



ISEG INSTITUTO SUPERIOR DE ECONOMIA E GESTÃO

UNIVERSIDADE DE LISBOA

MASTER
INTERNATIONAL ECONOMICS AND EUROPEAN
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MASTER'S FINAL WORK
DISSERTATION

MOBILITY IN HIGHER EDUCATION' S CONTRIBUTION TO
ECONOMIC COMPETITIVENESS AND COHESION IN EU:
TRENDS AND OUTCOMES

BEATRIZ ALEXANDRE DIAS

OCTOBER – 2021



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Learning and teaching at a distance, through a camera and a computer, made the last two years a challenge. Being a working student in a pandemic crisis also demanded adaptation and resilience. Then, this research is the result of a master's degree done in unexpected ways and without daily contact with other students and teachers.

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ABSTRACT, KEYWORDS AND JEL CODES

ABSTRACT: European Union and its Member States have been faced with gaps and disparities in economic competitiveness and cohesion. There are clear divides in the EU and countries and its regions grow and react to crisis in very different manners. This work explores how knowledge, education and R&I became associated with economic competitiveness and how that has been impacted by EU's strategies and policies. The desire to turn EU in a knowledge economy, where innovation and competitiveness are closely related to a highly skilled society, reinforced the role of Higher Education and, consequently, students' mobility. By analysing trends in economic competitiveness and higher education mobility, it's possible to notice that the same group of countries stands out has more competitive and more attractive for students, while clear differences are set between Member States.

KEYWORDS: Economic competitiveness; Knowledge Economies; Tertiary Education; EU Policies; Mobility in Higher Education

JEL CODES: F43, F63, J24, O43, I23, J60

RESUMO: A competitividade económica e a coesão na União Europeia e entre os seus Estados-Membros têm sido pautadas por lacunas e disparidades. Existem claras divisões na UE e os seus países e as suas regiões crescem e reagem a crises de forma muito diferente. Este trabalho explora como o conhecimento, a educação e R&I estão ligadas à competitividade económica e como têm sido influenciadas pelas políticas e estratégias da UE. O desejo de tornar a União Europeia numa economia do conhecimento, onde a inovação e a competitividade estão fortemente associadas a uma sociedade altamente qualificada, reforçou o papel do Ensino Superior e, consequentemente, da mobilidade de estudantes. Ao analisar tendências e na competitividade económica e na mobilidade no Ensino Superior, é possível detetar que o mesmo grupo de países se destaca como mais competitivo e atrativo para estudantes, marcando diferenças claras entre Estados-Membros.

PALAVRAS-CHAVE: Competitividade Económica; Economia do Conhecimento; Educação Universitária; Políticas da UE; Mobilidade no Ensino Superior

JEL CODES: F43, F63, J24, O43, I23, J60

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ABBREVIATIONS AND ACRONYMS

BP	Bologna Process
ECTS	European Credit Transfer System
EHEA	European Higher Education Area
EU	European Union
GCI	Global Competitiveness Index
HE	Higher Education
HEI	Higher Education Institution
ICT	Information and Communication Technologies
JCR	Joint Research Center
KE	Knowledge Economies
MFF	Multiannual Financial Framework
MS	Member State
OECD	Organisation for Economic Co-operation and Development
SME	Small and Medium-sized Enterprises
VET	Vocational Education And Training

ABBREVIATIONS (COUNTRIES)

AT	Austria	LU	Luxembourg
BE	Belgium	LV	Latvia
BG	Bulgaria	ME	Montenegro
CY	Cyprus	MT	Malta
CZ	Czechia	NL	Netherlands
DE	Germany	PL	Poland
DK	Denmark	PT	Portugal
EE	Estonia	RO	Romania
EL	Greece	SE	Sweden
ES	Spain	SI	Slovenia
FI	Finland	SK	Slovakia
FR	France	UK	United Kingdom
HU	Hungary	USA	United States of America
IE	Ireland		
IT	Italy		
LT	Lithuania		

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Introduction

A recent report from the Joint Research Centre (JRC) on European Union (EU) competitiveness acknowledges that in 2021 the European Union still faces challenges in becoming as competitive and innovative as possible and identifies some areas for improvement (Marschinski et al., 2021). Despite the European Union (EU) strategies for change and the focus on knowledge and innovation as a source of competitiveness and growth, when compared to other economic powers, like the United States (USA) or Japan, the EU still struggles in productivity, while also facing its own difficulties in the energy sector and its transition to a greener stage. Its manufacturing industry and global value chains have seen better days as well, losing power to new competitors like India and China (Marschinski et al., 2021, pp. 3). The effects of these challenges are also felt differently by each country, marking, for example, an opposition between northern and southern countries and their adjustments to labour productivity transformations (Marschinski et al., 2021, pp. 22). The role of education and innovation, mainly in the form of R&D, is identified as a relevant source of competitiveness and, again, a clear distinction is made between the better performers, in the north, and the worst performers, in the south (Marschinski et al., 2021, pp. 28).

Several EU strategies were designed and implemented during the last decades: at first, the Lisbon Strategy (LS) advocated for a “radical transformation of the European economy” (European Council, 2000), investing in education and information, with the goal of establishing a European Area of Research and Innovation. However, in the outcome of the financial crisis of 2008 and the following years of “sluggish growth” (Schwab & Brende, 2014, pp. v), EU’s growth and competitiveness were put into question. The 2020 Strategy followed the LS, hoping to turn the European Union in a “smart, sustainable and inclusive economy delivering high levels of employment, productivity and social cohesion” (European Commission, 2010, pp. 5), defining as its core investments education, digital transformation, sustainability, and competitiveness (European Commission, 2010).

Notwithstanding, back in 2014, while the EU prepared itself to embark on a new Multiannual Financial Framework (MFF), the World Economic Forum (WEF) advised that “large disparities exist among Member States, with some countries performing better

than both the EU average and other advanced economies, such as the United States, while some Member States perform far worse.” (Schwab & Brende, 2014, pp. 18).

The European Union needed great structural changes made in the long run and should accommodate for the differences between cultures and education levels amongst Member States (MS) and even its regions (Schwab & Brende, 2014).

As the EU's economic competitiveness in 2014 was undermined by disparities and gaps in each country's development, new strategies were defined for recovery. Continuing its turn to education and knowledge altered what the European Union defined as its goals and what it intended to provide for its citizens. The new budget reflected the importance knowledge economies assumed in the global economy (European Commission: DG Budget, 2014, pp.101) and what should a country target as beneficial investments for its citizens.

“(T)he Commission proposal entailed a marked shift in the allocation of resources (...) a shift towards competitiveness and investment in infrastructure with a focus on knowledge-based activities such as research and education.”

In: European Commission: DG Budget, 2014, pp.102.

Hence, “while the responsibility for education and training systems lies with the Member States, the role of the EU is to support and supplement their action”¹ and this new path followed by the EU brings Higher Education (HE) to a new light too. The *Smart and Inclusive Growth* initiative saw an increase in its available budget and new programs were created. The new *Horizon 2020* combined most educational, research and innovative programs promoted and mobility in education and life learning programs were subject to changes, with several programs (e.g., *Comenius*, *Erasmus Mundus* and *Youth in Action*) combined into one, the *Erasmus+* (Regulation 1288/2013).

By 2017, the Social Summit in Gothenburg, Sweden, proposed the creation of a *European Education Area* (EEA), that “seeks to foster cooperation between European Union (EU) Member States to further enrich the quality and inclusiveness of national education and training systems”². The new European Commission elected in 2019 followed its predecessor's path and intends to continue the work to create an EEA by

¹ https://ec.europa.eu/education/education-in-the-eu/about-education-and-training-in-the-eu_en

² https://ec.europa.eu/education/education-in-the-eu/european-education-area_en

2025, with the desire to provide for an education that's inclusive, digital, and accessible to all regions.

This MFW intends to focus on the path Europe chose and still invests in to maintain its competitive status in the global economy and the role allocated and performed by education and knowledge to attain that goal. In line with all the investments made to achieve the full potential of Higher Education, mobility in HE has been a priority for the EU too. The social, cultural, economic, and professional skills gained from an experience abroad are not only looked for in any company or business but also competences that the EU wants to extend to its students, wherever they're from. Mobility in education doesn't just entail graduate students since, with the current *Erasmus+* program, secondary schools also participate in exchange programs with students from all over Europe and researchers, teachers and even administrative staff can learn, teach, and work without constraints from physical or legal and bureaucratic frontiers.

The COVID-19 pandemic has suspended and, at some times, threatened the much-appreciated mobility achieved by the EU. This new restriction and its unexpected effects on students and teaching provides an interesting timing for this research. Our main research questions are: *How have mobility EU programs contributed to the role and impact expected from HE in the competitiveness and cohesion among MSs? Is there any tendency or room for improvement in the cooperation promoted by the EU?*

The aspects of competitiveness mentioned in this work will be aligned with what is considered as economic competitiveness and innovation by the EU and will follow its priorities to achieve it.

This research includes four sections. After the Introduction, section 2 presents a literature review on the evolution of competitiveness, knowledge economies and HE, while analysing the EU's path in education and training. Section 3 presents an empirical analysis on competitiveness and mobility in HE and section 4 concludes.

2. Literature review

In this section, a brief literature review analyses how competitiveness and the concept of Knowledge Economy (KE) have intertwined and defined the path and policies of the EU to deal with the differences between its MSs. Competitiveness and the KE had an impact on HE too, which resulted in new programs and projects, with great influence over MSs education sectors.

This section has three parts: the first, that reflects on the evolution of competitiveness and the importance of KEs; a second one, about the paths and policies followed by the EU to become more competitive and cohesive; and a final one, where transformations to higher education are analysed in its relation to the EU's strategies.

2.1 Economic competitiveness and the Knowledge Economies

Competitiveness is not a precisely defined concept, as it can be applied or thought of in different sectors and aspects. For the purposes of this analysis, where economic competitiveness is the focus, the definitions provided by the main international institutions will be adopted.

Table 1: Definitions of competitiveness

Institution	Definition
European Union ³	“An economy with a sustained high rate of productivity growth”
OECD ⁴	“a measure of a country's advantage or disadvantage in selling its products in international markets”
IMD ⁵	“the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people”
World Economic Forum ⁶	“the set of institutions, policies and factors that determine the level of productivity of a country.”

Source: own construction based on references.

³ <https://eur-lex.europa.eu/summary/glossary/competitiveness.html>

⁴ <https://stats.oecd.org/glossary/detail.asp?ID=399>

⁵ <https://www.imd.org/centers/world-competitiveness-center/rankings/world-competitiveness/>

⁶ Schwab (2019) pp. xiii

The four definitions in *Table 1* converge in some aspects: a country's ability to stay competitive and innovative is key to economic growth and resilience in the global economy, which can be achieved through high productivity and a strong presence in international markets.

However, the debate around what constitutes a competitive advantage to a country or a group of countries, an enterprise or any economical agent evolved significantly, especially after the 90s (Širá et al., 2020) and the sources of competitiveness have changed over the years (Sum & Jessop, 2013).

The last few decades have seen a massification of Information and Communication Technologies (ICTs), facilitating how information and knowledge are disseminated and causing a significant impact on markets (Širá et al., 2020). Interactions between economic agents (producers, buyers, and sellers) became instantaneous, as companies and enterprises found themselves in a never-ending competition to attract new consumers and to maintain, or gain, new market space (Chen & Dahlman, 2005).

Additionally, the idea that competitiveness is associated, or driven by, knowledge brought attention to the knowledge economies and the role they could play in economic growth. Thus, KEs rely on certain conditions to be successful. As Chen and Dahlman (2005) explain, a KE should focus on an educated and highly skilled society, where research and innovation (R&I) are a priority and directly applied in new and more competitive ways of production. This ought to be accomplished by efficient and proactive infrastructures and institutions that use technology and information to their advantage, to promote the creation and dissemination of knowledge (Chen & Dahlman, 2005).

Hence, the role that KEs could play in driving growth and prosperity was an incentive for countries to make the transition to a knowledge-based society, especially in the wake of the financial crisis of 2008 (Sum & Jessop, 2013). Several phenomena helped in the turn for knowledge, education, and R&I as sources of improvement and economical advantage: the rising levels of unemployment, the disproportion between the supply and demand of high and low-skilled labour, and the inadequacy and lack of adaptation to ICTs, either from firms or from the society (Parežanin, Jednak & Kragulj, 2014). Education becomes fundamental to stimulate innovation, promote economic growth (Enders et al., 2011, pp. 1) and, in the long run, is key to an equal society, where education, technology and labour skills are available to everyone (Schwab, 2019).

Currently, a competitive economy makes the most efficient use of its ICTs and it's able to educate and develop a highly qualified society. Investments in innovation, research and education become a significant aspect of an economy that produces and disseminates knowledge, with scientific and technological progress as priorities (Dima et al., 2018). Creativity and scientific progress grew crucial, either for the development of new ways of production and industrial processes, (Lane, 2012) or for sustainable growth and economies in need to catch up (Aleksejeva, 2016).

As new challenges and disparities became evident in the EU, competitiveness and KEs had a fundamental role for the policies and programs defined.

2.2 Economic competitiveness and the EU Strategies

Following the tendency already present in other economic powers (Rodrigues, 2002), this new way of perceiving growth was also strongly integrated in the EU as a way of facing its competition and defining its place in the world economy.

In 2000, the EU was “confronted with a quantum shift resulting from globalisation and the challenges of a new knowledge-driven economy” (European Council, 2000).

