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Impact of Higher Education Internationalisation on the Economy

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Reinhilde Veugelers

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Results at a glance

When developing their international strategy, most higher education institutions (HEIs), including those in Europe, focus predominantly on international mobility and the recruitment of students and scholars, along with international reputation and visibility. Internationalisation at home is still left underdeveloped. And while most impact assessment exercises focus on the more easily traceable short-term economic gains from international mobility, the few studies taking a broader perspective show that the clearest positive effects are longer term, from improved career and labour market positions.

The evidence of a stronger intra-EU connectivity is good news for the EU's mission to establish a European Higher Education (EHEA) and a European Research Area (ERA). Yet it also raises a concern that the process of intra-EU integration may divert attention away from, or substitute for, connectivity beyond the EU.

Survey evidence confirms that the main motivation for scholars to go abroad is scientific. The scientific excellence/prestige of the foreign institution remains by far the main criterion used for selecting destinations. When looking at the effects of international mobility, the evidence shows not only that the best scientists are internationally mobile, but also that cross-border mobility comes with a boost in human capital quality that would be absent without mobility.

Overall, the evidence clearly shows how internationalisation and excellence go hand in hand. Internationally mobile individuals tend to be the more talented individuals among their peers, with their emigration typically creating a 'brain drain' for their origin country and their immigration a 'brain gain' for the destination country. But as emigration and immigration are closely correlated, open countries also benefit from 'brain circulation', where countries gain more excellence in net terms from the imported talents than what they lose from their exported talents. This, however, only holds for those countries with a high-quality local base. Countries with a weaker local base still gain from importing talent, but their quality loss from emigration is bigger. Returnees are a particular source of brain gain for these countries, even if the returning emigrants are not the best ones.

For countries to benefit from internationally mobile scholars, a virtuous circle needs to be sustained by creating a strong environment that attracts the best of international talents. This 'best of immigrated talents' will be a brain gain over locals that further boosts the country's overall excellence. This in turn improves the attractiveness of the country for the next influx. Successful examples of such virtuous circles are the US, Switzerland, the UK and the northern European countries.

To build such a virtuous openness-excellence nexus, an open and strong local education and research environment needs to be high on the policy agenda at joint EU, national and regional level. At the same time, barriers for international mobility should be removed. Survey evidence points to regulatory issues such as portability of pension rights and visa requirements being significant barriers. All these are straightforward targets for policy to remove, being mostly a national/regional policy competence. If virtuous mobility circles are broken by extra burdens on mobility, there could be significant long-term implications. The true impact of the current backlash against internationalisation of higher education in a more deglobalised, post-pandemic era is likely to be felt to its full extent in the longer term.

Executive Summary

The report studies the state-of-play of the internationalisation of higher education institutions (HEIs) and its effect on the economy. Although HEIs and governments are increasingly adopting internationalisation strategies and recognising its importance for generating benefits to society, the internationalisation of HEIs cannot be taken for granted. Despite the increasing drive for internationalisation of higher education, it is fair to say that the expansion process is not smooth. It is driven by a dynamic and constantly evolving combination of political, economic, sociocultural and academic rationales. This holds even more so in the current deglobalisation trend, itself spurred on by the Covid-19 crisis and its aftermath. This makes it all the more important to monitor the process of internationalisation of HE and to evaluate its effects. This, however, presents a challenge, as high-quality internationally comparable indicators for the various forms of internationalisation are underdeveloped and high-quality studies on the impact of internationalisation are rare.

This report reviews the available evidence on the status and trends in internationalisation of higher education, with a special focus on Europe, and with a focus on the most practised and prioritised types, namely incoming and outgoing student and researcher mobility and international cooperation in research. It also provides recent evidence on the possible impact of internationalisation on the economy via improved labour market outcomes and more successful career paths for mobile students and research staff. It reviews specific EU policy instruments for stimulating internationalisation of HE in Europe, namely, Erasmus+, Marie Skłodowska-Curie and European Research Council grants. Based on all this evidence, a series of policy recommendations are suggested.

Aperçu des résultats

Lors de l'élaboration de leur stratégie internationale, la plupart des établissements d'enseignement supérieur, y compris d'Europe, mettent principalement l'accent sur la mobilité internationale, le recrutement d'étudiants et de chercheurs et leur réputation et leur visibilité internationales, mais rarement sur l'internationalisation, qui reste sous-développée. Si la plupart des analyses d'impact se concentrent sur les gains économiques à court terme de la mobilité internationale, qui sont plus faciles à retracer, les quelques études qui adoptent une perspective plus large montrent que les effets positifs les plus évidents se voient à plus long terme, au niveau de l'amélioration des possibilités de carrière et de la situation sur le marché du travail.

La connectivité intracommunautaire semble plus forte, ce qui est une bonne nouvelle pour la mission de l'Union européenne visant à établir des espaces européens de l'enseignement supérieur et de la recherche (EEES et EER), mais d'aucuns craignent que le processus d'intégration intracommunautaire ne détourne l'attention de la connectivité au-delà de l'Union européenne ou ne s'y substitue.

Les études confirment que les chercheurs se rendent avant tout à l'étranger à des fins scientifiques. L'excellence et le prestige scientifiques de l'institution étrangère restent de loin le principal critère utilisé par les chercheurs au moment de sélectionner leur destination. L'examen des effets de la mobilité internationale révèle non seulement que les meilleurs scientifiques sont mobiles sur le plan international, mais également que la mobilité transfrontalière s'accompagne d'une amélioration de la qualité du capital humain, qui n'aurait pas lieu sans la mobilité.

Dans l'ensemble, les faits montrent clairement que l'internationalisation et l'excellence vont de pair. Les personnes mobiles sur le plan international ont tendance à être les plus talentueuses parmi leurs pairs, leur émigration créant généralement une « fuite des cerveaux » pour leur pays d'origine et leur immigration un « gain de cerveaux » pour le pays de destination. Mais comme l'émigration et l'immigration sont étroitement corrélées, les pays ouverts bénéficient également de la « circulation des cerveaux », c'est-à-dire que les pays gagnent plus d'excellence en termes nets grâce aux talents importés que ce qu'ils perdent à cause de leurs talents exportés. Cela ne vaut toutefois que pour les pays disposant d'une assise locale de qualité. Les pays ayant une assise locale plus faible tirent toujours profit de l'importation de talents, mais la perte de qualité due à l'émigration est plus importante. Ces pays bénéficient toutefois d'un « retour des cerveaux » lorsque les émigrants regagnent leur pays, même si les talents qui reviennent ne sont pas les meilleurs.

Pour tirer parti de la mobilité internationale des chercheurs, tout pays doit établir un cercle vertueux durable en créant un environnement solide qui attire les meilleurs talents internationaux. Les « meilleurs talents immigrés » représenteront un gain de cerveaux qui viendront s'ajouter aux talents locaux. Cela renforcera l'excellence globale du pays, ce qui, par voie de conséquence, permettra d'améliorer l'attractivité du pays vis-à-vis des prochains afflux de chercheurs. Les États-Unis, la Suisse, le Royaume-Uni et les pays d'Europe du Nord figurent parmi les exemples de cercles vertueux.

Pour créer un lien aussi vertueux entre ouverture et excellence, l'instauration d'un environnement local d'enseignement et de recherche ouvert et solide doit occuper une place de premier plan parmi les priorités politiques européennes, nationales et régionales. Dans le même temps, les obstacles à la mobilité internationale devraient être supprimés. Des études montrent que les questions réglementaires, telles que la transférabilité des droits à la retraite et les obligations de visa, constituent des obstacles

importants. L'élimination de ces obstacles constitue un objectif politique simple à accomplir, puisqu'il s'agit essentiellement d'une compétence politique nationale/régionale. La rupture des cercles vertueux de mobilité en raison d'obstacles supplémentaires à la mobilité pourrait avoir des implications importantes à long terme. Les véritables effets de la détérioration actuelle de l'internationalisation de l'enseignement supérieur dans une ère post-pandémique plus déglobalisée se feront probablement sentir dans toute leur ampleur à plus long terme.

Résumé

Le présent rapport fait le point sur l'internationalisation des établissements d'enseignement supérieur et aborde ses effets sur l'économie. Bien que les établissements d'enseignement supérieur et les autorités adoptent de plus en plus de stratégies d'internationalisation et reconnaissent l'importance de l'internationalisation en tant que source de bénéfices pour la société, cette internationalisation ne peut être considérée comme acquise. Malgré la tendance croissante à l'internationalisation de l'enseignement supérieur, on peut dire que le processus d'expansion ne se déroule pas sans accroc. Il est animé par une combinaison dynamique et en constante évolution de considérations politiques, économiques, socioculturelles et académiques. C'est d'autant plus vrai dans le contexte actuel de démondialisation, qui est lui-même stimulé par la crise de la COVID-19 et ses conséquences. Il est donc d'autant plus important de suivre le processus d'internationalisation de l'enseignement supérieur et d'en évaluer les effets. Cela représente toutefois un défi, car les indicateurs de haute qualité comparables au niveau international sur les différentes formes d'internationalisation sont peu développés et rares sont les études de haute qualité sur les effets de l'internationalisation.

Le présent rapport passe en revue les données disponibles sur l'état et les tendances de l'internationalisation de l'enseignement supérieur, en mettant l'accent sur l'Europe. Il aborde les types d'internationalisation les plus pratiqués et les plus prioritaires, à savoir la mobilité entrante et sortante des étudiants et des chercheurs et la coopération internationale en matière de recherche. Il fournit également des données récentes sur les effets potentiels de l'internationalisation sur l'économie (ex. : les étudiants et chercheurs mobiles ont plus facilement accès au marché du travail et réussissent mieux professionnellement). Enfin, en plus d'examiner les instruments politiques spécifiques de l'Union européenne visant à stimuler l'internationalisation de l'enseignement supérieur en Europe, à savoir les bourses Erasmus+, Marie Skłodowska-Curie et du Conseil européen de la recherche, le présent rapport inclut une série de recommandations politiques fondées sur les données recueillies.

Die Ergebnisse im Überblick

Der Fokus der meisten Hochschuleinrichtungen, auch in Europa, bei der Entwicklung ihrer internationalen Strategie liegt neben den Faktoren internationaler Ruf und Sichtbarkeit vorwiegend auf der weltweiten Mobilität und der Anwerbung von Studierenden und Wissenschaftlern. Die „Internationalisierung zu Hause“ ist jedoch immer noch oft nur ein Stiefkind. Der Großteil der Folgenabschätzungen konzentriert sich dementsprechend auf die leichter nachvollziehbaren kurzfristigen wirtschaftlichen Gewinne aus internationaler Mobilität. Die wenigen Studien, die eine umfassendere Perspektive einnehmen, zeigen jedoch insbesondere positive längerfristige Auswirkungen in Form von verbesserten Karriere- und Arbeitsmarktpositionen.

Der Nachweis einer stärkeren Vernetzung innerhalb der Europäischen Union ist eine gute Nachricht für das Ziel der EU, einen Europäischen Hochschul- und Forschungsraum (EHR und EFR) zu schaffen. Es lässt aber auch die Sorge aufkommen, dass die innereuropäische Integration von der Vernetzung über die EU hinaus ablenken oder sie ganz ersetzen könnte.

Umfrageergebnisse bestätigen, dass die Hauptbeweggründe für Wissenschaftler, ins Ausland zu gehen, wissenschaftlicher Natur sind. Die wissenschaftliche Exzellenz/Reputation der ausländischen Einrichtung ist weiterhin das bei Weitem wichtigste Auswahlkriterium. Hinsichtlich der Auswirkungen internationaler Mobilität zeigt sich nicht nur, dass die besten Wissenschaftler international mobil sind, sondern auch, dass die grenzüberschreitende Mobilität mit einer Verbesserung der Qualität des Humankapitals einhergeht, die es ohne diese Mobilität nicht gäbe.

Insgesamt geht aus den Ergebnissen klar hervor, dass Internationalisierung und Exzellenz Hand in Hand gehen. Grenzüberschreitend mobile Personen sind in der Regel die begabteren unter ihren Altersgenossen, wobei ihre Abwanderung typischerweise einen „Brain Drain“ für ihr Herkunftsland und ihre Zuwanderung einen „Brain Gain“ für das Zielland darstellt. Da aber Ab- und Zuwanderung eng miteinander verbunden sind, profitieren offene Länder auch von der sogenannten „Brain Circulation“, bei der sie insgesamt mehr an Exzellenz durch Immigration gewinnen als sie durch Emigration verlieren. Dies gilt jedoch nur für Länder mit einer qualitativ hochwertigen lokalen Basis. Staaten mit einer weniger ausgeprägten lokalen Basis profitieren zwar immer noch von der Zuwanderung von Talenten, ihr Qualitätsverlust durch die Abwanderung ist jedoch größer. Rückkehrer sind für diese Länder ein wichtiger „Brain Gain“-Faktor, auch wenn es sich bei diesen nicht unbedingt um die wirklich besten Köpfe handelt.

Damit Länder von grenzüberschreitend mobilen Wissenschaftlern profitieren können, muss ein positiver Kreislauf aufrechterhalten werden, indem ein für die besten internationalen Talente attraktives Umfeld geschaffen wird. Diese „besten Köpfe“ zu gewinnen, stellt einen „Brain Gain“ für das Land dar, der die Exzellenz insgesamt weiter erhöht. Dies wiederum steigert die Attraktivität des Staates für weitere Talente. Beispiele für solche positiven Kreisläufe sind die USA, die Schweiz, Großbritannien und die skandinavischen Länder.

Ein offenes und attraktives lokales Bildungs- und Forschungsumfeld muss ganz oben auf der gemeinsamen politischen Agenda der europäischen, nationalen und regionalen Ebene stehen, um eine solche Synergie von Offenheit und Exzellenz zu schaffen. Gleichzeitig sollten Hindernisse für die internationale Mobilität beseitigt werden. Umfrageergebnisse deuten darauf hin, dass rechtliche Fragen wie die Übertragbarkeit von Rentenansprüchen und Visabestimmungen erhebliche Hemmnisse darstellen. All

dies sind konkrete politische Fragen, die zumeist in die nationale/regionale Zuständigkeit fallen. Wenn positive Mobilitätskreisläufe durch zusätzliche Hürden durchbrochen werden, könnte dies erhebliche langfristige Auswirkungen haben. Die Folgen des derzeitigen potentiellen Rückgangs in der Internationalisierung der Hochschulbildung in einer deglobalisierten Post-Corona-Zeit werden in ihrer ganzen Tragweite wahrscheinlich längerfristig spürbar sein.

Zusammenfassung

In dem Bericht werden der Stand der Internationalisierung der Hochschuleinrichtungen und die entsprechenden wirtschaftlichen Auswirkungen untersucht. Obwohl Hochschuleinrichtungen und Regierungen zunehmend Strategien für die Internationalisierung verfolgen und auch deren gesamtgesellschaftlichen Nutzen anerkennen, darf eine solche Internationalisierung der tertiären Bildung nicht als selbstverständlich betrachtet werden. Die Internationalisierung der Hochschulbildung ist zweifellos im Aufwind, dieser Prozess verläuft aber beileibe nicht reibungslos. Sie beruht auf einer dynamischen Kombination aus politischen, wirtschaftlichen, soziokulturellen und akademischen Erwägungen, die sich immer wieder ändern. Dies gilt umso mehr angesichts des aktuellen Trends zur Deglobalisierung, der wiederum durch die Covid-19-Krise und ihre Folgen verstärkt wird. Dies unterstreicht die Bedeutung der Überwachung der Internationalisierung der Hochschulbildung und der Evaluation der entsprechenden Auswirkungen. Dies stellt jedoch eine Herausforderung dar, da international vergleichbare, qualitative hochwertige Indikatoren für die verschiedenen Formen der Internationalisierung noch im Aufbau sind und qualitativ hochwertige Studien über die Auswirkungen der Internationalisierung selten sind.

Dieser Bericht enthält einen datenbasierten Überblick zu Stand und Trends der Internationalisierung der Hochschulbildung, insbesondere in Europa, wobei der Schwerpunkt auf den häufigsten und prioritären Formen, nämlich der Mobilität von Studierenden und Forschern in beide Richtungen und der internationalen Zusammenarbeit im Bereich der Forschung, liegt. Auch aktuelle Erkenntnisse über die möglichen Auswirkungen der Internationalisierung auf die Wirtschaft durch bessere Arbeitsmarkterfolge und steilere Karrierewege von mobilen Studierenden und Forschungsmitarbeitern sind darin dargelegt. Näher eingegangen wird auch auf die spezifischen politischen Instrumente der EU zur Förderung der Internationalisierung von Hochschulen in Europa, nämlich Erasmus+, Marie Skłodowska Curie und Stipendien des Europäischen Forschungsrats. Auf der Grundlage dieser Erkenntnisse wird eine Reihe von politischen Empfehlungen vorgeschlagen.

