reasons to be non-mobile are similar to the barriers to mobility, with a similar distribution across career stages: R4 researchers are the less affected by different reasons to be non-mobile, while R2 researchers indicate a much higher number of motives to explain their non-mobility. In addition, the importance of logistical problems and personal and family reasons greatly

varies between single researchers and those in couple, and between researchers with children and those without.

10.6.1.3. Effects of international long term mobility in post-PhD career stages

MOBILITY HAS A POSITIVE EFFECT ON NETWORKING AND INTERDISCIPLINARY COLLABORATION. A SOMEWHAT LESS POSITIVE EFFECT IS FOUND ON RESEARCH OUTPUT.

The positive opinion of output effects has also grown by 11pp and that of career related effects has done so by 9pp. Quality of life (personal effects), the salary and financial conditions (financial effects) and the job options outside academia (career-related effects) receive lower scores.

Mobile researchers in Iceland, Luxembourg and Romania are the most enthusiastic about the positive consequences of mobility. Spain and Denmark, on the opposite, tend to have a less optimistic vision of the effects of their mobility experiences. These differences are related to the cross-country heterogeneity in the appreciation of mobility for career progression.

For R2 and R3 researchers, the effect of mobility on advanced researcher skills and job options in academia is larger than for R4 researchers. On the other side, R4 researchers seem to benefit more from the positive effects of mobility on the number of co-authored publications and on the quality of the output compared to R2 and R3 researchers.

Most effects are slightly less pronounced for those that are currently mobile, indicating that effects are not automatic and that it might take some time for researchers to experience them. There are also some differences when mobility is related to a change of employer: the effects on factors related to researchers´ careers are more important in those cases than when there is no change of employer.

10.6.2. International short-term mobility (<3 month) in post-PhD career stages

Compared to 2012, there has been a slight decrease in short-term mobility: from 41% to 37%. Consistently with this, the share of those who have never been short-term mobile has increased (from 46% to 51%), showing a similar trend with those who have never been long-term mobile. There is some convergence between male and female researchers: the differences between the two have decreased, from a 6pp difference in 2012 to a 3pp difference in 2016.

Slovenia (49%), Italy (46%) and Hungary (44%) have the highest share of short-term mobile researchers. Croatia (30%), Luxembourg (29%) and Romania (22%) display the lowest shares. The patterns are not stable when comparing the values per country between 2012 and 2016: Luxembourg and Romania, now at the lower end of the spectrum, had the second (51%) and seventh (55%) highest positions respectively for this indicator in 2012. On the opposite, Italy, now at the higher end of the spectrum, had the fourth lowest value in 2012 (37%).

NON MOBILITY IN THE LONG-TERM AND IN THE SHORT-TERM ARE RELATED TO EACH OTHER: 62% OF THE RESEARCHERS WHO HAVE NEVER BEEN SHORT-TERM MOBILE HAVE NOT BEEN LONG-TERM MOBILE EITHER.

The highest shares of non-mobile – both in terms of long-term and short-term mobility – researchers are found in Germany Austria and Spain. On the opposite, Croatia and

Portugal are the countries with higher shares of researchers that have had both short-term and long-term mobility experiences.

In a similar way, those researchers who have been long-term mobile in the last ten years are also more likely to have short-term mobility experiences compared to the researchers who have never been long term mobile.

10.6.3. International collaboration in post-PhD career stages

PERSISTENT PATTERN OF INTERNATIONAL COLLABORATION: 63% COLLABORATE WITH OTHER EU RESEARCHERS, 46% WITH NON-EU RESEARCHERS

Two out of three researchers in the EU collaborate with colleagues located in other EU countries (63%). This percentage drops to 46% when non-EU countries are considered. This pattern is very similar to the 2012 pattern (67% and 52% respectively).

The results show some country patterns. First, smaller countries tend to be more open. Second, there tends to be more non-EU cooperation in Anglo-Saxon and Scandinavian systems. Third, there is a relatively low international collaboration in large West-European systems, such as Germany, France, Italy, or Spain. Furthermore, international collaboration is higher in later career stages, Natural Sciences, and among male researchers.

10.6.4. International virtual mobility in post-PhD career stages

AS IN 2012, VIRTUAL MOBILITY PARTLY SUBSTITUTES SHORT-TERM MOBILITY, AND THE EFFECT IS SMALLER FOR YOUNGER RESEARCHERS

Virtual mobility has a greater impact on reducing short-term mobility (51% of the researchers that collaborate with international partners) than on reducing long-term mobility (11%). This pattern is identical to MORE2 findings of 2012, with respective shares of 50% and 9%. Virtual mobility is seen to a larger extent as having no influence at all on researchers´ mobility decisions in large and affluent Western European countries, such as the United Kingdom, France and Germany.

For R1 researchers, virtual mobility reduces short-term mobility to a lesser extent compared to higher career stages: 42% of R1 researchers versus 54% of R2, and 51% of R3 and R4 respectively). One reason for this difference might be related to the fact that younger researchers have grown up in the digital era and consider digitalisation as the standard. They probably already use both approaches in their collaboration and they might perceive both approaches as being only partially interchangeable.

10.6.5. Conferences, meetings and visits in post-PhD career stages

VISITING CONFERENCES OR EVENTS IS COMMON PRACTICE AMONG RESEARCHERS IN EU HEI SECTOR.

Only 4% of the researchers have never visited a conference or an event, compared to 18% that have never gone to meetings and 22% that has never experienced visits, research visits or fieldwork. However, if the researcher engages in the latter type of move, they do them more frequently than the other types of short moves. The opposite holds for conferences and events. These findings are fully consistent with the results in MORE2 (2012).

10.6.6. Interdisciplinary mobility in post-PhD career stages

MORE THAN ONE THIRD OF ALL RESEARCHERS HAVE SWITCHED TO ANOTHER FIELD OR SUBFIELD DURING THEIR ACADEMIC CAREER, BUT THEY ARE LESS CONFIDENT ABOUT THE EFFECTS THEREOF THAN THEIR NON-INTERDISCIPLINARY MOBILE COLLEAGUES

More than one third of all researchers have switched to another field or subfield during their academic career (34%). Large differences are observed across countries, with shares ranging from 18% to 60%. Only small differences occur between genders and fields, although the Humanities have a considerably lower share of interdisciplinary researchers (29%).

74% of researchers think that interdisciplinary mobility is positive for recruitment, and for career progression. The shares are, however, lower among the interdisciplinary mobile (71% and 70%) than among those without interdisciplinary moves (76% and 77%).

10.6.7. Interdisciplinary collaboration in post-PhD career stages

73.5% OF RESEARCHERS HAVE COLLABORATED WITH OTHER FIELDS: INTERDISCIPLINARY MOBILITY IS AN IMPORTANT DETERMINANT FOR THAT

One of the factors that can explain the willingness to collaborate with other fields stems from the extent to which researchers themselves have previously worked in other fields: in this group, most of the researchers (80%) collaborate with other fields in their current position - a much higher share than among those without interdisciplinary mobility (70%).

Interdisciplinary collaboration with researchers working in academic institutes is much higher than that with researchers in the non-academic sector (60% in the same institute and 57% in other universities or research institutes, versus 31% in the non-academic sector).

BELOW AVERAGE SHARES OF INTERDISCIPLINARY COLLABORATION IN SSH

Large difference are observed between countries, ranging from 17% in France to 48% in Romania. Differences are also observed between fields. Agricultural Sciences reach the highest shares of multidisciplinary collaboration across the different types of collaboration. On the contrary, the Social Sciences stand out for being the discipline with a lower-than-average share in each of the categories. Also Humanities has shares below the average for interdisciplinary collaboration in the same institution and with non-academics.

10.6.8. Interdisciplinary virtual mobility in post-PhD career stages

VIRTUAL MOBILITY HAS AN EFFECT ON INTERDISCIPLINARY RESEARCH ACCORDING TO THREE QUARTERS OF THE RESPONDENTS

With respect to interdisciplinary research, virtual mobility has a greater impact on facilitating collaboration between research teams (53% of the researchers collaborating across disciplines) than on decreasing barriers to exploit other fields (28%). For about a quarter of the respondents the web-based tools did not influence their interdisciplinary collaboration.

While researchers in the field of the Agricultural Sciences are more inclined to collaborate with other disciplines, virtual technologies are less a supporting tool in this than in other fields (31% compared to 26% on average do not see an effect of virtual technologies on their interdisciplinary collaboration).

10.6.9. Intersectoral mobility in post-PhD career stages

18% OF THE POST-PHD RESEARCHERS WHO CURRENTLY WORK IN EUROPEAN HEI HAVE AT LEAST ONCE MOVED TO THE PRIVATE SECTOR

25% of R2, R3 and R4 researchers moved to another sector during their research career. This is a decrease from 30% in 2012, mainly due to a decrease of moves to the public sector. 18% moved at least once to the private sector (8% to large firms, 4% to SME or start-up and 6% to not-for-profit). 37% of all researchers working in another sector were in a dual position, i.e. combined this position with a HEI position.

The contractual conditions differ depending on the destination sector. In general we find longer-lasting fixed term contracts in NGOs and not-for-profit organisations and less medium term contracts in public and private sector (with the exception of SMEs and start-ups). Self-employment is most common in NGOs and not-for-profit organisations. In private industry, stipends/grants and permanent contracts are used more often than in other sectors.

Later career stage researchers are more inclined to take a position in government organisations, whereas R2 researchers tend to move to private industry and in particular to SMEs and start-ups. R3 researchers also have higher shares in the not-for-profit sector.

EVEN THOUGH INTERSECTORAL MOVES DO NOT APPEAR MUCH APPRECIATED IN RECRUITMENT OR CAREER PROGRESSION, NETWORKING IS STILL THE MOST IMPORTANT MOTIVE TO ENGAGE IN AN EXPERIENCE IN ANOTHER SECTOR

Even though intersectoral moves do not appear much appreciated in recruitment or career progression (cf. sections 10.3.1 and 28610.3.3 of this summary), networking is still the most important motive for moving to all sectors (70% of the cases). Other motives are more typical per destination sector e.g. contribution to society is more common as a motive to move to government and not-for-profit sectors, whereas gaining first-hand experience of industry, remuneration and bringing research to the market are more common in moves to the private industry.

Motives for moving to private industry depend on the family situation: researchers with a family seek more security in terms of pension plan, quality of life, positions etc. However, researchers without a family are on average driven by career-related aspects such as increasing their employability, remuneration, access to research equipment and infrastructures, etc.

10.6.10. Intersectoral collaboration in post-PhD career stages

35.5% OF RESEARCHERS COLLABORATE WITH NON-ACADEMIC SECTORS, 16% SEE THEIR MOVE AS A RESULT OF INTERNATIONAL MOBILITY

35% of researchers collaborate with non-academic sectors. This figure does not seem to be determined by the type of institutional system. It is more common in later career stages (47% in R4), for male researchers (39%) and less common in SSH fields (26% in

Humanities and 29% in Social Sciences). Women researchers are less inclined to non-academic collaboration (31% versus 39%), this difference is considerably larger than for the academic collaboration (79% versus 81%).

Academic collaboration is, as expected, more often the result of an international mobility experience but also non-academic collaboration is indicated to be the result of international mobility by 16% of the collaborating researchers. This pattern is stronger for the mobile researchers than for the non-mobile researchers and the differences are higher for the academic than for the non-academic collaboration.

Also intersectoral mobility has a small but still positive effect on intersectoral collaboration. Here, the non-academic collaboration is more affected than the academic collaboration: there is a 6pp difference between the intersectorally mobile and non-mobile with respect to academic collaboration, but a 17pp difference with respect to non-academic collaboration.

Based on this, we see evidence that mobility and collaboration go hand in hand and influence each other positively for a substantial part of researchers.

10.7. Attractiveness of ERA

The attractiveness of ERA is a result of the structure of career paths and the quality of working conditions, while international or intersectoral mobility may be driven by perceptions of varying attractiveness, so that mobility indicators, e.g. in terms of which countries researchers choose for their international mobility experience, can also be interpreted as indicators of attractiveness. Because the information from the global survey is missing, the analysis of attractiveness must be regarded as preliminary.

WORKING INSIDE THE EU IS GENERALLY ASSESSED AS WORSE THAN OUTSIDE THE EU, IN PARTICULAR IN NON-EU ADVANCED RESEARCH SYSTEMS

The main findings on the satisfaction of researchers working in the EU with working conditions and career path features have been reported above – this is the "self-assessment". Additional information is gained from non-EU researchers working in the EU and EU researchers who have worked abroad in the past.

Looking at advanced research systems only (non-EU OECD and Iceland, Norway and Switzerland), the share of researchers assessing working inside the EU as better than outside the EU is significantly lower than the share of researchers who assess it as being worse, by on average 45 percentage points for citizens of these countries and by 15 percentage points for those with mobility experience there. The share of researchers perceiving career paths and remuneration outside the EU as better than inside is higher by approximately 60 percentage points.

Looking at researchers from emerging countries or researchers who moved there, the results for the EU are better, but also not positive across the board.

Grouping researchers by current country of employment leads to the finding that researchers from Eastern and Southern Europe find it relatively more attractive than researchers from Western and Northern Europe to work outside the EU than inside, which indirectly reflects on the attractiveness of their countries of employment.

THE EU IS ATTRACTIVE IN TERMS OF FINANCIAL AND SOCIAL WORKING CONDITIONS, BUT LESS SO IN TERMS OF FACTORS FOR SCIENTIFIC KNOWLEDGE PRODUCTION

A further source for assessing attractiveness are the motives for geographical mobility, grouped by mobility within the EU and outside the EU, again differentiating between advanced and emerging research systems.

Researchers move abroad for working with leading scientists (within EU: 20%, outside EU: 25%), career progression (19 vs 19%), research autonomy (15 vs 16%), research funding and access to research facilities (9 vs 8%), the availability of suitable positions (8 vs 6%) and gaining an international network (7 vs 8%). These are factors related to scientific productivity, whereas other factors such as remuneration and personal reasons play a lesser role. These factors hence clearly determine attractiveness of a research system. With the exception of working with leading scientists in the case of the associated EU countries Iceland, Norway and Switzerland, the motives regarding scientific productivity are very similar both within the EU and outside the EU, showing that the forces of attraction of researchers are very similar across the board and that the EU is very heterogeneous in terms of attractiveness.

Again in line with previous research and also MORE2, moves outside the EU are less motivated by non-science related working conditions such as social security, pensions or other personal reasons – people are more motivated to move outside Europe for career reasons or reasons related to scientific productivity, rather than for other factors.

10.8. Implications for policy

As a basis for policy implications, we first provide a summary of the main findings with a view to policy relevance; we then link these findings to the ERA and 3Os (Open Innovation, Open Science, Open to the World) in a summary table, before we outline potential policy implications.

The EU is heterogeneous, with variability of answers across different national research systems influenced by:

- Structural differences in research/university organisation acting e.g. on the nature of authority relationships, the structure of PhD studies, the share of fixed-term contracts, the prevalence of merit-based recruitment and career progression.
- General economic conditions acting e.g. on salaries, research funding and career perspectives in terms of availability of suitable positions.