Putting a crucial emphasis on information and knowledge, the Lisbon Strategy, designed for the decade of 2000-2010, focused on working towards more education and training, more digitalization and innovation, and the result should be, by 2010, a “powerful engine for growth, competitiveness and jobs” (European Council, 2000). The Lisbon Strategy defined as a goal the creation of an European Area of Research (EAR), alongside a bigger investment in education and R&I, and set up benchmarks and targets to modernize markets and enterprises and foment more innovative economies (European Council, 2000).

After the financial crisis of 2008 and the difficult years that emerged from it, the 2020 Strategy (European Commission, 2010) followed as a decisive point for the EU's transformation into a knowledge economy. As member states struggled to recover from the financial crisis, especially the cohesion countries (Brunazzo, 2016), it was clear that not all states were equally competitive and there were some drastic economic differences (European Commission, 2010).

Hence, the 2020 Strategy laid out the plan for a “smart, sustainable and inclusive growth” (European Commission, 2010) and knowledge and education were especially invested in three essential areas: i) the investment in a *greener Europe*, which corresponds

to a comprehensible shift to renewable energy sources (European Commission, 2010), and, consequently, a significant effort for most countries and enterprises to adjust production methods; ii) an investment in a *digital Europe* (European Commission, 2010), with a focus on digital competence and literacy, but also keeping in mind how these technologies can be used to improve communication, information access and, consequently, people's lives; iii) and, finally, investment in areas such as *competitiveness and cohesion* have risen as a main concern (European Commission, 2010), especially as a result of flagrant differences between the Member States' economies and after the enlargement of 2004 to Eastern European countries.

Seven flagships were presented to define the EU's work to become more competitive: *Innovation Union*, *Youth on the move*, *A digital agenda for Europe*, *Resource efficient Europe*, *An industrial policy for the globalisation era*, *An agenda for new skills and jobs* and *European platform against poverty* (European Commission, 2010). Investments in innovation and research, targets and benchmarks in education and environmental changes were established as commitments for "both the EU and the Member States" (European Commission, 2010, pp.4).

The 2020 Strategy simplified goals and policies and was a guide for EU's programs and decisions, however, economic recovery was still a challenge.

In a report from 2014, the World Economic Forum evaluated the EU's place in the economy when compared to other world powers, like the USA, Japan, and China, and concluded that, while facing external challenges, the EU needed more competitiveness and cohesion amongst its MSs and as a whole (Schwab & Brende, 2014).

Accentuating the disparities between North and South, this report pointed out several structural differences. The labour markets still presented a gap between high and low skilled population. In some countries, especially in the South of the EU, the business environment was unattractive for enterprises and the adaptation to digital transformations was still an issue (Schwab & Brende, 2014). These disparities ended up leading to a clear delay in innovation and, consequently, in fulfilling the goal for a knowledge society set out in 2010 (Schwab & Brende, 2014).

The spread in performance across European countries is particularly stark in areas such as innovation, where the "innovation divide" is illustrated by a three-point gap, on a scale

of one to seven, that separates the best performers— headed by Nordic countries—from the worst (Hungary, Bulgaria and Romania).

In: Schwab & Brende, 2014, pp.18

The negotiations for the MFF of 2014 to 2020 were especially long and agreement was difficult to achieve (European Commission: DG Budget, 2014). The challenges for the European Union were very present and the flagships proposed in the 2020 Strategy continued as the guideline for the budget set for the next decade. There was an increase in the budget for *Smart and Inclusive Growth*, with a focus on competitiveness, infrastructures, and cohesion (European Commission: DG Budget, 2014) and, throughout these strategies and different paces of economic growth and development, competitiveness and education are still crucial aspects for the EU.

A report on the future of the EU in 2050 advises on the significance knowledge and innovation already have and could continue to play in the economic growth and social sustainability desired (Hudson et al., 2015). By mapping out the future of the EU, this report reinforced how knowledge and higher education are fundamental.

In recent years, however, a more complex model has come to dominate policy discussion in Europe: the knowledge triangle. (...) Education, research and innovation; universities, laboratories and companies; teachers, scientists and entrepreneurs – all are part of a system that, if well managed, creates wealth, jobs, growth and, if one is an optimist, social progress.

In: Hudson et al., 2015, pp. 4.

Despite the increase in budget, the simplification of programs and policies, “ten years after the crisis and the north-west, south-east divide across the EU is still clear and visible” (European Commission: DG Regional and Urban Policy, 2019, pp. 5).

There is a great divergence in growth and development between the metropolitan regions or capitals and the outer regions, as the report on the European Regional Competitiveness in 2019 demonstrates. Certain regions in European Union are considerably more competitive than others, with the old “blue banana” (European Commission: DG Regional and Urban Policy, 2019, pp. 5) and income inequalities

between northern and southern and eastern European countries still a reality (European Commission: DG Regional and Urban Policy, 2019).

While the report states that “the quality of institutions, macroeconomic stability, health, basic education, labour market efficiency, technological readiness and business sophistication are all aspects where the region could act to improve its competitiveness” (European Commission: DG Regional and Urban Policy, 2019, pp. 23), it also acknowledges that for less competitive countries, an investment in these areas has more effective results when compared with those who are already well positioned in competitiveness and economic growth.

Innovation of member states as a whole has been a focus for the EU as well. In the most recent report, evaluating how MSs performed until 2019, the European Innovation Scoreboard analyses *Framework conditions*, *Investments*, *Innovation activities*, and *Impacts* and concludes that innovation has been constantly improving, even for countries in need to catch up (European Commission: DG Regional and Urban Policy, 2019). However, despite the general evolution and growth, innovation still marks significant differences between the EU (European Commission: DG Regional and Urban Policy, 2019) and the report divides performances into four groups⁷:

- i) *Innovation Leaders*, represented by Belgium, Denmark, Finland and Sweden;
- ii) *Strong Innovators*, represented by Austria, Estonia, France, Germany, Ireland, Luxembourg and the Netherlands;
- iii) *Moderate Innovators*, composed by Cyprus, Czechia, Greece, Italy, Lithuania, Malta, Portugal, Slovenia, and Spain;
- iv) *Emerging Innovators*, composed by Bulgaria, Croatia, Hungary, Latvia, Poland, Romania and Slovakia.

Hence, as innovation and competitiveness are increasingly important for stability, sustainability, and economic growth, more than half of EU's member states still perform below the EU average. The goals for cohesion and competitiveness laid out in the 2020 Strategy are still in the making and undermined by the differences already mentioned.

The investment in knowledge and innovation to stimulate economic growth is a continuous challenge for the EU, with measures being updated and reformulated as, with

⁷ This classification of countries by innovation levels will inform the application of cluster analysis in section 3.4. of this MFW.

time, policies and efforts do not match the progress made by the EU's main competitors, like the USA, Japan, or China (European Commission, 2020).

Despite substantial efforts at the EU, national and regional level, the European paradox continues to exist: the Union continues to be a global leader in terms of scientific output producing, for example, 22.7 % of all high-quality scientific publication, but still lags behind in translating this advantage into products, services, processes and solutions that meet the demand.

In: European Commission, 2020, pp. 7

A policy review published in 2020, reflecting again on the role of knowledge and R&I, but also on the impact of Covid-19, points out these differences in the global economy and states that the way forward relies heavily on knowledge, education, and research to provide the European Union and its Member States with the necessary advances and scientific breakthroughs (European Commission, 2020). Academic institutions should reinforce the connection between HE and their country's main industries and stakeholders; civil society and businesses are identified as the main actors for the policies and programs proposed too, as deeper cooperation between universities and companies could create more mobility and more participation in HE (European Commission, 2020).

The work of the EC elected at the end of 2019 was also obligated to adjust to the pandemic and to the potential economic crisis that ought to follow a difficult year for businesses, schools and universities, and society in general.

However, despite the pandemic crisis, the EC remains focused on the six priorities already defined: *A European Green Deal*, *A Europe fit for the digital age*, *An economy that works for people*, *A stronger Europe in the world*, *Promoting the European way of life* and *A new push for European democracy* (Bassot, 2021).

Knowledge and education have, once again, a great impact on how these priorities turn into realities. As the EC pursues a more digital Europe, where everyone should have access to information and be able to work with the new ICTs, it intends to incorporate digitalization into markets and security (Bassot, 2021). *An economy that works for people* focuses on "employment, skills, and social protection" (Bassot, 2021, pp. 9). Finally, by wanting to *Promote the European way of life*, the EC's "envisages inclusive education and training from early childhood to higher education, improved employment

opportunities and skills recognition, better access to health services and to adequate and affordable housing” (Bassot, 2021, pp. 14).

The next section will focus on how Higher Education and the policies the EU defined for it had an impact on competitiveness and cohesion and if they helped the EU closing the gaps between their countries.

2.3 Higher Education in the European Union

Following the last chapter’s conclusions, it’s important to notice that the ambition to create a competitive HE area, with a recognized quality and attractiveness for other countries, inside or outside EU, has been a work in progress for quite some time.

Higher education lies at the centre of this new found concept of competitiveness. Once economic growth, KEs and HE turned into a recipe for success, universities turned into “economic drivers” (Lane, 2012). Higher education institutions (HEIs) became part of a market, an industry, with students, teachers, researchers, and their work as its output and all the efficiency needs a market requires (Sum & Jessop, 2013). HE has also taken on the difficult task of providing for better jobs, better economies and, at the end, a more unified Europe (Dakowska & Velarde, 2018). All this combined with a new phase of globalization that “affects individuals’ motivation to achieve increased competitiveness” (Dvir & Yemini, 2017, pp.200), led to a new role for the EC.

Then, the EC’s power or influence over HE can be, to some extent, measured and analysed through the different instruments and policies it promotes in a field where support and cooperation are the only means of action at its disposal. Recognizing that EC’s communications and programs have a great impact over HE (Sin, Veiga & Amaral, 2016), it can also be argued that the EC acts in what can be considered a grey area (Dakowska & Velarde, 2018) and its political influence expanded to a department where there should be none. Therefore, since cooperation and active involvement of MSs are key for policies in HE to work, EC’s strategy has been to participate and involve itself in projects to promote intergovernmental action plus collaboration with HEI and their stakeholders (Dakowska & Velarde, 2018).

In its relation with the Bologna Process (BP), at first, the EC acted as a point of contact and counselling, but, as the project grew, it adhered as full member in 1999 and, after that point, their paths became so intertwined that BP’s policies and EU programs are hard to tell apart (Dakowska & Velarde, 2018).

Hence, the BP and its structural changes to HE in European countries, accompanied by the EC's efforts into connecting its MSs through education and innovation, also allowed for mobility and its growing importance in higher education to become relevant both as a strategy and as a goal.

Section 3.1. presents and discusses the process of construction and implementation of the EHEA and section 3.2. relates EHEA with the EU's strategy and the work of the EC.

2.3.1 The Bologna Process and the European Higher Education Area

In light of the new economic role found in higher education and considering the significant differences between European countries, there was a need to push them to adapt and adjust to new paths and goals. In an area that falls under each state's governance, the BP emerged as an impelling effort from governments to transform how countries collaborated and how their students and researchers could work together towards the same end (Faber & Westerheijden, 2011).

Consensual Process and Heterogenous Results

As the main focus laid in being more innovative, more appealing and competitive, four countries - Italy, France, the United Kingdom and Germany - and their ministers of education and research committed, in a declaration signed in Sorbonne, in 1998,

to engage in the endeavour to create a European area of higher education, where national identities and common interests can interact and strengthen each other for the benefit of Europe, of its students, and more generally of its citizens.

In: Sorbonne Declaration (1998), pp. 3

A year later, this declaration paved the way for the Bologna Declaration and all the reforms and the processes it initiated were not only significant for HE but can also be analysed in the consequences they had for the construction of an European identity.

First, BP focused on creating an European Higher Education Area (EHEA), a system or a form of cooperation "capable of giving its citizens the necessary competences to face the challenges of the new millennium, together with an awareness of shared values and belonging to a common social and cultural space" (Joint declaration of the European Ministers of Education, 1999, pp.1). This goal translated into several changes proposed

to HEIs, as education should become more transparent, more comparable, and especially more recognizable between European countries (Teichler, 2019). Alongside this desire to make degrees more compatible, both the Sorbonne and Bologna Declarations reinforced the role of mobility and the importance of graduates' ability to relocate and explore other cultures and societies, as "the fast growing support of the European Union, for the mobility of students and teachers should be employed to the full" (Joint declaration on harmonisation of the architecture of the European higher education system, 1998, pp.2).

The mechanisms set in place to achieve these goals expanded to most countries that joined the BP and to this day are common in most universities (European Commission/EACEA/Eurydice, 2020). A two degree-cycle, composed of a bachelor's and a master's degree, was put in place to facilitate students' transition to other countries as well as the recognition of their degree, regardless of the chosen university. At the same time, a Diploma Supplement should accompany every degree, as a way of easing the transference of knowledge and comparison of curriculums. Finally, the European Credit Transfer and Accumulation System (ECTS) has become a powerful tool for mobility in higher education and has allowed for long and short term mobility (European Commission/EACEA/Eurydice, 2020).

The consensus around these changes is that, even though they act upon the educational system of each country, they were made through coordination, through the interconnection of paths and targets and with the intervention of different actors, with more or less competitive higher education systems (Faber & Westerheijden, 2011). Then, the Bologna Process "compared to policy-making in other sectors, (...) stands out as a unique and interesting anomaly: a consensual process, relying largely upon trust and action between a wide range of very different countries, institutions and stakeholders" (European Commission/EACEA/Eurydice, 2020, pp.157).