1. Introduction

1.1 (Increasing) importance of internationalisation of higher education

Internationalisation of higher education is anything but a new phenomenon, since scholars were highly mobile even in medieval Europe. Erasmus is an exemplary pilgrim of this period, justifying why the EU's flagship mobility programme was named after him. Nevertheless, in current times, internationalisation of higher education has become a much more central component of HEIs' and national and EU policies, covering a broader range of activities and relying on more strategic approaches.

There are push and pull factors driving the trend towards the internationalisation of higher education, at institutional and policy level. Stakeholders are more aware of the advantages of the internationalisation of higher education, and this is a strong pull. The push comes from the increasing globalisation of economies and societies, and the growing importance of 'knowledge' as a driver for growth, which, supported by technology, improves international connectivity. For EU countries, this trend also holds a strong regionalisation dimension, backed by EU policy to establish an EHEA and ERA.

Yet, at the same time, internationalisation also increases pressure on HEIs, regions and countries to engage in a global 'war' to attract students and researchers and funding, and a further global 'war' for the top positions in world rankings.

Despite all the increasing attention on it, it is fair to say that internationalisation of HE is not a smooth expansion process, but one driven by a dynamic and constantly evolving combination of political, economic, sociocultural and academic rationales. This holds all the more in the current deglobalisation trend further spurred by the Covid-19 crisis and its aftermath. This makes it all the more important to monitor the process of internationalisation of HE and to evaluate its effects. This is, however, a challenge, as high-quality internationally comparable indicators for the various forms of internationalisation are underdeveloped and high-quality studies on the impact of internationalisation are rare.

1.2 The many faces of HEI internationalisation

Internationalisation of higher education encompasses many forms, the most typical of which include:

- short-term and long-term mobility of students, staff and researchers
- strategic partnerships in education, research and innovation
- shared or joint programme offers
- establishment of sites abroad and export of educational services.

In recent years, the concept of internationalisation has broadened to include internationalising at home as well as abroad. This encompasses internationalisation of the curriculum, transnational education (TNE) and digital learning. It was prompted by Jane Knight's broader 2011 definition for internationalisation as "the intentional process of integrating an international, intercultural or global dimension into the purpose, functions and delivery of post-secondary education, in order to enhance the quality of education and research for all students and staff, and to make a meaningful contribution to society".

This broader definition of internationalisation reflects the increased awareness that internationalisation has to be seen to be about more than mobility. The 'abroad' mobility component needs to become an integral part of the internationalised curriculum to ensure internationalisation for those 'at home' as well, through curriculum development. Knight also emphasises that internationalisation is not a goal in itself, but

a means to enhance quality and impact on broader dimensions of societal impact than economic effects.

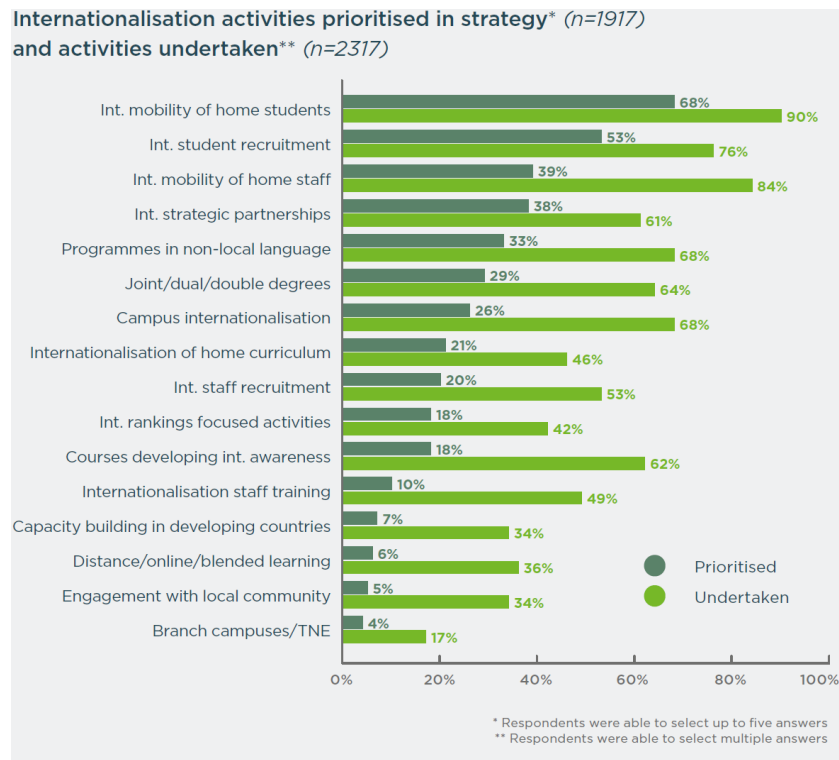
Yet despite the growing importance attached to this broader concept of HE internationalisation, most national strategies, including those in Europe, are still predominantly focused on mobility, recruitment and/or training of foreign students and scholars, and international reputation and visibility. Similarly, impact assessment studies still typically focus on economic net gains, most often on short-run economic costs and benefits. Two recent surveys on HEI internationalisation confirm that international (and especially outbound) student mobility is a key policy focus in internationalisation policies at host institutions.

The 2019 **global IAU** (International Association of Universities) **survey** results show that student mobility as a whole, be it incoming or outgoing, credit or degree mobility, is the top priority for HEIs in all regions, followed by strategic partnerships and international research collaboration. While HEIs seem to value the international experience of their staff, they still consider it as a plus more than a requirement. However, while student mobility remains the most important internationalisation activity, a more holistic approach to internationalisation does seem to be emerging, with internationalisation of the curriculum/at home being considered as important areas of internationalisation too. With respect to partnerships, universities are taking on a more strategic approach to identifying partners. In Europe in particular, substantial advances are being made in educational partnerships for joint programmes, joint bids for international projects and, where the legislation permits it, in double/joint degrees. <https://www.iau-aiu.net/Global-survey-on-Internationalization>

The 2019 **European EAIE (European Association for International Education) Barometer** confirms that student mobility was – and still is – an essential feature of internationalisation for European HEI (Figure 1). The internationalisation activities most commonly reported as being practised and/or prioritised are international mobility opportunities for home students, international student recruitment and mobility opportunities for home faculty/staff, followed by international strategic partnership building. Fewer respondents reported that their HEIs prioritised activities related to internationalisation at home. The least practised or prioritised activities were branch campuses and other TNE activities, which were noted as a priority by only 4% of respondents.¹ <https://www.eaie.org/our-resources/barometer.html>

¹ Although 28% of the UK respondents indicated their HEIs prioritise branch campuses and other TNE activities, this was not noted as a priority activity by a single respondent in 14 other EHEA countries.

Figure 1. Internationalisation priorities and activities undertaken by European HEIs



Source: EIAE Barometer (2019)

Survey respondents view regional/national-level policy as a key external driver and influencer of internationalisation policies at institutional level. At the same time the survey results highlight that there are still important barriers to be overcome, linked mainly to funding and regulatory constraints such as immigration rules, but also to institutional issues of language proficiency and the nature of engagement and reward from their staff. Despite the fact that internationalisation is well supported by policies at EU (and in many cases national) level, as well as by institutional strategies and structures, EIAE survey respondents highlighted that internationalisation is not properly funded, not supported by all internal stakeholders, nor recognised as an important feature of the work of faculty and staff in a number of HEIs. Respondents from Southern Europe were also more likely to cite inadequate national support infrastructure and the lack of a national/regional strategy for internationalisation (37%) as a key challenge.

1.3 Outline of the report

Although HEIs and governments are increasingly adopting internationalisation strategies and recognising its importance for generating benefits to society, the internationalisation of HEIs cannot be taken for granted. This report will provide the available recent empirical evidence on the status and trends in internationalisation of HE in Europe, with a focus on the most practised and prioritised types. Before we start this analysis, Section 2 first looks at the world rankings of HEIs and the position of European HEIs in these rankings. The increasing role of these international university rankings has increased the global competition pressure for HEIs (Vernon, Balas and Momani, 2018, Collins and Park, 2016, Teichler, 2017).

International student mobility is discussed in Section 3, while international research mobility and cooperation is discussed in Section 4. For each of these activities, we will look at the evidence in the literature on drivers and effects. This will allow us to read and interpret the recent evidence on patterns for each of them in terms of expected benefits and costs, and policy implications. Section 5 analyses specific EU policy instruments for stimulating internationalisation of HE in Europe. Section 6 concludes with a summary of major findings and policy recommendations.

2. European universities in world rankings

HEI world rankings have increased in number and the amount of attention paid to them. As the use of world rankings grows, so does the debate about their usefulness and accuracy. Many issues are debated: the limited set of attributes included in the rankings for which international comparable data are available; the focus on measurable outputs only; the failure to properly account for inputs; a language bias in favour of English speaking countries; and the risk of 'gaming', where institutions and countries focus on the components of the construction of the indicators they can influence without necessarily improving their overall quality. The discussion has made clear that the quality of universities cannot be precisely measured by mere numbers. Any ranking is therefore bound to be controversial and should be used with caution.

In contrast to other rankings, U-Multirank is a European ranking system that leaves the decision on the relevance of individual indicators to users. It does not produce composite scores because there is no sound methodological justification for 'adding up' the scores on diverse individual measures, or for weighting them to produce a single composite score as used in league tables. It therefore allows transparent comparisons rather than an oversimplified league table.²

Bearing in mind that university rankings should be used with caution, the next two sections consider the two most prominent world rankings of higher education institutes, the Academic Ranking of World Universities (ARWU) and the *Times Higher Education-QS World University Rankings* (THE).

2.1 ARWU ranking

The ARWU (better known as the Shanghai Ranking) is exclusively focused on the research performance of universities and does not include other (public) research organisations. It uses six indicators to rank universities on their research performance: the number of alumni and staff winning Nobel Prizes and Fields Medals; the number of highly cited researchers; the number of articles published in the journals *Nature* and *Science*; the number of articles indexed in the Science Citation Index Expanded and the Social Sciences Citation Index; and a per capita performance indicator, which comprises the scores of the previous five indicators divided by the number of academic staff.

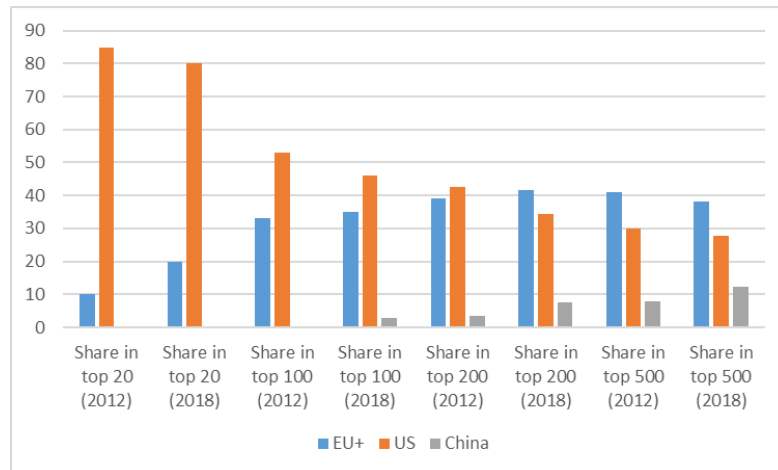
Figure 2 shows the trend in the performance of the EU+³ in the ARWU, relative to the US and China. It can be seen that US universities dominate the top of the ARWU, occupying 16 out of the top 20 places. Europe has improved its ARWU position, however, including at the top. It doubled the number of its institutions in the top 20 from two (both in the UK), to four (three in the UK; one in Switzerland), but these are not all EU-27. China is not yet in the top 20, but is slowly making its way there, with Tsinghua University, Peking University and Zhejiang University taking three positions in the top

² Based on empirical data, U-Multirank compares institutions with similar institutional profiles and allows users to develop personalised rankings by selecting performance measures/indicators in terms of their own preferences. <https://www.umultirank.org/>

³ EU+ refers to all 27 member states of the EU, plus the UK, Switzerland, Israel and Norway.

100. Despite progress, neither the EU+ nor China has been able to substantially challenge the US universities for top positions, although there is more turbulence lower down in the ranking.

Figure 2. Country/region's share of universities in the Shanghai ranking



Source: own calculations based on Shanghai Ranking Consultancy (2018)

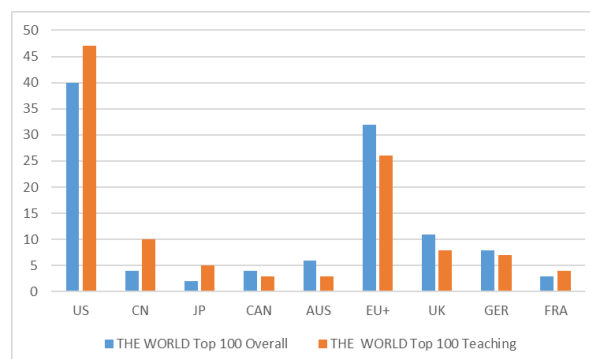
Note: EU+ refers to all 27 member states of the EU, plus the UK, Switzerland, Israel and Norway.

2.2 THE ranking

In contrast to the ARWU ranking, which only looks at research, the THE World University Rankings evaluates research-intensive universities across all their core missions: teaching, research, knowledge transfer and **international outlook**.

The performance indicators used for the THE ranking are grouped into five areas: research, citations and teaching are all weighted at 30%,⁴ while international outlook accounts for 7.5% and industry income for 2.5%. The international outlook score is based on three equally weighted components: (i) proportion of international students; (ii) proportion of international staff; and (iii) international collaboration (as measured by field-normalised co-publications).

Figure 3. Country/region's share of universities in THE global overall ranking (2019)

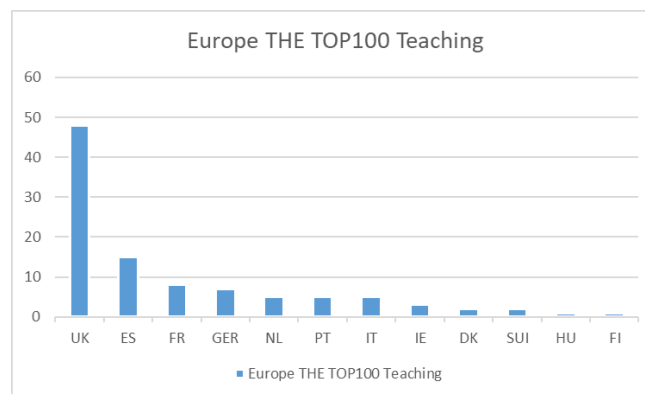


⁴ The research component contains reputation (from Academic Reputation Survey) (18%), research income (6%) and research productivity (6%). The teaching component contains reputation (from Academic Reputation Survey) (15%), staff-to-student ratio (4.5%), academic staff with PhDs (6%), doctorate-to-bachelor ratio (2.25%), and institutional income (2.25%).

Source: Own calculations based on THE ranking (2020)

Figure 3 clearly shows how US universities strongly dominate the world THE ranking and particularly for the teaching dimension. China and Japan also have a stronger share in the top teaching ranking than overall, leaving the EU+ with a smaller share in the top teaching ranking than overall. Within the EU+, the UK holds the dominant position overall, particularly in teaching. Figure 4 looks more closely at the **teaching ranking for European countries**. It shows the UK's dominance in the EU+ teaching ranking, taking up almost half of the top 100 positions in the THE European teaching ranking.