Furthermore, considerable heterogeneity in researchers' assessment of career paths and working conditions comes from differences linked to gender, fields of science and career stages. The main dimensions of this study thus grasp an important part of the determinants of career and mobility decisions of researchers.

Several aspects of career paths and working conditions of relevance for the ERA have significantly improved since 2012, among them the share of fixed-term contracts, public advertisement of vacancies, merit-based recruitment and satisfaction with working conditions both relating to financial conditions and conditions relevant for scientific knowledge production. While MORE3 cannot make a causal attribution to EU policy initiatives, it is clear that the awareness for such issues has been raised.

"Classic" features of the EU such as comparatively good social security also show up in the MORE3 findings, with researchers on average being very satisfied with social security. Attractiveness of research careers in academia – by comparison with jobs outside academia – is negatively influenced by pay levels in academia, but positively by satisfaction with the job challenge as well as job security.

Cooperation with industry or experience with industry is less highly valued for recruitment and career progression than core research activities, with the exception of some Eastern European countries (this needs to be investigated further: dual positions, cooperation with industry may be linked to low pay in Eastern European countries). This is already obvious at the level of PhD training and continues along the research career of respondents, with differences by field of science (engineering and medicine reporting higher involvement with industry). It is natural that researchers strive foremost for skills related to knowledge production and that recruitment and career progression as well as PhD skills focus on these skills. From this perspective, a share of 67% of researchers saying that entrepreneurship skills will be important in their future career may actually be quite high, and this number is higher than the share of researchers receiving entrepreneurship training at PhD level (40%). Indeed, at the PhD level a need emerges to further promote the innovative doctoral training principles, where exposure to industry figures prominently.

Researchers move and are attracted to other research systems mainly because of working conditions influencing their scientific productivity, rather than because of issues such as salary, social security or the quality of life. The mobility flows show a clear picture, with most mobility during PhD and in post-PhD career stages going to countries that are traditionally considered attractive research systems: the United States, the United Kingdom and Germany. Also, mobility shapes collaboration patterns and hence mobility perspectives influence scientific knowledge production. This means that addressing the attractiveness of ERA would mainly work through improving the conditions for scientific knowledge production, above all clear career paths, research funding and access to research facilities, research autonomy and also providing perspectives for international mobility as international collaboration is usually positive for the quality of research. Once these conditions are best practice in Europe, the EU will succeed in attracting increasing numbers of leading scientists, creating positive feedback loops as more leading scientists attract more leading scientists.

These findings can be linked to the main priorities of the ERA reinforcement strategy[142], together focusing on a European research system that can compete in a global research landscape:

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

The table below summarises some of the main findings of MORE3 as they relate to each of these priorities. Based on this, a number of potential policy directions are identified.

[142] COM(2012) 392 final

ERA priority areas	Related to concepts	Related findings in MORE3
1. More effective national research systems		⇨ European national research systems are still heterogeneous. This is determined historically and convergence would require a structural change that can only happen gradually and long term. ⇨ The MORE3 results point at a persisting imbalance in terms of satisfaction of researchers with their current position between research systems in Europe, as well as in the flows from and to European countries. Countries that are regarded traditionally as more attractive research systems are frequent destinations. Southern and Eastern European countries are the main sending systems. Career-related factors (better conditions for research) are the main drivers for mobility, explaining these flows and the imbalances therein.
2. Optimal transnational cooperation and competition	International cooperation	⇨ International mobility and collaboration rates are stable over time. There is a clear link between international mobility and international collaboration, thus confirming the need for optimal mobility conditions and an open labour market for researchers to reach optimal transnational cooperation. (EU) Mobility funding contributes thus to international cooperation.
	International competition	⇨ In total, about 42% of researchers in the EU28 are satisfied with the availability of research funding which is low when compared with other working conditions. Heterogeneity between countries is high. Together with access to research facilities and proper equipment, the availability of research funding is one of the working conditions researchers look out for when deciding between jobs. Low research funding in non-aligned systems makes competition inefficient and frustrating, as researchers spend their time writing proposals which get rejected. ⇨ They are the 5th and 6th most common motive for researchers in their last move, ticked by 75% and 68% of the mobile respondents. Their importance for mobility is also relatively stable compared to 2012. So indeed the availability of research funding determines the attractiveness of a research position or career. ⇨ The MORE3 EU HE survey did not collect evidence on (improved) efficiency in terms of having the right researchers in the right place, on the right topics.
3. An open labour market for researchers (facilitating mobility, supporting training and ensuring attractive careers)	⇨ Facilitating mobility, open labour market for non-native researchers	⇨ The patterns for international mobility and collaboration are stable, but compared to 2012 barriers to mobility seem to have become less important. Perception is that open, transparent, and merit-based recruitment has improved compared to 2012, but we do not know from the survey whether this also means that more international profiles are attracted to the institutes. Euraxess is still not known by the majority of researchers, but there is no information on how HEI have changed their recruitment policies as a result of the awareness building measures promoted by the EU. While there are encouraging signs, there needs to be further evidence to conclude on whether or not openness of the EU labour market for researchers has improved.

	⇨ Open labour market based on merit, recognition of all relevant skills	⇨ Perception is that open, transparent, and merit-based recruitment has improved compared to 2012, but we do not know from the survey whether this also means that more international profiles are attracted to the institutes. ⇨ The majority of researchers believe in non-standard activities and paths as positive factors for their future research career. The main one is international mobility, followed by transferable skills and alternative forms of research output. Again, large differences between higher education systems, with Southern European countries being more sceptical about the recognition of non-standard activities and paths in general. ⇨ Regarding their future career the vast majority of researchers in the EU28 agree that different types of transferable skills are important for a successful future career, in particular those of decision-making and problem solving, critical and autonomous thinking, communication and presentation, networking and grant and/or proposal writing.
	⇨ Training of research skills, as well as other skills to create openness towards careers outside academia	⇨ Within the EU, the supervision of doctoral training mainly lies in the hands of single researchers. Only 15% are embedded in a doctoral school, which indicates that there is room for further professionalisation in European PhD training, or an increase in structured PhD training. ⇨ Training for young scientists in transferable skills broadens their labour market options. On average in the EU28 countries, 33% of PhD candidates receive training in transferable skills. The country differences are significantly high though, ranging from 9% to 67%. 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 collaboration with citizens, government and broader society. ⇨ A relatively low share of researchers highlight the importance of industry funding or intersectoral collaboration and this is also reflected in the pattern of internships and work placements – these are least common in the private sector. ⇨ Training is a further driving factor for mobility. Quality of training and education is regarded a very important motive for PhD degree mobility, ranking second after working with leading scientists and before career progression.
	⇨ Attractiveness of research careers	⇨ There is an upward trend in the satisfaction of researchers in their current research position in Europe. ⇨ European research careers are in general attractive in terms of financial and social working conditions, but less so in terms of factors for scientific knowledge production. ⇨ Improving the conditions for scientific knowledge production, above all clear career paths, research funding and access to research facilities, research autonomy and also providing perspectives for international mobility as international collaboration, can be expected to be positive for the quality of research and for the attractiveness of the European research careers.

4. Gender equality and gender mainstreaming in research	Mainstreaming	⇨ 41.5% of researchers are women in 2016, compared to 38% in 2012. ⇨ Women researchers are more represented in early career stages, and clearly underrepresented in the R4 career stage (even more so than in 2012). Partly due to this, women researchers are less likely to live in a couple or have a family. ⇨ Male and female researchers are not equally distributed across fields of science. The most balanced disciplines are the Social Sciences and the Humanities, in which 49% of the researchers are women. On the opposite, in Engineering and Technology (26%) and in the Natural Sciences (37%) the presence of women is clearly lower. This distribution is very similar to the findings in 2012.
	Equality	⇨ Women researchers are still, as in 2012, participating less in international and intersectoral mobility and collaboration. We do observe a convergence both in PhD and post-PhD stage international mobility in the last ten years. Also the gap between countries became narrower since 2012. ⇨ The shares for interdisciplinary mobility and collaboration, however, are 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 Europe, and they are also not expected to be valued highly in recruitment or career progression. ⇨ Industry funding and work placements are regarded less important for PhD training than the other Innovative Doctoral Training Principles. Schemes such as the pilot action *'Horizon 2020 SME Innovation Associate'*, which provides financial support to the recruitment of post-doctoral research associates in the European SMEs and start-ups, could hence be valuable. ⇨ The third least important principle is interdisciplinary collaboration. ⇨ There is only very limited cooperation with non-researchers and training for collaboration with non-researchers and other actors in society is among the least often received trainings, often not available as training even.
	Open science: - Digital innovations - New ways of disseminating research results - New ways of collaborating (globally)	⇨ As mentioned before, the majority of researchers believe in non-standard activities and paths as positive factors for their future research career. The main one is international mobility, followed by transferable skills and alternative forms of research output. ⇨ 86% of researchers consider innovative digital skills important for their future careers, and 84% consider collaboration with citizens, government and broader society as important. ⇨ Virtual mobility can also support open science. Over half of the interdisciplinary mobile researchers see virtual mobility as a tool to support collaboration and for a similar share of the international mobile, it replaces short visits abroad.

	Open to the world	⇨ Cf. global survey ⇨ 46% of researchers that currently work in the EU collaborate with non-EU researchers (compared to 63% in EU countries and 63% in the own country). This is similar to 2012, when 52% collaborated outside the EU.
	Knowledge circulation	⇨ The above summarised factors of international, intersectoral, interdisciplinary and virtual mobility and collaboration show that there is significant interaction with other researchers, and to a lesser extent with other sectors and disciplines. There are thus indications of a strong knowledge circulation and efficiency in academic research, with important spillovers to other levels of society. At the same time, there is room for improvement given the large and persisting country differences and the limited orientation towards industry and society.
6. International cooperation	Cross-cutting priority	⇨ Cf. priorities 2, 3 and 5.

Based on these insights, there seem to be five potential directions for policies for the EU:

- Continue working on the quality of PhD studies as the main point of entry into research careers; foster more structured training and doctoral schools through sharing best practice and providing competitive grants to innovative doctoral school projects across the EU. Some of this funding could be earmarked for countries struggling with current economic conditions or which come from far behind as is the case in some Eastern European countries.
- Continue and renew the focus on research funding and on economic conditions for researchers in countries struggling with the economic crisis. One way to combine "efficiency and equity" may be to locate large research facilities in struggling countries, which would still be open to researchers from across the EU.
- Diffuse best practice as to how to structure recruitment policies, career paths and conditions for scientific knowledge production, to spread excellence from existing centres in the EU to wider areas of the EU. This needs to be tailor-made for the heterogeneous situation of the EU and address country specific issues, such as the balance between teaching and research in some Eastern European countries, transparent and merit-based recruitment and career paths in some Southern European countries and the high share of fixed-term contracts in countries such as Germany.
- The contribution of researchers to economic goals needs to be further analysed: open innovation – one of the three O's - currently profits less from intersectoral mobility of academic researchers. Schemes such as the pilot action 'Horizon 2020 SME Innovation Associate' could be valuable. However, one result of empirical studies is that higher scientific productivity goes hand in hand with higher commercialisation of research results, with e.g. top US institutions generating the biggest part of licensing income or academic spin-offs. Hence, addressing the conditions for scientific knowledge production will also indirectly foster the economic impact of researchers.
- On gender, the picture of a high share of male researchers (75%) in the highest career stage R4 also continues in MORE3. Gender policies should be continued.

These policies would influence the effectiveness of national research systems. E.g., low quality of working conditions and non-merit based recruitment and career progression lead to asymmetric mobility within ERA, which may become worse as ERA becomes more open.

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Annexes

1. Survey methodology

1.1. Ex ante: Survey and sampling design

The sampling strategy is at the core of the methodological approach of the MORE3 EU HE survey. It is based on stratified random sampling, the best option for a survey of individuals that have to be classified according to a number of common characteristics (e.g. country, gender, age, field of science, career stage, etc.). It was as such defined at the start of the process with the aim of producing estimates with a minimum degree of accuracy (5% max error -p value of 5%) at both EU28 and individual country level for the EU28+3 countries, and in consistency with the MORE2 EU HE survey (2012).

In what follows, we briefly summarise the sampling strategy of the MORE3 EU HE survey in view of interpretation the indicators in this report correctly and to their full value. For more detailed information, we refer to the Methodological Report complementing this report.

Objective: The objective is to define a sampling methodology under the requirements of random selection of the units in order to define the necessary sample size in accordance with a predefined level of accuracy of the estimates. Estimates are to be produced at country level after stratification of researchers by field of science (FOS). The sampling strategy is therefore built from the start on information on researchers in Europe per country and field and the necessary sampling size is calculated for each combination of country and field.

The rationale behind a FOS-based stratification, arises from the assumption that the field of science affects closely some variables of analysis (for example mobility), even if it is not the only relevant feature affecting the variables of the survey. PhD candidates[143], age, university size, level of funding, territorial allocation and many other factors are relevant for the study, yet the lack of available information on these variables make that they cannot be adopted for stratification. Thus, estimates in some cases can be affected by not including these variables in the sampling frame.[144]

Sampling frame: The 'optimal' sampling frame consists of an up-to-date nominal list of researchers including both contact details and the auxiliary information necessary for the definition of stratification variables (e.g. country, gender, age, field of science, career stage, etc.). If this kind of information is available, it is possible to define a random stratified sample of units that, after the survey, can be weighted for representing the total population with respect to the selected variable(s).

This sampling frame for researchers currently working in HEI in Europe is not given, but the study team developed a proxy frame in the early stages of the project based on available information on the HEI in Europe and followed a two-stage stratified sampling strategy.

[143] Even if many HEI usually include PhD candidates in the research workforce the lack of official totals by country and by FOS is an obstacle for adopting this variable as a stratification one.

[144] As we will describe further, we have made an attempt for post-stratification based on career stage, a characteristic that turned out to have large explanatory power in the MORE2 study, but as not information was available ex ante this could not be taken into account in the sampling design ex ante and only serves for the purposes of post-stratification of the results.

Two-stage stratified sampling strategy:

- A proxy frame for HEI is available, so in the first stage HEI clusters were sampled from this (first stage or primary unit);
- In the second stage researchers (second stage or secondary unit) were then selected in these HEI and stratified by FOS.

The clustering of HEIs has the property to ensure that the sample of researchers is allocated proportionally to the FOS in each country so that estimates are consistent with the country number of researchers in each FOS. This also avoids that a too limited number of clusters cover all the sampled researchers which would in turn result in a bias of the estimates.

The practical implementation of this sampling strategy consists of the following steps:

- Calculation of the sample size for each country necessary for making country estimates according to the random sampling formula for estimating proportions with a maximum (sampling) error of 5% with a probability of 95%,.
- Allocation of the initial sample into the 3 broad FOS according the known totals (stratification procedure) under the assumption that FOS affects the variables of study.
- Since the sampling frame for researchers is not a priori available, a list of HEI clusters is developed as sampling frame for the primary units (HEI) and we know by our sampling frame the contact references of each cluster/HEI and its FOS.
- Under the assumption that each secondary unit is specialised in the FOS of the primary unit we can calculate the population of researchers within each cluster and select a subsample.
- The implementation of the sampling strategy is based on an oversampling methodology ensuring a selection at random to ensure sample significance at country and FOS level. The sampling matrix will thus consist of 93 final cluster strata (each cluster strata is composed of the HEIs found for the same country and the same FOS, where the target countries are 31 in number and the FOS are 3), and will indicate for each cluster (HEI) the minimum number of researchers to be surveyed.