However, as successful as these transformations were, they were implemented in a sluggish way, with countries being left behind as others made a clear and swift transition, only gaining the necessary "momentum" to change in the last decade (Sin, Veiga & Amaral, 2016, pp.57).

For example, in Portugal, the Bologna Process was defined "as a messy and lengthy affair" (Sin, Veiga & Amaral, 2016, pp.157), as political instability and constant government changes held back much of the actions proposed and gaps in autonomy and legislation produced different results for public and private institutions (Sin, Veiga & Amaral, 2016). As for Eastern European countries, the connection between higher

education and European values, heavily promoted by BP, was even more relevant as a way of catching up to the rest of the MSs and facilitating integration into the European Union (Dakowska & Velarde, 2018).

Consequently, as countries and governments adjusted policies to substantially alter how their HE area is organized, the effects on the “Europeanisation” process and mobility were notable too.

As efforts were made to ensure that all students’ and researchers’ qualifications were recognizable and transposable amongst universities (Sin, Veiga & Amaral, 2016), this also meant that the same standards’ guidelines and quality assurance systems were now applied by most European countries and even by some non-European participants in the BP. Thus, it’s interesting to note, at this point, how these mechanisms and policies have also led to a new perception of the BP’s role in constructing an European identity.

With different economic and political paths being followed within the European Union or even within Europe, “the Bologna Process is the largest European initiative geography-wise, which has appealed to the facilitation of a European identity through educational matters” (Kushnir, 2016). For the last couple of decades, most European countries and all of EU’s member states have agreed on such critical policies and benefited from a higher education that is comparable, structured in the same way, and that should be capable of providing the same quality and further mobility to all its students (Kushnir, 2016).

As it promoted education and European citizenship values through the EHEA, Bologna also led to a new form of growth and support for the European project, with the European Commission taking its place in the project at a later stage, providing “the funding and technical expertise to keep the process going” (Sin, Veiga & Amaral, 2016). So, even though mobility was the primary goal, cooperation between countries became essential and, with time, BP’s measures ought to make European society more cohesive and fairer (López, do Rosário Pinheiro & Barreira, 2019).

Worth noting as well is how these new standards and quality assessments can turn into a challenge too. “Due to the absence of a legal centre of authority in the Bologna Process, thinking about and implementing agreed-upon standards has emerged as a ‘soft’ policy instrument to produce major reform changes” (Lumino & Landri, 2020, pp.657), since the demands and conditions for participating in the EHEA may not be defined equally by all countries or taking differences and similarities between them into consideration (Elken, 2017).

In addition, these policies can be further analysed through the considerable shifts they should have promoted in mobility and even in society, as desired in the Sorbonne and Bologna declarations, however, challenges and inequalities persist in the social and the internationalization aspects of the Bologna Process.

Then, the BP was designed with education and innovation as main focus, with the goal to develop more qualified and competitive societies, more capable of facing the challenges of the KEs (Enders et al., 2011). However, the latest implementation report on the Bologna Process, from 2020, starts by describing how the number of students and academic staff has greatly increased over the last years, as well as the number of HEIs, yet the investment made in education and research didn't follow this tendency to grow (European Commission/EACEA/Eurydice, 2020).

In the same report, it is recognized that the values and opportunities that should arise from greater comparability and coordination in HE are only reached by a small share of students.

Disadvantaged learners still face access barriers to higher education; students from low and medium educated families are strongly under-represented, and are more likely to enter higher education with a delay; gender imbalances, if improving slightly, still persist and remain marked in some discipline areas with significant implications for the labour market and society; and life-long learning is still not a reality for learners in many countries.

In: European Commission/EACEA/Eurydice, 2020, p.99

Even though the social dimension of the BP has been an important subject, with the latest *communiqués*, such as the *Bucharest Communiqué* in 2012 and the *Paris Communiqué* in 2018 (European Commission/EACEA/Eurydice, 2020), acknowledging the need for more consistent and efficient actions, the familiar context, the financial status and even the gender of a student are still pivotal determinants of its path and choices through HE. The report admits that a more balanced and inclusive HE also represents more quality and competitiveness, but the imbalances detected affect what should be the outcomes of the BP and hinder the initial purposes stated of a more competitive, more educated, and fairest society (European Commission/EACEA/Eurydice, 2020).

As for mobility, the efforts to promote internationalization have been a constant for most HEIs in the EHEA, yet the full results are difficult to determine and analyse and, as consequence, so are the real effects of the BP.

Internationalisation and mobility goals: some challenges and limits

Internationalization and student mobility are at the core of the BP and there is a clear increase in students and researchers who continue their work abroad, within and outside the EU/EHEA (European Commission/EACEA/Eurydice, 2020). Actions like financial support and scholarships, alongside the credits system and degree comparability, are the most adopted strategies to attract foreign students. However, financial support is only one of the main obstacles to mobility and, even though the coordination of degree systems was helpful, there is still much room for improvement when measuring mobility and determining its causes and effects (Teichler, 2019).

In fact, the main discussions around the BP and its results and effects are closely linked to the lack of an organized method for collecting information and giving it a correct treatment and analysis. The Bologna Process “has been both a manifestation and a catalyst for internationalisation” (European Commission/EACEA/Eurydice, 2020, pp.123), without actually pinpointing results and visible effects. Additionally, this inaccuracy can allow for mobility to be thought of as a result of other transformations, such as digitalization, reduction of travel costs and time, as well as a natural desire to travel and migrate (Sin, Veiga & Amaral, 2016). The latest goal for mobility is one of the examples of the poorly done reports on mobility. When, in 2009, the BP Work Group defined that by 2020 at least 20% of graduates should take part in some kind of international experience, the imbalances between countries were clearly not considered (European Commission/EACEA/Eurydice, 2020). Not all countries and their HEIs participate in mobility in the same way and some present great disparities between outgoing and incoming students. Portugal, for example, can be considered an importing country, receiving a lot more students than it sends abroad (Sin, Veiga & Amaral, 2016). Hence, this 20% target was easily met by only a few countries but most of them are not close to being capable of offering an international experience to one-fifth of their students.

Additionally, as “the database available to examine the quantitative development of students’ mobility in Europe can only be characterized as deplorable” (Teichler, 2019, pp.430), the real achievements of the BP remain uncertain.

Notwithstanding, “the Bologna Process extended the conception of Europe into a new domain, which until then had been an object of struggle for the European Union authorities, with mixed outcomes. The Process thus constituted a golden breakthrough for the Commission to pursue integration in the field of higher education” (Sin, Veiga & Amaral, 2016, pp.59).

2.3.2 The European Commission and the European Education Area

In the last decades, the EC has been an advocate for the role HE could have for economic growth and competitiveness, by putting forward some different strategies and policies, while setting out goals and targets for MSs.

EU’s Strategies and Goals

The Lisbon Strategy, defined, in 2000, the goals and main areas where the EU should invest to turn, by 2010, into a knowledge society, more competitive and innovative, as seen in section 2.2.

For education, the LS established that, alongside an investment in the digital area and ICTs, the EU ought to promote research programs, investments and networks; reduce by half the number of 18-24 years old without higher education that were no longer studying or working; and “fostering the mobility of students, teachers and training and research staff both through making the best use of existing Community programmes (Socrates, Leonardo, Youth)” (European Council, 2000).

This Strategy had a very utilitarian view of education (Ertl, 2006) and aimed at providing for better qualifications and sustainable employability, leading naturally to a more competitive EU. The LS had a revision in 2005 (investing more in knowledge and innovation was still a priority) yet, at the end of 2008, the adoption of the European Economic Recovery Plan⁸ affected its implementation.

Nevertheless, the European Commission recognized the difficulties in implementing this strategy as an equal process for its Member States, since not all of them had the same quality, competitiveness and investment for higher education and their economies did not perform and grow in the same way (Enders et al., 2011).

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52008DC0800&from=EN>

As already stated in this research, in section 2.2, the 2020 Strategy, “A strategy for smart, sustainable and inclusive growth”⁹ was a turning point for educational policies in the EU. The 2020 Strategy proposed some targets and benchmarks that still regulate the EU’s and Member States action. For example, to attain by 2020: 3% of the EU's GDP invested in R&D (in 2018 the value for EU-28 was 2.18%)¹⁰ and at least 40% of the younger generation should have a tertiary degree. In 2019, the percentage in EU-28 and population between 25 and 29 years with tertiary education (levels 5-8 ISCED) was 40% (Eurostat database, 2021).

The new *Horizon 2020*¹¹¹² combined most educational, research and innovative programs promoted, such as the *Framework Programme for Research* and the *Competitiveness and Innovation Framework Programme* and has had a positive impact in education and research, allowing for some MSs to stand out.

Several EU Member States and Horizon 2020 associated countries (Croatia, the Netherlands, Luxembourg, Sweden, Austria, the UK, Norway and Switzerland) are ahead of the United States, leading the transition to the open access of research outputs, while China and South Korea are lagging behind.

In: European Commission, 2020, pp. 35

The *Erasmus+* program, established in 2014 (Regulation 1288/2013), with the MFF 2014-2020, replaced several educational and training programs as well, such as *Comenius*, *Erasmus Mundus* and *Youth in Action*. With programs for mobility in secondary and tertiary education, for teachers, researchers and administrative staff, the *Erasmus+* program has moved 3.37 billion euros and almost 940 000 participants, only in 2019. It’s an increase in budget and participants, as the EU acknowledges how important mobility is for education and the value it creates (European Commission, 2020).

The *Education and Training 2020*, presented as a strategic framework from the EC, establishes and monitors the EU's policies in these areas, as well as the goals defined

⁹<https://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>

¹⁰ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=R_%26_D_expenditure

¹¹ <https://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020>

¹² <https://op.europa.eu/en/publication-detail/-/publication/fad8c173-7e42-11e7-b5c6-01aa75ed71a1/language-en/format-PDF/source-77918455>

by the 2020 Strategy, allowing for the cooperation between countries and comparison of results.

Hence, the EC has been promoting HE, R&I and mobility in secondary and tertiary education as a mechanism to support the goal of a more competitive and innovative society, leading to full and sustainable employment.

However, in its latest report, the *Education and Training Monitor 2020*, the EC ponders on the effects of the pandemic crisis on education, teachers, and students (European Commission, DG for Education, Youth, Sport and Culture, 2020).

The pandemic crisis and the European Education Area

The EC maintains that social context and familiar environment remain as important factors in educational achievements and that the digital competences, recognized as fundamental in post covid times, are still a big deficit for most students and teachers (European Commission, DG for Education, Youth, Sport and Culture, 2020).

Education relies more and more on ICTs, yet most teachers and students do not incorporate technology in their daily activities, or do not consider themselves capable of using them (European Commission, DG for Education, Youth, Sport and Culture, 2020).

The pandemic crisis has reinforced these difficulties in adaptation and aggravated gaps in qualifications, at the same time it delayed, but not stopped, the EC's plans for education. Some countries adapted and recovered more rapidly to the pandemic crisis and the effects it had on education, confirming that "the performance of education systems largely depends on the quality of teaching, yet the teaching profession is faced with significant challenges across the EU" (European Commission, DG for Education, Youth, Sport and Culture, 2020, pp.5).

Therefore, the EU's challenges in education, research and training remain a reality to be dealt with and the new EC, elected in 2019, stays focused on continuing and improving education and competitiveness in the EU (Bassot, 2021). The project to build an European Education Area by 2025 is reinforced by tools and programs that ought to stimulate not only better educational results, but also mobility. The EC then proposes creating a *Network of European Universities*, reinforcing cooperation and the quality of HEIs; promoting and reinforcing automatic mutual recognition of diplomas; and, finally, the adoption of an *European Student Card* and the *Erasmus+* app, which should facilitate communication and information exchange.

To conclude, the EU's influence and work in an area (Education) where it should only support and provide guidance has been quite relevant and transforming. By establishing certain goals and benchmarks, it has created an impulse and motivation for countries to act upon. It has also provided them with the right tools and programs, to facilitate transition into the quality it expects. The EC's programs for mobility (e.g., *Erasmus+* and extensions) have also been key in promoting cooperation and education and scientific progress, however, not without some structural challenges, as the next section will demonstrate.

3. Empirical Analysis of Competitiveness and Higher Education Mobility

3.1 Data Sources: Global Competitiveness Index (GCI)

The Global Competitiveness Index, published every year by the World Economic Forum¹³, is one of the most used databases to analyse a country's performance, determined by several fundamental pillars, and its competitive place in the global economy. Thus, this report is updated constantly, to reflect on the changes in markets and economies and to adjust the pondered weight of each pillar to competitiveness (Schwab, 2019). The latest editions use a methodology revised in 2018, that relies on 12 pillars, divided in four main categories:

- i) *Enabling Environment*, which measures aspects like macroeconomic stability, quality of institutions and infrastructure, and ICT adoption;
- ii) *Human Capital*, which measures health and society's skills;
- iii) *Markets*, which evaluates markets and the financial system;
- iv) *Innovation Ecosystem*, which analyses the business environment and innovation.

Since the focus has been on knowledge, education and competitiveness, the indicators selected reflect these subjects, but also focus on a country's capacity to attract and to retain talent. Appendix 2 presents the indicators chosen, their indicator identification (ID) in the GCI and the code used for the empirical analysis. Hence, these indicators are used to measure the rank of each country (between 1 and 7, being the 7 the

¹³ <https://www.weforum.org/reports/the-global-competitiveness-report-2020/in-full>.

best level). The GCI allows to find its relative position of all countries studied and how they have performed throughout the years. Comparison between each MS is then complemented by its position in the global economy. For this research, the empirical analysis was based on the original raw data database of GDI in CVS format. For the methodological aspects of the GCI and most recent values for GCI, the GCI Report of 2019¹⁴ (Schwab, 2019) was consulted, since the last published report, from 2020, was a special edition on Covid-19 and how countries were impacted by it.