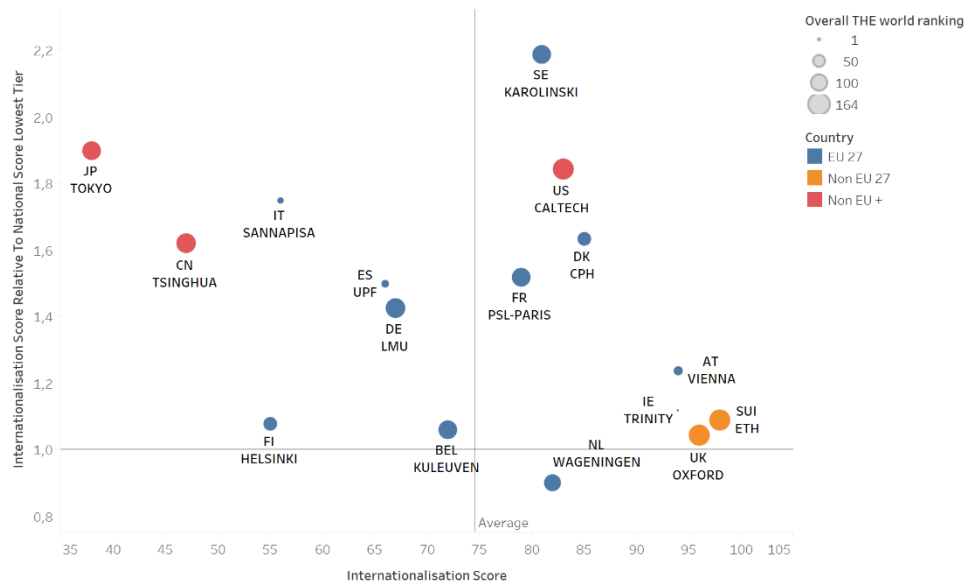
Figure 4. Country's share of universities in THE European teaching ranking



Source: own calculations based on THE ranking (2020)

Figure 5 takes the university in each major country which has the highest world THE overall score and shows this on internationalisation on the X-axis. Institutions from EU+ countries are indicated in blue. The position of the HEI in the THE ranking is reflected in the size of its bubble. Most countries' top performing HEIs score high on internationalisation. These top THE HEIs have an average score equal to 75 on 100 for internationalisation. More than half of them have a score higher than 75%.

Figure 5. International orientation of top THE HEIs per country (2019)



Source: own calculations based on THE ranking (2020)

Note: The X-axis has the score of each HEI on 100 in the THE ranking for internationalisation. The Y-axis has their score on internationalisation relative to the score of the HEI from their country which comes first in the top 500 to 1000 of the overall THE ranking.

The Y-axis of Figure 5 has the score on internationalisation for each top HEI, relative to the score on internationalisation of lower tier peers of their country. Almost all of these top institutions are more internationalised than the HEIs in their country that are lower down the HEI ranking (as the relative internationalisation on the Y-axis indicates). Those top institutions with internationalisation scores of less than 75 (on the left side of the figure) are based in countries with limited internationalisation. Yet even these top HEIs all score higher than the peers in their country that are lower in the HEI ranking, as their relative internationalisation score highlights. The top HEIs that don't score much higher than their bottom country peers are all located in countries where the internationalisation score is high across the range of HEI. The UK, Switzerland, the Netherlands and Ireland are countries where all HEIs have a high internationalisation score.

In summary, as there are no HEIs in the lower left quadrant in Figure 5, all top HEIs have either a high or higher than their country average internationalisation score. All this reflects how top-ranked HEIs in a country are all intense practitioners of internationalisation, or at least more than the lower tier peers from their country.

3. Drivers and impact of internationalisation of higher education in Europe: international student mobility

To assess the costs and benefits of international student mobility to sending and receiving countries, and to design efficient policies to encourage the international movement of students, it is necessary to identify who moves *from* where *to* where, and why.

3.1 Drivers of international student mobility: a review of the literature

Different strands of academic literature have put forward different reasons for the migration of students between countries or regions. First, from a human capital perspective, migration is considered an investment and the decision to move is made to access better education and job opportunities and/or to increase future income. Second, migration can also be viewed as a consumption choice, where people move for non-pecuniary reasons, such as seeking better local amenities. Students not only focus on the future returns that new skills will provide for them, but also take into account the context in which they will live, work and study (Sá et al., 2004, Agasisti and Dal Bianco, 2007, Beine et al., 2014).

There are both push and pull factors that affect student mobility as people decide where to move from and to. Push factors relate to the home country/region and the student's decision to study overseas, while pull factors relate to the host country and those factors that make countries/regions more attractive than other potential destinations. Student migration is mainly driven by differentials in education capacity (i.e. a lack of educational facilities in the country of origin, and the quantity, quality and prestige of educational institutions in the country of destination). It is also driven by differentials between origin and destination countries in the costs and funding available for higher education, and differentials in returns or rewards for education and skills.

Both economic and non-economic factors will count in the decision to move. Economic factors include better economic performance by the host country, exchange rates, more affordable mobility (due to lower tuition fees or higher education subsidies, for instance) and higher quality education in the host country. The decision to study abroad may also be determined by non-economic factors, such as political stability or cultural and religious proximity between origin and destination (OECD, 2019).

Sanchez-Barrioluengo and Flisi (2017) in an econometric analysis of international mobility of students in the EU find that institutional characteristics, in particular better research-quality universities with a higher reputation, are found to be more important than regional characteristics of the host (urbanisation, employment opportunities and quality of the education system⁵) as drivers of international mobility. All this confirms the importance of HEIs and their internationalisation strategies for countries' performance on internationalisation of HE. Characteristics of host universities, including teaching load, student fees, research excellence and reputation, are an important determinant of their attractiveness. This holds more for degree mobility than for credit mobility, which tends to be more equally distributed across member states.⁶

Abbott and Silles (2016) confirm that the perceived quality of education abroad and the perceived value of host institutions are critical for international students when selecting their country of destination. Top-ranked HEIs are therefore the most sought-after destinations for internationally mobile students. Students worldwide are increasingly aware of differences in quality among tertiary education systems, with university league tables widely consulted (as discussed above).

⁵ Unfortunately, the availability of public funding for higher education was not included as an environmental characteristic.

⁶ **Degree mobility** involves the enrolment in a degree programme in the country of destination. **Credit mobility** is defined as temporary tertiary education and/or study-related traineeship abroad within the framework of enrolment at a 'home institution'.

3.2 Effects of international mobility of students: a review of the literature

When assessing the effects of the internationalisation of HEIs, benefits and costs can be grouped as direct or as indirect or external effects. They can be looked at from various perspectives: from that of the individuals, from the HEIs, as well as from the perspective of regional and national economies and from a global perspective. For reviews of benefits and costs of internationalisation, see e.g. de Villé et al., 1996, Throsby, 1991 & 1998, CPB (2012), London Economics (2018), OECD (2018), Dewitte et al., (2020).

Direct costs for the host environment relate to the general costs of supplying educational services to international students and employing foreign researchers. They also include specific support expenditures for international students and scholars, connected to, for example, international offices, grants to attract international students and faculty, and contributions to international networks. There are also direct public social costs that the presence of international students and scholars in the country bring about, mainly in healthcare and social security.

Tuition fees, for example from non-EEA students in Europe, also provide direct benefits, depending on the country of residence. The non-tuition fee expenses of scholars and students, as they purchase goods and services, generate income for the supplying industries and, hence, for the national economy. Further benefits derive from scholars' and students' relatives and friends, who visit the hosting country and spend money that again affects the overall economy. There are also direct social benefits that arise from private social contributions related to healthcare or social security expenditures from employed foreigners.

But perhaps the highest benefits arise from the **increased human capital** of international students and scholars. The extent of these effects will depend on the quality of the mobile student or scholar and the match between the mobile individuals and their host and home environment. These effects will play out particularly in the **long-term** effects on labour market outcomes. International experience prepares new generations of researchers and highly skilled workers for academia and for other sectors of the economy. Who benefits from these effects depends on the retention rate in the host country when international students and scholars graduate or complete their research and subsequently return home or not, and the labour market positions they take up. The effects are also likely to differ depending on the type of students.

There are also external or indirect effects from international mobility. First, there might be externalities that are driven by effects on peers, i.e. fellow students and researchers in the host environment. These effects will depend on the quality increment which international students and scholars may bring to their local host environment and its absorptive capacity. An additional indirect effect that is identified in the literature is the effect on the economy through economic multipliers from input-output links to other sectors in the economy from the direct effects on other economic sectors.

Additional indirect effects are discussed in the literature but are typically more difficult to measure. Indirect effects can arise from the integration of different cultures that may result in a positive multicultural environment, or, conversely, feed a more closed local cultural environment. Finally, internationalisation leads universities to compete for a global pool of talents, fostering competition and increasing visibility and reputation, which is expected to be more generally beneficial. The presence of international students and scholars is also expected to play a positive role in attracting foreign trade and investment and in increasing the diplomatic influence of the hosting nations, when a closer relationship is fostered with the students' countries of origin.

There are also potential indirect costs to internationalisation to be considered. The higher revenues and positive external effects to be expected may encourage universities to enrol more international students and recruit foreign faculty rather than recruiting domestic ones. Given the capacity constraints of university facilities, this could displace domestic students and scholars.

When looking at the empirical evidence, there is a considerable consensus on the positive net impact of international mobility of students, certainly in the long run. Several studies have tried to quantify the direct and indirect costs and benefits associated with the internationalisation of students (Throsby, 1998, Centraal Planbureau, 2012, London Economics, 2018, De Witte et al, 2020). In 1998, Throsby carried out a comparative analysis at the institutional as well as the national level for Australia, Germany and the UK. This study was confined to short-term effects and the findings suggested that incoming students in the UK and Australia yielded neither a significant surplus nor a deficit.

A more recent report by the Centraal Planbureau (CPB, 2012) models costs and benefits in the Netherlands, both during studies and after graduation, and for both incoming and outgoing students. Costs and benefits were considered during the timeframe of studies, and after that, based on a retention rate for graduate students, calibrated at 19%. The results showed net benefits corresponding to 0.12% of GDP. The study also showed how critical the retention rate was for generating an overall net positive benefit. The CPB study also attempted to analyse the impact of externalities in terms of quality of international students compared with Dutch students. They found that international students were more likely to gain their degree on time and obtained higher grades than Dutch students.

The Dutch evidence would suggest that there is scope for positive externalities on local peers, by having higher quality foreign peers to learn from. But these externalities on local peers were not explicitly measured. London Economics (2018) analysed the costs against the benefits for the UK that were generated by international students enrolled in the 2015/16 UK academic year. In terms of the costs, the study considered teaching grants, student aid and other public costs such as healthcare, housing, social security and child-education expenditure. In the case of benefits, the study associated the benefits with fee income, non-fee expenses such as accommodation, subsistence, course costs and spending on children. The report also tried to assess the impact of visitor income, and revealed a benefit-cost ratio of 4.6 for EU students and 14.8 for non-EU students. The latter results were strongly influenced by the higher tuition fees paid by non-EU students in the UK. In 2019, London Economics looked at the benefits for the UK economy from international students after their graduation (up to 10 years later). With a high retention rate (for example, 37% for EU PhD students after one year, to 26% after 10 years), the UK economy ends up with considerable benefits. They also show how international students are particularly likely to fill up positions where the UK faces acute skill shortages, such as digital skills, thus minimising the crowding-out threat.

Bergerhoff et al. (2013) use a macro-economic growth model based on the Lucas model⁷ to calibrate the potential growth effects of HE internationalisation on the national economy. In their two-country model, assuming that individual students only go abroad when it is beneficial to them, they show how in the long run internationalisation is always beneficial for both countries. The distribution of the gains between host and home

⁷ In the Lucas model, the population is divided into workers, students and teachers. Output depends on capital and effective workers (human capital). Education is necessary for the creation of human capital. Educational productivity can differ across countries. Students can take education at home or abroad (Bergerhoff et al., 2013).

countries, however, depends on a number of critical parameters, such as the rate of internationalisation and the probability of staying in a foreign country. Looking at long-term growth, the host country benefits if it attracts many foreign students who then stay in the country, improving its labour market outcomes (cf supra). A policy to open up universities for foreign students therefore needs a complementary policy to make the labour market attractive for these foreign students. Countries that emphasise short-term effects are more likely to limit access for foreign students to avoid the costs of education, which in turn lowers short-term output.

In summary, the literature shows that the benefits from internationalisation can be substantial, provided a long-term perspective is taken. The long-term effects of contributing to knowledge creation, innovation and economic performance come from the integration into the domestic labour markets. But these effects depend critically on stay rates after graduating. According to Oosterbeek and Webbink (2011) and Parey and Waldinger (2010), studying abroad, and the number of months spent studying abroad, increases the probability of working abroad later in life. The OECD (2009) estimated that the stay rate of foreign students is between 15% and 35% for most countries.

For students at masters or doctoral level, the long-term positive effects can be expected to be even more significant, as they may contribute to research and development in the host country, initially as students, but even more importantly, later on as researchers or highly qualified professionals in the workforce. These long-term benefits can quickly outperform any short-term benefits from tuition fees, living expenses or relatives visiting. The scale of these positive effects is, however, again critically determined by the retention rate and the quality of those staying.

Internationalising is not only a win for the host economy, but can also be a win for the home economy because mobile students, even if they stay in the host country, can also make positive contributions to their home countries, for example by building business networks there (Docquier and Lodigiani, 2010, Flisi and Murat, 2011).

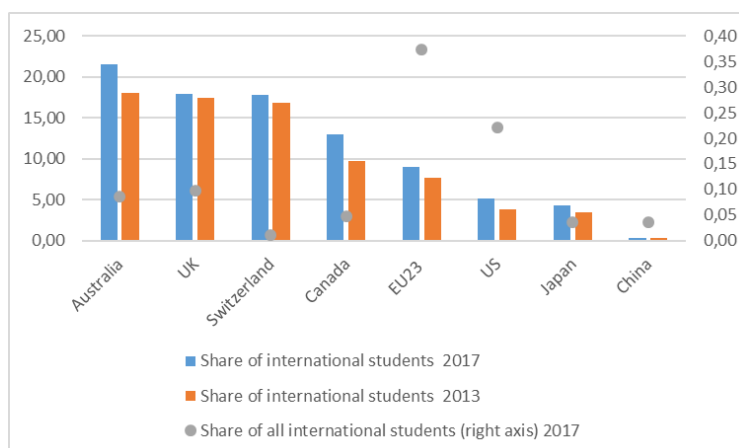
3.3 Recent evidence of international student mobility in the EHEA

3.3.1 Major destinations

Figure 6 shows the major destination countries for internationally mobile students. English-speaking countries are the most attractive student destinations overall, with three countries (the US, the UK and Australia) receiving more than 40% of all mobile students in OECD and partner countries. As a destination country, the US alone accounts for 22% of the total international education market share in OECD and partner countries (about 18% of the number of mobile students globally). Australia and the UK each have between 9% and 10% of the market share for OECD and partner countries. The US has an even higher share at doctoral level, hosting 26% of the internationally mobile doctoral students in OECD and partner countries.

The European Union is a key geographical area for inward mobility, with 1.7 million mobile students enrolled in the EU-23, which makes the EU as a region the largest destination in the world, as the right axis of Figure 6 shows. Expressed as a share of all tertiary students (left axis), the EU-23 has a much higher share of foreign students than the US, with Asia (Japan and China) far behind. Australia, the UK, Switzerland and Canada are the countries with the highest share of foreign students. In all countries and regions, the share of foreign students keeps increasing over time.

Figure 6. Destination countries/regions for international students worldwide



Source: based on Education at a Glance 2019: OECD indicators

Note: Left axis is for the bars, showing the share of all students of a country/region which are international. Right axis is for the bullets, showing the share of a country/region of all international students worldwide.

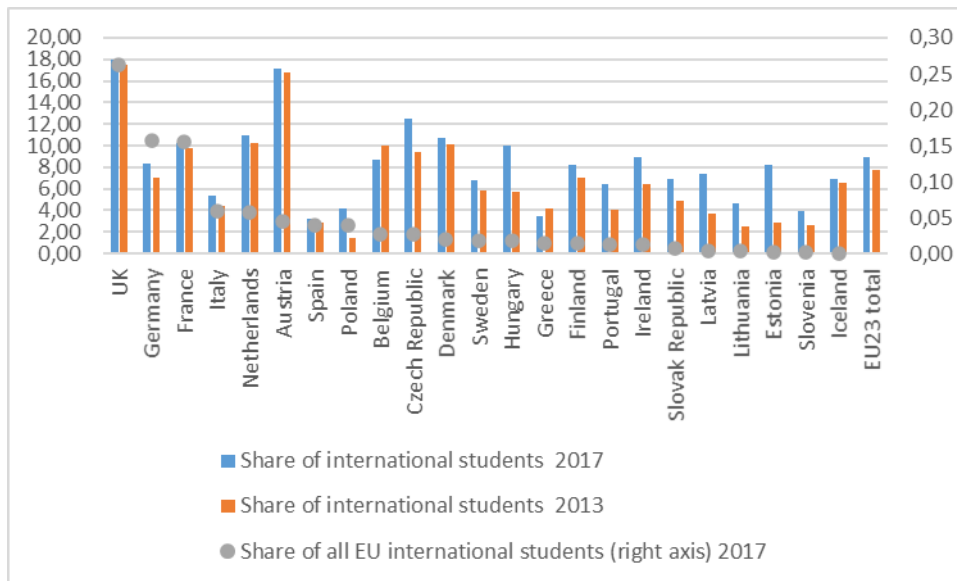
EU-23 includes the countries that are members of the EU and OECD (AT, BE, CZ, DK, EST, FIN, FR, DE, EL, HU, IE, IT, LV, LT, LUX, NL, PL, PT, SK, ES, SUI, UK).