Each of these steps is further detailed in the Methodological report complementing this report.

Once the sample of researchers to address for the survey was finalised, the survey could be implemented. As in MORE2, the raw data collection was organised through computer-assisted telephone interviews (CATI) and computer-assisted web interviews (CAWI). To further refine the information and in particular its statistical significance, a calibration and editing strategy was developed:

- First, a non-response survey was organised to collect data on why researchers did not participate in the main survey and on whether they would deviate from the general answering pattern in three key questions (>3 month mobility, <3 month mobility and intersectoral mobility).
- A second action in the refinement of the main data is the editing of partial responses by means of donor techniques so as to recycle information of researchers that have filled in a substantial part of the survey but did not reach the end.

The sampling strategy to collect sufficient information per country and field of science, combined with the calibration and editing strategy to refine the information and correct for non-response effects, results in the calibrated final sample on which all indicator development and measurement is based.

1.2. Ex post: Stratification strategy

The MORE3 HEI survey strategy is thus based on stratified random sampling, for which a proxy frame was developed and a sample selected in two stages. As mentioned before, the standard stratification that was already defined and integrated in the sampling strategy ex ante, is that based on field of science. However, we also looked into post-stratification based on gender and career stage. In the analysis phase, it is the available information in both the sampling frame and population that together determine the extent to with ex ante or post stratification is possible in the analysis. This is explained below in order to understand the applied stratifications in our analysis, reflected in the indicators of this report.

Sampling frame: If sufficient information is available for specific variable(s) in the sampling frame, it is possible to define a random stratified sample of units that, after the survey, can be weighted for representing the total population with respect to the selected variable(s). Given the set-up of our sampling strategy, this is the case for country and the fields of science. Information on age, gender or career stage are not generally available and are as such not included in the proxy frame.

Population: Eurostat provides statistics on the overall research population in Europe, distributed per country, gender, age and field of science. In other words, for these variables also information on the distribution in the total population is available. This is a benchmark for the representativeness of the responses and allows weighting sample information in order to reflect this population with a specific level of accuracy. There is however no information on the distribution for career stage in Eurostat.

Ex ante versus ex post stratification : For the MORE3 EU HE survey, accuracy is aimed for at country level, and the sampling strategy EX ANTE takes into account the distribution across countries and fields of science. This is indeed possible because these two types of information are known up front for the sampling frame (proxy frame, as discussed under (1)) as well as their distribution for the entire population (Eurostat data, as discussed under (2)).

For those variables where the information is not publicly available upfront, like for gender (only population, not proxy frame) and career stage (not in population nor proxy frame), the EX POST weighting is the only option. An EX ANTE strategy is not possible as the response cannot be steered towards this if there is no information in the proxy frame to steer on. We also point out that ex post weighting will result in less accurate estimates than the ex ante defined country level estimates (the aim for accuracy of the country level estimates is 5% at a probability of 95%) because the response is not 'steered' for these variables and weighting is only done ex post.

An EX POST weighting is possible under the conditions that:

- If the variable is not available ex ante, it is surveyed so that it becomes available ex post for all respondents;
- There is information on the distribution of the population to allow for ex post weighting (to better reflect the constitution of the population with respect to this variable).

For gender the information is surveyed and the information on the distribution of the population is available in Eurostat. The first condition for careers stage is also fulfilled by asking about the career stage in the MORE3 survey. But for career stage there is no information on the population available in Eurostat. However, to make post-stratification possible, the second condition needs to be fulfilled: information on the distribution over the total population needs therefore be collected. Therefore, we have collected data from

other, national, sources in order to come to an indicative distribution for the research population in Europe (per country).

An important limitation when population information is built on many different national sources, is a lack of consistency and coverage. That is why we have also consulted Eurostat R1 information and MORE2 country fiches to validate the national data sources. Second, based on data availability, we have formulated a proposal for the post-stratification for career stages. For the detailed outline of this approach, we refer to the Methodological Report complementing this report. Important for the interpretation of the results in this report is that:

- Only a **rough approximation** of the distribution of the researcher population per country over career stages could be obtained due to the strong heterogeneity of national sources across countries and within countries. This reflects on the framework built for the post-stratification for career stages and **leads to the resulting indicators being an equally rough estimation** of the reality.

- The survey stratification is set up to guarantee a maximum 5% error estimates of researchers at country level – but not at career stage level. In the interpretation of the results, it must thus be taken into account that **errors for estimates based on career stage post-stratification will be (substantially) higher than this 5%**, in particular for those strata where only a small number of responses was obtained (career stage*country).

- Information is **not available for all countries in the sample**. The result is that for Estonia, Cyprus and Luxembourg, it is not possible to do the weighting of the surveyed units under a post-stratification step; for Malta and Slovakia, only a weighting of the R1 researchers is be possible excluding any estimation for the other stages. Practically, this means that **the aggregate career stage stratified indicator includes only 25 EU Member States instead of 28**.

- The instability of the data, combined with insights from the survey data, have led us to suggest an **aggregation of the R2 and R3 career stages**. The rationale for this approach comes from the fact that the definitions of the first and of the top stage of careers, respectively PhD candidates and full professors, are more intuitive and standardised at national level than the intermediate stages, R2 and R3. Furthermore, the respondents of the survey show a concentration in the R3 level (40% of the total of responses indicated that they are R3) with a much lower share of R2 (18%). The estimated totals in many countries, however, record higher shares of R2 researchers than R3. Thus the suggested solution is a three level aggregation shedding light on the first level, R1, the top level R4 and the intermediate levels aggregated, R2 and R3. **The aggregate career stage stratified indicator will thus provide values for R1, for R2&3 and for R4 instead of for the four career stages separately.**

These are important limitations that cannot be addressed without better quality of the basic data on career stages at national level and that lead us to predominantly report on the key indicators weighted for the ex-ante defined strata based on country and field of science (also consistent with the MORE2 indicators). The post-stratification for career stages will be used mainly as a validation of how well this indicator is balanced for the career stages and/or how it might be affected by a potential unbalance. It is only reported at EU level and for the key indicators in the report.

1.3. Description of the sample

The survey has been administered in 31 European countries: the 28 Member States of the European Union and Iceland, Switzerland and Norway. It has been implemented through both CAWI (Computer-assisted web interviewing) and CATI (Computer-assisted telephone interviewing) techniques. One third (33.2%) was collected through CAWI and the remaining two thirds of the responses (66.8%) through CATI. The total number of respondents that answered the survey is 10,394.

In the following sections we describe the MORE3 EU HE sample and how its characteristics compare to:

1) The information collected ex ante in the sampling frame (country, field of science) – this helps to assess the quality of the sampling frame;
2) Each other, i.e. are response patterns logical (age and career stage) – this helps to assess the quality of the collected survey data;
3) The characteristics of the population according to Eurostat; this helps to assess the effect of the weighting on the final results at population level.

1.3.1. Country level

The number of respondents per country and field of science are given in the table below. For more information on the relation with the sample size requirements and the error rates based on the comparison of both, we refer to the Methodological Report complementing this report.

Table 47: Sample per country and field of science

	Total	Natural	Health	Social
Austria	372	226	41	105
Belgium	375	158	108	109
Bulgaria	280	133	51	96
Croatia	361	186	53	122
Cyprus	277	122	12	143
Czech Republic	328	221	51	56
Denmark	346	150	69	127
Estonia	303	173	41	89
Finland	371	168	46	157
France	380	181	53	146
Germany	388	211	56	121
Greece	383	201	78	104
Hungary	262	128	11	123
Iceland	278	123	44	111
Ireland	364	163	74	127
Italy	381	155	77	149
Latvia	221	50	10	161
Lithuania	310	113	48	149
Luxembourg	260	136	12	112
Malta	218	90	40	88
Netherlands	369	153	78	138
Norway	345	133	65	147
Poland	355	172	90	93
Portugal	340	180	77	83
Romania	374	216	67	91
Slovakia	319	150	59	110
Slovenia	301	154	72	75
Spain	410	171	67	172
Sweden	384	157	90	137
Switzerland	359	170	68	121
United Kingdom	380	202	63	115
EU28	**9,421**	**4,520**	**1,594**	**3,298**
Total EU28+3	**10,394**	**4,946**	**1,771**	**3,677**

Source: MORE3 EU HE survey (2016)
(n=10,394)

The questionnaire included a set of sociodemographic questions that allow to validate and refine the relationship of each of the researchers with the countries in which they have worked and studied. These questions allow to validate the stratification procedure at country level: 98% of the respondents declare to currently work in the same country that was used for the sampling process. There is also almost perfect correlation between country of residence and country of current employment. This correlation pattern is logical and comparable to MORE2, where a correlation of 98.4% was observed between panel country and country of current employment.

Around 83-84% of the respondents have the citizenship of the country they currently work in and round 72-73% have obtained their PhD in the same country as the one they currently work in. Also 73% has obtained their PhD in the country where they have citizenship.

Table 48: Overlap across countries of reference

	Equal to panel country	Equal to country of current employ-ment	Equal to country of residence	Equal to country of citizenship (first)
Country of current employment	98,0%			
Country of residence	96,9%	97,0%		
Country of citizenship (first)	83,5%	83,4%	84,4%	
Country of PhD degree	73,6%	73,2%	73,2%	73,3%

Source: MORE3 EU HE survey (2016)
Note:
- Panel country is equal to country of current employment for 98% of the respondents in the sample.
- Country of employment is based on question 31: "Country of employer"
- Country of residence is based on question 4: "Country of residence"
- Country of citizenship is baed on question 5: "Country of citizenship"
- Country of PhD degree is based on question 9: "Please indicate below all higher education (=post-secondary) diplomas/degrees you have obtained so far and their details."
- (n=10,394)

1.3.2. Fields of science

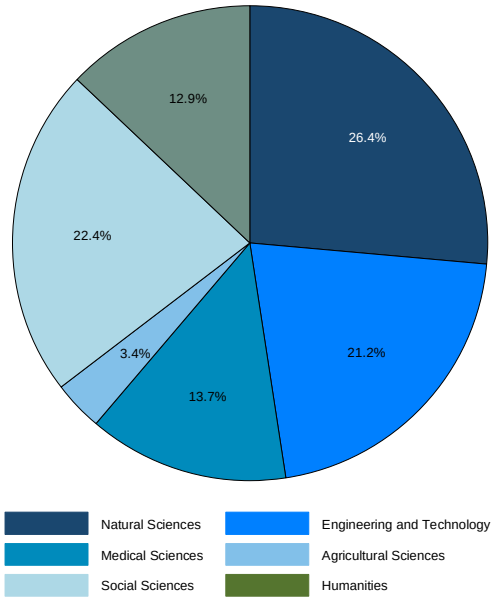
The MORE3 EU HE survey asked the respondents to self-select their field of science from a list of six fields, based on the Fields of Research and Development (FORD) classifications proposed by the OECD in the 2015 Frascati Manual[145]:

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

Figure 156: Distribution of fields of science in the sample shows the overall distribution of respondents across the six fields of science. The largest share of respondents corresponds to the Natural Sciences and the smallest to Agricultural Sciences.

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

Figure 156: Distribution of fields of science in the sample



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 12: "What is your main field of research in your current position?"
- (n=10,394)

As described in detail in the previous section, the MORE3 EU HE survey applied a stratification strategy in order to achieve representative results in the combined strata of country of employment and fields of science. Consistent with the stratification applied in the MORE2 study, this was based on an aggregated level of three fields of science:

- NATURAL: Field 1 (Natural Sciences) and Field 2 (Engineering and Technology)
- MEDICAL: 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)

The match between the information collected ex ante and used in the stratification strategy and the data collected in the survey reaches 82%. The table below provides an overview of the sample distribution compared to the Eurostat and population distribution in terms of fields of science. From this we find that in most countries, the sample distribution is similar to the population distribution. Overall, the Natural Sciences and Engineering and Technology have a 10pp higher share in the sample than in the population, mainly to the expense of Medical and Agricultural Sciences. Only in Latvia, the pattern is very different with a much higher representation of the Social Sciences and Humanities (+36pp difference between sample and population) and much lower of Natural Sciences and Engineering (-23pp) and Medical and Agricultural Sciences (-13pp). A lower share of Social Sciences and Humanities is also collected in the sample for Portugal (-17pp), Poland (-16pp) and Czech Republic (-11pp).

When FOS-based weights are applied in the analysis, we will see that in countries with a lower share of one of the FOS than in the population, the responses of researchers in this FOS will receive higher weight than those of researchers in the overrepresented fields. In general, the responses of the researchers in Natural Sciences and Engineering and Technology will be given less weight in the calculation of aggregated indicators than those of Medical and Agricultural Sciences.

Table 49: Field of science distribution in the sample and in the population

	Sample			Population		
	Natural	Health	Social	Natural	Health	Social
Austria	61%	11%	28%	45%	23%	32%
Belgium	42%	29%	29%	42%	30%	28%
Bulgaria	48%	18%	34%	36%	25%	39%
Croatia	52%	15%	34%	46%	28%	26%
Cyprus	44%	4%	52%	46%	3%	51%
Czech Republic	67%	16%	17%	44%	28%	28%
Denmark	43%	20%	37%	31%	41%	29%
Estonia	57%	14%	29%	50%	14%	36%
Finland	45%	12%	42%	41%	21%	37%
France	48%	14%	38%	24%	40%	36%
Germany	54%	14%	31%	42%	25%	32%
Greece	52%	20%	27%	45%	18%	37%
Hungary	49%	4%	47%	38%	22%	40%
Iceland	44%	16%	40%	21%	40%	39%
Ireland	45%	20%	35%	42%	22%	36%
Italy	41%	20%	39%	40%	22%	37%
Latvia	23%	5%	73%	45%	18%	37%
Lithuania	36%	15%	48%	36%	16%	48%
Luxembourg	52%	5%	43%	46%	10%	44%
Malta	41%	18%	40%	29%	23%	48%
Netherlands	41%	21%	37%	33%	37%	30%
Norway	39%	19%	43%	25%	33%	42%
Poland	48%	25%	26%	36%	22%	42%
Portugal	53%	23%	24%	41%	17%	42%
Romania	58%	18%	24%	58%	23%	19%
Slovakia	47%	18%	34%	41%	19%	40%
Slovenia	51%	24%	25%	38%	37%	26%
Spain	42%	16%	42%	40%	19%	40%
Sweden	41%	23%	36%	37%	26%	36%
Switzerland	47%	19%	34%	24%	40%	36%
United Kingdom	53%	17%	30%	38%	24%	38%
EU28	**48%**	**17%**	**35%**	**39%**	**25%**	**36%**
Total EU28+3	**48%**	**17%**	**35%**	**38%**	**26%**	**36%**

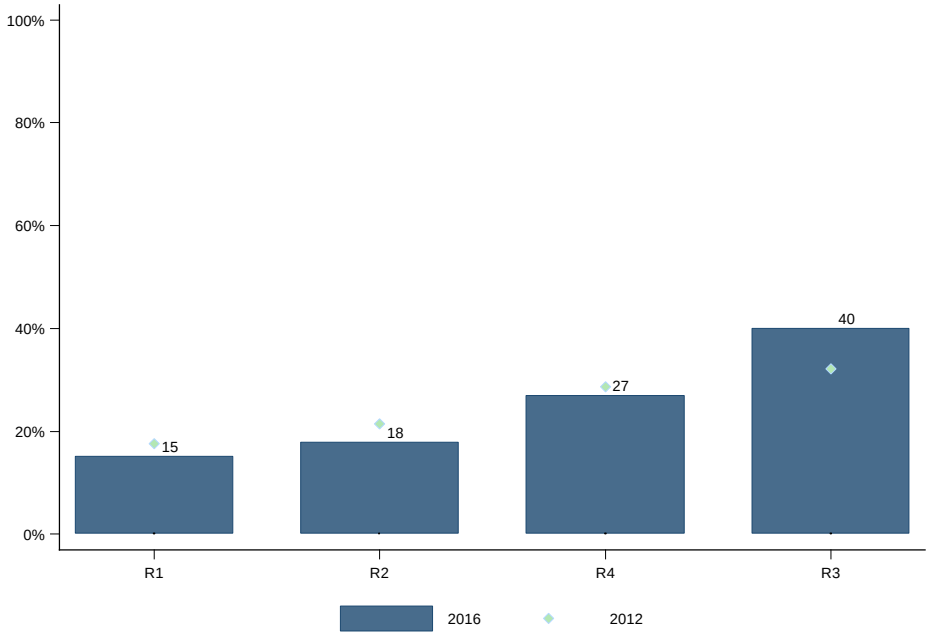
Source: MORE3 EU HE survey (2016)
(n=10,394)

1.3.3. Career stage

Figure 157 shows the distribution per career stage of researchers in the sample of MORE3. As in MORE2 there is a strong emphasis on the later career stages in the sample (R3 in particular). The R1 researchers seem underrepresented to what we expect from Eurostat shares of R1 in the total.