Additionally, there is data available from 2007 to 2019, however, for the indicators chosen, data was only available until 2017-2018. For better comparison with data from mobility, this research focuses only the period of 2015-2016, 2016-2017, and 2017-2018. For the indicators of *Capacity to Attract Talent* and *Capacity to Retain Talent*, values were available for 2016 and 2017 and they were analysed with data from 2016-2017 and 2017-2018, respectively. The data are analysed by pair of years because some indicators are only available for one of the two years.

¹⁴ https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

3.2 Competitiveness in the EU: a cluster analysis

For the period of 2015-2016, a hierarchical cluster analysis was done, using the average linkage between groups method, and the squared Euclidean distance, with no limit to the total number of clusters to be created. The variables used to cluster correspond to two groups. The first cluster analysis is based in the following indicators: *Tertiary education enrolment*, *Quality of the education system*, *Quality of math and science education*, and the *Quality of scientific research institutions*.

Figure 1 shows how several groups (clusters) are formed and how differently they are combined. Belgium, Netherlands, and Finland form the top group, while Greece, Slovak Republic and Spain stand out as bottom performers. Portugal positioned a bit above average. It's worth noticing how groups change and how differently countries perform when the quality of their education system is compared to their *Capacity to Innovate*, what is done in the second cluster analysis (*Figure 2*).

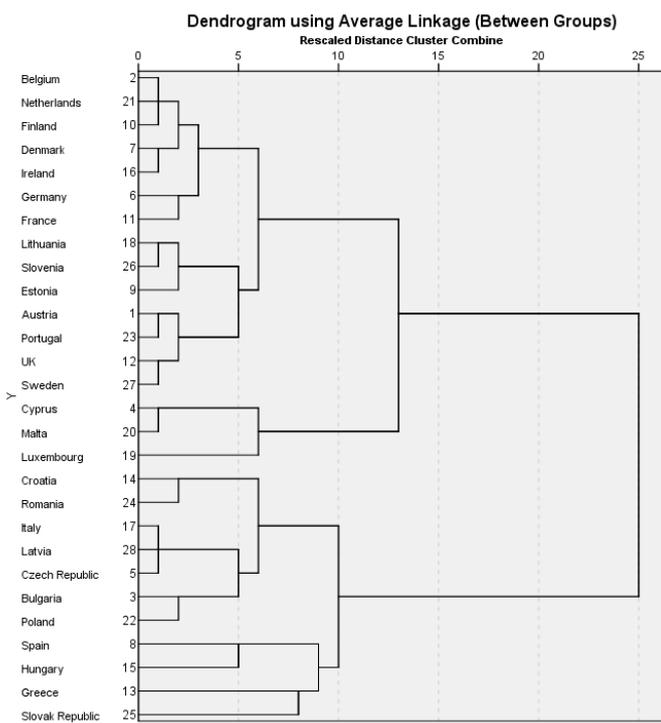


Figure 1: Cluster analysis of *Tertiary education enrolment*, *Quality of the education system*, *Quality of math and science education*, and the *Quality of scientific research institutions*, 2015-2016

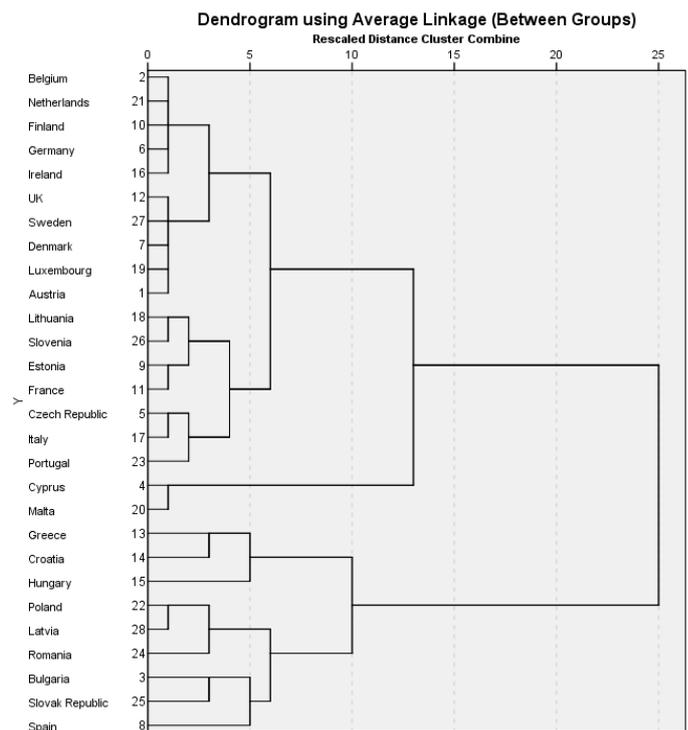


Figure 2: Cluster analysis of *Capacity to Innovate*, *Quality of the education system*, *Quality of math and science education*, and the *Quality of scientific research institutions*, 2015-2016

Source: [GCI 2019](#), own calculations

Even though the top performers remain the same, with Germany and Ireland standing out too, the bottom performers now include Bulgaria, Romania, and Spain. Portugal stands below the average when its capacity to innovate is also considered.

For the period of 2016-2017, the same hierarchical cluster analysis (using the average linkage between groups method, and the squared Euclidean distance) was performed and presents similar results as the period of 2015-2016.

The same comparison was made, between *Tertiary Education Enrolment* (Figure 3) and the quality of the education system, and the *Capacity to Innovate* (Figure 4) the same system provides.

As before, the quality of the education system and their innovation puts the same countries as top performers, while Southern and Eastern European countries stand out once again with a great gap from Belgium, the Netherlands and Finland.

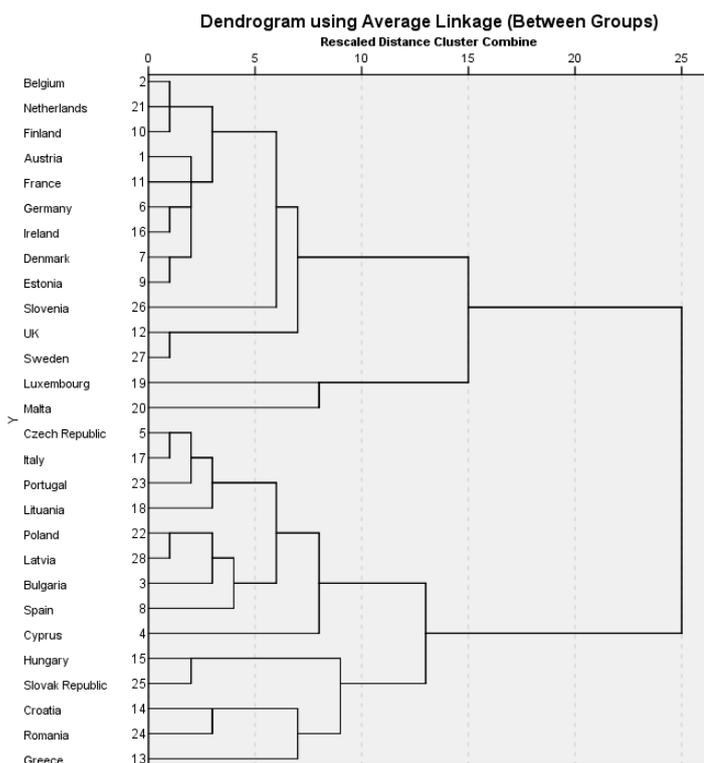


Figure 3: Cluster analysis of *Tertiary education enrolment, Quality of the education system, Quality of math and science education, and the Quality of scientific research institutions, 2016-2017*

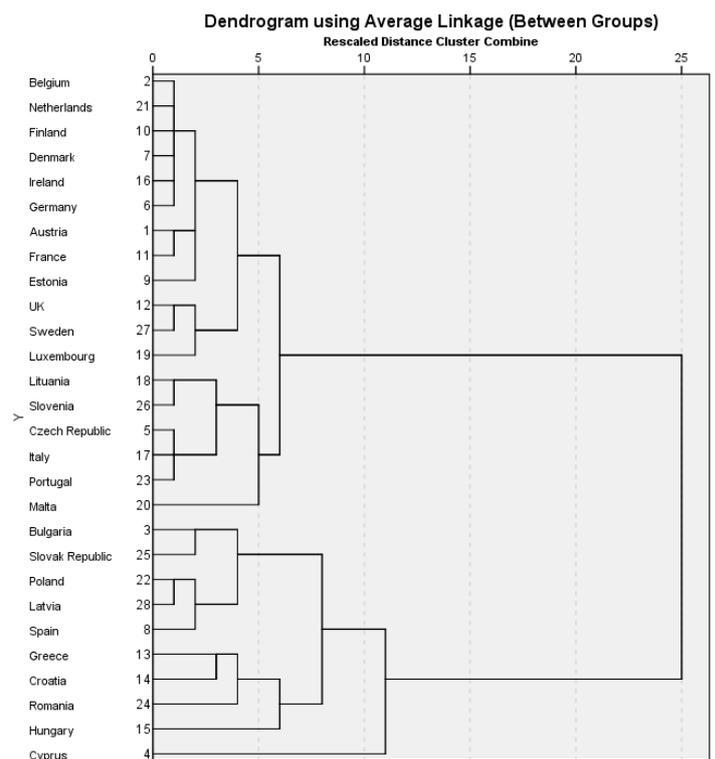


Figure 4: Cluster analysis of *Capacity to Innovate, Quality of the education system, Quality of math and science education, and the Quality of scientific research institutions, 2016-2017*

Source: [GCI 2019](#), own calculations

For the period of 2016-2017, it's also possible to compare each MSs *Capacity to Attract Talent* (Figure 5) and *Capacity to Retain Talent* (Figure 6). By analysing how groups perform when their education system is compared to their ability to attract skilled labour, in contrast to their capacity to retain it, it's interesting to notice the disparities that arise.

Groups that compare the performance of countries like Italy, Lithuania, Slovenia, or even Portugal, Czech Republic, and Estonia, mark the differences between the rest of the EU, but, most of all, reinforce the idea that the northern Europe performs in a similar manner and with a clear advantage over the rest of the MSs. This same idea is present when comparing the capacity to innovate and maintain the talent already attracted.

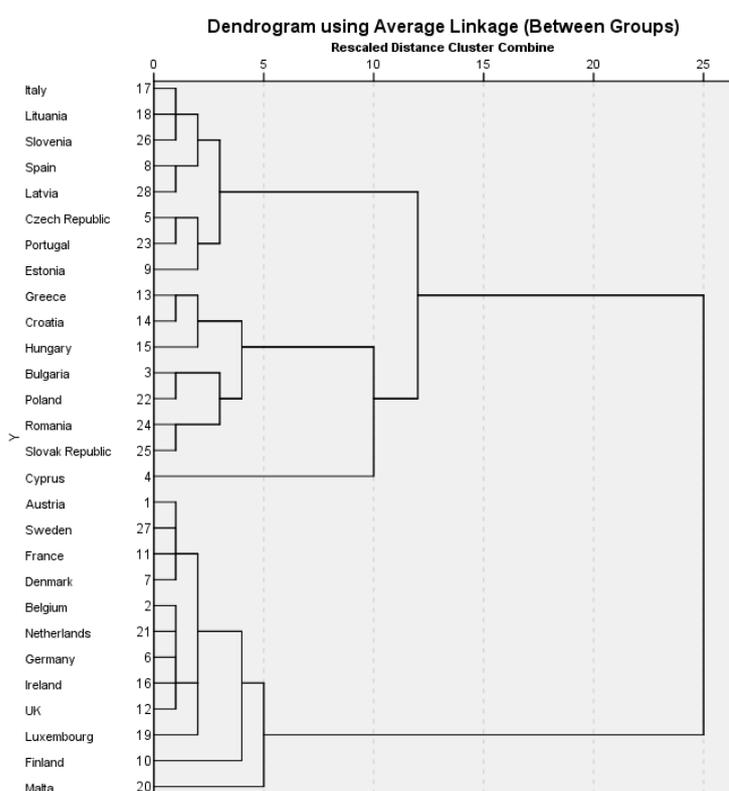


Figure 5: Cluster analysis of *Capacity to Innovate*, *Capacity to Attract Talent*, *Quality of the education system*, and the *Quality of scientific research institutions*, 2016-2017

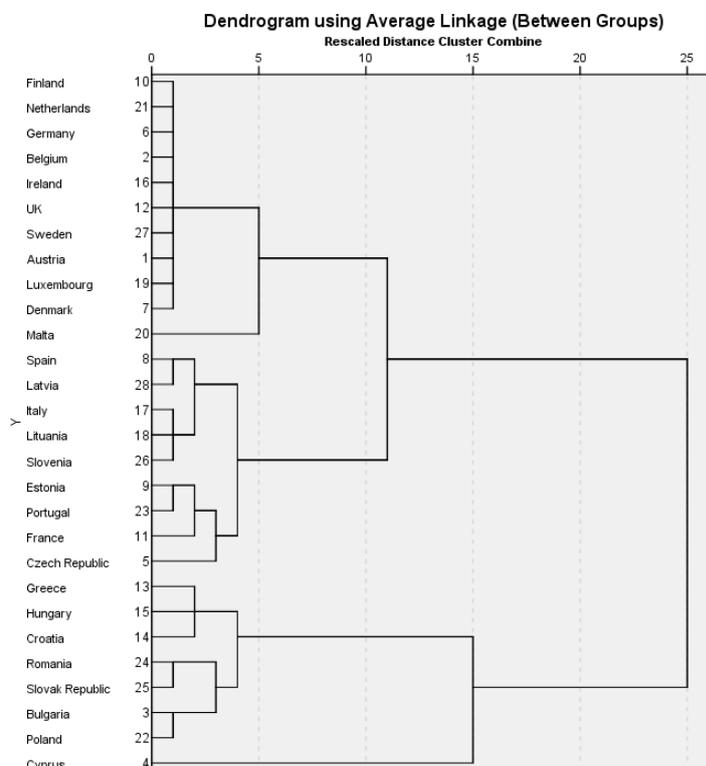


Figure 6: Cluster analysis of *Capacity to Innovate*, *Capacity to Retain Talent*, *Quality of the education system*, and the *Quality of scientific research institutions*, 2016-2017

Source: [GCI 2019](#), own calculations

In the period of 2017-2018, comparing *Tertiary Education Enrolment* (Figure 7) and the quality of the education system confirms a tendency of Belgium, the Netherlands, Germany, and Denmark as a group of top performers, and presents Estonia as a new member of the group. As for the *Capacity to Innovate* (Figure 8), Finland joins the previous mentioned cluster.