Figure 7 (right axis) details further how the inflow of foreign students in the EU-23 is distributed among EU-23 countries. The UK is by far the largest destination, followed by France and Germany (both with nearly 260 000 students). In turn, these three countries are far ahead of Italy (98 000), the Netherlands (96 000), and Austria (74 000) (OECD, 2019).

The UK and Austria are the European countries with a high share of foreigners among their students. Spain, Italy and Greece have a low share of foreign students. Among EU-13 countries,⁸ the Czech Republic and Hungary have increased their share of foreign students substantially, as has Estonia and Latvia.

⁸ EU-13 are the 13 countries added to the European Union in 2004 - Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

Figure 7. Destination countries for international students within the EU



Source: own calculations based on OECD (2019), Education at a Glance

3.3.2 Foreign students by level of study and field

The proportion of internationally mobile students is higher at graduate than at undergraduate level and is the highest among doctoral students (OECD, 2019). The foreign rate of doctoral and masters' students relative to bachelors' is particularly high in the UK, the US and Switzerland.

Table 1. Incoming student mobility in tertiary education, by level of study (2017)

	All tertiary	Bachelor	Master	Doctoral
UK	18	14	34	42
Switzerland	18	10	29	55
Germany	8	5	14	10
Italy	5	5	5	15
EU23	9	7	13	22
US	5	4	13	26
OECD	6	4	13	22

Source: Education at a Glance 2019: OECD indicators

Note: numbers are the share of students that are international for a country/region for various levels of study.

In terms of the fields of study, the share of foreign students is highest in the social sciences and humanities, especially in the EU-23.

Table 2. Distribution of international students by field of study (all tertiary students) (2017)

	SOCIAL SCIENCES & HUMANITIES	NATURAL SCIENCES	ENGINEERING	MEDICAL
EU23	54	15	17	11
UK	61	16	15	7
Switzerland	52	20	18	8
US	50	20	20	7
OECD	55	15	18	9

Source: Education at a Glance 2019: OECD indicators

3.3.3 Major countries of origin

For all OECD countries, the major country of origin of international students is Asia; the major origin country is China. Two thirds of Asian students converge on just five destination countries: Australia, Canada, Japan, the UK and the US.

The second major region of origin of international students is Europe, which makes up 24% of all mobile students enrolled in OECD countries.

European international students prefer to stay within Europe; their share reaches 42% of mobile students enrolled in the EU-23 countries. Intra-EU mobility is thus an important part of international mobility for European students. Europe is also a major origin region for incoming students to Switzerland.

Table 3. Distribution of international students by region of origin (2017)

	Asia	Europe	Africa	Others
EU23	32	42	13	14
UK	53	32	7	8
Switzerland	11	72	5	12
US	77	7	5	12
OECD	56	24	8	13

Source: Education at a Glance 2019: OECD indicators

3.3.4 The attraction and stay rates of international students in the US

In this section we focus on the US as destination for international students. On an individual country basis, the US remains the most important destination country for foreign students, as documented above. The US regularly reports statistics on foreign students as part of the science and engineering indicators (SEI) reported by the National Science Foundation (NSF). These numbers show that science and engineering (S&E) graduate students with temporary visas have become an increasingly important part of US graduate enrolment. In 2015, about 240 000 international students on temporary visas were enrolled in US S&E graduate programmes, representing 36% of total US

graduate enrolment (up from 26% in 2008). In some fields, including computer sciences, engineering, mathematics and statistics, and economics, the majority of enrolment is foreign (National Science Foundation, 2018).

Similarly, high foreign penetration rates hold at the doctoral level. International students on temporary visas obtained more than 15 000 S&E doctorates in the US in 2015, up from about 8 000 in 2000, representing a share of 34%, up from 30% in 2000. In engineering, mathematics, computer sciences and economics, foreign students gained more than half of the degrees.

Chinese students obtained more than a quarter of all the international S&E doctorates awarded in the US. More than one third of Chinese students in the US gain their S&E doctorates in engineering.

Compared with Asian and Chinese students, European students gained far fewer US S&E doctorates and tended to focus less on engineering than their Asian counterparts. The largest numbers of European students who achieve S&E doctorates in the US come from Germany, Italy, Romania, Greece and France, in that order. The number of EU-13 students gaining S&E doctorates at US universities nearly doubled between 1995 and 2007 but has since declined. The number of US doctorate recipients from other EU countries has been more stable overall.

As most of the benefits for host countries from international students come from the longer-term labour market effects (as discussed above), keeping the best foreign students after they graduate matters. The US keeps track of these stay rates. For the EU, no similar regular statistics on stay rates are available. Table 4 shows that about 70% of temporary visa holders earning a US S&E doctorate are still in the US five and 10 years later. Chinese graduates have the highest stay rate, with 90% of those who graduated in 2005 still in the US 10 years later. The stay rate for Europeans is much lower, but still substantial: 65% of those who graduated in 2005 are still in the US 10 years later.

Table 4. The attraction and stay rates of international students in the US

Country of citizenship	2010 foreign doctorate recipients (share)	5-year stay rate (%)	2005 foreign doctorate recipients (share)	10-year stay rate (%)
Total	100	70	100	70
China (incl Hong Kong)	29	85	34	90
India	17	83	11	85
Europe	11	64	12	65
North and South America	10	53	11	50
South Korea	10	66	9	56

Source: own calculations based on NSF/SEI (2018), temporary visa holders receiving S&E doctorates in 2010 and 2005 who were in the US in 2015, by country of citizenship at time of degree

4. Drivers and impact of internationalisation of higher education in Europe: international researcher mobility and cooperation

It is generally understood by policymakers and the wider stakeholder community that the mobility of research staff is beneficial for improving the quality of research, but also for improving the quality of higher education, developing the circulation of knowledge and supporting student mobility. The role of academic researchers in internationalisation of HE goes beyond their own internationalisation, as it will also affect the internationalisation of education in their institution. Postiglione and Altbach (2013, p. 11) state: "It would seem obvious that those who teach at a university, the academic staff, are key to any academic institution's internationalisation strategy. After all, the professors are the people who teach the classes at a branch campus, create the curricula for franchised programmes, welcome international students into their classrooms, collaborate with others, and the like. Indeed, without the full, active and enthusiastic participation of the academics, internationalisation efforts are doomed to fail."

This section will focus on foreign academic staff and international collaboration in science (as witnessed by co-publications) as the major forms of internationalisation of research. While academic visits and exchanges are quite common practice in most universities, the most engaging form of internationalisation is employment. By making the decision to look for employment in the academic sector outside their country of nationality, academics make a long-term commitment. In turn, attracting foreign academic staff is a key dimension of the global competition between universities. By hiring foreign academics, institutions make a commitment to internationalisation that has long-term implications.

4.1 Drivers of international researcher mobility: evidence from surveys

Most of the empirical evidence on the subject has been derived from surveys of academics. These studies mostly focus on individual motives for becoming internationally mobile.

Results of a large-scale survey on international mobility of researchers (SCIGLOB) covering 16 countries and four disciplines (biology, chemistry, earth and environmental sciences, and materials science) indicate that the main motivation for going abroad is scientific interest (Franzoni, Scellato and Stephan, 2015). This includes the opportunity to improve future career prospects, collaboration with outstanding faculty, colleagues or research teams. Related to this main motivation, the excellence/prestige of the foreign institution in one's own area of research is a main selection criterion. This confirms the importance of global ranking of universities (as discussed above). In contrast, the main motivations for returning home are personal and family based.

A large-scale survey on mobility patterns and career paths of EU researchers, funded by the EC,⁹ confirms the SCIGLOB results that better research environments and the quality of the destination research environment are the major motives for EU researchers to be internationally mobile. This holds even more so when EU researchers move outside the EU (Veugelers & Van Bouwel, 2015).

The OECD-UNESCO-EUROSTAT survey of doctorate holders (Auriol, 2010, Auriol, Misu and Freeman, 2013, OECD, 2014) confirms that the preferred destination for European researchers going abroad is another European country. This led some authors

⁹ For more information on the MORE survey and its various waves, see <https://www.more3.eu/project-description>

to state that “there is not any evidence yet to believe that there is a loss of talent in Europe as a whole, at least when it comes to the mobility of doctorate holders. The international mobility of scientists, in general, and of doctorate holders tends to be mainly intra-EU mobility” (Chaminade and Plechero, 2016).

However, surveys targeting researchers with the highest potential show a different pattern. A commonly used definition for high quality researchers is scientists who receive a number of citations that are in the top 1% of the world distribution of citations in their discipline. For these star scientists, the central place to go is the US (Schiller and Diez, 2010).

Similar results showing a stronger preference for the US as a destination for better researchers are obtained by Veugelers and Van Bouwel (2015). They use data from the MORE survey, more particularly the part covering EU-US post-PhD mobile researchers. Their results show that international student mobility during the PhD is an important determinant of the decision to go abroad after the PhD. At the same time, prior intra-EU mobility during the PhD motivates researchers to remain mobile, but to select European countries as their destination rather than the US. Conversely, PhD graduates who put strong motivational emphasis on career and working with star scientists are significantly more inclined to choose the US as a destination.

4.2 Effects of international researcher mobility: evidence from surveys

As most evidence on the subject has been derived from surveys of academics, the focus of the studies looking at the effects of international research mobility has been on the implications for scientific performance and resulting career impacts for the individual researcher (Geuna, 2015).

In general, the literature agrees that internationally mobile researchers are more productive and have a higher propensity to establish larger international networks than researchers remaining at home for the duration of their entire career (Schiller and Diez, 2010, Tripl, 2012).

A major issue in assessing the effects of international mobility on scientific performance is disentangling the selection and treatment effect, as better students tend to be the ones who go abroad.

Scellato, Franzoni & Stephan (2014), using the GLOBSCI survey (cf supra), found that not only are the best scientists internationally mobile, but that cross-border mobility also comes with a boost in research quality that would be absent without mobility. Higher scientific productivity is measured through an increased number and quality of subsequent publications.

Using large-scale survey data (MORE) on European researchers who have been mobile after their PhD, Veugelers and Van Bouwel (2015) found similar positive self-reported effects from mobility on improved research productivity. Respondents also reported other related positive effects on their research career, such as improved access to a network of experts.

Similar advantages have been identified at the institutional level, where it has been shown that hiring researchers trained in the institution, so-called inbreeding, is detrimental to scientific output (Horta et al., 2010).

While the evidence of positive effects on the scientific productivity of mobile researchers is clear, the analysis of effects becomes more complicated at the country level. The countries of origin fear the ‘brain drain’ of losing a share of their scientific talent (Veugelers, 2017). Within the EU, there is a particular fear that the most talented

scientists will be lost to the US, and, within Europe, that southern and eastern European countries will lose talent to Western and Northern Europe. Van Bouwel & Veugelers (2014) find that EU researchers mobile to the US in particular are more likely to be strongly career motivated (which can be interpreted as code for 'talent'¹⁰), compared with their intra-EU mobile peers. Those mobile European researchers who went to the US were significantly more likely to report strong positive career effects than their mobile peers who moved within the EU (up to twice as high). Interestingly, this 'US destination premium' seems almost entirely due to selection. Once this selection is accounted for, there are no longer any significant differences in productivity effects between US-mobile and intra EU-mobile researchers. These results suggest that the US manages to attract the better type of EU researchers, supporting brain drain concerns for the EU. Yet, as these more talented EU mobile researchers are more likely to experience bigger positive effects from their mobility to the US, this higher human capital could still be beneficial to the EU if and when these mobile researchers return to the EU, or when they stay connected to their home environment, for example through scientific collaboration. The substantial return rates, although still smaller than the stay rates for EU students in the US (as discussed above), are nevertheless higher than for Asian students in the US, and are suggestive of such positive effects.

What matters beyond the stay rate is the quality of those who stay. In a further search of possible brain drain from Europe, Van Bouwel & Veugelers (2014) examined the return choices of a sample of Europeans pursuing PhD degrees in economics in the US. Better students who graduated from top US institutes are more likely to stay in the US, conditional on finding a first job at a top institute. The probability of these top individuals returning to Europe later on in their career becomes very small.

The more recent literature suggests moving *beyond the traditional brain drain-gain debate* to a positive-sum brain circulation perspective in which mobility generates productivity gains that could benefit both the outgoing and the incoming country (Canibano, Vertesy and Vezzulli, 2017). These positive sum effects can come from internationally mobile researchers keeping strong connections with their origin country, such as through collaborative research (Baruffaldi and Landoni, 2012), and from internationally mobile researchers returning home and bringing to their home environment connections built up in their destination environment (Baruffaldi and Landoni, 2012).

4.3 Evidence on internationalisation of academic staff and its effects from official statistics

Most information on researchers' mobility comes from researchers' surveys. While providing important insights into the characteristics of mobile researchers, on mobility determinants and outcomes, most survey-based literature does not allow for generating a systematic overview of mobility and internationalisation of academic staff in European higher education. For this we have to revert to official statistics on foreign academic staff, which are unfortunately very poor, particularly statistics comparable across countries, fields and time.

¹⁰ Unfortunately, the survey does not provide a direct measure of ability. We can only capture researchers' ability indirectly with such variables as the scientific quality of the PhD-granting country or career motivation of the respondent (assuming that more talented researchers are more likely to be career motivated when mobile).

4.3.1 Foreign faculty in the US

As the review of the survey literature made clear, the US is a favoured destination for internationally mobile academics, especially the most talented ones. The US regularly traces the share of academic positions taken up by foreigners (non-US citizens or foreign-born but naturalised) as part of the science and engineering indicators (SEI) reported by the NSF. The SEI 2018 report shows that 28% of its full-time (FT) faculty staff is foreign. This share rises to 50% among the young generation of post-docs (SEI 2018). The share of foreign faculty is much higher in engineering, where more than half of the FT faculty is foreign and about three out of four post-docs are foreign. In the physical sciences as well, more than one third of the FT faculty is foreign and more than half of the post-docs are foreign. Social sciences and humanities score lower on internationalisation of their faculty.

Table 5. Share of foreign faculty in the US (2015)

	All positions	Full-time faculty	Post-docs
ALL	30	28	50
Physical sciences	36	35	56
Engineering	53	54	73
Life sciences	26	21	47
Social sciences & humanities	19	19	25

Source: own calculations based on NSF, SEI 2018

4.3.2 Foreign faculty in the EU

Official statistics on foreign faculty in the EU have long been unavailable. More recently, data have become available through the European Tertiary Education Registry (ETER) project (European Commission/EACEA/Eurydice, 2015).¹¹ ETER provides systematic evidence on the internationalisation of academic staff across a large number of countries and at the level of individual HEIs.

Bonnacorsi et al., (2018) used the ETER database to analyse foreign staff at HEI in Europe covered by ETER. Out of the 37 countries covered by ETER, data on foreign staff is only available for 19 countries (combining different years) and slightly more than 1500 HEIs. Data is available for all countries in Western Europe (except for Ireland and the French-speaking part of Belgium), but unfortunately not for Eastern Europe. Foreign academic staff is defined as academic staff not having the citizenship of the country in which the HEI is established. Academic staff includes professorial positions as well as several types of teacher and researcher positions, including, in some countries, a large share of PhD students. A main limitation is that data are not disaggregated by academic career levels. This is unfortunate as the ETER data includes PhD students as well as FT faculty, which are quite heterogeneous subgroups with respect to drivers and effects from internationalisation. This also makes the data difficult to compare with the US data reported above. As the PhD student body is typically more likely to be international, the

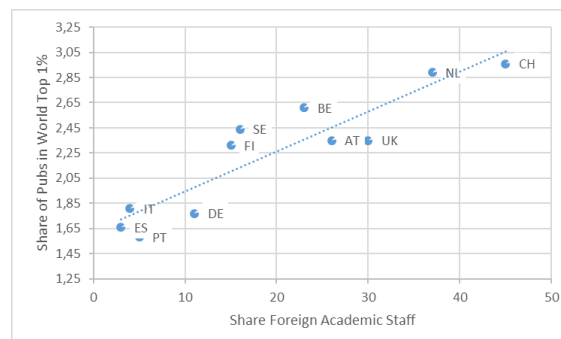
¹¹ For more information on ETER, see <https://www.eter-project.com/#/home>

ETER numbers are upwardly biased compared with the numbers on academic staff reported for the US.