In Table 50, we observe considerable differences in the distribution per country. The largest shares of R1 are found in Germany (34%), Luxembourg (34%) and Belgium (30%). R2 are more common in Poland (34%), Portugal (29%) and Switzerland (29%). The R3 are indeed highly represented in most countries. Particularly high values are observed in France (55%), Bulgaria (52%) and Malta (51%). Relatively lower values are found for Germany (19%), Luxembourg (24%) and Norway (24%), where R1 form the bigger group. The shares of R4 researchers are particularly high in Greece (44%), Spain (43%) and Romania (41%). In these countries also R3 reach more than 42%, so there is a clear inclination to the later career stages here.

Figure 157: Self-declared career stages



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 15: "In which career stage would you currently situate yourself?"
- (n=10,394)

Table 50: Number of respondents per career stage (self-declared in the survey)

Country	Total	R1	R2	R3	R4	*R1 %*	*R2 %*	*R3 %*	*R4 %*
Austria	372	53	88	124	107	*14%*	*24%*	*33%*	*29%*
Belgium	375	111	43	134	87	*30%*	*11%*	*36%*	*23%*
Bulgaria	280	25	41	145	69	*9%*	*15%*	*52%*	*25%*
Croatia	361	44	71	167	79	*12%*	*20%*	*46%*	*22%*
Cyprus	277	34	65	125	53	*12%*	*23%*	*45%*	*19%*
Czech Republic	328	17	57	135	119	*5%*	*17%*	*41%*	*36%*
Denmark	346	68	62	155	61	*20%*	*18%*	*45%*	*18%*
Estonia	303	82	42	111	68	*27%*	*14%*	*37%*	*22%*
Finland	371	69	73	114	115	*19%*	*20%*	*31%*	*31%*
France	380	25	54	209	92	*7%*	*14%*	*55%*	*24%*
Germany	388	130	97	74	87	*34%*	*25%*	*19%*	*22%*
Greece	383	18	26	170	169	*5%*	*7%*	*44%*	*44%*
Hungary	262	51	33	120	58	*19%*	*13%*	*46%*	*22%*
Iceland	278	45	28	121	84	*16%*	*10%*	*44%*	*30%*
Ireland	364	43	85	173	63	*12%*	*23%*	*48%*	*17%*
Italy	381	15	103	158	105	*4%*	*27%*	*41%*	*28%*
Latvia	221	53	13	73	82	*24%*	*6%*	*33%*	*37%*
Lithuania	310	40	47	122	101	*13%*	*15%*	*39%*	*33%*
Luxembourg	260	89	71	62	38	*34%*	*27%*	*24%*	*15%*
Malta	218	20	43	112	43	*9%*	*20%*	*51%*	*20%*
Norway	345	83	45	82	135	*24%*	*13%*	*24%*	*39%*
Poland	355	25	119	129	82	*7%*	*34%*	*36%*	*23%*
Portugal	340	23	98	168	51	*7%*	*29%*	*49%*	*15%*
Romania	374	18	43	160	153	*5%*	*11%*	*43%*	*41%*
Slovakia	319	38	76	149	56	*12%*	*24%*	*47%*	*18%*
Slovenia	301	38	48	146	69	*13%*	*16%*	*49%*	*23%*
Spain	410	20	40	173	177	*5%*	*10%*	*42%*	*43%*
Sweden	384	74	54	150	106	*19%*	*14%*	*39%*	*28%*
Switzerland	359	103	103	94	59	*29%*	*29%*	*26%*	*16%*
The Netherlands	369	86	48	141	94	*23%*	*13%*	*38%*	*25%*
United Kingdom	380	30	43	166	141	*8%*	*11%*	*44%*	*37%*
EU28	**9,412**	**1,339**	**1,683**	**3,865**	**2,525**	**14%**	**18%**	**41%**	**27%**
Total EU28+3	**10,394**	**1,570**	**1,859**	**4,162**	**2,803**	**15%**	**18%**	**40%**	**27%**

Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 15: "In which career stage would you currently situate yourself?"
- (n=10,394)

When we compare the age structure in the sample with the self-declared career stages, we expect a higher average age for higher career stages. Table 17 confirms that this is indeed the case in the sample of the MORE3 EU HE survey.

Table 51: Distribution of groups of age per self-declared career stage

Age group	R1	R2	R3	R4	Total
<35	60.4%	27.9%	7.1%	0.7%	17.1%
35-44	21.3%	45.0%	37.9%	11.2%	29.4%
45-54	11.1%	17.9%	34.0%	33.0%	27.4%
55-64	6.2%	8.0%	17.1%	38.4%	19.5%
>65	1.0%	1.2%	3.9%	16.8%	6.4%
Total	1,570	1,859	4,162	2,803	10,394

Source: MORE3 EU HE survey (2016)
Note:
- These figures reflect the distribution in the sample. No weights are applied.
- Based on question 15: "In which career stage would you currently situate yourself?" and question 3: "What is your year of birth?"
- (n=10,394)

Table 52: Distribution of groups of age per self-declared career stage

Age group	R1	R2	R3	R4	Total
<35	55.7%	27.0%	7.7%	0.7%	32.3%
35-44	19.0%	42.9%	36.2%	12.7%	25.7%
45-54	15.2%	18.7%	35.6%	35.2%	23.8%
55-64	8.5%	10.7%	17.6%	37.5%	14.8%
>65	1.6%	0.8%	3.0%	13.9%	3.4%
Total	1,570	1,859	4,162	2,803	10,394

Source: MORE3 EU HE survey (2016)
Note:
- These figures reflect the distribution in the population. Weights per career stage are applied.
- Based on question 15: "In which career stage would you currently situate yourself?" and question 3: "What is your year of birth?"
- (n=10,394)

Table 53: Distribution of groups of age per self-declared career stage

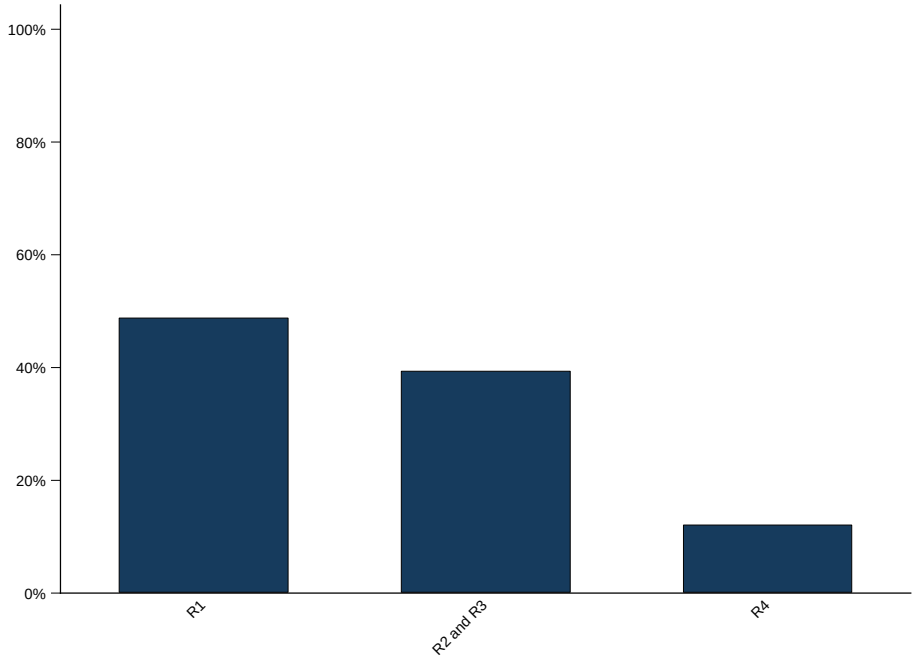
Age group	R1	R2	R3	R4	Total
<35	60.5%	23.5%	7.1%	0.5%	16.1%
35-44	19.0%	43.6%	36.4%	11.2%	27.9%
45-54	12.0%	21.0%	35.1%	36.0%	29.4%
55-64	7.2%	10.1%	18.2%	37.9%	20.8%
>65	1.3%	1.8%	3.1%	14.4%	5.9%
Total	1,570	1,859	4,162	2,803	10,394

Source: MORE3 EU HE survey (2016)
Note:
- These figures are the result of applying the weights designed on the basis of field of science.
- Based on question 15: "In which career stage would you currently situate yourself?" and question 3: "What is your year of birth?"
- (n=10.394)

To what extent the distribution of researchers per country over career stages in the sample reflects the reality is difficult to assess as no Eurostat data on this dimension is available. Based on the information that is available in literature and Eurostat totals and R1 data, we assume that there are relatively high shares of R3 researchers and low shares of R1 researchers in the sample as compared to what we can expect. When the career stage-based weights are applied, we see that indeed the distribution is shifted towards a majority of R1 and decreasing shares in the following career stages (Figure

158). It is thus expected that the career stage weighted indicators will indeed reflect a more realistic distribution of the information over career stages in Europe.

Figure 158: Distribution of self-declared career stages when weights based on post-stratification are applied



Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 15: "In which career stage would you currently situate yourself?"
- (n=10,394)

1.3.4. Gender

In total, 41% of the respondents in the sample are female. This is the same share as found in Eurostat for the entire population of researchers. Also at country level the distributions of sample and population are similar (see Table 54). The main differences are found in Croatia and Latvia (with respectively 13pp and 10pp difference between sample and population). On the other hand, female researchers are less represented in the sample in the United Kingdom (-15pp), Greece (-12pp) and Austria (-10pp). When gender-based weights are applied in the analysis, we will see that in countries with a lower share of female researchers than in the population, the responses of the female researchers receive higher weight than those of their male counterparts. As the overall balance between sample and population is good, this will have only limited effect on the values for the indicators.

Table 54: Gender distribution in the sample and in the population

	Share of Female researchers in the **sample**	Share of Female researchers in the **population**
Austria	30%	40%
Belgium	36%	41%
Bulgaria	55%	48%
Croatia	61%	48%
Cyprus	35%	39%
Czech Republic	29%	36%
Denmark	36%	43%
Estonia	48%	47%
Finland	37%	47%
France	38%	33%
Germany	36%	38%
Greece	27%	39%
Hungary	36%	39%
Iceland	45%	51%
Ireland	41%	44%
Italy	46%	40%
Latvia	63%	54%
Lithuania	51%	55%
Luxembourg	36%	38%
Malta	29%	33%
Netherlands	37%	41%
Norway	39%	47%
Poland	44%	43%
Portugal	51%	48%
Romania	51%	47%
Slovakia	40%	46%
Slovenia	48%	42%
Spain	40%	41%
Sweden	37%	44%
Switzerland	43%	36%
United Kingdom	29%	45%
EU28	**41%**	**41%**
Total EU28+3	**41%**	**41%**

Source: MORE3 EU HE survey (2016)
Notes:
- Based on question 2: "What is your gender?"
- (n=10,394)

1.4. Ex ante versus ex post stratification: a comparison of estimates

This section presents the results for the main indicators when the post-stratification by career stage is applied, comparing it to the results obtained by ex ante weighting procedures, and it addresses the reasons behind the few cases in which there are differences across both types of estimates.

Section 1.2 of this Annex has presented the main potential limitations of post-stratifying the data by career stage, being the most important ones the incomplete availability of secondary data (lack of data for specific countries[146]), and substantially higher error rates. In spite of these potential pitfalls, the estimates obtained applying both stratification weights are very similar, with the differences being lower than the sampling error in most of the cases.

Table 55: Career paths and working conditions (EU28)

Indicator	Weights based on field of science	Weights based on career stages	Difference
Early stage researchers in doctoral programme	61.0%	60.1%	*0.9%*
Share of researchers with a PhD degree	83.9%	59.1%	*24.8%*
Average duration current employment	12.4%	9.7%	*2.7%*
Share of researchers with a fixed-term contract	26.1%	37.9%	*-11.8%*
Share of researchers with a dual position in current employment	9.7%	9.5%	*0.2%*
Share of researchers with a dual position in the private industry	0.8%	0.9%	*-0.1%*
Share of researchers with a dual position in the public sector	1.8%	1.7%	*0.1%*
Satisfaction with current position: academic factors	91.2%	90.6%	*0.6%*
Satisfaction with current position: employment factors	77.5%	74.0%	*3.5%*
Satisfaction with current position: personal factors	86.6%	85.2%	*1.4%*
Satisfaction with current position: career progression	70.1%	67.4%	*2.7%*
Share of researchers in full time positions	90.0%	83.5%	*6.5%*
Average category of teaching load	1.9%	1.8%	*0.2%*

Source: MORE3 EU HE survey (2016)

Table 55 shows the indicators related to career paths and working conditions. The cases in which the differences between indicators are larger are those referring to the share of researchers with a PhD degree (+25 pp. difference between the estimate weighted by field of science compared to the one weighted by career stage), the share of researchers with a fixed-term contract (-12 pp. difference), and the share of researchers in full time positions (+6 pp. difference). These are precisely the indicators which show a larger variation across career stages, especially between R1 researchers and higher career stages. Table 56 shows how R1 researchers have a much lower share of researchers with a PhD than the other career stages, many of them are still enrolled in PhD training. Since the post-stratification weight increases the importance of this group to the expense of

[146] There were no available data for Estonia, Cyprus and Luxembourg. For Malta and Slovakia, only a weighting of the R1 researchers was possible.