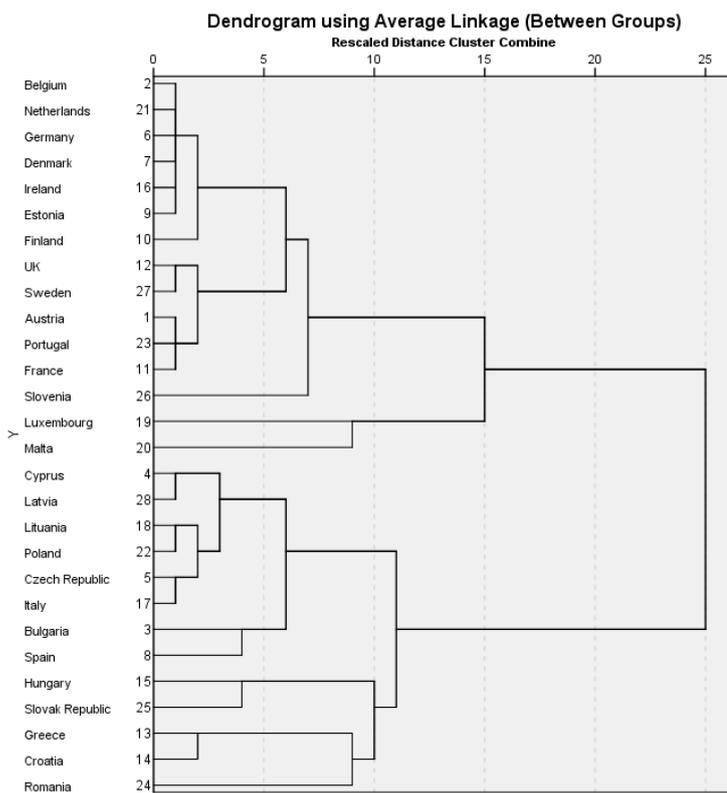


Figure 7: Cluster analysis of *Tertiary education enrolment, Quality of the education system, Quality of math and science education, and the Quality of scientific research institutions, 2017-2018*

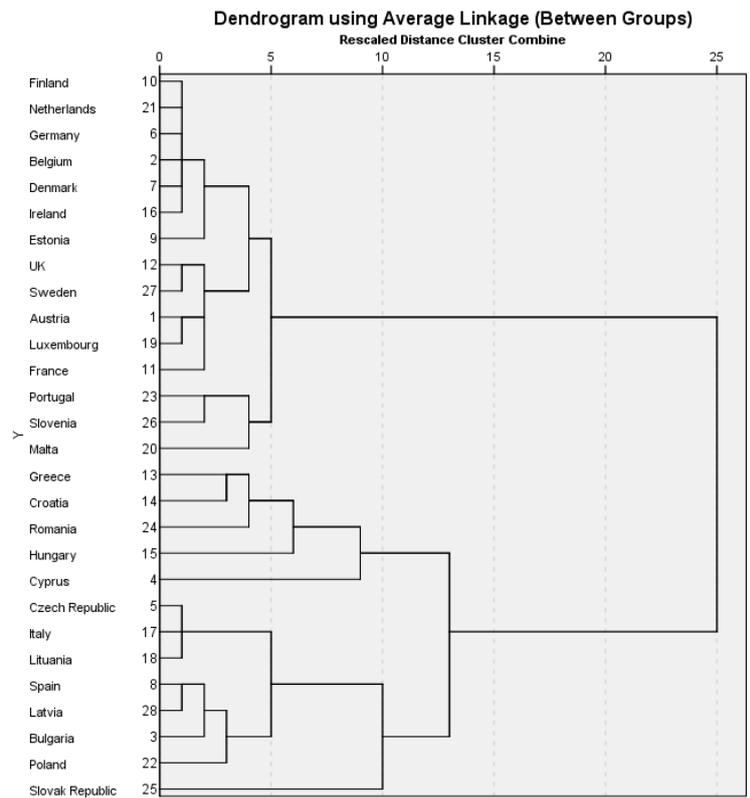


Figure 8: Cluster analysis of *Capacity to Innovate, Quality of the education system, Quality of math and science education, and the Quality of scientific research institutions, 2017-2018*

Source: [GCI 2019](#), own calculations

When comparing the *Capacity to Attract Talent* (Figure 9) and the *Capacity to Retain Talent* (Figure 10) with the quality of the education system and the Capacity to Innovate, the period of 2017-2018 reinforces conclusions and trends seen before. It's worth noticing that, while the same countries remain in the same cluster at the top, the same bottom clusters are also present for this period, but also for the ones observed before. Bulgaria, Romania, Hungary, and Slovak Republic still have a great gap between the rest of the MSs.

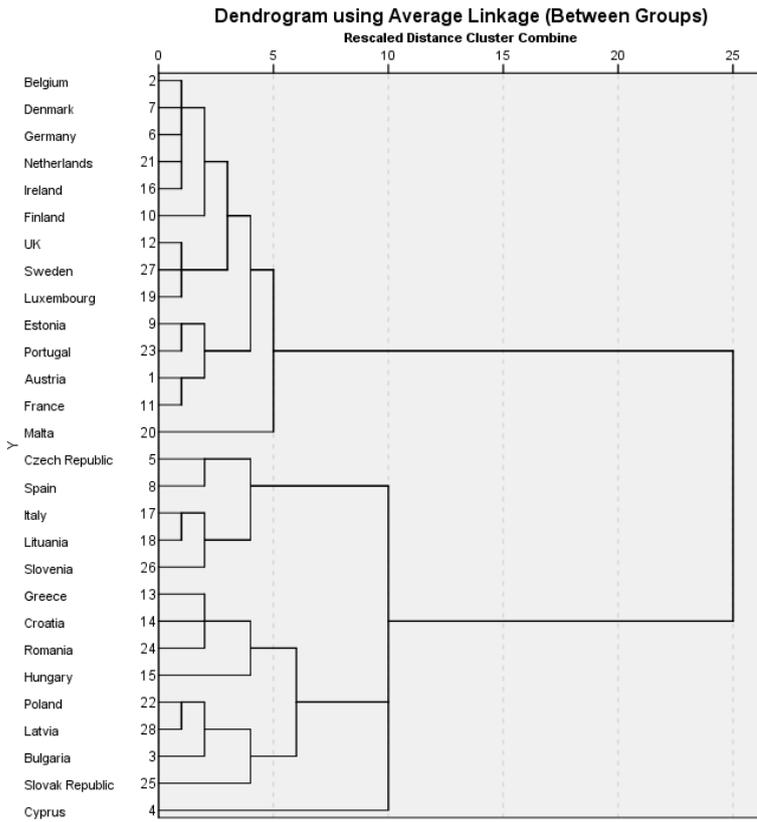


Figure 9: Cluster analysis of *Capacity to Innovate*, *Capacity to Attract Talent*, *Quality of the Education System*, and *Quality of scientific research institutions*, 2017-2018

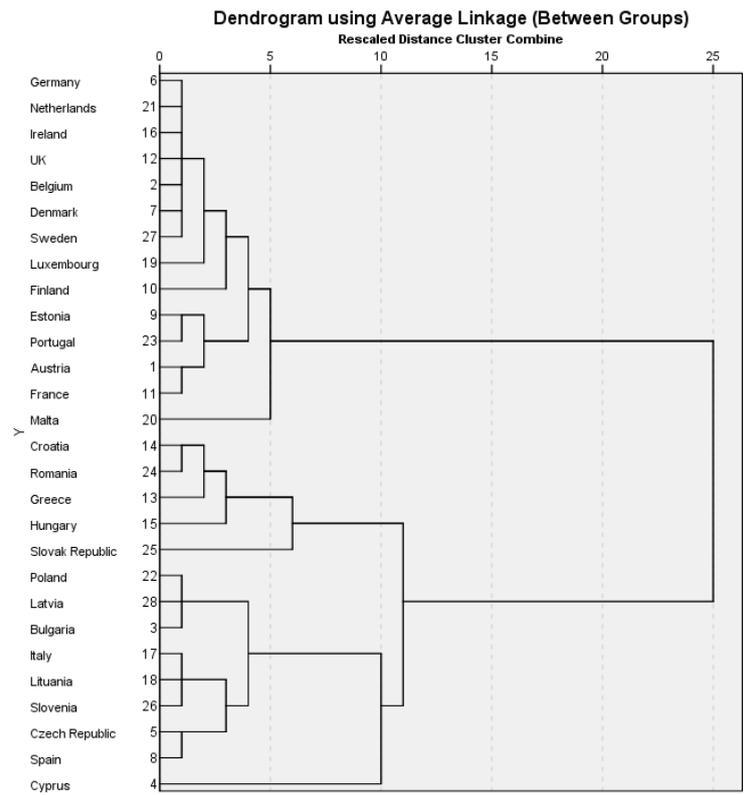


Figure 10: Cluster analysis of *Capacity to Innovate*, *Capacity to Retain Talent*, *Quality of the Education System*, and *Quality of scientific research institutions*, 2017-2018

Source: [GCI 2019](#), own calculations

3.3 Data Sources: Mobility in Higher Education - Eurostat, UNESCO, and OECD

For this research on mobility in higher education, degree mobility and credit mobility were analysed for bachelor's and master's degrees, using the dataset available in Eurostat¹⁵, and collected by Eurostat, UNESCO and OECD. For the Eurostat dataset, *mobility in tertiary education* is therefore represented in two different ways:

- i) *Credit degree mobility* is “defined as temporary tertiary education or/and study-related traineeship abroad within the framework of enrolment in a tertiary education programme at a "home institution" (usually) for the purpose of gaining academic credit (i.e., credit that will be recognised in that home institution)”¹⁶;
- ii) *Degree mobility* is defined as “the physical crossing of a national border to enrol in a degree programme at tertiary-level in the country of destination”¹⁷. This distinction allows for clarification on mobility flows that derive from the effort and investment of the EU, from mobility flows that derive from migration.

Data is available for short-tertiary education and doctoral degrees; however, most countries are missing information for these cycles, and the ones who provided it have only a few cases reported, not significant for analysis.

3.4 Mobility in Higher Education in the EU: a descriptive and cluster analysis

For this research, data from Eurostat, measuring the *number of mobile graduates* reported from each MS, is split by *credit mobile* and *degree mobile*. With this distinction, it is possible to evaluate how many graduates participate in EU funded programs, such as *Erasmus+*, and how many migrate to pursue education, i.e., a full degree, outside their *country of origin*, already defined as the country where upper secondary education was

¹⁵https://ec.europa.eu/eurostat/web/education-and-training/data/database?p_p_id=NavTreeportletprod_WAR_NavTreeportletprod_INSTANCE_LUWsdX8ute5m&p_p_lifecycle=0&p_p_state=normal&p_p_mode=view

¹⁶ https://ec.europa.eu/eurostat/cache/metadata/Annexes/educ_uae_enr_esms_an3.pdf

¹⁷ idem

obtained. Furthermore, it is also possible to determine the countries that receive most graduates and if any trend can be observed in mobility in the EU in the last years.

Sections 3.4.1 and 3.4.2 present a descriptive analysis of *the number of credit mobile graduates*, for bachelor's and master's degrees, from 2016 to 2019. Even though a trend or tendency could arguably be defined from an analysis of just 4 years, it's worth noticing that the same results were overall expected over time.

Sections 3.4.3 and 3.4.4 present a descriptive analysis of the number of graduates, originating from the EU, studying in another MS. Data was available from 2013 to 2019, however, data was analysed from 2014 onwards, respecting the new MFF set for 2014-2020, and the significant changes in the EU policies and investment in education (see point 2.2 and 2.3.2)

3.4.1 Credit Mobile graduates – Bachelor's degree

The distribution of mobile bachelor's students in the four years analysed (*Appendix 1.1. to 1.4*) show, through the boxplots calculated, that the number of mobile graduates was unbalanced and presented great disparities amongst MSs.