The ETER data show that Switzerland, the Netherlands and the UK stand out as the countries with a high share of foreign academic staff. The Netherlands has traditionally been very open (34% in 2011, rising to 37% in 2016). The foreign staff ratio in the UK increased from 24% in 2011 to 30% in 2016. But Switzerland has an especially high foreign staff ratio, which keeps expanding; already 34% in 2011, 45% of its academic staff is currently foreign. Austria and Belgium are two small open countries with 26% and 23% respectively, while the Scandinavian countries score somewhat lower (10-20%). The ETER countries with a low share of foreign academic staff (<10%) are Germany and France and the southern countries of Italy, Portugal and Spain.

Internationalisation of academic staff is associated with the size of the country, with small countries such as Switzerland, Belgium and Austria more likely to have higher rates of internationalisation. But the scientific quality of the host country also matters, as the graph in Figure 7 shows. Countries with a higher scientific quality, as measured by the share of their publications belonging to the World Top 1% most-cited publications (a size-insensitive measure of scientific quality of the country's science) also have a higher share of foreign academic staff, as Figure 7 shows.¹² This confirms what was reported above, namely that countries with a high research quality are favourite destinations for internationally mobile academics, especially for the better talents. So a virtuous circle is established where high quality countries can attract the best talents, which then contribute to the high quality of the science being produced in these countries and in turn constitute a factor of attractiveness for new incoming talent.

Figure 7. The share of foreign faculty and the scientific research quality by EU country (2016)

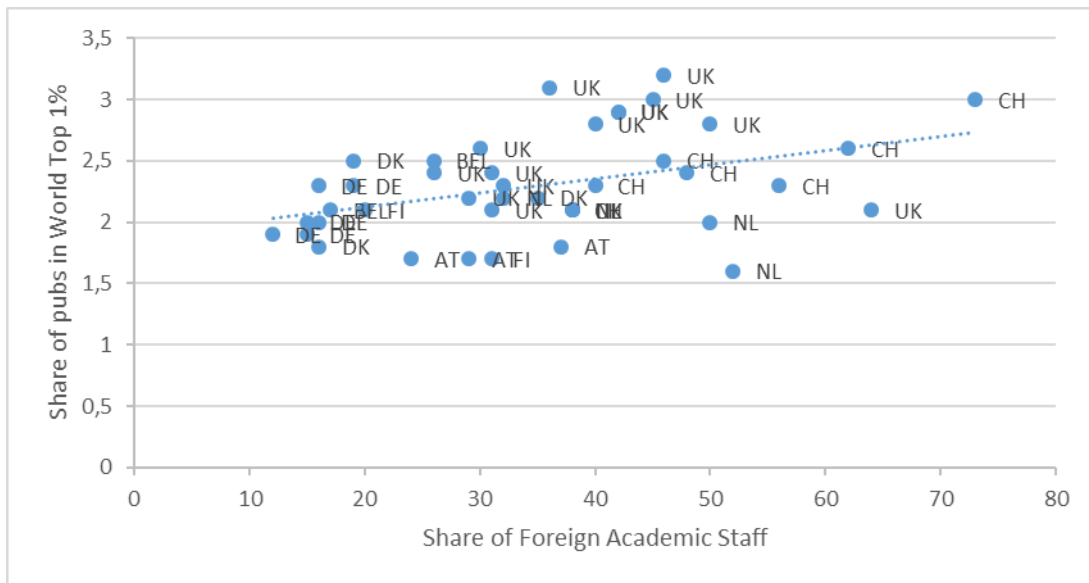


Source: own calculations based on ETER (for foreign academic staff) and on NSF/SEI2020 (for publications in World Top 1%)

The presence of highly reputed top institutions is another attractiveness factor for countries. The positive relationship between research quality and internationalisation of foreign staff also holds at the level of individual HEIs, as Figure 8 shows. For Switzerland, institutions such as ETH Zurich (62%), EPFL Lausanne (73%) or the University of Zurich (46%) score high on foreign faculty rate, even above the already high average Swiss level. In the UK, highly reputed top institutions such as Oxford (45%), University College London (42%), Cambridge (46%), and Imperial College London (50%) all score above UK average. In the Netherlands, Eindhoven (52%) and Delft (5%) score above the Dutch average.

¹² The correlation coefficient between share of foreign faculty of a country and its share of publications in the World Top 1% most cited amounts to 0.92 for the used sample of EU countries.

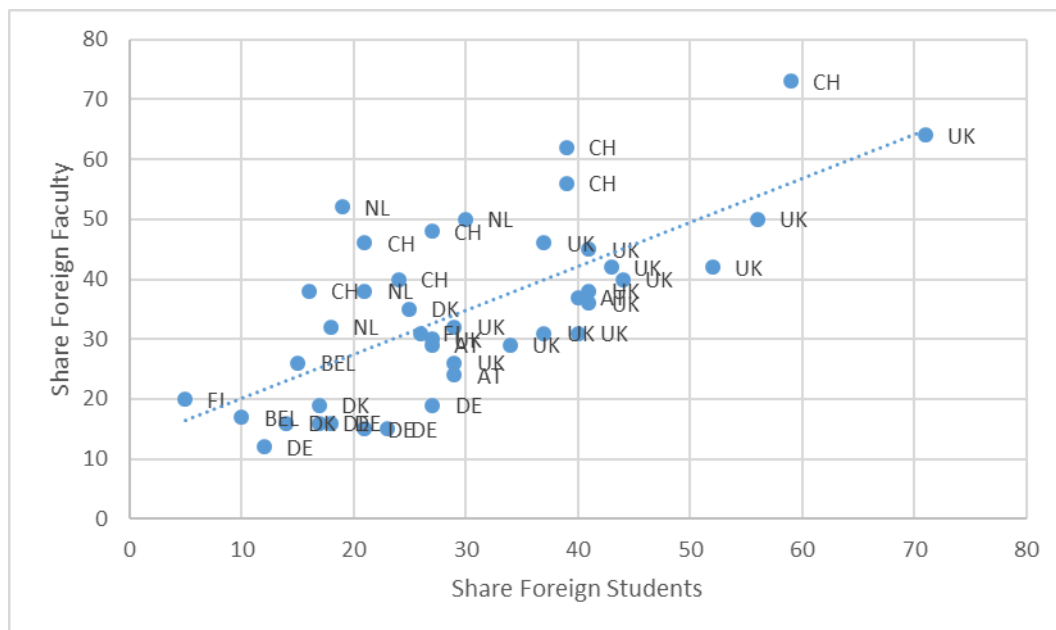
Figure 8. The share of foreign faculty and the scientific research quality by EU HEIs (2016)



Source: own calculations based on ETER (for foreign academic staff) and on NSF/SEI2020 (for publications in the World Top 1%)

Further analysis relating the internationalisation of academic staff of an HEI with the internationalisation of their student body shows a rather clear positive association. HEIs with a high share of foreign academic staff also display high levels of internationalisation of their student body, as Figure 9 shows. EPFL, with its 73% share of foreign faculty, has 59% of its student body international; ETH with 62% foreign staff, has 39% foreign students; Imperial College London with 50% foreign staff, has 56% foreign students. London School of Economics with a share of 64% foreign faculty holds 71% foreign students. All this suggests that these HEIs have a consistent internationalisation strategy across all their activities, commensurate with their position as 'world universities', as evidenced in their position in world rankings (as discussed above).

Figure 9. The share of foreign faculty and the share of foreign students by EU HEIs



Source: own calculations based on ETER for share of foreign faculty (2016) and on THE (2019) for share of foreign students

4.4 Evidence on the international mobility of researchers and its effects from scientific publication records

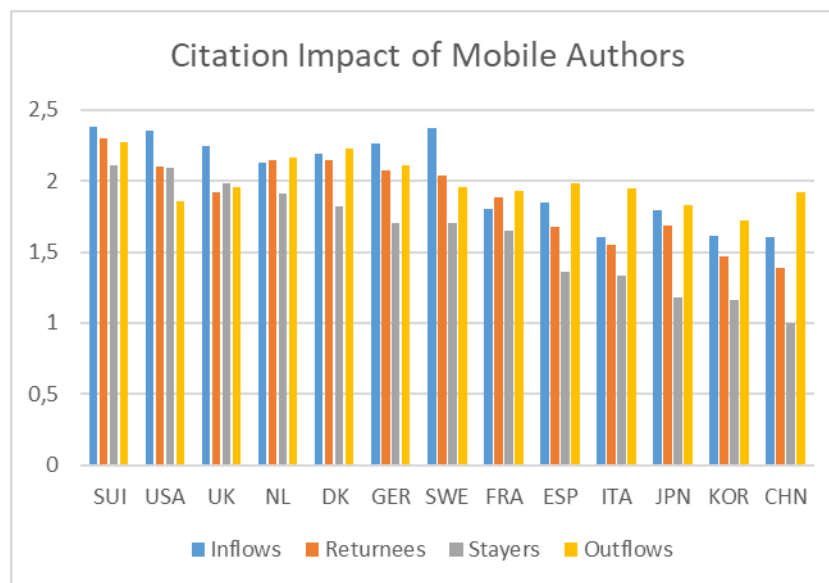
Scientific publication records are another source of information that can be used to trace the international mobility of researchers, using the recorded affiliation of authors and changes therein. Using publication information also allows the mobility profile of authors to be related to their research performance as measured by how much and where they publish. The advantage of this approach is that it is not based on survey responses, but can rely on publicly available data on publications, which is available and comparable at large scale across countries, scientific disciplines and time. The drawback of using this information is that it only covers active researchers who are publishing. It also requires consecutive publications to be able to identify mobility from changes in affiliations of the same author.

This section reports on results from using this type of information. It allows a comparison of immobile authors ('stayers') with mobile authors (both from the perspective of incoming and outgoing authors of countries). It also allows us to look at the returnees, completing the analysis of brain drain/brain gain/brain circulations.

The quality of mobile and immobile researchers is represented through their research performance before the mobility event. More particularly, the quality of the scientific journals they were publishing in, as measured by their impact factors, is used as a proxy for the quality of the various types of researchers. Although impact factors of journals are often misused and therefore open to debate, it remains, when carefully and properly used, an important source of information that would be difficult to gather or understand at large scale by means of individual expertise (cf Hicks et al., (2015)). Bearing in mind all the caveats of impact factors, we will use it in this section as a cross-country, cross-time and cross-fields-comparable proxy for research quality.

As countries are ranked by the quality of the stayers, Figure 10 shows how the better science countries have better quality inflows: top talents go to the better places and better places attract top talents. This is consistent with the survey evidence on motives for international mobility, identifying the search for better research environments as the major push factor, as discussed above. At the same time, the figure also shows that the 'outflows' of researchers from top science countries are of high quality.

Figure 10. Research quality of mobile authors



Source: Own calculations based on OECD, 2017

Note: Average 2015 Scimago Journal Rank (SJR) scores of the different mobility groups. Countries are ordered alongside the quality of their local science system (quality of the local authors). Inflows are new inflows only. The measure of quality is based on the rankings of the journals of the articles in which the different types of researchers are publishing.¹³

Mapping in- and outflows, the **US** is perhaps the country that benefits most from international researcher mobility. Being a leading science country, it manages to attract the most talented emigrating authors among all countries. And as these new immigrating researchers are better than the already high quality of its stayers, its influx is a clear brain gain for the US, pushing the quality of its research even further than its already high local level. At the same time, its outflow is of lower quality than its stayers and its newly attracted immigrating talent, avoiding a brain drain for the US. So overall, the high scoring of the US in terms of research excellence seems strongly related to its openness, confirming a virtuous circle: with its high research excellence, it is able to attract the best of foreign talents and these best of foreign talents help to reinforce the attractiveness of the US as a destination for foreign talent. Yet the outflow of researchers from the US is of high quality. For instance, the quality of US emigrants is higher than the quality of the local German science base. Thus scope for a brain gain is created for most countries from attracting this US outflow.

¹³ Expected citation impact of scientific authors, by mobility profile in 2016, is based on the comparison of 2015 Scimago Journal Rank (SJR) scores for the documents published by scientific authors, based on the journal rank corresponding to an author publishing in 2016, and on their mobility record up to 2016 counting from 2001. The indicator is still experimental.

This is also the case for **Switzerland**, where the high quality of its local science base allows it to attract a high quality of inflows, even higher than its already high local level. Immigration of foreign talent is therefore an important brain gain for Switzerland, and source for the high quality of Swiss research, similar to the US. But unlike the US, the quality of its outflow is higher than its stayers, constituting a brain drain for Switzerland. This creates scope for a 'win' for other countries who can attract this high-quality outflow. However, as long as the quality of its new inflow is superior to the quality of its outflow, Switzerland is winning from its openness.

Like Switzerland, the **UK** is a country with a high quality of locals and an open science system. With the quality of its immigration higher than the quality of its locals, its openness is a win for the UK and contributes to its overall high science quality. Its high outflow is about the same quality as its locals, so in net terms, the UK wins more in quality from its immigration than it loses in quality from its emigration. Yet the quality of this emigration is still higher than the local quality in all other EU-27 countries considered. Emigration from the UK is thus a source of a win for all those EU-27 countries that can attract them. The UK should therefore not be seen as only a country managing to attract the best of talents. It is also a source of better talents to import for EU-27 countries.

A second tier of open and high excellence European countries are the northern European countries (**Netherlands, Sweden, Denmark** and **Finland**), which also have substantial mobility and high quality of inflows. Sweden has an especially high share of inflow, with a high-quality increment of imported talents over its locals. **Germany** and **France**, being larger and with a smaller share of 'movers', have higher-quality inflow than their stayers. But their outflow is also of high quality. For Germany this leaves a positive net balance, but for France a negative one: it loses more in quality of emigration than it gains in quality from immigration.

The EU-15 countries for which brain circulation is most challenging are the southern countries of **Spain** and **Italy**. Their local science is of lower quality than other EU countries considered. Nevertheless, even for these countries, mobility is a gateway to excellence. Spain and Italy are winning from immigration, as the influx of new and returning talents is higher than the local quality. Yet the quality of these inward talents is lower than for other countries, as a lower local excellence makes it more difficult to attract better foreign talent. In addition, the quality of new immigrants is definitely smaller than the quality of talents moving out. Italy suffers most from a negative brain balance, with the highest difference between the quality of those leaving versus the quality of those entering or returning.

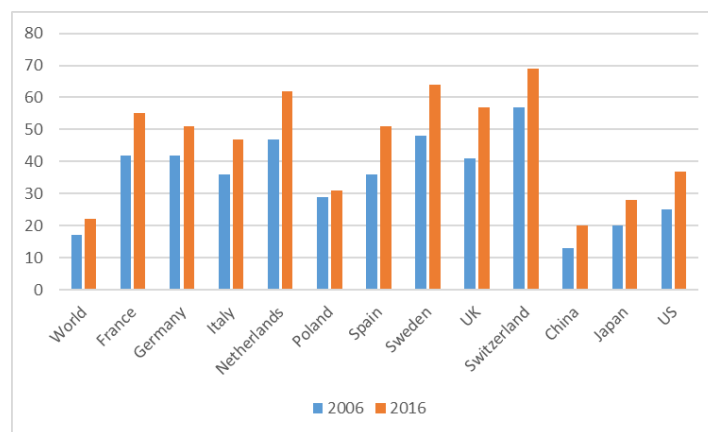
Finally, it is interesting to look at **China**, a major source country for internationally mobile researchers. China has the highest quality differential between leavers and stayers; its outflow constitutes a significant brain drain. This means that it is (still) sending out the best of its talents to the rest of the world. Chinese emigrating researchers have a higher quality than the average locals in other countries, including countries such as Germany and the Netherlands. So for most host countries the influx of Chinese researchers is therefore a brain gain. But China is also winning from its openness. Chinese returnees are an important part of Chinese internationally mobile researchers, and these returnees, although of lower quality than the emigrants and the new inflow, nevertheless outdo the stayers to an exceptional degree in terms of research quality, compared with other countries' returnees.