R2, R3 and R4 stages, this entails that that the overall estimate produces a significantly different result.

At the same time, Table 56 also shows that consistent estimates are produced through both types of weighting for each career stage. Only R1 researchers, the use of different weights generates a 6pp difference. This is due to the different country composition in the two sets of weights (cf. footnote 146).

In the same vein, Table 57 reflects the extent to which the ex ante stratification and the career stage weight post-stratification produce consistent findings at career stage level on the shares of researchers with a fixed-term contract. It is the reweighting of the sample – through giving a larger weight to R1 researchers – what produces the disparities at EU level. Similarly, the shares of researchers in full-time positions are displayed in Table 58, showing that the difference in the estimates produced by the ex ante stratification and by the career weight post-stratification comes from attributing a larger importance to R1 researchers in post-stratification estimates.

Table 56: Share of researchers with a PhD across career stages (EU28)

Career stages	Weights based on field of science	Weights based on career stages
R1	15.8%	21.8%
R2 & R3	95.2%	95.1%
R4	95.2%	94.6%

Source: MORE3 EU HE survey (2016)

Table 57: Share of researchers with a fixed-term contract across career stages (EU28)

Career stages	Weights based on field of science	Weights based on career stages
R1	65.0%	58.2%
R2 & R3	26.6%	22.2%
R4	6.1%	7.3%

Source: MORE3 EU HE survey (2016)

Table 58: Distribution of researchers in full-time positions across career stages (EU28)

Career stages	Weights based on field of science	Weights based on career stages
R1	65.7%	72.0%
R2 & R3	92.6%	93.8%
R4	96.8%	97.2%

Source: MORE3 EU HE survey (2016)

In Table 59 we observe that the indicators referring to PhD mobility and mobility during the PhD stage are very robust. The ex ante stratification and the post-stratification produce very similar results.
Table 60 shows the indicators related to mobility and collaboration in the post-PhD stage. The only case in which the difference between both indicators is larger than the sampling error is the one referring to international mobility. The differences between the two indicators rely on the fact that the distribution of responses is very much dependent on career stage, as it is shown in Table 61.

Table 59: PhD mobility and mobility during PhD stage (EU28)

Indicator	Weights based on field of science	Weights based on career stages	Difference
PhD Mobility	16.3%	19.4%	*-3.1%*
Mobility during PhD	18.2%	16.5%	*1.7%*

Source: MORE3 EU HE survey (2016)

Table 60: Collaboration and mobility in post-PhD stage (EU28)

Indicator	Weights based on field of science	Weights based on career stages	Difference
Post PhD: Long-term mobility in the last ten years	27.4%	25.0%	*2.4%*
Post PhD: Long-term mobile more than ten years ago	18.1%	18.5%	*-0.4%*
Post PhD: Never long-term mobile	54.5%	56.4%	*-1.9%*
Post PhD: Short-term mobility in the last ten years	37.2%	36.7%	*0.5%*
Post PhD: Short-term mobility more than ten years ago	11.6%	10.7%	*0.9%*
Post PhD: Never short-term mobile	51.2%	52.6%	*-1.4%*
International collaboration with colleagues from EU or non-EU countries	68.8%	60.2%	*8.6%*
Interdisciplinary mobility	34.3%	31.3%	*3.0%*
Interdisciplinary collaboration	73.5%	71.8%	*1.7%*
Intersectoral mobility	24.8%	23.6%	*1.1%*
Intersectoral collaboration	35.5%	31.0%	*4.5%*

Source: MORE3 EU HE survey (2016)

Table 61: Distribution of international collaboration across career stages

Career stages	Weights based on field of science	Weights based on career stages
R1	44.7%	44.8%
R2 & R3	66.5%	72.1%
R4	85.0%	84.4%

Source: MORE3 EU HE survey (2016)

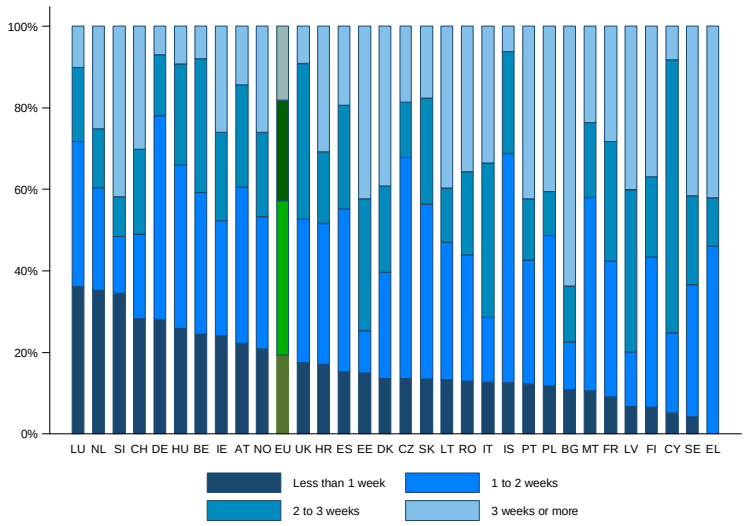
2. Questionnaire

Cf. separate document

3. Additional tables and figures

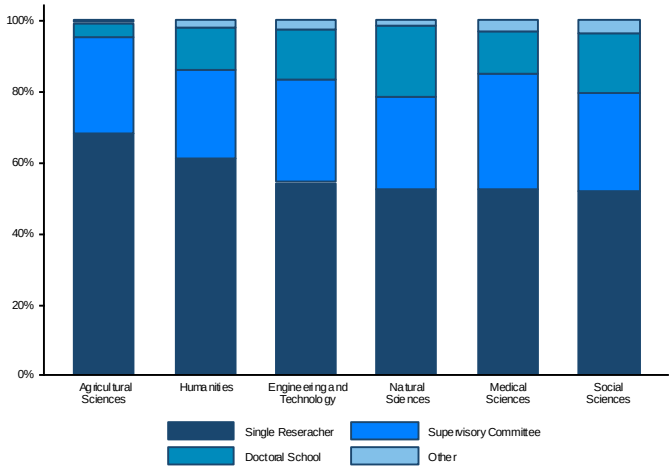
3.1. Career path

Figure 159: Duration of training on transferable skills in total per year



Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 56: "How much training on (transferable) skills did you receive in total per year?"
- (n= 1,130)

Figure 160: PhD supervision structures, by field of science



Source: MORE3 EU HE Survey (2016)
Notes:
- Only R1 PhD candidates and R2 PhD holders.
- Based on question 49: "How would you describe your PhD in terms of supervision structure?"
- (n=2,786)

Table 62: Share of female researchers by career stage and countries

Country	R1	R2	R3	R4
Austria	56,4%	41,1%	31,1%	16,2%
Belgium	48,9%	48,7%	29,4%	24,2%
Bulgaria	56,1%	55,7%	60,4%	49,6%
Croatia	64,9%	60,8%	60,5%	62,1%
Cyprus	44,1%	43,1%	33,8%	20,1%
Czechia	16,2%	46,1%	34,9%	30,1%
Denmark	42,6%	42,3%	44,2%	24,7%
Estonia	62,1%	56,2%	50,8%	27,8%
Finland	50,5%	37,8%	44,6%	30,5%
France	51,2%	63,2%	40,6%	35,4%
Germany	48,2%	44,6%	39,0%	16,0%
Greece	54,4%	35,2%	28,6%	24,8%
Hungary	39,8%	30,3%	46,1%	35,9%
Ireland	44,4%	41,9%	48,8%	21,2%
drIceland	68,3%	75,2%	57,7%	29,5%
Italy	73,6%	48,6%	45,7%	40,8%
Latvia	67,5%	78,9%	55,3%	44,5%
Lithuania	60,1%	53,3%	60,0%	36,8%
Luxembourg	46,3%	45,4%	20,9%	18,5%
Malta	63,0%	42,8%	25,6%	23,6%
Netherlands	63,1%	47,9%	37,3%	15,5%
Norway	52,2%	46,7%	51,7%	30,3%
Poland	58,5%	58,6%	42,3%	31,9%
Portugal	49,6%	63,3%	48,9%	32,7%
Romania	65,4%	58,1%	52,2%	44,4%
Slovakia	36,0%	47,0%	42,5%	30,7%
Slovenia	68,8%	67,8%	41,7%	45,9%
Spain	50,6%	40,2%	44,4%	36,1%
Sweden	45,3%	41,3%	37,1%	30,3%
Switzerland	60,3%	46,3%	34,9%	42,6%
United Kingdom	48,1%	41,8%	38,2%	15,8%
EU	**49,6%**	**47,7%**	**40,8%**	**25,3%**

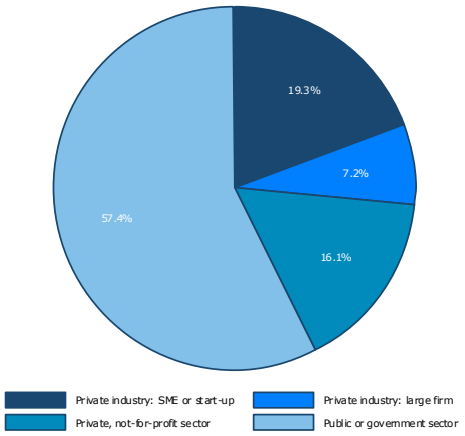
Source: MORE3 EU HE Survey (2016)
Notes:
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- Based on question 2: "What is your gender?" and question 15: "In which career stage would you currently situate yourself?"
- (n=10,394)

Table 63: Type of contract by current career stages and countries

Country	Permanent contract				Fixed term contract				No contract or self-employed			
	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
Austria	13,3%	50,1%	77,0%	92,1%	82,8%	49,9%	22,4%	7,2%	3,9%	0,0%	0,6%	0,7%
Belgium	10,3%	22,0%	71,5%	94,2%	83,1%	75,6%	28,5%	5,8%	6,6%	2,4%	0,0%	0,0%
Bulgaria		66,1%	90,6%	95,7%		32,0%	7,5%	4,3%		2,0%	1,9%	0,0%
Croatia	42,9%	39,8%	84,0%	90,1%	55,3%	60,2%	16,0%	9,9%	1,7%	0,0%	0,0%	0,0%
Cyprus	46,4%	58,2%	87,8%	88,5%	44,4%	41,8%	12,2%	11,5%	9,2%	0,0%	0,0%	0,0%
Czech Republic		45,8%	62,5%	62,8%		54,2%	37,0%	32,6%		0,0%	0,5%	4,6%
Denmark	18,1%	9,7%	87,8%	92,9%	79,2%	90,3%	12,2%	7,1%	2,7%	0,0%	0,0%	0,0%
Estonia	47,0%	39,7%	59,1%	62,6%	47,7%	60,3%	40,9%	37,4%	5,3%	0,0%	0,0%	0,0%
Finland	24,6%	34,7%	57,5%	82,4%	65,5%	63,9%	40,1%	17,6%	9,9%	1,4%	2,3%	0,0%
France		70,3%	96,1%	94,3%		29,7%	2,4%	1,1%		0,0%	1,5%	4,5%
Germany	13,9%	35,7%	59,8%	92,9%	81,5%	62,5%	40,2%	7,1%	4,6%	1,8%	0,0%	0,0%
Greece			80,9%	96,2%			18,6%	3,8%			0,5%	0,0%
Hungary	33,5%	64,7%	94,1%	94,2%	45,9%	35,3%	5,9%	5,8%	20,6%	0,0%	0,0%	0,0%
Ireland	48,5%	53,6%	91,4%	100,0%	44,6%	45,1%	8,6%	0,0%	6,9%	1,3%	0,0%	0,0%
Iceland	59,5%		78,6%	88,1%	33,1%		21,4%	10,8%	7,3%		0,0%	1,1%
Italy		61,9%	89,2%	94,4%		38,1%	10,8%	3,7%		0,0%	0,0%	1,8%
Latvia	60,6%		55,5%	75,4%	29,1%		44,5%	24,6%	10,4%		0,0%	0,0%
Lithuania	27,4%	19,6%	22,3%	35,7%	60,1%	76,0%	75,2%	63,3%	12,5%	4,4%	2,4%	1,0%
Luxembourg	11,8%	13,1%	60,6%	100,0%	87,1%	86,9%	39,4%	0,0%	1,1%	0,0%	0,0%	0,0%
Malta		90,0%	97,2%	100,0%		10,0%	2,8%	0,0%		0,0%	0,0%	0,0%
Netherlands	26,4%	22,4%	79,4%	91,1%	68,8%	77,6%	19,4%	7,1%	4,8%	0,0%	1,2%	1,8%
Norway	19,2%	15,4%	84,7%	95,3%	77,6%	82,2%	15,3%	4,3%	3,2%	2,4%	0,0%	0,5%
Poland		52,6%	71,3%	76,4%		47,4%	28,1%	19,7%		0,0%	0,6%	3,9%
Portugal		41,6%	87,2%	98,4%		54,6%	11,8%	1,6%		3,8%	1,0%	0,0%
Romania		95,7%	96,7%	99,3%		1,9%	2,7%	0,7%		2,4%	0,6%	0,0%
Slovakia	11,0%	20,0%	30,9%	65,0%	41,8%	77,2%	67,1%	35,0%	47,2%	2,7%	2,0%	0,0%
Slovenia	63,1%	59,2%	89,2%	92,4%	34,4%	40,8%	10,0%	5,3%	2,6%	0,0%	0,7%	2,3%
Spain		39,7%	83,0%	95,3%		60,3%	13,8%	1,8%		0,0%	3,2%	2,9%
Sweden	18,6%	35,2%	88,6%	95,0%	74,1%	63,1%	10,7%	2,9%	7,3%	1,7%	0,7%	2,1%
Switzerland	13,5%	15,5%	52,0%	95,2%	86,5%	84,5%	47,5%	4,8%	0,0%	0,0%	0,5%	0,0%
United Kingdom	68,0%	72,4%	94,1%	97,9%	24,2%	27,6%	5,9%	2,1%	7,9%	0,0%	0,0%	0,0%
EU	**27,9%**	**49,1%**	**83,4%**	**92,8%**	**65,0%**	**50,0%**	**15,9%**	**6,1%**	**7,1%**	**1,0%**	**0,7%**	**1,1%**

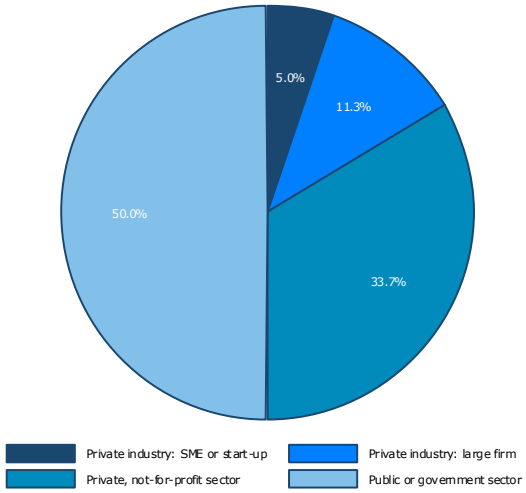
Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 32: "Type of contract"
- (n=10,184)