There are two notorious outliers, Germany, and Spain, that maintain their position of preferred countries for mobility under EU programs, as, by a great margin, they attract more students than the others. The differences between countries also mean that the first quartile of countries analysed welcomed a much inferior number of graduates (e.g., Malta, Cyprus, Luxembourg), while the third quartile includes most countries (e.g., Portugal, Romania, and Finland) but ranges from close to a thousand students received to more than five thousand students, showing how differently countries attract students from abroad.

For the period from 2016 to 2019, a hierarchical cluster analysis (using the average linkage between groups method, and the squared Euclidean distance) helps to clarify how MSs can be compared between each other and allows for a better view of how a small group of countries is far more welcoming of mobile students than others (*Figure 11*). In accordance with the distinction made by the EU, of four groups of countries that innovate at different paces (European Commission: DG Regional and Urban Policy, 2019), a limit of four clusters was set, to facilitate further analysis and conclusions.

Italy, France, the Netherlands, and the UK form a second group of countries with a great number of students received, during bachelor’s degrees, even though their numbers are still way far from the values registered by Germany and Spain (the first group).

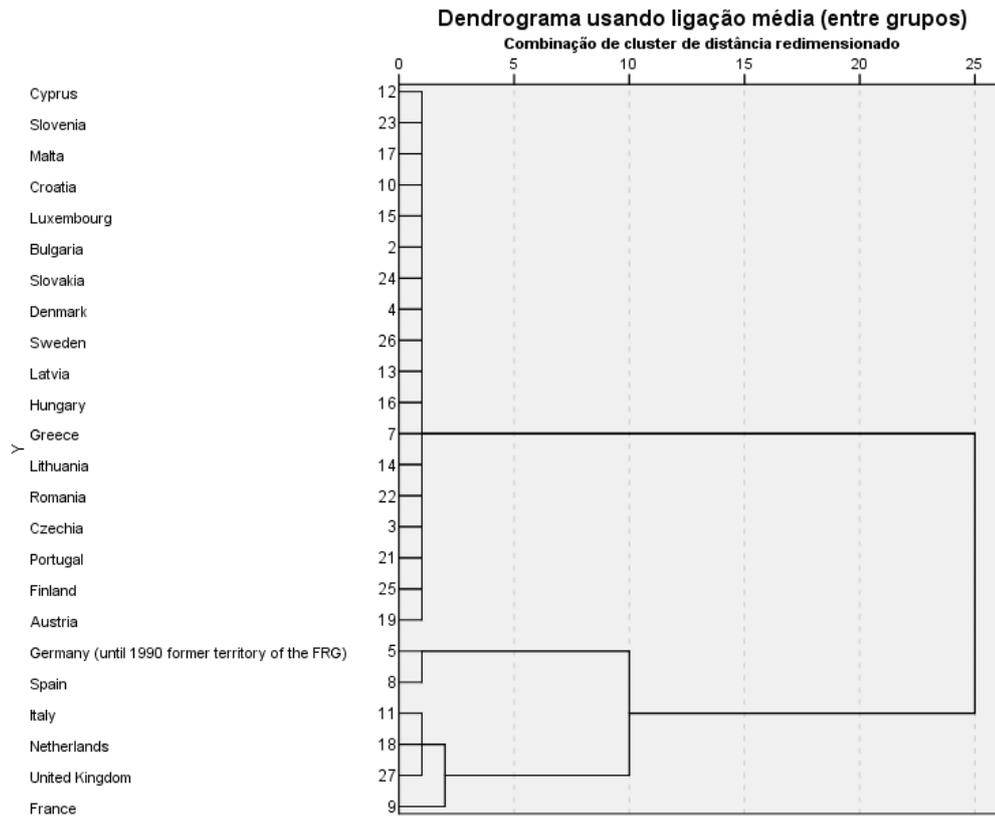


Figure 11: Credit Mobile Graduates – Bachelor’s Degree, 2016 to 2019

Source: own calculations based on Eurostat, ([educ_uae_mobc01](#))

3.4.2 Credit Mobile graduates – Master’s degree

The analysis of the distribution of mobile master’s students in the four years analysed show differences in the number of students received in each MS (*Appendix 1.5 to 1.8*).

From 2016 to 2019, disparities were greater at a master’s level. Three countries, France, Germany, and Italy, pointed out as extreme outliers, accepting far more students than all other MSs. France received more than 20 thousand students in each of the four years studied, marking a significant difference for most countries (e.g., Portugal, the

Netherlands and Austria) in the EU, who welcomed less than 5 thousand graduates per year in average. Luxembourg, Malta, Cyprus, and Greece are at the bottom of the distribution of the students hosted from abroad.

As previously, the same hierarchical cluster analysis was made for this set of data, using the same limit of four clusters defined (*Figure 12*). A clear gap between countries is noticeable for this level of tertiary education as well.

France, Italy, and Germany form a group of that admitted more than twice as many students than all other countries, with Spain closely following them. Once again, the gap between MSs is evident when most of them fit in a third cluster.

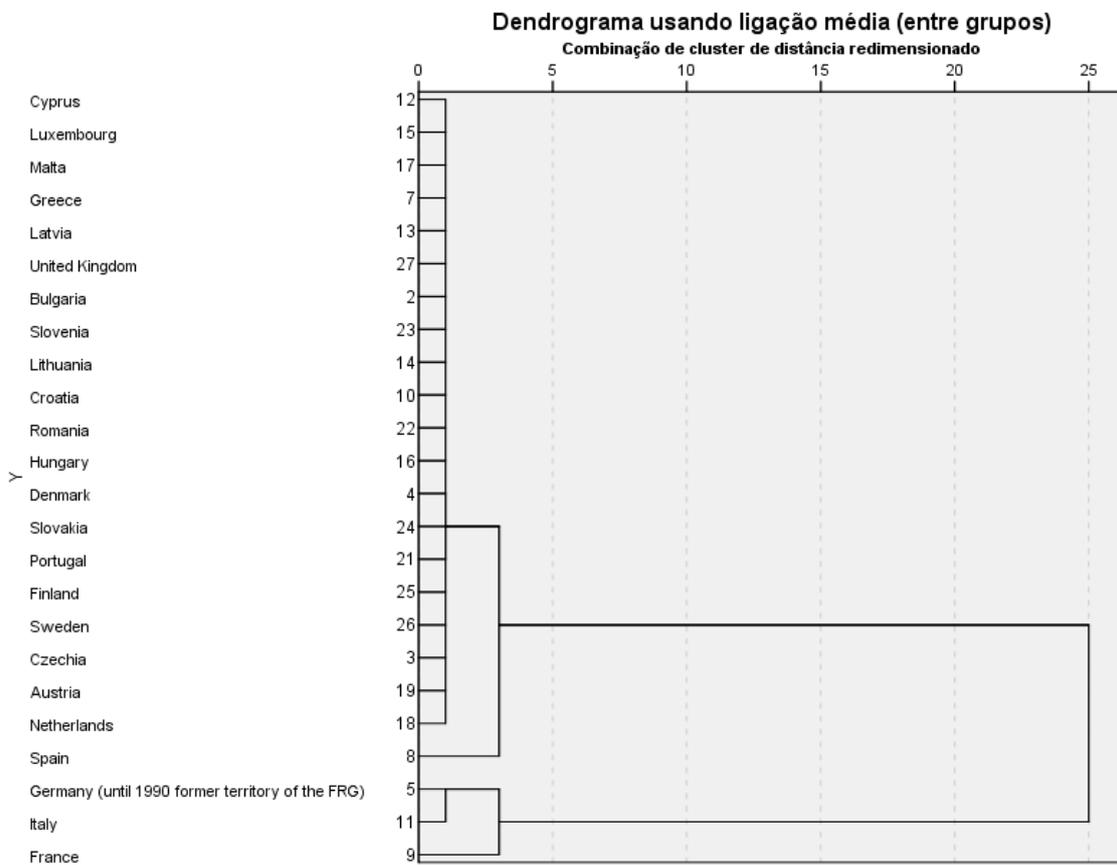


Figure 12: Credit Mobile Graduates – Master’s Degree, 2016 to 2019

Source: own calculations based on Eurostat, ([educ uoe mobc01](#))

3.4.3 Degree Mobile graduates – Bachelor’s degree

From the analysis of the distribution of students, originating from the EU, studying in a different country from where they finished upper secondary education (*Appendix I. 9 to I.14*) it is evident that the same country (UK) keeps the top position (outlier) across time. The UK received, per year, more than 20 thousand students from other MSs. The Netherlands is pointed out in 2014, 2015 and 2019 as an outlier, while all other MSs performed far worse and received less than 5 thousand students in each year.

A non-hierarchical analysis of clusters was done as a first step for this data set, since there is an extreme outlier, and the rest of the group performs in a similar way. After that, a hierarchical cluster analysis, with a limit of 3 clusters defined as a result from the previous non-hierarchical analysis, revealed that the Netherlands and Germany form a second cluster and the rest of the MSs is included in a third cluster (*Figure 13*).

Once again, the EU students’ attraction power of EU countries is significantly different and it is interest to notice that the main choice during the period for degree mobility lies in a single country, the UK.

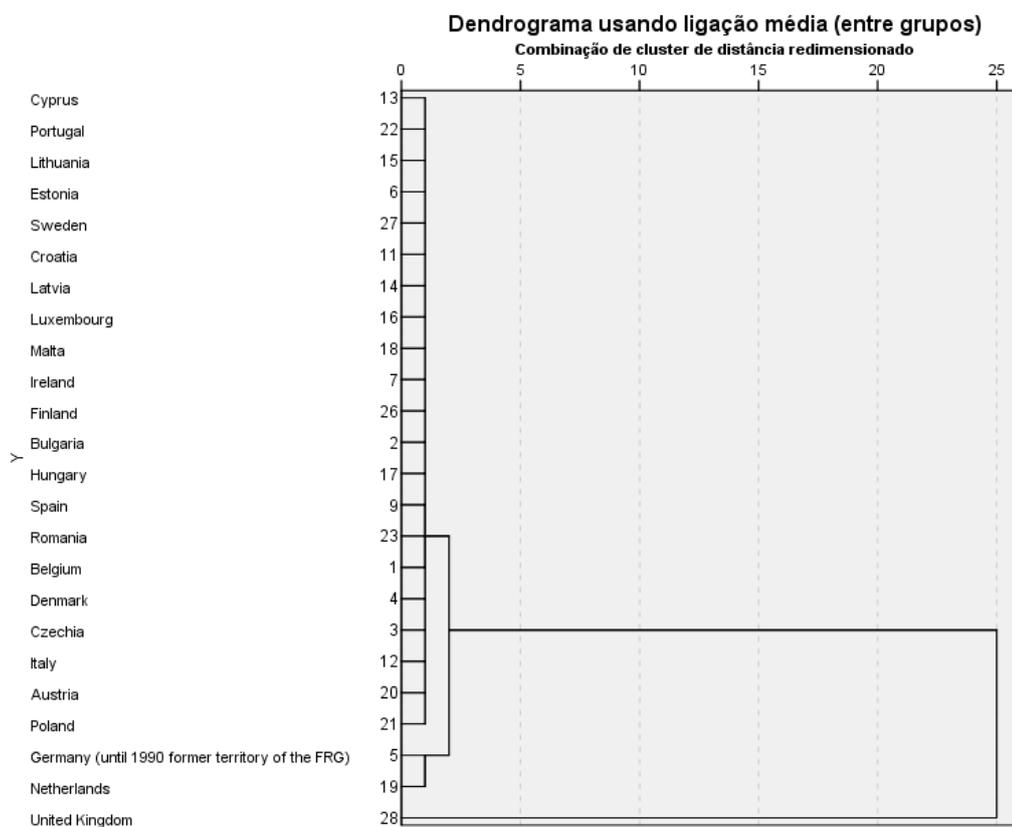


Figure 13: Degree Mobile Graduates – Bachelor’s Degree, 2014 to 2019

Source: own calculations based on Eurostat, ([educ_uoe_mobg02](#))

3.4.5 Degree Mobile graduates – Master’s degree

Since the measure for country of origin is set at upper secondary school, the data does not reflect changes between bachelor’s and master’s degree. Consequently, it also does not allow for interpretation on continuity in tertiary education in a foreign country or if students change MSs between the first and second cycles of HE.

Appendixes 1.15 to 1.19 represent the boxplot analysis for mobile Master’s graduate. The data demonstrates again the presence of an extreme outlier, the UK, recording again more than 20 thousand mobile students enrolled in a master’s degree.

Germany is identified as an outlier for all years, except for 2017, and all other MSs admitted less than 5 thousand income mobile students per year.

As done for the dataset for bachelor’s graduates, a non-hierarchical cluster analysis was done, followed by a hierarchical one limited to 3 clusters. The results are similar to the ones in the previous section. The UK stands out as a single outlier, with Germany and the Netherlands pointed out as a second cluster, and the other MSs in a third group (Figure 14).