4.5 Evidence on international collaboration in research and its effects from scientific publication records

A final piece of evidence we can look at for recent patterns in internationalisation is international collaboration in research. This form of internationalisation can be traced through international scientific co-publications. As with the author information used in the previous section, co-publication information has the advantage of relying on publicly available data on publications, which is available and comparable at large scale across countries, scientific disciplines and time.

Internationally co-authored scientific publications have been on the rise worldwide and in every major country considered: 22% of all scientific publications worldwide were internationally co-authored in 2016, up from 17% in 2006 (Figure 11). Compared to Asia and also to the US, most EU countries are more inclined towards international co-publications, and increasingly so. This is most pronounced for smaller EU countries, including Switzerland, Sweden and the Netherlands. But even the larger EU countries, including France, Germany, Spain and Italy, count on international collaboration for about half of their scientific output. The UK stands out as among the large European countries as the most inclined to co-publish internationally.

Figure 11. Internationally co-authored publications as a share of a country's total publications

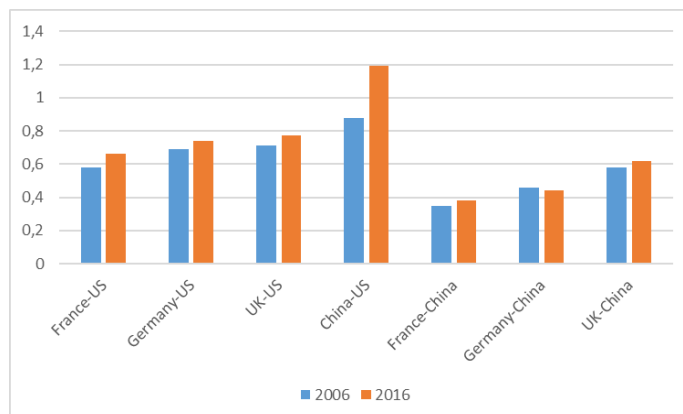


Source: own calculations based on National Science Foundation (2018)

The effects of international collaboration on the quality of research will depend on whom one collaborates with and how strong and complementary research partners are. Figure 12 shows the expected intensity of collaborative ties between two countries, taking into account the attractiveness (scientific size) of both countries as partners for international collaboration. Numbers above 1 reflect stronger than expected ties; numbers below 1 reflect weaker than expected ties.

The figure shows that although all the large EU countries have strengthened their ties to the US, they are still under-represented in research collaboration with the US. The US-China tie has also grown in importance and is now above par. For the large EU countries, ties with China, although becoming more important, are only slowly becoming stronger and remain below par.

Figure 12. Trends in partnerships for international co-authored S&E publications, worldwide

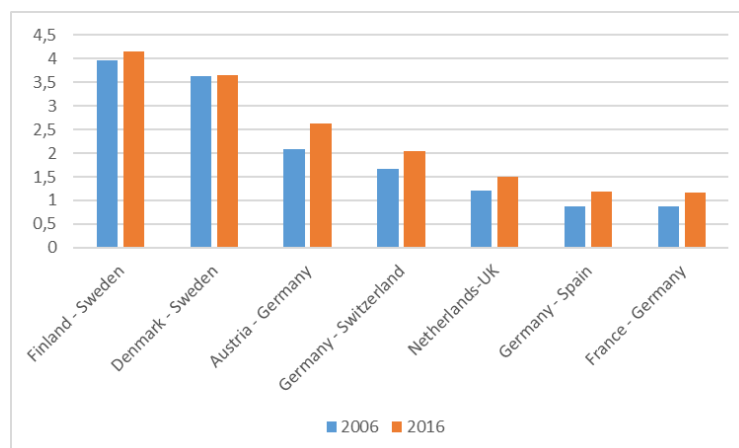


Source: own calculations based on National Science Foundation (2018)

Note: The index of collaboration is calculated as follows: $IC_{xy} = (C_{xy}/C_x)/(C_y/C_w)$, where IC_{xy} = index of collaboration between country x and country y, C_{xy} = number of papers co-authored between country x and country y, C_x = total number of international co-authorships by country x, C_y = total number of international co-authorships by country y, and C_w = total number of international co-authorships in the database.

The graph in Figure 13 focuses on a selection of the collaborative ties among the EU+ countries with sufficient numbers of publications. It shows how bilateral ties among EU+ countries have become stronger over time and are now all above par, often very substantially. These results are therefore supportive for the increasing integration and gradual building of an ERA.

Figure 13. Trends in partnerships for international co-authored S&E publications, intra-EU



Source: own calculations based on National Science Foundation (2018)

Finally, we look at whether international co-publications are of higher research quality. To assess research quality, we look at how often international co-publications

are cited compared to other scientific publications.¹⁴ We use the evidence for EU researchers and their extra-EU collaborations, as reported by Elsevier (2017). Elsevier's study shows that EU-28 publications written with extra-EU collaborators had a larger impact, as measured by the Field-Weighted Citation Index (FWCI),¹⁵ than EU-28 publications in general. On average, a national publication written by EU-28 authors is 20% more cited than the world average. But a publication written by an EU-28 author with extra-EU partners is more impactful: it is on average 75% more often cited than the world average. For the EU-13, collaboration with external partners (both other-EU and extra-EU) provides an even more important pathway to excellence. While their national publications measured by the FWCI are significantly below world average (with an FWCI around 0.6), their publications in collaboration with external partners are 50% more likely to be cited.

5. Impact of policy

Virtually all European countries have a policy in favour of internationalisation of higher education and research. The EU adds an additional complementary policy level to the regional and national policy levels for internationalising higher education in its member states. The goal of the EU level's internationalisation of HEI policy is to create new opportunities for policy stakeholders in higher education to learn from one another across national borders and to work together on joint projects. Through its Erasmus+ and Framework Programmes, the EU supports international exchanges for students, academic staff and researchers, as well as structured cooperation between HEIs and public authorities in different countries.

The **European EAIE Barometer** shows that the EU-level policies clearly had the highest positive impact on internationalisation at the respondents' HEIs (73%), while the national level was positively viewed by half of the respondents (51%).¹⁶ Of the EU programmes, Erasmus+ was noted as having the most positive effect on internationalisation at respondents' HEIs. There seems to be lower awareness of the impact of the EU research funding among those surveyed. This perhaps reflects more that research funding traditionally falls outside the remit of the international officers and the main group surveyed, which are often still in separate silos in HEIs.

Concerning national and regional policies, the respondents were most positive about the impact of national agencies (63%), financial support for internationalisation activities (56%) and the national research infrastructure (50%). Immigration regulations were seen as having the most negative impact on internationalisation efforts at respondents' HEIs (38%), followed by admissions regulations (18%). Immigration and admissions regulations received the most mixed reviews. These were particularly negatively viewed by respondents in the UK (81%) and Denmark (77%).

In this section, we will focus on the EU main policy instruments to support the internationalisation of higher education. Student and teaching staff mobility has been actively promoted through the Erasmus+ programme (Section 5.1), while the main

¹⁴ See Schmoch & Schubert (2008) for an analysis on using citations to sort out the quality differences in international co-publications.

¹⁵ The FWCI "compares the actual number of citations received with the average number of citations for a publication of the same subject, document type, and publication year. It therefore accounts for differences in citation practices between subjects, and is benchmarked against the world average, set at 1.00. For instance, an FWCI of 1.24 means that a publication in this subject is cited 24% more often than expected compared to the world, while a value of 0.90 would mean the publication is cited 10% less than the global average" (Elsevier 2017, p. 8).

¹⁶ Swiss respondents report the least positive impact in the entire sample (38 %). In light of Switzerland having been demoted to a partner country of the Erasmus+ programme, these findings are perhaps hardly surprising.

instruments for researcher mobility are the Marie Skłodowska-Curie actions (Section 5.2) and the European Research Council (ERC) grants (Section 5.3) within the EU Framework Programmes, while the international research projects funded within the EU Framework Programmes instruments are the main instruments for international research cooperation (Section 5.4).

5.1 International student mobility and Erasmus+

With the Bologna Process in 1999, the EU started to make European higher education more homogeneous and comparable across countries, and more attractive to international students, and a series of reforms was set in motion. Its main objectives were the introduction and standardisation of a three-cycle degree system (bachelor's, master's and doctoral degrees), and the recognition of qualifications from foreign institutions and of periods of study. An underlying objective of the process was to stimulate mobility across Europe of students, teachers and researchers.

The commitment of the EU to improving student mobility as a core goal of the EHEA and a major policy priority of the EU agenda for modernising higher education was reiterated in the 2011 Council conclusions: "learning mobility is widely considered to contribute to enhancing the employability of young people through the acquisition of key skills and competences, including especially language competences and intercultural understanding, but also social and civic skills, entrepreneurship, problem-solving skills and creativity in general".

Following the 2011 Communication on an agenda for the modernisation of Europe's higher education system (COM(2011)), member states committed themselves to promoting the learning mobility of young people by setting a goal to increase the proportion of EU graduates from higher education who completed a period of their studies or training abroad to 20% by 2020 (Council of the European Union, 2011).

The main EU instrument promoting student and teaching staff mobility is the Erasmus+ programme. Students can study abroad for up to 12 months. While most of the funding goes to individual mobility, there is also funding for joint masters, student loans, and a budget for strategic partnerships and innovative policy development.

In the current 2014-2020 Framework Programme (Horizon 2020), a budget of €14.7 billion was allocated to the Erasmus+ project, 40% up on the previous 2007-2013 Framework Programme (FP7), signalling the importance of the instrument to the EU. Two thirds of the budget went to mobility exchanges, and the rest to partnerships. By the time Horizon 2020 has finished, up to two million students, including 450 000 trainees, are expected to have benefited from grants to study and train abroad. This more than doubles the opportunities offered in the past 30 years. More than 135 000 students and staff can come to Europe – or go outside Europe.

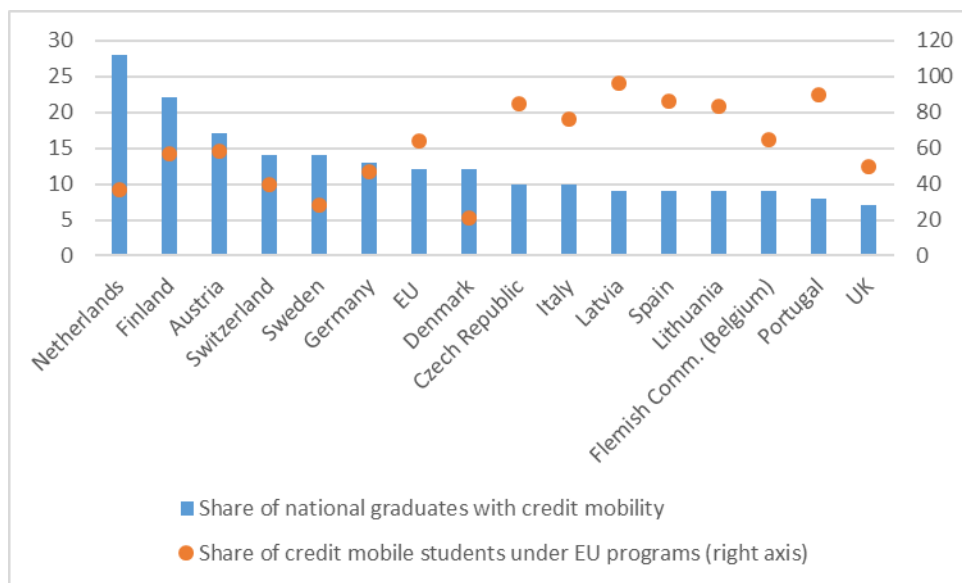
5.1.1 Erasmus+ participation: evidence on student mobility

The European Commission (2015) reported that more than one million students participated in the Erasmus programme in the five years between 2009 and 2013, which is about 5% of all tertiary education students. Over time, this number is targeted to increase, as the countries participating in the Bologna Process agreed that by 2020 at least 20% of graduates should have spent part of their study or training abroad.

To assess the 20% target of higher education graduates with a period of higher education-related study or training abroad by 2020, both degree mobility and credit

mobility (cf supra) are included in the benchmark.¹⁷ Figure 14 looks at the most recent OECD evidence. It focuses on credit mobility, ie a study stay abroad within an enrolment at a 'home institution', as this is the dimension which Erasmus+ covers. It shows that, on average, 12% of graduates are credit mobile, but there is quite a lot of variance across EU+ countries. While more than one out of every four students in the Netherlands is credit mobile, this is only one out of 10 in Flanders. EU support is an important driver of credit mobility, as on average 64% of credit mobile students in the EU do this under EU programmes, namely Erasmus+. For EU-13 and southern European countries, the contribution of EU funding through Erasmus+ to credit mobility is even more marked.

Figure 14. Credit mobility in the EU



Source: OECD/UIS/Eurostat (2019)

5.1.2 Effects of Erasmus

The Erasmus impact studies (European Commission, 2014, 2016) analyse the effects of Erasmus student mobility (for both study and placement periods abroad) on individual skills enhancement and employability. Papers discussing these topics include for example, Hadis (2005) and Brandenburg et al. (2014). These studies typically conclude that enhancing employability abroad is an important effect for Erasmus students: they are in a better position to find their first job and enhance their career development, and they are more likely to live and work abroad in the future. These studies typically rely on correlations to report positive effects. Yet it is highly likely that unobserved and therefore uncontrolled heterogeneity, mostly in terms of motivation and ability, affects both the decision to go on exchange as well as the measured outcome(s). The positive correlation may thus be due to the selection of better students into exchange programmes, rather than because of the causal 'treatment' effect due to the programme. A few studies have looked more carefully at the selection versus treatment effects. Parey and Waldinger (2011) use aggregate German data to show that going on an exchange increases the probability of working abroad. Di Pietro (2012) confirms this finding using data on Italian graduates. The impact of participation in exchange

¹⁷ **Degree mobility** involves the enrolment in a degree programme in the country of destination. **Credit mobility** is defined as temporary tertiary education and/or study-related traineeship abroad within the framework of enrolment at a 'home institution'.

programmes on employability is mixed. Di Pietro (2015) shows that, among Italian graduates, international exchange enhances the probability of employment three years after graduation. Joosten (2018), using data on more than 5 000 KULeuven students, of which 18.5% went on exchange, finds that all positive effects on employability are contained in the selection of students into an exchange, rather than in the treatment effect from the exchange programme in which they participated.

5.2 International mobility of researchers: Marie Skłodowska-Curie Fellowships and ERC grants in EU's Framework Programme

Next to mobility of students, the international mobility of academic staff and researchers more generally is also one of the priorities of the European Commission's higher education modernisation agenda and the Bologna reforms. Several policies have been introduced at the European level. Next to the previously discussed Erasmus+, the EU supports international mobility of researchers, mainly through two major instruments in its Framework Programmes: the Marie Skłodowska-Curie actions (MSCA)¹⁸ and the ERC grants. Although not specifically designed to address international mobility, ERC grants have the portability to allow researchers to move. They were also meant to be designed for attracting top talent to come or return to the EU.

5.2.1 Marie Skłodowska-Curie Fellowships

The Marie Skłodowska-Curie actions, and particularly its individual fellowships (IF) and staff exchanges (RISE), are designed to encourage international mobility. The IF are particularly important tools for stimulating international mobility, as they fund individual researchers who have already obtained their PhD, to enable them to stay for a longer period in a host institution in another country to work on individual research projects and acquire new research skills.¹⁹

(i) Participation in Marie Skłodowska-Curie Individual Fellowships

Data on MSCA Individual Fellowships (European Commission 2019) shows that most of the IF are intra-EU (72% of all individual researchers with IFs, 84% of all institutions with IFs). Twenty-three per cent of IF researchers go to or come from third countries. Ten per cent of IF recipient institutions are in a third country.

The UK is the major destination country for intra-EU MSCA fellowships. The most important source countries for MSCA fellows moving into the UK are intra-EU, with Italy the largest source country, followed by Spain (15%) (Veugelers et al. (2019)). China is the major source country for MSCA researchers from outside the EU.

In terms of extra-EU destinations for MSCA fellows, the US is by far the leading destination among third countries in terms of receiving European researchers (EC, 2019). Of the IF going to third countries, 76% go to the US. Together with Canada and Australia, these three countries represent 94% of all destinations for IF (EC, 2019), evidence consistent with the search for strong research environments for international mobility (as discussed above). Veugelers et al. (2019) on FP7 data report that for the US destination, one third of these are Italian nationals, another 17% are Spanish, 11.5% are German and 9.5% are from the UK. China is the destination for 5.7%, of which about 46% are returnees, that is, those with Chinese nationality.