Figure 161: Types of dual positions if the HE sector is the main sector of employment



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 29: "Can you please indicate the time share and sector of your two (main) positions:"
- (n=306)

Figure 162: Types of dual positions if the HE sector is the second sector of employment



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 29: "Can you please indicate the time share and sector of your two (main) positions:"
- (n=76)

Table 64: Average length of career stages by countries and fields of sciences

Country	Duration R1-R2				Duration R2-R3				Duration R3-R4			
	Health	Natural	Social	Total	Health	Natural	Social	Total	Health	Natural	Social	Total
Austria	3,77	4,55	4,22	4,26		5,24	5,42	5,44		7,32	6,18	6,79
Belgium	4,74	4,66	5,49	4,94	5,06	5,10	3,22	4,49	7,48		6,53	6,98
Bulgaria	5,80	6,41	5,95	6,09	5,64	3,26	5,01	4,51				7,57
Croatia	5,56	5,25	5,50	5,39	4,43	5,34	4,63	4,92		5,39		5,67
Cyprus		4,48	5,13	4,84		6,33	4,94	5,62				6,36
Czech Republic	4,59	4,55	3,38	4,21	5,00	5,11	5,79	5,27		7,48		7,26
Denmark	4,74	4,81	4,44	4,67	4,65	4,44	4,04	4,42				8,33
Estonia	5,64	5,91	6,98	6,26		3,32	2,14	3,27		6,63	5,46	6,17
Finland	4,20	5,59	5,97	5,41	4,11	4,38	3,90	4,16		4,98	4,72	5,00
France	4,24	3,85	4,59	4,27	3,26	3,53	2,84	3,17		7,24	6,76	7,02
Germany	4,93	4,46	4,81	4,69		4,88	2,78	4,13		5,41		5,14
Greece	4,76	4,87	6,59	5,49	6,98	7,02	5,27	6,37		9,48	7,32	8,49
Hungary		5,45	6,72	5,65		5,31	4,29	5,10				6,03
Ireland	4,25	4,70	4,77	4,62	5,87	5,37	3,65	4,94		8,08		7,21
Iceland	5,23	4,84	5,56	5,28	3,03	5,36	3,72	3,74		5,57		6,39
Italy	4,12	4,52	4,89	4,57	8,30	7,29	8,14	7,85		9,66	7,41	8,59
Latvia		6,44	5,07	5,76		6,67	4,76	5,25			4,96	5,93
Lithuania	4,30	5,20	5,28	5,10	4,87	5,84	4,12	4,89		7,43	9,41	7,83
Luxembourg		3,97	4,59	4,27		4,00	3,70	4,02				5,72
Malta	4,61	4,89	5,18	4,96		6,05	6,87	6,12				6,92
Netherlands	5,24	5,07	4,67	5,02	5,49	3,99	4,15	4,56		6,39		6,76
Norway	5,98	5,42	5,81	5,77	3,91	4,94	3,03	3,76		6,63	5,53	6,18
Poland	4,78	5,25	5,93	5,44	10,06	10,72	9,17	9,95		7,37		8,55
Portugal	4,78	5,23	5,46	5,25	2,59	3,63	3,71	3,49		6,03		5,34
Romania	3,97	4,38	4,90	4,39	4,47	3,59	3,34	3,75		6,80		6,30
Slovakia	5,48	5,28	5,02	5,22	7,58	5,20	4,76	5,46		10,28		9,09
Slovenia	4,49	5,30	4,75	4,88	4,31	4,35	3,96	4,25		7,44		6,87
Spain	3,89	4,22	4,95	4,44	4,02	5,11	3,76	4,36	8,75	9,24	6,29	8,14
Sweden	5,81	5,26	5,80	5,61	4,83	4,90	4,36	4,66		7,58	7,18	7,58
Switzerland	3,98	4,29	5,06	4,47	4,84	4,47	5,06	4,87			4,92	5,45
United Kingdom	4,26	4,33	4,92	4,54	5,58	5,49	4,48	5,11		8,48	8,44	8,24
EU	**4,50**	**4,59**	**5,07**	**4,74**	**4,99**	**5,42**	**4,53**	**4,99**	**7,46**	**7,77**	**6,96**	**7,42**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 21: "Please indicate the starting year in which you first entered the subsequent career stages:"
- R1-R2: Natural: n=4.247; Health: n=4.503; Social: n=3.074;
- R2-R3: Natural: n=3.304; Health: n=1.196; Social: n=2.465;
- R3-R4: Natural: n=1.367; Health: n=497; Social: n=939

Table 65: Skills to be considered important for future research career (in or out academia) by fields of science

	Agricultural Sciences	Engineering and Technology	Human-ities	Medical Sciences	Natural Sciences	Social Sciences
Innovative digital skills	92.5%	88.0%	84.6%	88.5%	86.3%	82.8%
Critical/autonomous thinking	95.8%	96.9%	98.8%	97.4%	98.3%	96.6%
Decision making problem solving	98.1%	98.8%	97.7%	98.3%	98.5%	97.2%
Grant/Proposal writing	94.4%	92.9%	94.1%	95.4%	95.2%	94.4%
Entrepreneurship	78.0%	66.7%	58.4%	72.4%	66.2%	64.9%
Teamwork	95.2%	94.0%	92.0%	96.1%	95.1%	92.8%
Time management	93.0%	92.1%	91.7%	94.2%	94.9%	91.4%
People management	93.8%	89.3%	85.9%	92.2%	91.1%	85.4%
Project management	95.5%	94.7%	90.6%	93.9%	94.8%	91.7%
Networking	94.0%	95.2%	94.2%	95.4%	94.9%	95.5%
Negotiation	83.0%	76.6%	79.9%	86.8%	79.2%	79.5%
IPR	82.6%	72.3%	67.9%	77.2%	70.6%	63.4%
Communication and presentation skills	97.8%	95.1%	98.1%	97.7%	94.9%	93.6%
Collaboration with citizens, government and broader society	86.1%	82.3%	85.0%	85.3%	82.8%	85.5%
Ethics	89.2%	87.4%	90.3%	95.4%	88.9%	89.0%

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 44: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=8,619-9,291)

Table 66: Shares of researcher agreeing on recruitment policies by country

Country	Merit-based	Transparent	Externally and publiciy advertised
Austria	80.5%	76.4%	83.9%
Belgium	78.0%	75.2%	86.2%
Bulgaria	65.1%	70.0%	70.0%
Croatia	65.6%	66.0%	67.5%
Cyprus	72.2%	73.7%	76.9%
Czech Republic	85.8%	82.8%	83.6%
Denmark	84.7%	74.5%	82.8%
Estonia	78.6%	76.8%	79.1%
Finland	82.1%	72.5%	80.8%
France	68.2%	69.2%	85.0%
Germany	80.3%	76.2%	83.2%
Greece	72.6%	77.9%	70.6%
Hungary	55.2%	59.4%	58.7%
Ireland	76.1%	74.4%	85.5%
Iceland	86.9%	82.4%	80.1%
Italy	60.5%	61.1%	77.6%
Latvia	82.9%	78.8%	80.3%
Lithuania	66.8%	71.0%	67.6%
Luxembourg	78.3%	77.7%	86.3%
Malta	84.9%	84.1%	87.9%
Netherlands	80.9%	72.4%	79.1%
Norway	81.4%	74.0%	81.5%
Poland	82.9%	79.2%	85.1%
Portugal	60.5%	61.1%	64.8%
Romania	76.4%	81.6%	87.9%
Slovakia	65.0%	63.3%	63.1%
Slovenia	69.9%	69.0%	62.7%
Spain	63.0%	58.8%	55.3%
Sweden	83.3%	74.2%	85.6%
Switzerland	79.7%	75.0%	86.4%
United Kingdom	85.2%	83.0%	88.8%
EU	**76.5%**	**74.1%**	**80.3%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question Q40: "What is your opinion on the following issues with respect to recruitment in your home institution?"
- (n=9,224-9,570)

Table 67: Other important factors affecting recruitment by country

Country	Research output	Inter-sectoral mobility	Inter-disciplinary mobility	Inter-national mobility	Transferable skills
Austria	83.3%	56.4%	74.2%	88.8%	83.8%
Belgium	86.9%	52.2%	76.6%	91.9%	87.9%
Bulgaria	73.4%	54.1%	63.8%	76.0%	69.8%
Croatia	74.3%	51.8%	66.4%	83.5%	71.6%
Cyprus	72.2%	55.0%	65.9%	82.7%	71.1%
Czech Republic	79.2%	71.8%	79.7%	89.6%	87.3%
Denmark	68.9%	60.0%	73.2%	86.0%	76.8%
Estonia	81.3%	64.3%	77.8%	93.1%	85.6%
Finland	68.0%	62.6%	72.8%	92.5%	69.1%
France	81.0%	49.7%	63.8%	89.9%	78.5%
Germany	81.1%	60.9%	76.6%	87.4%	86.8%
Greece	77.4%	61.4%	72.3%	88.4%	73.0%
Hungary	67.6%	53.0%	66.7%	81.7%	72.3%
Iceland	77.5%	70.4%	82.2%	90.7%	87.4%
Ireland	73.6%	61.9%	77.1%	84.7%	84.0%
Italy	61.4%	50.6%	67.1%	92.2%	76.6%
Latvia	84.6%	82.8%	83.1%	93.4%	91.4%
Lithuania	81.5%	55.3%	69.4%	81.7%	74.5%
Luxembourg	87.7%	56.2%	78.4%	93.0%	83.5%
Malta	79.0%	65.0%	78.5%	90.3%	83.2%
Norway	76.2%	57.3%	76.6%	91.1%	75.2%
Poland	78.3%	63.6%	80.5%	86.8%	80.5%
Portugal	70.8%	58.5%	73.2%	81.5%	78.4%
Romania	81.0%	61.7%	82.5%	85.2%	86.8%
Slovakia	78.5%	60.9%	79.4%	90.3%	80.5%
Slovenia	68.7%	58.0%	73.0%	85.9%	80.2%
Spain	65.9%	47.1%	67.6%	89.1%	73.8%
Sweden	81.2%	66.1%	78.0%	89.5%	84.7%
Switzerland	81.2%	54.0%	80.6%	89.8%	82.1%
The Netherlands	79.4%	60.3%	75.1%	88.4%	83.1%
United Kingdom	75.2%	59.0%	77.5%	86.2%	83.4%
EU	**76.0%**	**57.6%**	**74.0%**	**87.6%**	**81.3%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question Q42: "In your experience, would you say the following factors are regarded as positive or negative factors for recruitment in your home institution?"
- (n=9,347-9,931)

Table 68: Issues with respect to career progression in the home institution, by country

Country	Merit-based	Transparent	Tenured
Austria	67.7%	75.3%	60.1%
Belgium	72.4%	72.5%	71.3%
Bulgaria	63.0%	69.6%	62.5%
Croatia	56.4%	63.9%	56.1%
Cyprus	68.3%	72.5%	67.4%
Czech Republic	83.2%	82.1%	74.4%
Denmark	75.7%	63.5%	69.1%
Estonia	74.0%	68.9%	68.0%
Finland	74.2%	67.5%	68.4%
France	51.9%	67.8%	61.2%
Germany	65.5%	72.8%	64.9%
Greece	69.1%	77.7%	61.8%
Hungary	52.9%	51.6%	53.5%
Ireland	54.6%	58.5%	62.5%
Iceland	84.3%	79.1%	76.9%
Italy	56.2%	62.6%	46.5%
Latvia	81.8%	78.8%	77.4%
Lithuania	65.7%	67.1%	66.2%
Luxembourg	63.9%	56.7%	54.4%
Malta	72.8%	75.9%	70.4%
Netherlands	72.5%	60.6%	67.6%
Norway	75.5%	68.9%	63.0%
Poland	83.5%	82.2%	75.8%
Portugal	51.9%	53.9%	49.3%
Romania	80.0%	83.8%	72.2%
Slovakia	64.2%	67.2%	56.3%
Slovenia	66.5%	72.8%	59.3%
Spain	51.5%	62.7%	45.3%
Sweden	78.7%	71.2%	73.6%
Switzerland	69.7%	66.8%	64.8%
United Kingdom	68.2%	74.9%	73.3%
EU	**65.1%**	**70.6%**	**64.2%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 41: "What is your opinion on the following issues with respect to career progression in your home institution?"
- (n=8,800-9626)

Table 69: Share of researchers feeling somewhat or very positive about their future prospects for their research careers, by countries

Country	Very or somewhat confident about the future career prospects
Austria	84.6%
Belgium	81.4%
Bulgaria	79.0%
Croatia	81.3%
Cyprus	83.9%
Czech Republic	85.2%
Denmark	81.1%
Estonia	76.1%
Finland	84.4%
France	70.5%
Germany	77.1%
Greece	82.0%
Hungary	67.0%
Ireland	82.0%
Iceland	92.6%
Italy	57.9%
Latvia	79.8%
Lithuania	68.0%
Luxembourg	77.2%
Malta	94.6%
Netherlands	85.5%
Norway	85.7%
Poland	78.5%
Portugal	54.0%
Romania	78.9%
Slovakia	79.2%
Slovenia	82.9%
Spain	64.1%
Sweden	89.1%
Switzerland	84.2%
United Kingdom	80.7%
EU	**75.6%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (n=10,394)

Table 70: Skills to be considered important for future research career (in or out academia) by countries