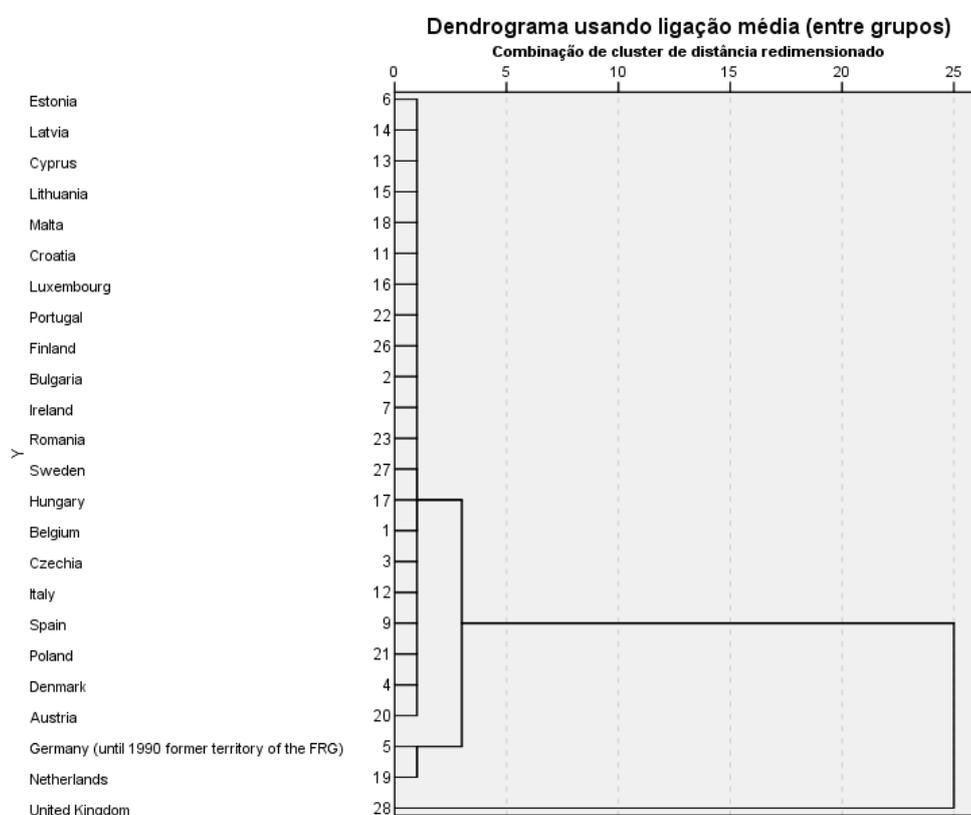


Figure 14: Degree Mobile Graduates – Master’s Degree, 2014 to 2019

Source: own calculations based on Eurostat, ([educ_uoe_mobg02](#))

3.5 Net flow of internationally mobile students

Data from UNESCO Institute for Statistics¹⁸ was also used for comparison of net flows of mobile students. Countries can be thought of as importers or exporters of mobile graduates, as some countries tend to receive considerably more students than they send out and vice-versa. Even though the dataset analysed does not provide more information regarding the country or even continent of origin of graduates, it's interesting to demonstrate how some countries in the EU continuously welcome more students than they send abroad and how it's been a trend for the last few years.

Confirming the analysis of the previous sections, the UK, France, and Germany stand out as great net importers of students, receiving a lot more students than they send out. The dataset provided by UNESCO also pointed out countries who send out more students than they receive, i.e., net exporters, such as Bulgaria, Cyprus, Lithuania, Luxembourg, Malta, Romania, Slovakia, and Slovenia (*Figure 15*).

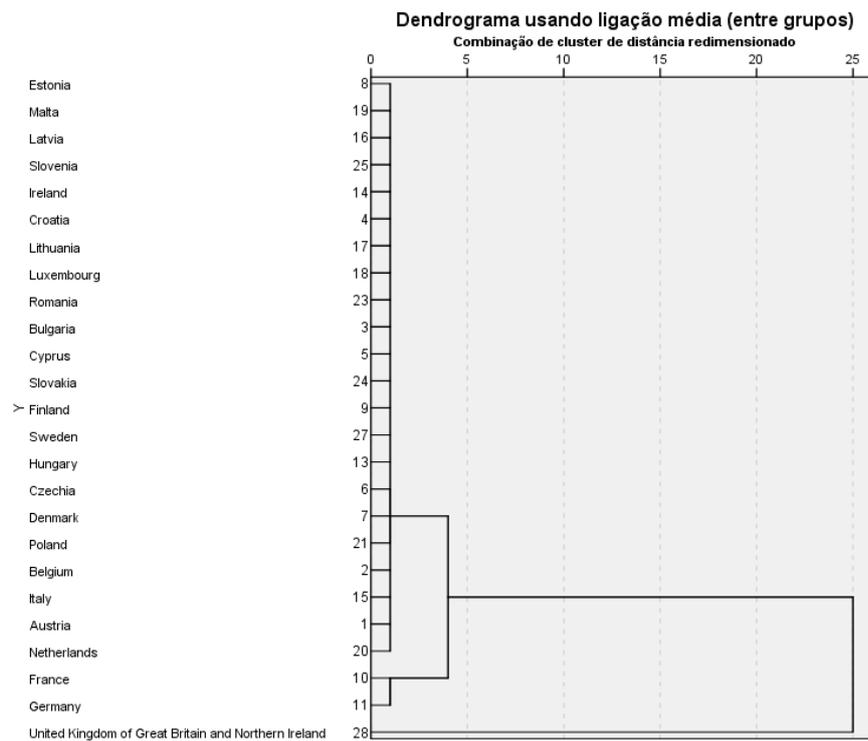


Figure 15: Net flow of internationally mobile students (inbound - outbound), both sexes (number), 2015 to 2019

Source: own calculations based on [UIS.Stat](https://uis.unesco.org/)

¹⁸ <http://data.uis.unesco.org/>

4. Conclusion, Limits, and future research

4.1. Conclusions

Analysing the different strategies and policies promoted by the EU, either through its official programs and funding schemes, either through its role in intergovernmental projects and cooperation, it's important to notice that economic growth, associated with economic competitiveness, has been a constant concern and a goal for the EU.

By associating competitiveness, knowledge and education, the EU has been transforming and developing HE towards what it's considered more attractive, more transparent and, especially, more innovative. Promoting mobility in HE has also been one of the key points in the EC's educational program. Creating international experiences, allowing students, teachers, and administrative staff to develop their skills in another country, is considered fundamental for a highly skilled population, in a society that should become more integrated and, in the end, more European.

However, gaps and disparities in competitiveness and growth still represent a great divide in the EU. As seen through the reports done on innovation and competitiveness of MSs and regions and confirmed by the cluster analysis done in section 3.1, there is a great distance between countries, and, especially, between North and South.

Germany, Belgium, Finland, Sweden, Denmark, and the Netherlands stand out, not only as most competitive, better innovators, but also as countries with educational systems more attractive, with better quality and capable to attract and retain more students, and, consequently, more talent, as seen in section 3.2.

It's worth noticing the role the UK plays in mobility in HE. Even though it wasn't as attractive in EU funded programs, it was the primary choice (by far) of mobile graduates. By receiving and attracting more talent and combining that with its role as a competitive and innovative country, it has a clear appeal and advantage when educating and maintaining a highly skilled, knowledge society.

The cohesion countries still pose a challenge for the EU. Struggling to become more competitive and catch up to the rest of the EU, the repercussions in their educational system are visible. Even though most of these countries have improved their education and adhered to the standards and guidelines of the EU, they're still not attractive enough and are not capable of retaining the talent they attract.

4.2. Limits and future research

The analysis of learning mobility in tertiary education in the EU is subject to several difficulties. First, even though the EU promotes mobility in higher education, there is no centralized entity to assess the results of policies and programs put into action. Then, data originates from national sources, provided by each Member State, subject to the administrative differences and difficulties from each higher education system.

As a result, through the course of this data analysis, some MSs were missing information for certain years or had different definitions for different study cycles. For example, data for credit mobility is also missing information for Ireland, even though *Erasmus+* is promoted in this country, through the Erasmus+ Irish National Agency for Higher Education, which even has an updated website with information about the program, but no results accounted for or ready for consultation.

The analysis of competitiveness from the GCI and the EU's reports is also a result of methodologies and data estimated by different entities, that result from interviews and analysis from experts in each country analysed. Despite its credibility and strength as an expert's analysis, it's important to notice that different entities will necessarily provide different results, and, to some extent, different measures and actions from the countries studied. Plus, the empirical analysis in this research would benefit from a longer period analysed to be able to confidently conclude on trends in competitiveness and international mobility.

As for future research, it will be interesting to see what happens to mobility, either degree mobility or funded by the EU.

In the outcome of Brexit and the new restrictions to migration in the UK, will it maintain its role as the most preferred country for graduates?

With the advance in technologies and education at a distance that became standard with the pandemic crisis, will mobility promoted by the EU change its patterns? Will the EU be capable of diminishing the disparities in graduates' mobility and recover the role it envisioned for mobility in the HE?

In conclusion, there is a lot more to explore on mobility in HE and how it impacts competitiveness and innovation in a country, especially, what motivates a student, teacher, or researcher to choose a country but, most importantly, what motivates one to stay.

Bibliography

Aleksejeva, L. (2016). Country's competitiveness and sustainability: Higher Education Impact. *Journal of Security & Sustainability Issues*, 5(3).

[http://www.tb.lt/Leidiniai/Journal%20of%20Security%20and%20Sustainability%20Issues/2016-5\(3\)-full.pdf#page=51](http://www.tb.lt/Leidiniai/Journal%20of%20Security%20and%20Sustainability%20Issues/2016-5(3)-full.pdf#page=51)

Amaral, A., & Sursock, A. (2018). The EC Communications, the Knowledge Society and Their Influence Over Higher Education. In *European Higher Education and the Internal Market* (pp. 161-192). Palgrave Macmillan, Cham.

https://doi.org/10.1007/978-3-319-91881-5_6

Bassot, É. (2021). *The six policy priorities of the von der Leyen Commission: State of play in spring 2021*. European Parliamentary Research Service.

[https://www.europarl.europa.eu/RegData/etudes/IDAN/2021/690584/EPRS_IDA\(2021\)690584_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/IDAN/2021/690584/EPRS_IDA(2021)690584_EN.pdf)

Brunazzo, M. (2016). The history and evolution of Cohesion policy. In *Handbook on Cohesion Policy in the EU*. Edward Elgar Publishing.

<https://doi.org/10.4337/9781784715670.00014>

Chen, D. H., & Dahlman, C. J. (2005). The Knowledge Economy. The KAM Methodology and World Bank Operations. *World Bank Institute Working Paper* No. 37256, Washington DC.

<https://ssrn.com/abstract=841625>

Dakowska, D., & Velarde, K. S. (2018). European higher education policy. In *Handbook of European Policies*. Edward Elgar Publishing.

<https://hal.archives-ouvertes.fr/hal-01519174>

Dima, A. M., Begu, L., Vasilescu, M. D., & Maassen, M. A. (2018). The relationship between the knowledge economy and global competitiveness in the European Union. *Sustainability*, 10(6), 1706.

<https://doi.org/10.3390/su10061706>

Dvir, Y., & Yemini, M. (2017). Mobility as a continuum: European commission mobility policies for schools and higher education. *Journal of Education Policy*, 32(2), 198-210.

<https://doi.org/10.1080/02680939.2016.1243259>

Elken, M. (2017). Standardization of (higher) education in Europe—policy coordination 2.0?. *Policy and Society*, 36(1), 127–142.

<https://doi.org/10.1080/14494035.2017.1278873>

Enders, J., De Boer, H., File, J., Jongbloed, B., & Westerheijden, D. (2011). Reform of higher education in Europe. In *Reform of Higher Education in Europe* (pp. 1-10). Brill Sense.

https://doi.org/10.1007/978-94-6091-555-0_1

European Commission/EACEA/Eurydice (2020). *The European Higher Education Area in 2020: Bologna Process Implementation Report*. Luxembourg: Publications Office of the European Union.

https://eacea.ec.europa.eu/nationalpolicies/eurydice/sites/default/files/ehea_bologna_2020.pdf

European Commission. (2003). *Investing Efficiently in Education and Training: An Imperative for Europe* (COM (2002) 779 final). Brussels: The European Commission.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52003AR0086&from=EN>

European Commission. (2010). Communication from the Commission EUROPE 2020. *A strategy for smart, sustainable and inclusive growth*.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC2020&from=EN>

European Commission: DG Budget. (2014). *European Union public finance. 5th edition*. Publications Office of the European Union.

[doi:10.2761/17724](https://doi.org/10.2761/17724)

European Commission: DG Regional and Urban Policy. (2019). *The European Regional Competitiveness Index 2019*.

https://ec.europa.eu/regional_policy/sources/docgener/work/2019_03_rci2019.pdf

European Commission, DG for Education, Youth, Sport and Culture. (2020). *Education and training monitor 2020*.

<https://op.europa.eu/webpub/eac/education-and-training-monitor-2020/en/chapters/foreword.html#foreword>

European Commission. (2020). *Research & Innovation Valorisation Channels and Tools: Boosting the Transformation of Knowledge Into New Sustainable Solutions*. Luxembourg: Publications Office of the European Union.

<https://op.europa.eu/pt/publication-detail/-/publication/f35fded6-bc0b-11ea-811c-01aa75ed71a1>

European Council (2000). Presidency conclusions, Lisbon European Council, 23 and 24 March 2000.

https://www.europarl.europa.eu/summits/lis1_en.htm

Ertl, H. (2006). European Union policies in education and training: the Lisbon agenda as a turning point?. *Comparative Education*, 42(1), 5-27.