¹⁸ In Horizon 2020, Marie Skłodowska-Curie actions (MSCA) involve ITN (Initial Training Networks), IF (Individual Fellowships), RISE (Research and Innovation Staff Exchanges) and COFUND (Cofunding of Regional, National and International Programmes). In FP7, the acronym used was MCA, for Marie Curie Actions.

¹⁹ Research and Innovation Staff Exchanges (RISE) involve a larger number of individual researchers, but they involve much shorter visits (typically less than three months).

In terms of extra-EU sources for MSCA fellows coming into the EU, India, China and Russia are the major source countries. Eleven per cent of MSCA fellows moving to the UK are Chinese researchers and 7% are Indian. Ten per cent of MSCA fellows in Germany are Indian and 6% are Chinese researchers (Veugelers et al. (2019)).

(ii) Effects from participating in Marie Skłodowska-Curie Individual Fellowships

The EC report on the final evaluation of FP7 MCA and the mid-term evaluation of Horizon 2020 MSCA provides an assessment of the effects from these actions, using evidence collected as part of surveys among participating individuals and organisations as well as a comparison group of researchers and organisations. The survey data is further complemented with bibliometric analysis (EC, 2017).

At the **individual level**, the evidence suggests positive impact on career development.

- Of the IF fellows who moved to a permanent position after their fellowship, 63% reported that this was to a large or very large extent the result of the fellowship. As drivers of this positive career impact, the results suggest the impact of training, continued international partnerships and international mobility.
- 60% of the IF respondents were (very) satisfied with the training they received during their MSCA fellowship.
- 83% were (very) satisfied with the partnerships they developed. Only 11% of the IFs who returned home were no longer collaborating with their host institution.
- IF fellows remain internationally mobile throughout their career. One third of IF fellows have changed their country of employment at least twice (in a period of 10 years), compared to one out of ten researchers in the comparison group.

IF fellows are more than twice as likely as the average researcher to have **publications** that belong to the Top 1% of cited publications in their field. It's important to note that the ex post evaluation of the effect on scientific performance from participating in the programme should take into account initial selection, as more talented researchers are more likely to be selected in the programme. As there are no significant differences in top performance compared to the control group, this would suggest that the superior performance of IF fellows is in the selection, rather than the treatment from the fellowship.

At the **organisational level**, more than two thirds of the responding host organisations reported that their existing international collaborations, their internationalisation strategy and their global reputation had improved because of participation in MC IFs.

Effects from **extra-EU** inward and outward mobility through MSCA have also been assessed (EC (2019)).

- For third-country researchers in MSCA IFs, 60% reported their participation improved their research skills to a (very) great extent; 53% reported their career progressed to a (very) great extent because of their IF.
- Although it was to a somewhat lesser extent than in the case of third-country researchers hosted in Europe, European researchers who were hosted in third-country-based organisations during their MSCA fellowship also reported significant impacts on acquired skills and competences. Unfortunately, these results do not distinguish by type of MSCA and country of destination.

- Host organisations from high-income third countries (US, Canada, Australia, Japan and Korea - and especially their leading universities) see the MSCA as a way of attracting excellent researchers from Europe through IF.
- Both survey evidence and the qualitative findings from interviews and case studies indicate that the RISE action (staff exchanges) which in many third countries is by far the most popular action, generally does not lead to research talents being attracted and retained. The mobility period in RISE actions is too short to build strong professional connections and networks, or to consider and search for new professional opportunities. In contrast, IF are found to be more suitable and effective in terms of attracting and retaining talented researchers in Europe, as these actions often involve young researchers who are more inclined to be mobile, having fewer institutional attachments.
- The study also looked for potential synergies between the MSCA and other EU programmes. Despite some joint promotion of EU programmes in third countries, an active strategy to plan synergies between the EU programmes does not seem to exist. But, although not planned, the interviews and case studies provided examples of occasional synergies, for example individuals who become MSCA fellows after participating in Erasmus Mundus, or Marie Skłodowska-Curie experience helping fellows to get an ERC grant.

Both EU reports confirm the results from a 2014 EU study on the effects of Marie Skłodowska-Curie IFs (EC (2014)), which used data from large-scale survey evidence from IF fellows as well as a comparable control group, and bibliometric information for statistical analysis. Most of the researchers surveyed in both subgroups are currently employed, so only marginal differences were registered. However, the statistics showed that IF fellows are more likely than other researchers to work under a permanent (open-ended tenure) contract. Additionally, IF fellows appear slightly more frequently than the control group to be employed by top academic institutes. No statistically significant effects on career speed or income were found. IFs do have a greater effect on career mobility compared with other types of fellowships. This is particularly evident with regards to geographical mobility. In quantitative terms, the differences observed between IF fellows and the control group with respect to career outcomes are, however, in most cases small or marginal. This can be because career benefits may take a longer time to fully materialise and require longer ex post monitoring. Non-IF researchers in the control group may also have benefited from equivalent mobility schemes, which produced similar effects.

5.2.2 ERC grants

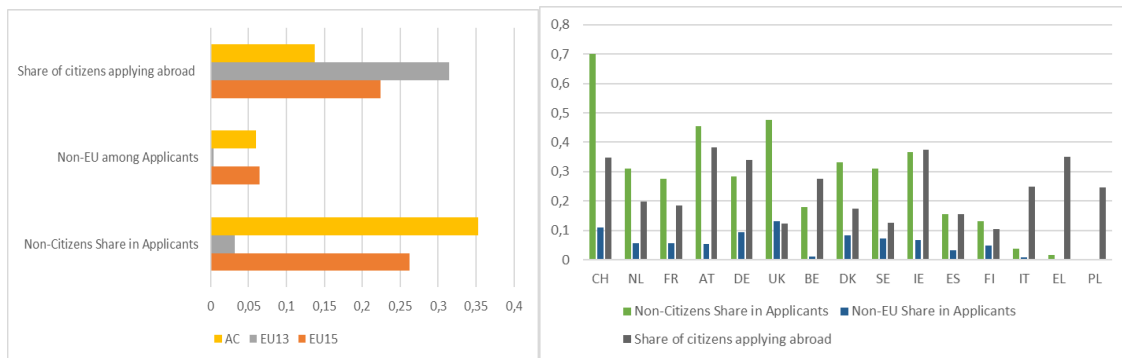
Although the portability of ERC grants should help intra-EU mobility of researchers, the data on ERC grants does not reveal whether it does. Only a limited number of grants are being transferred during the grant. Most of the mobility occurs when applicants move to a new hosting institute before or on receiving the grant, rather than during the grant. We will concentrate in this section on how ERC grants are used as an instrument for host institutions in the EU and Associated Countries (AC) to attract foreign talent before or at grant.

On average a quarter of all ERC applications are made by researchers who are non-nationals in the host country where they apply. Most of this mobility is intra-EU; only a quarter of non-national applicants are from outside the EU.

Figure 15 (right panel) shows the shares for the major ERC countries. Switzerland has the highest share of foreigners among its applicants, followed by the UK and Austria. The UK and Switzerland also have the highest rate of non-EU researchers among their ERC applicants, all commensurate with their attractiveness and openness (as discussed above). Germany is also a relatively open host country, in particular for non-EU

researchers. Northern countries are also more attractive to foreign researchers, while the south and the EU-13 countries are less attractive to non-citizens, especially to non-EU ERC applicants. The latter countries have a high share of their citizens applying abroad. On average one third of applicants with EU-13 citizenship apply with research institutions abroad. But outward mobility is also high for some EU-15 countries. More than one in five of ERC applicants from Greece and Italy apply abroad. Germany, Switzerland and Austria also have high outward mobility rates, as does Ireland.²⁰

Figure 15. Inward and outward mobility for ERC applicants



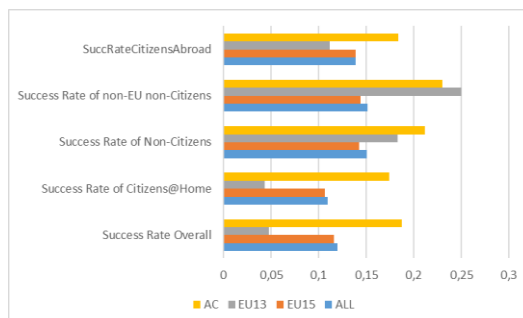
Source: own calculations based on ERCEA data (2018)

To assess how the inward mobility of researchers helps ERC-hosting countries to access talent and how outward mobility of researchers through ERC is a drain on talent, we have to look at the quality of the ERC applicants by mobility profile. We measure quality through their relative success rate to obtain an ERC grant, that is, we look at how often ERC applicants from the various mobility groups are successful in obtaining ERC grants relative to the success rate of all ERC applicants.

Compared to an overall ERC application success rate of 12% (and a success rate for home-country applicants of 11%), the success rate for those applicants that are applying in a destination country which is not their country of nationality is 15% (Figure 16), revealing a quality premium for foreign applicants consistent with mobile scholars being more talented. This holds both for extra- and intra-EU foreign applicants. This premium for foreign applicants is especially high for EU-13 countries, indicating that when they attract foreign applicants (which unfortunately is rather infrequently, as discussed above), they do attract better talents than their local applicants.

²⁰ For German citizens applying abroad, the UK is the major destination country (31%), followed by Switzerland (15%). For the Swiss, the UK and Germany are about equally sized major destinations. For Ireland, the most important destination is the UK (67%). Source: own calculations based on ERCEA data (2018).

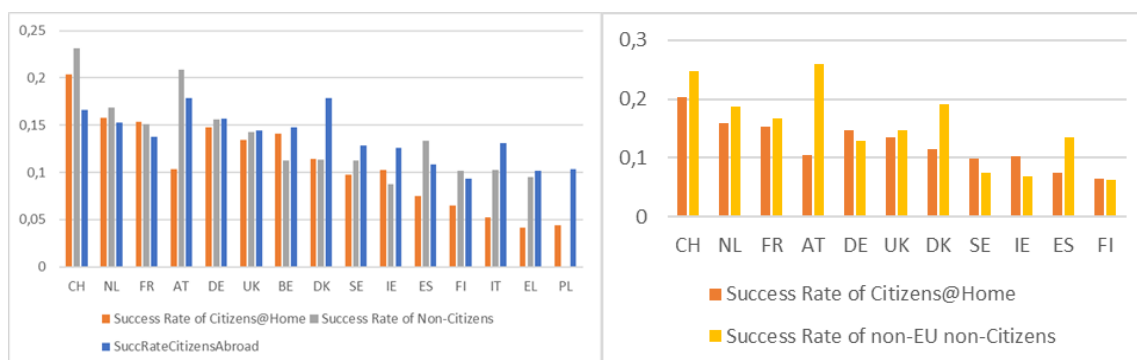
Figure 16. Success rates of ERC applicants by mobility type



Source: own calculations based on ERCEA data (2018)

Figure 17 shows that the success rates of outwardly mobile researchers are typically above the average success rate, suggesting that outwardly mobile researchers are of higher quality than the local applicants. This premium is particularly high for the south (Greece, Italy, Portugal and Spain), illustrating a brain drain through ERC for these countries.

Figure 17. Success rates of ERC applicants by mobility type for major ERC host countries



Source: own calculations based on ERCEA data (2018)

With respect to inward mobility, Figure 17 shows that on average the success rate of foreign applicants is in most cases higher than each country's average success rate, suggesting on average a gain in talent for the host country. This gain is similar for researchers from other EU countries and from non-EU countries (right panel). This gain from inward mobility is high even for a country such as Switzerland, which also has a high local success rate. It is also particularly high for Austria as well as for countries in the south (Spain, Italy, Portugal, and Greece).

5.2.3 International collaboration in FP7

Not surprisingly, given the aim of the EU's Framework Programmes, the overwhelming majority (90%) of all links in FP7 are intra-EU (Table 6). This is almost three times higher than what one could have expected from the EU's scientific size in the world. However, even if fostering intra-EU links is the major aim of the EU's Framework Programmes, links need not be exclusive: intra-EU collaboration could be combined with extra-EU collaboration within FP7 projects. Nevertheless, these extra-EU links occurred infrequently: 6% of links in EU-28 projects were with associate countries and only 3.5% were with third countries, massively lower than what could have been expected, based on the scientific size of these regions. Although the US is the largest

third-country partner, followed by China (CN), both countries were still massively under-represented as third countries, relative to their scientific sizes.

The lower part of Table 6 zooms in on the intra-EU collaborative links, which are split between the EU-15 and EU-13. Within the EU, partners from the EU-15 are the most important for intra-EU collaboration, both within the EU-15, as well as for projects from EU-13 countries. With 89% of all EU publications coming from the EU-15, the importance of partners of the EU-15 for intra-EU collaboration is on a par with their scientific size (as measured by their number of scientific publications). Intra-EU-13 collaboration accounted for only 18.4% of all intra-EU links for the group of EU-13 countries. Although this is small compared with the importance of links with the EU-15, this is nevertheless a larger share than what could have been expected, based on the scientific size of the EU-13 (representing 13% of all EU publications in 2010). This shows that FP7 boosted the EU-13 as partners for scientific publications beyond what could have been expected from the EU-13's scientific size.

Table 6: Share and index of international collaborative links under FP7

Share of links						Weighted index of links				
	EU28	AC	THIRD	Of which US	Of which CN	EU28	AC	THIRD	Of which US	Of which CN
EU28	0.89	0.06	0.04	0.13	0.07	2.83	1.13	0.05	0.36	0.29
AC	0.88	0.06	0.04	0.14	0.06	2.80	1.20	0.06	0.38	0.25
		EU15		EU13		EU15		EU13		
EU15	0.90		0.10		1.00		0.78			
EU13	0.82		0.18		0.91		1.39			

Source: own calculations based on FP7 collaborative links in all programmes from European Commission (2018)

Note: For each project p with n partners, a link is a connection between partner i and partner j . For example, for a project with three partners, there are three links, for a project with four partners, six links, and so on. The upper right side of the table has the shares of collaborative links expressed as a ratio relative the weight of the partner, as measured by its size in world publications, measured in 2010.

On the impact of FP7-funded co-publications, Elsevier (2017) shows that FP7-associated publications written with non-EU partners had on average a FWCI of more than three, that is, with an expected impact at least three times greater than the world average. This higher score is not only relative to the world average but is also relative to FP7-associated publications that involved only EU authors. Thus, although publications written by EU authors and funded by the FP7 programme overall had a greater impact in terms of average citations than the overall average of publications written by EU authors, FP7-funded publications that were collaborations between EU and non-EU researchers had on average a greater citation impact than FP7-funded publications written only by EU researchers. This result shows that external collaboration, that is, collaboration with partners outside one's own block, although substantially infrequent under FP collaboration, holds the highest scope for an increment in research impact, as measured by the higher FWCI for these co-publications.

6. Conclusions and policy recommendations

Internationalisation of HEIs has grown in importance in national and EU policies. For EU countries, there is an additional strong regionalisation dimension, backed by an EU policy to establish an EHEA. Yet internationalisation of HE in the EU is not a smooth expansion process, but rather a dynamic and constantly evolving one. The UK withdrawal from the EU and the Covid-19 crisis are some recent major challenges to HE internationalisation in Europe.

While the Covid-19 crisis may stimulate the adoption of digital technologies for internationalisation at home, it also at the same time constrains the international mobility of researchers, jeopardising the beneficial effects from short- and long-term research stays. In fact, a recent survey organised by the EAIE indicated that the dominant longer-term concerns of respondents from the Covid-19 crisis turn on how mobility dynamics will unfold over time (Rumbley (2020)). This makes it all the more important to constantly monitor and evaluate internationalisation of HE and its effects.

This report has aimed to review the available evidence and analysis. This concluding section will summarise the main findings of the report on whether EU HE is sufficiently international, whether it is realising all the potential economic benefits from internationalisation, which EU policy instruments have been deployed, and whether these instruments are effective. It will conclude with recommendations for EU policy.

6.1 A summary of main findings

A broad perspective on internationalisation has become more mainstream, which sees internationalisation as “the intentional process of integrating an international, intercultural or global dimension into the purpose, functions and delivery of post-secondary education, in order to enhance the quality of education and research for all students and staff, and to make a meaningful contribution to society” (Knight, 2011). This broader definition not only focuses on the typical internationalisation abroad, but also includes internationalising at home, from internationalisation of the curriculum to transnational education and digital learning. It also emphasises that internationalisation is not a goal in itself, but a means to enhance quality and broader impact dimensions than solely economic effects.