Country	Digital skills	Thinking	Decision making	Proposal writing	Entrepre-neurship	Teamwork	Time manage-ment	People manage-ment	Project manage-ment	Networking	Negotiation	IPR	Commun-ication skills	Colla-boration	Ethics
Austria	81,9%	97,2%	99,2%	95,3%	71,0%	94,1%	95,2%	92,5%	94,9%	96,3%	85,6%	78,7%	96,6%	81,8%	86,2%
Belgium	85,6%	99,2%	99,5%	94,3%	70,0%	93,9%	96,2%	93,5%	95,7%	95,7%	82,6%	64,6%	96,5%	83,6%	93,4%
Bulgaria	92,1%	93,3%	97,4%	86,5%	68,2%	91,6%	88,6%	84,8%	90,5%	86,3%	71,8%	71,4%	96,4%	84,4%	91,7%
Croatia	91,8%	96,3%	96,9%	94,1%	74,5%	96,8%	92,5%	91,2%	94,5%	96,4%	84,5%	76,2%	95,8%	84,5%	93,4%
Cyprus	91,7%	98,6%	97,8%	94,6%	74,1%	93,3%	92,2%	88,3%	91,6%	93,3%	78,4%	78,2%	94,8%	87,3%	92,1%
Czech Republic	88,6%	96,3%	97,2%	97,7%	66,8%	95,9%	93,8%	91,7%	96,8%	92,0%	81,8%	85,6%	97,4%	82,5%	92,1%
Denmark	79,8%	97,3%	97,0%	91,0%	66,1%	91,3%	87,6%	81,9%	92,2%	95,6%	73,6%	51,1%	95,4%	76,1%	84,4%
Estonia	91,6%	98,3%	99,3%	95,2%	66,3%	93,4%	95,6%	91,3%	94,8%	96,1%	88,0%	72,5%	96,1%	85,5%	94,2%
Finland	86,3%	96,8%	99,3%	95,2%	72,8%	95,9%	93,4%	90,3%	94,7%	97,9%	87,6%	72,7%	97,4%	88,3%	93,8%
France	79,8%	96,9%	95,8%	95,3%	66,8%	94,9%	90,4%	84,4%	92,4%	95,0%	79,2%	76,9%	93,2%	82,0%	92,0%
Germany	88,3%	95,5%	98,3%	92,9%	69,2%	92,6%	94,2%	88,0%	92,9%	94,5%	82,1%	74,7%	97,2%	76,7%	85,7%
Greece	87,0%	97,8%	97,6%	92,9%	68,0%	96,3%	89,8%	87,7%	90,4%	94,7%	78,4%	66,3%	94,5%	83,6%	93,1%
Hungary	83,0%	95,5%	96,1%	88,1%	62,5%	90,5%	92,8%	82,4%	89,3%	90,0%	78,3%	61,7%	94,2%	72,9%	83,1%
Ireland	82,9%	98,6%	98,7%	96,6%	66,2%	91,5%	95,0%	91,7%	93,6%	95,1%	77,8%	68,5%	97,5%	85,8%	89,5%
Iceland	92,5%	99,3%	99,5%	96,4%	74,6%	97,1%	96,4%	93,0%	95,4%	97,0%	89,2%	73,6%	98,2%	90,6%	96,0%
Italy	89,4%	98,4%	96,1%	93,6%	65,3%	93,5%	87,4%	84,1%	91,5%	94,2%	80,9%	74,1%	92,4%	87,0%	91,0%
Latvia	92,9%	98,2%	98,8%	93,6%	83,2%	91,4%	95,1%	93,5%	96,7%	95,8%	92,4%	84,6%	97,7%	94,9%	95,8%
Lithuania	88,2%	96,0%	96,0%	91,9%	72,0%	90,6%	88,5%	85,1%	92,2%	91,5%	79,2%	71,7%	94,6%	79,6%	90,5%
Luxembourg	87,1%	98,5%	99,3%	94,5%	63,4%	94,6%	92,1%	89,8%	93,4%	95,3%	77,4%	64,9%	98,5%	79,6%	86,8%
Malta	89,7%	97,1%	98,6%	95,9%	75,9%	94,8%	98,6%	93,7%	95,6%	98,0%	82,2%	85,0%	98,6%	90,6%	96,5%
Netherlands	84,1%	98,0%	97,1%	92,1%	60,8%	91,3%	90,0%	85,4%	87,5%	95,3%	80,9%	58,5%	95,7%	81,8%	88,8%
Norway	79,3%	99,5%	97,0%	93,4%	52,1%	93,1%	89,0%	83,6%	93,6%	96,0%	66,4%	46,8%	94,6%	77,7%	88,2%
Poland	91,3%	98,0%	98,4%	97,2%	84,4%	92,9%	92,5%	90,4%	94,9%	93,0%	85,2%	88,2%	96,9%	89,4%	95,0%
Portugal	91,6%	97,8%	97,3%	94,2%	72,7%	97,9%	94,0%	92,6%	95,2%	96,6%	79,5%	82,8%	96,9%	91,8%	93,7%
Romania	95,9%	98,0%	98,4%	94,7%	87,4%	96,3%	93,7%	93,5%	95,3%	96,3%	84,2%	93,7%	96,2%	89,2%	97,9%
Slovakia	85,9%	96,4%	96,4%	96,1%	64,3%	93,6%	90,3%	85,9%	92,4%	90,3%	83,8%	75,1%	95,0%	80,4%	90,2%
Slovenia	90,3%	95,9%	95,7%	91,9%	71,2%	94,1%	91,0%	88,2%	91,6%	96,8%	77,4%	75,9%	96,2%	84,4%	93,5%
Spain	93,6%	97,5%	98,2%	96,2%	56,9%	97,0%	95,0%	91,2%	94,5%	94,2%	78,9%	74,5%	95,1%	87,0%	93,1%
Sweden	84,5%	99,0%	98,1%	96,6%	61,3%	95,6%	92,9%	90,0%	93,8%	95,4%	72,3%	61,8%	96,5%	86,5%	89,0%
Switzerland	84,4%	98,9%	98,5%	96,4%	67,6%	94,3%	95,8%	87,7%	95,3%	97,4%	82,2%	67,9%	95,6%	82,2%	89,1%
United Kingdom	82,0%	99,1%	99,4%	95,1%	62,2%	94,1%	94,3%	91,7%	93,5%	96,6%	80,6%	59,6%	96,2%	88,4%	90,5%
EU	**86,3%**	**97,5%**	**98,1%**	**94,5%**	**66,6%**	**94,2%**	**93,0%**	**89,2%**	**93,3%**	**95,0%**	**80,7%**	**70,9%**	**95,9%**	**84,3%**	**90,3%**

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 44: "Which skills do you consider important for your future research career (in or outside academia)?"
- (n=9,49-10,257)

Table 71: Positive factors influencing career progression, by country

Country	Research output	Intersectoral mobility	Interdisciplinary mobility	International mobility	Transferable skills
Austria	82.1%	62.8%	78.7%	88.1%	84.1%
Belgium	87.7%	52.0%	73.8%	87.5%	87.4%
Bulgaria	81.1%	60.7%	71.7%	81.4%	73.4%
Croatia	78.7%	54.0%	68.6%	84.1%	72.5%
Cyprus	72.9%	55.3%	67.5%	78.5%	71.4%
Czechia	85.3%	71.2%	79.5%	89.5%	84.3%
Denmark	74.3%	60.4%	75.9%	86.9%	79.4%
Estonia	83.3%	64.2%	78.6%	91.8%	84.4%
Finland	67.8%	63.0%	72.1%	90.7%	70.5%
France	82.6%	45.0%	62.3%	89.1%	78.8%
Germany	82.1%	64.7%	80.9%	87.3%	86.5%
Greece	77.8%	57.5%	73.6%	86.2%	75.3%
Hungary	73.4%	53.6%	62.3%	72.2%	67.4%
Ireland	76.9%	62.2%	75.5%	83.5%	80.2%
Iceland	76.9%	62.6%	74.1%	88.5%	84.0%
Italy	64.0%	50.9%	69.7%	89.7%	75.4%
Latvia	84.2%	80.7%	83.4%	91.0%	91.5%
Lithuania	83.7%	59.8%	75.2%	83.2%	73.7%
Luxembourg	84.9%	58.4%	76.9%	90.2%	82.3%
Malta	83.7%	63.6%	77.4%	88.0%	82.0%
Netherlands	80.1%	58.1%	74.6%	86.7%	82.6%
Norway	78.2%	53.7%	72.6%	86.5%	74.2%
Poland	85.6%	66.1%	80.2%	88.4%	78.8%
Portugal	71.2%	55.8%	70.5%	77.7%	75.2%
Romania	86.5%	68.5%	85.3%	87.7%	89.8%
Slovakia	82.7%	63.9%	79.2%	86.9%	82.2%
Slovenia	73.1%	59.1%	72.7%	86.5%	79.7%
Spain	66.5%	49.8%	69.6%	85.2%	75.8%
Sweden	80.3%	64.5%	77.8%	88.0%	84.7%
Switzerland	78.9%	49.3%	78.3%	85.4%	82.4%
United Kingdom	75.1%	57.7%	74.1%	77.8%	81.0%
EU	**77.4%**	**58.1%**	**74.3%**	**84.6%**	**80.7%**

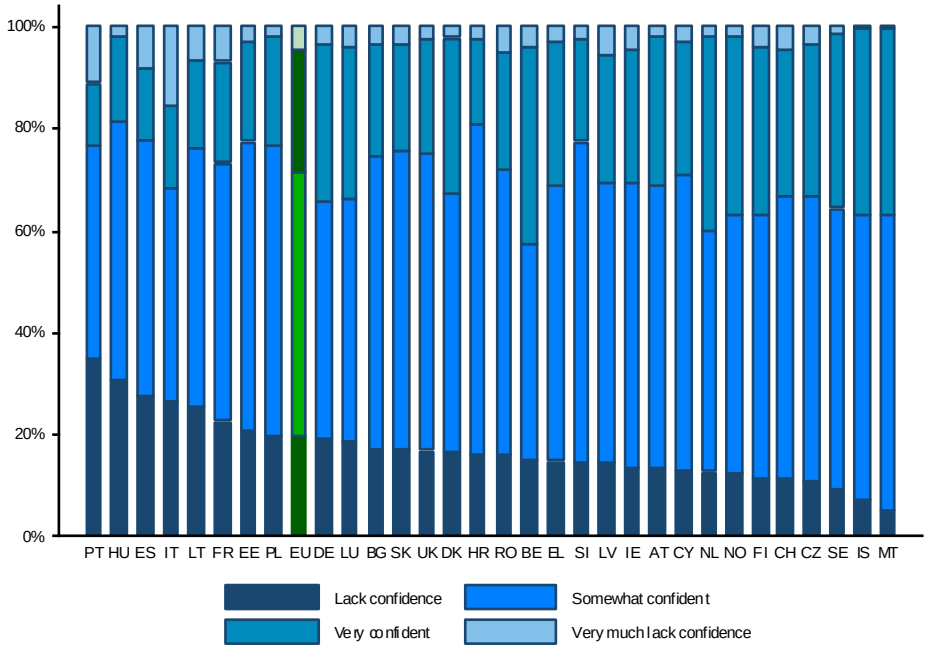
Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 43: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?"
- (n=9,412-9,908)

Table 72: Positive factors influencing career progression, by field of science

	Agricultural Sciences	Engineering and Technology	Humanities	Medical Sciences	Natural Sciences	Social Sciences
Interdisciplinary mobility	81.5%	76.8%	73.1%	77.9%	77.1%	65.3%
International mobility	88.4%	84.7%	86.5%	86.8%	84.0%	81.0%
Intersectoral mobility	72.1%	65.5%	45.5%	61.3%	61.8%	51.8%
Research output	83.9%	77.1%	74.1%	78.4%	79.6%	75.4%
Transferable skills	75.5%	81.0%	79.2%	85.1%	82.5%	75.8%

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 43: "In your experience, would you say the following factors are regarded as positive or negative factors for career progression in your home institution?"
- (n=9,412)

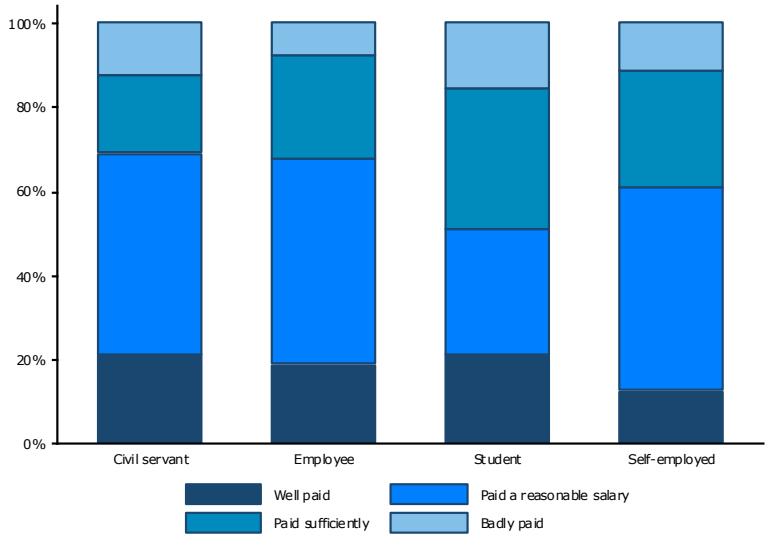
Figure 163: Confidence in future career prospects, by country



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 48: "Overall, how confident do you feel about the future prospects for your research career?"
- (n=10,398)

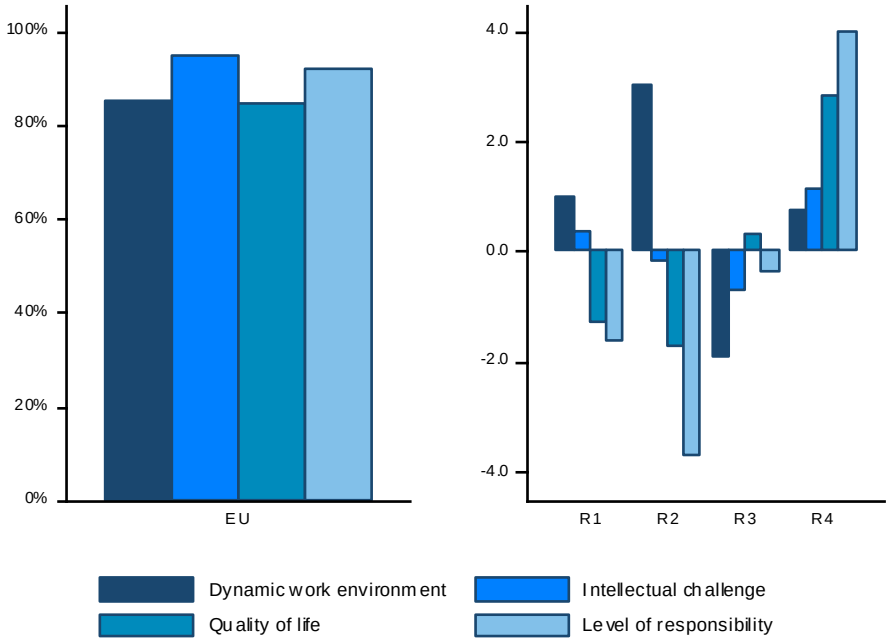
3.2. Working conditions

Figure 164: Remuneration package, by employment status



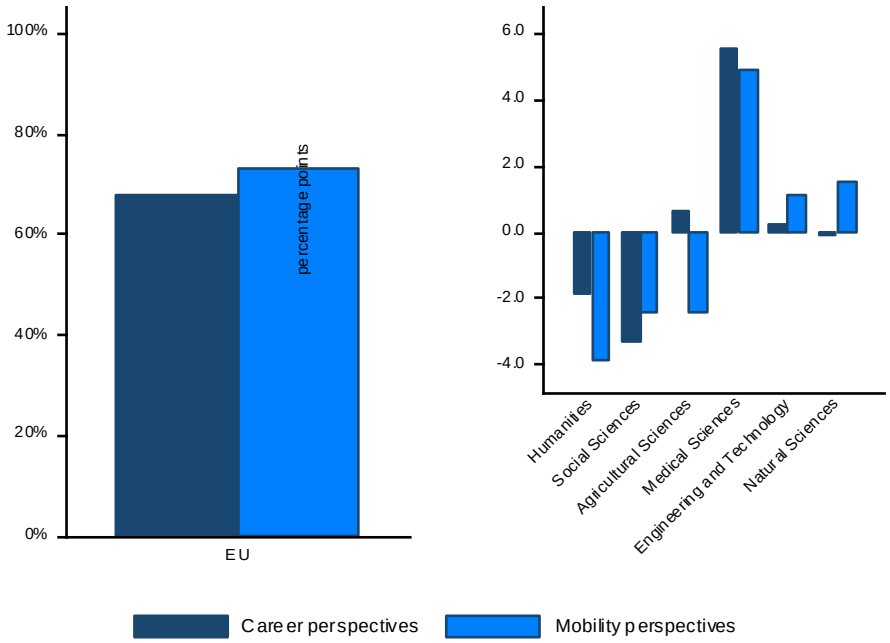
Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 37: "How do you feel about your remuneration package (if you do not take into account a second income or, if applicable, the income of your partner)? I consider myself to be..."
- (n=9,412)