Despite the growing importance attached to a broad concept of internationalisation of HE, most policy strategies, including in Europe, are still predominantly focused on international mobility, recruitment of international students and scholars and global reputation building, leaving internationalisation at home underdeveloped. And, despite the broadening of impact dimensions, most impact assessment exercises typically focus on short-term economic gains, overlooking the much more sizeable longer-term labour market gains from improved human capital.

Reputation and global rankings

The global competition for reputation, the ability to attract talented students and academics, and to attract income from around the world, is spurred on by the increasing role of international university rankings.

US universities still dominate the top of these rankings, both for research and teaching. Their positions are being challenged by European and Chinese HEI, though these have not yet been able to dislodge US HEIs from the top positions. Within Europe, the UK takes up a dominant position in the rankings, both in research and teaching.

Those HEIs that are top ranked are all intense practitioners of internationalisation of both research and teaching, and countries doing well in these rankings all have HEI

with a high internationalisation, confirming the strong correlation between scoring on these global rankings and internationalisation of HE.

International mobility of students

Institutional characteristics are found to be more important than regional or national characteristics as drivers of international mobility, and in particular the presence of better-quality universities with a higher reputation. As the perceived quality of instruction abroad and the perceived value of host institutions are key criteria for international students when selecting their country of destination, top-ranked HEIs are top destinations for internationally mobile students. University league tables and other international university rankings are widely disseminated and are therefore common information sources for prospective students to assess differences in quality among tertiary education systems.

Not surprisingly, the US remains by far the most popular destination country for internationally mobile students, followed by the UK. Asia is the main origin region of international students, and China the main home country. Most Asian students converge on just a few countries, with the US, the UK and Australia their main destinations. More than one third of Chinese students in the US earn their PhD degree in engineering.

The US benefits not only from a high attraction rate from Asia/China, but also from the high stay rate of these students, which is much higher than for European students. Stay rates matter, as they will drive the long-term effects of internationalisation.

Long-term effects from international mobility come from the integration of mobile students into the labour markets, contributing to knowledge creation, innovation and economic performance. These long-term benefits can quickly outperform any short-term costs and benefits, while limiting crowding-out effects. The size of these positive long-term effects for the host environment are critically determined by the retention rate and the quality of those staying. For students at masters or doctoral level, the positive effects can be expected to be even more important, as they can contribute to research and development in the host country, initially as students, but even more importantly, as researchers or highly qualified professionals later on. These longer-term effects also create more scope for a positive sum perspective where mobility generates gains that could benefit not only the home country, but also the host country. Benefits for the host country come from internationally mobile researchers keeping strong connections with their origin country, for example through collaborative research and from returning home at a later stage and bringing with them higher human capital and connections built up in their destination environment.

International mobility of scholars

The main **motivation** for scholars when going abroad is scientific, with the scientific excellence/prestige of the foreign institution in one's own area of research as the chief selection criterion for destinations. By contrast, the main motivations for returning home are personal and family based.

In view of its position at the scientific frontier, the US is not unexpectedly a major destination for internationally mobile researchers. Yet the evidence shows that the international mobility of EU scientists in general, and of doctorate holders in particular, tends to be mainly intra-EU. The more talented EU mobile scholars, however, choose to study in the US. Evidence on foreign staff at European HEIs has recently become available also for the EU (ETER), and this confirms that the scientific quality of the host environment matters.

Environments with a high research quality are favourite destinations for internationally mobile academics, especially for the better ones. This establishes a virtuous circle where high-quality environments can attract the best talents, who then contribute to the high quality of the science being produced in these environments, which thus remain attractive to new incoming talent.

HEIs with a high share of foreign academic staff also display high levels of internationalisation of their student body. All this suggests that these HEIs have a consistent internationalisation strategy across all their activities, education as well as research, commensurate with their position as 'world universities', as evidenced in their position in world rankings.

When looking at the **effects** of international mobility of scholars, the evidence shows not only that the best scientists are internationally mobile, but that cross-border mobility also comes with a boost in research quality that would be absent without mobility. While this evidence of positive effects on the scientific productivity of mobile researchers is clear at the individual level, the effects become more complicated at the country level, where brain drain issues need to be considered. Scientific publication records can trace the international mobility of researchers and assess brain drain or gain effects for host and home countries. This evidence confirms how the better science countries have better quality inflows, and therefore that top talents go to the better places and that better places attract top talents. But the outflows of top science countries are also of high quality. This shapes the scope for a win-win from mobility with top places. Such mobility should not only be seen as a win for countries such as the US, the UK or Switzerland, but also for other countries, because they can attract scholars from these top places, typically returnees who are of higher quality than locals. For most host countries the inflow of Chinese researchers is a brain gain. Emigrating Chinese researchers have a higher quality than the average locals in potential host countries, including countries such as Germany and the Netherlands.

The data confirm the positive sum, brain circulation story, not only for the US but also for China and Europe. For European countries, this holds particularly for the UK and Switzerland, and other northern EU countries. The EU countries for which brain circulation is most challenging are the central and eastern European countries and the southern European countries because their local science is of lower quality than that of other EU countries, making them less attractive destinations for mobile talents. Mobility can be a gateway to excellence even for these countries, because the inflow of new and returning talents is higher than the local quality. Yet, the quality of these inward talents is lower than for other countries, as a lower local excellence makes it more difficult to attract better foreign talent. The quality of their returnees is also lower than the quality of talents moving out.

International collaboration in research

The effects of international collaboration on the quality of research will depend on how strong and complementary the chosen research partners are.

The evidence shows that the US-China tie has grown in importance and is now above par, and that the large European countries have also strengthened their ties to the US and China. However, Europe is still under-represented in research collaboration with the US and China, taking into account their scientific importance. Bilateral ties among European countries have become stronger over time, however, and are now all above par, often very substantially. These results illustrate the increasing integration and gradual building of an ERA.

It can be seen that the impact of intra-EU collaboration is higher than for nationally produced science, when measured by the scientific quality of international

collaboration. Yet the highest quality increment for the EU derives from publications written by an EU author with extra-EU partners.

Impact of EU policies

The EU level adds a complementary policy level to the regional and national policy levels for higher education. HEIs consider EU-level policies as having the highest positive impact on their internationalisation. The national level is still regularly viewed as hampering internationalisation, for example through language and visa regulations.

The **Erasmus+** programme is the main EU instrument to promote international student and teaching staff mobility. The EU is increasingly committed to this instrument, as witnessed by an increasing budget over time. In addition, member states are promoting the learning mobility of young people with adopting a target to increase the proportion of EU HE graduates completing a period of their studies or training abroad to 20% by 2020. This commitment has meant the numbers of credit mobile students have increased in Europe, with the Erasmus+ programme a chief source for credit mobility for EU countries. The impact studies on Erasmus typically find positive results on individual skills enhancement, employability and institutional development. Yet most studies mix selection with treatment effects, as the best students with the best potential for skills enhancement and employability are more likely to be selected for Erasmus exchanges.

Marie Skłodowska-Curie Actions (MSCA) fellowships are particularly aimed at encouraging international mobility, that is, funding researchers who move to another host country to be research-active, both intra- and extra-EU. MSCA has also seen a growing EU budget, most of which goes to financing intra-EU mobility. The impact studies on Marie Skłodowska-Curie fellowships typically find positive results on individual skills enhancement, employability and institutional development. However, selection effects need to be isolated from treatment effects for this policy action too, as the best scholars with the best potential for skill enhancement are more likely to be selected for MSCA Fellowships.

European Research Council (ERC) grants, although not explicitly designed to foster international mobility, can be used by host institutions in Europe as an instrument to attract foreign talent and to reverse the brain drain. Indeed, a substantial share of ERC applications is made by researchers who are non-nationals in the host country where they apply. Most of this mobility remains intra-EU. Interpreting the higher success rates of foreign applicants as a measure of their higher quality, illustrates how the ERC programme serves as an instrument for brain gain. This premium holds both for extra- and intra-EU foreign applicants, and for all European hosting countries, including southern European countries and central and eastern European countries. At the same time, the success rates of outwardly mobile researchers are typically above the average of their home country, suggesting that outwardly mobile researchers are a brain drain for the home country. This premium is particularly high for southern European countries and central and eastern European countries.

The **cooperation** projects funded through the EU budget are overwhelmingly intra-EU. The EU-funded cooperation projects boosted central and eastern European countries as partners for scientific publications beyond what could have been expected from their scientific size, illustrating the contribution of the EU budget to progressing the integration of the ERA. The US and China are still massively under-represented as third countries, despite their scientific sizes. Yet the quality of EU-funded scientific collaborations shows that collaboration with partners outside the EU, although very infrequent, provides the highest scope for an increment in research quality.

6.2 Policy implications

Although institutional and political stakeholders recognise the important positive effects from the HE internationalisation, evidence shows that there are still barriers and costs to mobility and unexploited benefits. Furthermore, the political, economic and social environment in favour of HE internationalisation is highly dynamic and cyclical. The current times of rising protectionism, the rising US-China conflict, the UK withdrawal from the EU and the Covid-19 pandemic are particularly threatening for internationalisation of HE, making it all the more important to continuously monitor it and evaluate its effects. This report, in reviewing the evidence, has made clear that monitoring and evaluation requires further progress. Yet despite the need for more and better data and analysis, the current state of evidence already suggests a number of policy implications.

Policies supporting HE internationalisation

Evidence of a stronger intra-EU connectivity is good news for the EU's mission to establish an EHEA and ERA. At the same time, it raises a concern that the intra-EU process of integration diverts attention away from, or substitutes for, openness extra-EU. The EU has much to gain from attracting talent and from collaborating with top places outside the EU, namely the US and China, and European countries that are not part of the EU-27, particularly Switzerland and the UK. It is a reminder that a critical part of the EHEA and ERA process is to foster extra-EU openness as a conjoined twin to intra-EU mobility.

Overall, the evidence clearly shows how internationalisation and excellence go hand in hand. Internationally mobile individuals, particularly masters, PhDs and seasoned researchers, are the more talented individuals among their peers, typically making emigration a brain drain for the origin country, and immigration a brain gain for the destination country. But as emigration and immigration is highly correlated, open countries enjoy brain circulation, where more excellence is gained from the imported talents than what is lost from exported talents. This, however, only holds for the countries with a high-quality local base. Countries with a weaker local base still gain from importing talent, but their quality loss from emigration is higher. Returnees are a particular source of brain gain for these countries, even if the returning emigrants are not the best emigrants.

For countries to benefit from mobile talents, a virtuous circle must be fed by having a strong environment that attracts the best of international talents. These best of immigrated talents will be a brain gain over locals, further boosting the country's overall excellence. This will in turn improve the attractiveness of the country for the next inflow. Not only the US, but also Switzerland, the UK and the northern European countries are successful examples of such virtuous circles.

To build the foundations of a virtuous openness-excellence nexus, a strong and open local education and research environment should therefore be high on the policy agenda. This agenda should be a joint EU and national/regional agenda.

Barriers to international mobility should also be removed. Survey evidence points to regulatory issues, such as portability of pension rights and visa requirements, as significant barriers. All these are straightforward targets that policy can remove, being a mostly national/regional policy competence. Extra burdens on mobility may have important long-term implications if they jeopardise virtuous mobility circles. The true impact of the current backlash in HE internationalisation in a more deglobalised, nationalist, post-pandemic closed era is not likely to be felt to its full extent until the longer term.

HEIs are important for shaping a country's or region's reputation for excellence in education and research. Policies should look at removing barriers and providing incentives and resources for HEIs to engage in internationalisation strategies and reap their benefits. HEIs need to create the environment and incentives for their staff, scholars and students to engage in internationalisation activities. HEIs need to commit to proper incentives for a long-term, encompassing internationalisation strategy. A big worry for HEIs is what will happen in a post-Covid, more deglobalised world. Given the uncertainty of the future, it is difficult for the institutions to develop mitigation action plans. This holds *a fortiori* for UK HEIs with their highly internationalised strategies. They have a high reliance on incoming foreign students and their tuition fees as income source, a strong internationalisation of research and teaching staff, and a strong participation in EU programmes to attract talented foreign students and scholars and collaboration partners. These institutions are doubly hit by both the deglobalisation uncertainty and the UK withdrawal from the EU.

In the current climate, the mandate for the regional, national and EU policymakers is to mitigate the huge uncertainty by committing to supporting HE internationalisation, by continuing their financial support, and if possible, even increasing it. This will be more sustainable if the effectiveness of their interventions can be more forcefully demonstrated by high-quality impact analysis, for which the roadmap is discussed below. The EU level should clearly show its commitment to international mobility programmes, particularly Erasmus+, Marie Skłodowska-Curie fellowships and ERC grants, and prioritising these programmes in its next EU budgets. In addition, the EU should devote more attention to a better mix of its policy instruments for international mobility. It should also mix its instruments better with national and regional ones. Although the evidence suggests that stakeholders, especially hosting institutions, exploit the synergies between various instruments, even in the absence of a strong formal policy to coordinate instruments, it is nevertheless important that proper analyses are done to assess whether synergies are fully exploited.

A careful analysis of the design of the current set of policy instruments is also needed to check whether there are overlaps that lead to wasteful duplication, and/or areas of action that are not (yet) covered. An example of missing instruments at the EU level are international fellowships for long-term stays abroad for PhD students with bottom-up individual applications. The Marie Skłodowska-Curie IFs are for PhD holders and the International Training Networks (ITNs) are for PhD students within institutional proposals. The evidence reviewed shows that recruiting the most promising researchers at early stages of their careers is likely to be more successful and impactful, whereas trying to recruit leading researchers at later career stages will be more difficult and costlier, as they are less likely to move. Offering attractive internationalisation instruments for early-stage researchers is thus a most attractive policy area, but one not yet covered by EU instruments. When designed in line with the MSCA and ERC grants, they can offer similar high reputation effects, beyond what national or regional grants could reach.

Improving data and analysis

Although a number of policy implications clearly emerged from the available evidence and analysis, the report also made clear that monitoring and evaluation still requires further progress. An important policy recommendation for the EU and its member states is to invest in high-quality international and time-comparable indicators for the various forms of internationalisation. Sufficient detail should be available not only on the quantity of international connections but also the quality, including details about the source and destination of international connections. More data should also be collected at the individual level, and pre- and post-mobility tracking of their activities, careers and performance. This should be done on a large scale, covering as much as

possible the heterogeneity of individuals involved by geographic areas, scientific disciplines and other characteristics. For evaluation of policy actions, it is important to have this information on a large scale, for both those 'treated' by the policy instruments and comparable others.

Much more can be done by investing in greater standardised and matched publicly available data. Regular large-scale surveys are also an important source of information for inquiring about individual motives and impediments to mobility and applying (or not) for policy programmes, as well as for gaining individual perceptions of the effectiveness of international mobility on their careers and any treatment from the instruments in which they participated. As all this requires a big, systematic and persistent policy effort, which is best done at a coordinated European level. This has long been on the agenda of the European Commission (see for example Recommendation 1 in the Final FP7 & Midterm H2020 report of 2017 (EC 29/5/2017)). It is time to take bigger and bolder steps towards this agenda.

It is not only better indicators for international connections that need to be collected. There is also a need for more regular studies analysing the net effects from internationalisation, studies that identify both economic and non-economic effects, and direct as well as indirect effects. These studies should identify how important selection of talents is as a driver of effects from programmes. They should look not only at short-term costs and benefits but also at the long-term effects, as this is where most of the potential for positive effects can be found. To assess long-term effects, more indicators will be needed to trace stay rates, the quality of stayers and their activity profiles when staying. Returnee flows, their quality and effects, should also be monitored in a more structural way, as these constitute an important source of the brain circulation that creates win-wins from internationalisation for source and destination countries.

Finally, more regular studies are needed to analyse the effectiveness of policy instruments deployed for stimulating internationalisation. This includes EU policy instruments like Erasmus+, MSCF fellowships and ERC grants. But these should also be complemented with national or regional instruments. These studies should employ state-of-the-art indicators and methodologies, differentiating between selection and treatment effects, and comparing recipients before and after the treatment with proper counterfactual groups. The analysis of policy actions should not only be done at the level of individual instruments but also at an aggregate level to examine the policy mix of different instruments as to whether and how they complement or substitute for each other. This includes the mix of the different EU policy instruments and also the mix of EU and national or regional policy instruments.

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