Figure 165: Individual Satisfaction at work, by career stage



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 36: Please indicate your satisfaction with each factor as it relates to your current position:"
- (n=9,926-10,035)

Figure 166: Career and mobility perspectives in the current position, by field of science



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 36: Please indicate your satisfaction with each factor as it relates to your current position:"
- (n=9,741/9,645)

3.4. Mobility in post-PhD stage

Table 73: International >3 months mobility in post-PhD career stages, by country (2012-2016)

Country 2016	>3 month mobility in the last ten years	>3 month mobility more than 10 years ago	Non-mobility >3 months mobile	Country 2012	>3 month mobility in the last ten years	>3 month mobility more than 10 years ago	Non-mobility >3 months mobile
Luxembourg	61.4%	9.8%	28.8%	CH	53.1%	12.1%	34.8%
Switzerland	48.1%	18.2%	33.8%	DK	53.0%	12.7%	34.3%
Norway	40.4%	13.0%	46.6%	IS	48.9%	19.0%	32.1%
Cyprus	38.5%	16.3%	45.3%	LU	47.4%	11.0%	41.6%
Austria	38.4%	22.9%	38.8%	BE	46.5%	12.7%	40.9%
France	34.8%	17.8%	47.4%	NL	46.1%	13.5%	40.3%
Belgium	33.3%	21.0%	45.6%	AT	45.4%	19.6%	35.0%
Germany	33.3%	16.6%	50.1%	DE	44.7%	14.0%	41.4%
Hungary	33.1%	19.4%	47.5%	CY	44.1%	16.7%	39.2%
Netherlands	32.5%	15.2%	52.3%	NO	43.4%	19.0%	37.7%
Ireland	32.3%	17.4%	50.3%	FI	42.3%	14.2%	43.6%
Iceland	30.6%	12.8%	56.6%	SE	39.5%	13.3%	47.2%
Denmark	30.3%	21.5%	48.2%	IE	36.9%	22.5%	40.5%
Spain	29.1%	28.4%	42.4%	HU	34.0%	23.6%	42.4%
Sweden	28.0%	15.1%	56.9%	GR	33.9%	26.8%	39.2%
Estonia	27.7%	21.1%	51.2%	SL	33.8%	12.8%	53.4%
United Kingdom	25.6%	16.6%	57.9%	ES	32.3%	19.8%	47.8%
Finland	24.8%	16.8%	58.4%	GB	28.5%	20.1%	51.4%
Greece	24.0%	26.9%	49.1%	SK	27.6%	16.0%	56.4%
Slovaka	23.6%	12.3%	64.1%	PT	27.4%	12.3%	60.3%
Slovenia	23.5%	19.4%	57.1%	EE	26.6%	17.1%	56.3%
Italy	22.4%	22.0%	55.6%	FR	26.5%	20.8%	52.7%
Bulgaria	21.3%	14.8%	63.9%	IT	25.2%	18.8%	56.0%
Poland	19.5%	13.0%	67.5%	MT	24.2%	15.3%	60.5%
Czech Republic	19.1%	16.9%	63.9%	LV	19.7%	9.1%	71.2%
Croatia	18.7%	11.6%	69.7%	RO	19.7%	4.0%	76.4%
Malta	16.9%	12.8%	70.2%	HR	18.9%	12.0%	69.1%
Portugal	16.9%	9.6%	73.6%	LT	18.1%	14.1%	67.8%
Lithuania	16.7%	19.2%	64.1%	BG	18.0%	12.8%	69.1%
Romania	13.3%	7.2%	79.5%	CZ	16.2%	17.3%	66.5%
Latvia	12.2%	7.8%	79.9%	PL	9.1%	12.1%	78.8%
EU28	**27.4%**	**18.1%**	**54.5%**	**EU27**	**31.0%**	**17.4%**	**51.6%**

Source: MORE3 EU HE survey (2016) and MORE3 EU HE survey (2012)
Notes:
- Based on question 64: "After gaining your highest educational qualification (PhD or other), how would you typify your international mobility experience?"
- (n=8,073)

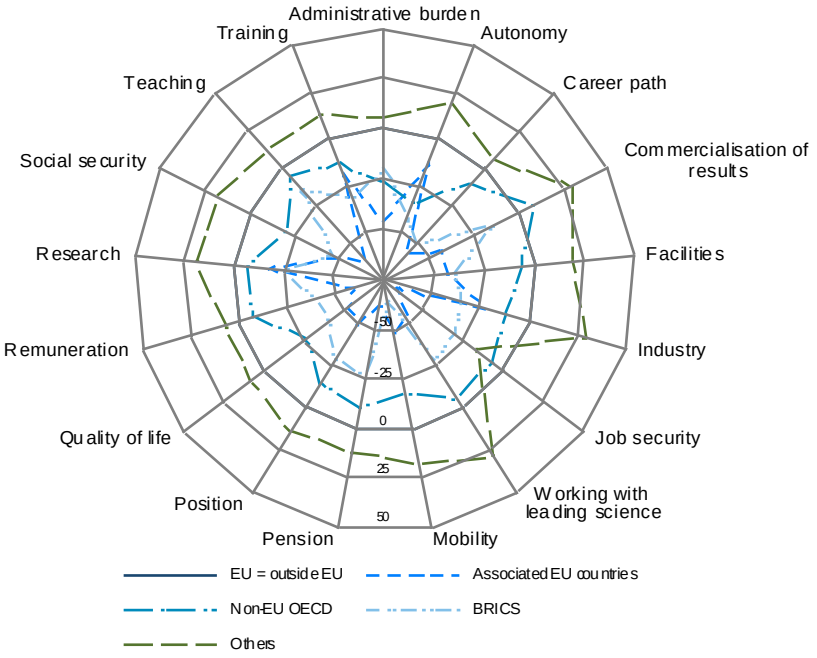
Table 74: International <3 months mobility in post-PhD career stages, by country (2012-2016)

Country 2016	<3 month mobile less than ten years ago	<3 month mobile more than ten years ago	Non-mobility <3 month	Country 2012	<3 month mobile less than ten years ago	<3 month mobile more than ten years ago	Never <3 month mobile
Slovania	48.8%	11.8%	39.5%	Hungary	60.5%	11.7%	27.8%
Italy	45.5%	12.9%	41.6%	Denmark	55.7%	10.6%	33.6%
Hungary	43.8%	18.9%	37.3%	Iceland	55.7%	8.1%	36.2%
Slovakia	42.2%	8.1%	49.7%	Romania	55.2%	4.5%	40.3%
Bulgaria	42.1%	13.0%	44.9%	Belgium	54.3%	8.4%	37.4%
Norway	41.6%	8.6%	49.8%	Austria	52.4%	18.5%	29.1%
Belgium	40.9%	4.3%	54.8%	Luxembourg	50.6%	5.7%	43.8%
Czech Republic	40.9%	14.8%	44.3%	Germany	48.5%	18.3%	33.2%
Spain	40.9%	15.3%	43.8%	Latvia	45.4%	9.2%	45.4%
Finland	40.5%	8.5%	51.0%	Slovenia	45.3%	13.3%	41.3%
Germany	39.9%	13.5%	46.6%	Estonia	45.0%	16.7%	38.3%
Greece	39.6%	11.7%	48.8%	Czech Republic	44.6%	28.1%	27.4%
Austria	38.9%	16.6%	44.5%	Portugal	44.4%	13.6%	42.0%
Iceland	38.6%	4.8%	56.6%	Greece	44.4%	15.2%	40.3%
Malta	38.1%	5.4%	56.5%	The Netherlands	44.3%	6.7%	49.0%
The Netherlands	37.2%	7.2%	55.6%	Slovakia	43.9%	11.6%	44.5%
Estonia	37.1%	12.4%	50.5%	Sweden	43.8%	10.1%	46.1%
Latvia	36.0%	20.3%	43.6%	Finland	42.9%	10.6%	46.5%
Cyprus	35.9%	9.5%	54.6%	Norway	41.9%	16.1%	42.0%
Sweden	35.8%	9.4%	54.8%	Spain	41.7%	23.6%	34.7%
Denmark	35.8%	10.0%	54.2%	Cyprus	41.4%	11.0%	47.6%
Switzerland	34.6%	6.4%	58.9%	Switzerland	41.1%	11.6%	47.2%
France	34.5%	13.7%	51.9%	Bulgaria	41.1%	12.5%	46.4%
Portugal	34.3%	8.0%	57.7%	Latvia	39.6%	13.6%	46.7%
Poland	34.3%	9.9%	55.8%	Ireland	39.5%	13.2%	47.3%
Latvia	34.0%	4.7%	61.3%	Croatia	39.5%	11.1%	49.4%
United Kingdom	33.5%	10.0%	56.5%	Malta	37.4%	8.7%	53.8%
Ireland	32.6%	6.8%	60.6%	Italy	37.1%	22.2%	40.7%
Croatia	29.7%	6.2%	64.1%	United Kingdom	37.1%	7.8%	55.1%
Luxembourg	29.5%	1.9%	68.6%	France	33.4%	7.7%	58.9%
Romania	22.3%	4.7%	73.0%	Poland	29.2%	8.0%	62.8%
EU28	**37.2%**	**11.6%**	**51.2%**	**EU27**	**41.0%**	**13.4%**	**45.6%**

Source: MORE3 EU HE survey (2016) and MORE3 EU HE survey (2012)
Notes:
- Based on question 79: "I have…"
- (n=8,073)

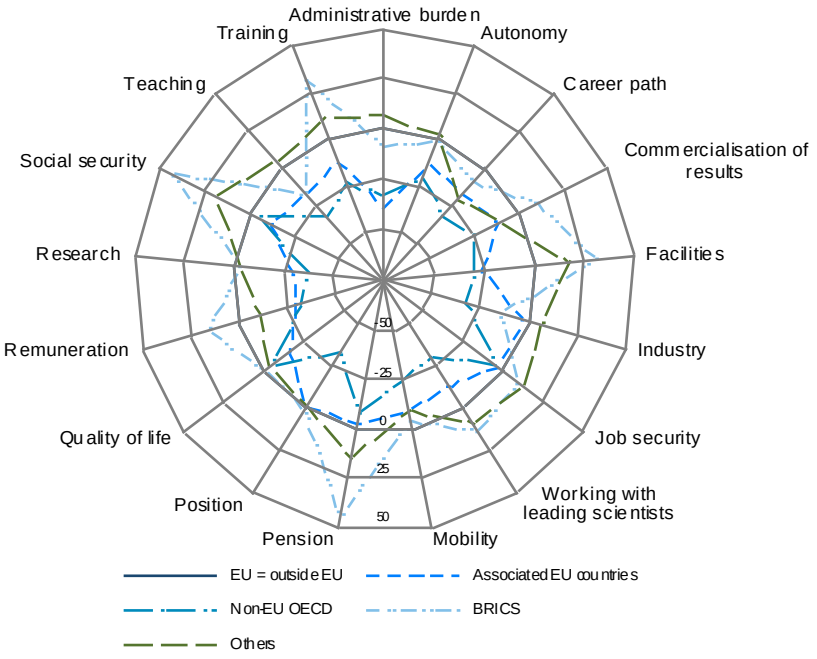
3.5. Attractiveness

Figure 167: Comparison between working outside the EU and working inside the EU as a researcher by region of citizenship, detailed indicators



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 47: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better outside the EU than in the EU."
- (n=339)

Figure 168: Comparison between working outside the EU and working inside the EU as a researcher by mobility experience, detailed indicators



Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 76: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better than in the EU."
- (n=805)

Table 75: Comparison between working outside the EU and working inside the EU as a researcher by region of citizenship

	Country Groups - Citizenship	EU-associated countries	non-EU OECD	BRICS	other
	Number of observations	31	87	90	131
Outside the EU is **better** than inside the EU regarding …	Attractive career paths	66,8	28,8	64,0	40,6
	Conditions for scientific knowledge Productior	46,5	31,7	51,0	29,7
	Engagement in Industry	44,7	16,6	49,6	23,4
	Mobility perspectives	58,6	32,6	74,4	36,0
	Availability of suitable positions	57,4	41,1	52,5	29,3
	Remuneration and other material factors	68,3	36,3	56,7	37,0
	Quality of training and education	24,1	26,6	56,5	34,6
Outside the EU is **worse** than inside the EU regarding …	Attractive career paths	8,8	18,6	13,0	45,9
	Conditions for scientific knowledge Productior	7,3	17,6	22,7	46,9
	Engagement in Industry	12,1	14,7	25,3	53,3
	Mobility perspectives	10,3	14,8	10,3	53,7
	Availability of suitable positions	8,8	26,1	24,3	42,7
	Remuneration and other material factors	9,9	21,9	20,0	42,8
	Quality of training and education	5,5	13,2	25,2	48,2

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 47: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better outside the EU than in the EU."
- Green = high compared to the average of the column; Red = low compared to the average of the column.
- (n=339)

Table 76: Comparison between working outside the EU and working inside the EU as a researcher by mobility experience

	Country Groups - Target countries	EU-associated countries	non-EU OECD	BRICS	other
	Number of observations	146	499	64	96
Outside the EU is **better** than inside the EU regarding …	Attractive career paths	30,5	40,1	24,2	46,2
	Conditions for scientific knowledge Productior	31,9	41,1	21,8	23,8
	Engagement in Industry	22,1	38,4	25,5	28,2
	Mobility perspectives	26,9	35,2	19,8	36,0
	Availability of suitable positions	24,1	43,0	21,7	27,9
	Remuneration and other material factors	29,7	32,4	15,8	25,8
	Quality of training and education	18,2	33,3	5,0	18,6
Outside the EU is **worse** than inside the EU regarding …	Attractive career paths	13,2	8,0	15,0	25,6
	Conditions for scientific knowledge Productior	8,9	10,7	24,1	29,8
	Engagement in Industry	15,0	9,6	23,1	26,5
	Mobility perspectives	17,7	10,9	16,4	27,3
	Availability of suitable positions	23,4	9,8	22,3	26,5
	Remuneration and other material factors	17,0	21,7	38,3	32,1
	Quality of training and education	6,5	10,1	36,3	29,2

Source: MORE3 EU HE Survey (2016)
Notes:
- Based on question 76: "How does working as a researcher outside the EU compare to inside the EU? Please indicate if something was worse, similar or better than in the EU."
- Green = high compared to the average of the column; Red = low compared to the average column.
- (n=805)

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The MORE III study aims at updating, improving 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 for the development of an open labour market for researchers. This study gathers data to highlight emerging policy needs and priorities regarding mobility patterns, career paths and working conditions of researchers.

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

Studies and reports

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