<https://doi.org/10.1080/03050060500515652>

Faber, M., & Westerheijden, D. (2011). European Degree Structure and National Reform: Constitutive Dynamics of the Bologna Process. In *Reform of higher education in Europe* (pp. 11-28). Brill Sense.

https://doi.org/10.1007/978-94-6091-555-0_2

Hudson, R. et al. (2015) *The Knowledge Future: Intelligent policy choices for Europe 2050*. Luxembourg: Publications Office of the European Union.

https://ec.europa.eu/futurium/en/system/files/ged/55_the_knowledge_future_intelligent_policy_choices_for_eu2050_0.pdf

Joint declaration of the European Ministers of Education. (1999). *The Bologna Declaration of 19 June 1999*.

https://www.ehea.info/media.ehea.info/file/Ministerial_conferences/02/8/1999_Bologna_Declaration_English_553028.pdf

Joint declaration on harmonisation of the architecture of the European higher education system. (1998). *Sorbonne Joint Declaration*. Paris.

https://ehea.info/media.ehea.info/file/1998_Sorbonne/61/2/1998_Sorbonne_Declaration_English_552612.pdf

Kushnir, I. (2016). The role of the Bologna Process in defining Europe. *European Educational Research Journal*, 15(6), 664-675.

<https://doi.org/10.1177/1474904116657549>

Lane, J. E. (2012). Higher education and economic competitiveness. In Lane, J. E. & Johnstone, D. B. (Eds.). (2012). *Colleges and Universities as Economic Drivers: Measuring Higher Education's Contributions to Economic Development* (pp.1-30). Albany, NY: SUNY Press.

https://www.researchgate.net/publication/256048697_Higher_Education_Internationalization_and_Economic_Competitiveness

López, S. M. D., do Rosário Pinheiro, M., & Barreira, C. F. (2019). The concept of quality within the European Higher Education Area (EHEA): dimensions and discourses. *Higher Education after Bologna*, 77, Imprensa da Universidade de Coimbra.

https://doi.org/10.14195/978-989-26-1620-9_3

Lumino, R., & Landri, P. (2020). Network time for the European Higher Education Area. *Educational Philosophy and Theory*, 52(6), 653-663.

<https://doi.org/10.1080/00131857.2019.1708328>

Marschinski, R., Amores, A.F., Amoroso, S., Bauer, P., Cardani, R., Csefalvay, Z., Genty, A., Gkotsis, P., Gregori, W., Grassano, N., Hernández, H., Martínez Turégano, D., Nardo, M., Pataracchia, B., Potters, L., Ratto, M., Roman, M.V., Rueda Cantuche, J.M., Sanchez Martinez, M., Tacchella, A., Tübke, A., Vezzani, A., *EU Competitiveness: Recent Trends, Drivers, and Links to Economic Policy*, EUR 30571 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-28950-0, JRC123232.

<https://doi.org/10.2760/856014>

Parežanin, M., Jednak, S., & Kragulj, D. (2014). The influence of the knowledge-based economy on the competitiveness of European economies and businesses. In *Innovative Management and Firm Performance* (pp. 68-90). Palgrave Macmillan, London.

https://doi.org/10.1057/9781137402226_3

Regulation 1288/2013. Establishing 'Erasmus+': the Union programme for education, training, youth and sport and repealing Decisions No 1719/2006/EC, No 1720/2006/EC and No 1298/2008/EC. European Parliament, Council of the European Union.

<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1288&from=EN>

Sin, C., Veiga, A., & Amaral, A. (2016). Mobility. In: *European Policy Implementation and Higher Education*. Issues in Higher Education. Palgrave Macmillan, London.

https://doi.org/10.1057/978-1-137-50462-3_8

Širá, E., Vavrek, R., Kravčáková Vozárová, I., & Kotulič, R. (2020). Knowledge economy indicators and their impact on the sustainable competitiveness of the EU countries. *Sustainability*, 12(10), 4172.

<https://doi.org/10.3390/su12104172>

Schwab, K. (2019). The Global Competitiveness Report 2019. World Economic Forum.

http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

Schwab, K., & Brende, B. (2014). The Europe 2020 competitiveness report: building a more competitive Europe. In *World Economic forum, Insight report*, Geneva.

http://www3.weforum.org/docs/WEF_Europe2020_CompetitivenessReport_2014.pdf

Sum, N. L., & Jessop, B. (2013). Competitiveness, the knowledge-based economy and higher education. *Journal of the Knowledge Economy*, 4(1), 24-44.

<https://doi.org/10.1007/s13132-012-0121-8>

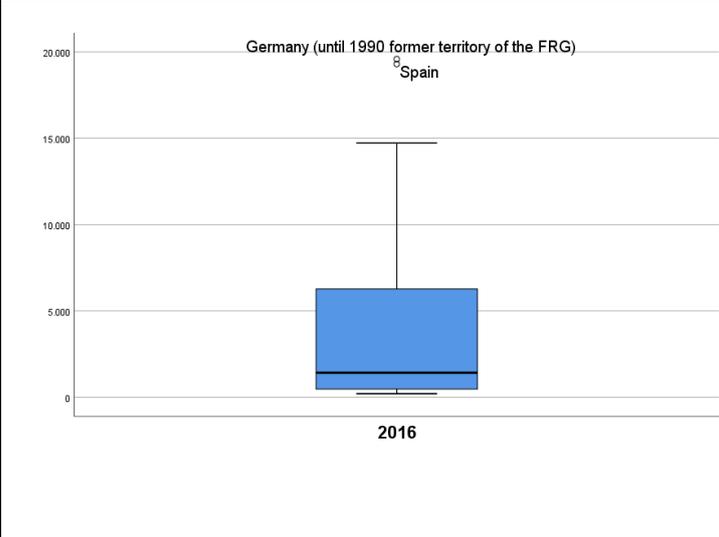
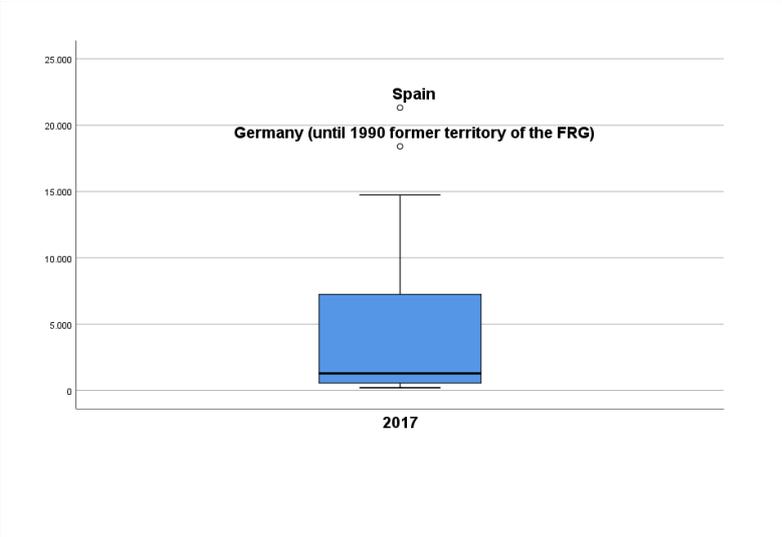
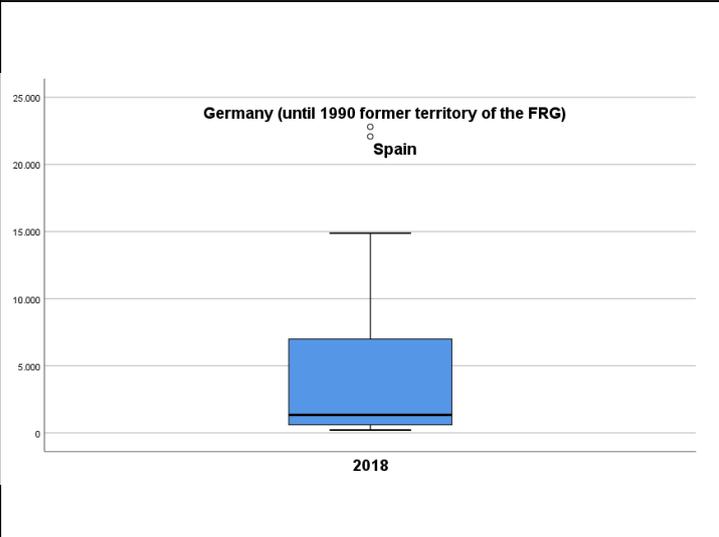
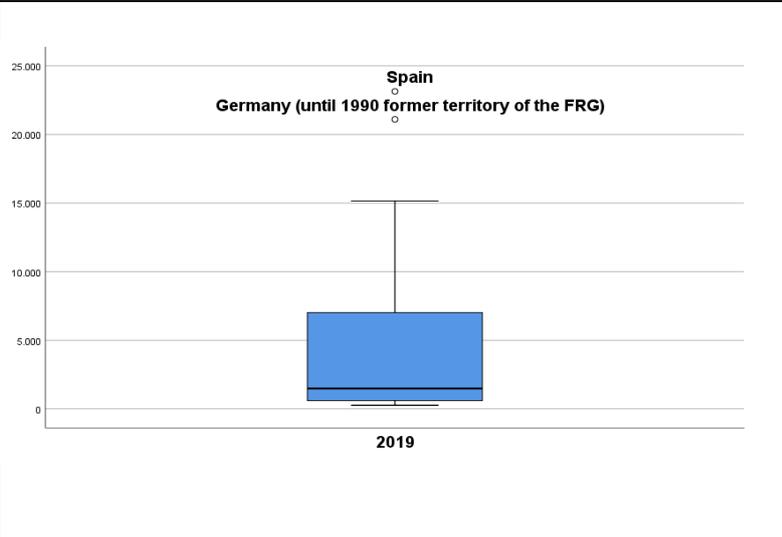
Teichler, U. (2019). Bologna and student mobility: a fuzzy relationship. *Innovation: The European Journal of Social Science Research*, 32(4), 429-449.

<https://doi.org/10.1080/13511610.2019.1597685>

Treaty on European Union (2007). Lisbon.

https://eur-lex.europa.eu/eli/treaty/teu_2012/oj

Appendix 1. Credit Mobile and Degree Mobile by country (2016-2019)

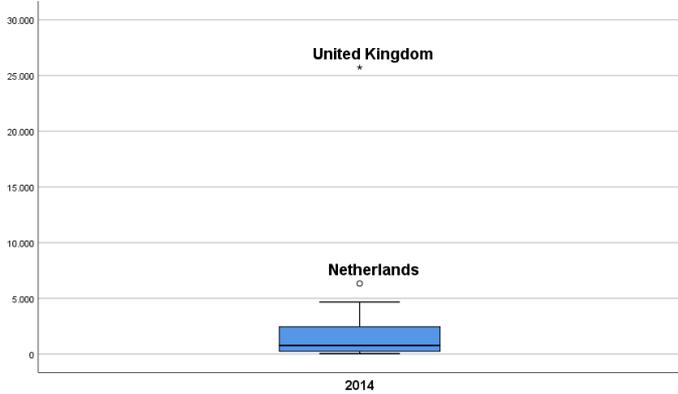
<p>Appendix 1.1: Credit mobile graduates - bachelor's degree, year 2016</p>	<p>Appendix 1.2: Credit mobile graduates - bachelor's degree, year 2017</p>
	
<p>Appendix 1.3: Credit mobile graduates - bachelor's degree, year 2018</p>	<p>Appendix 1.4: Credit mobile graduates - bachelor's degree, year 2019</p>
	

Source: own calculations based on Eurostat, ([educ uoe mobc01](#))

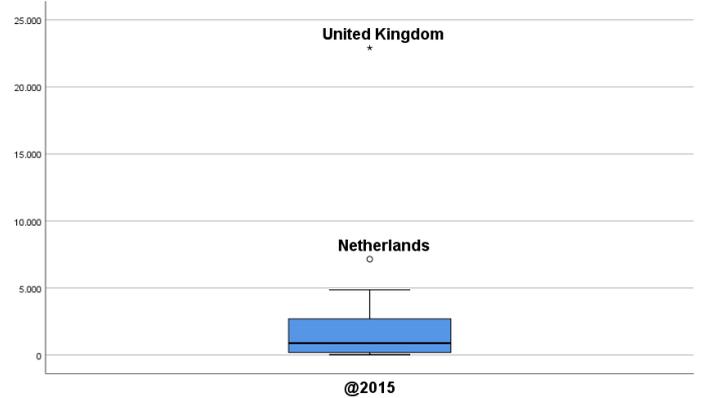
<p>Appendix 1.5: Credit mobile graduates – master’s degree, year 2016</p>	<p>Appendix 1.6: Credit mobile graduates – master’s degree, year 2017</p>
<p>Box plot for 2016 showing credit mobile graduates for France, Germany (until 1990 former territory of the FRG), Italy, and Spain. The y-axis ranges from 0 to 25,000. France has the highest number of graduates, followed by Germany, Italy, and Spain.</p>	<p>Box plot for 2017 showing credit mobile graduates for France, Italy, and Germany (until 1990 former territory of the FRG). The y-axis ranges from 0 to 25,000. France has the highest number of graduates, followed by Italy, and Germany.</p>
<p>Appendix 1.7: Credit mobile graduates – master’s degree, year 2018</p>	<p>Appendix 1.8: Credit mobile graduates – master’s degree, year 2019</p>
<p>Box plot for 2018 showing credit mobile graduates for France, Germany (until 1990 former territory of the FRG), and Italy. The y-axis ranges from 0 to 25,000. France has the highest number of graduates, followed by Germany, and Italy.</p>	<p>Box plot for 2019 showing credit mobile graduates for France, Italy, and Germany (until 1990 former territory of the FRG). The y-axis ranges from 0 to 25,000. France has the highest number of graduates, followed by Italy, and Germany.</p>

Source: own calculations based on Eurostat, ([educ_uae_mobc01](#))

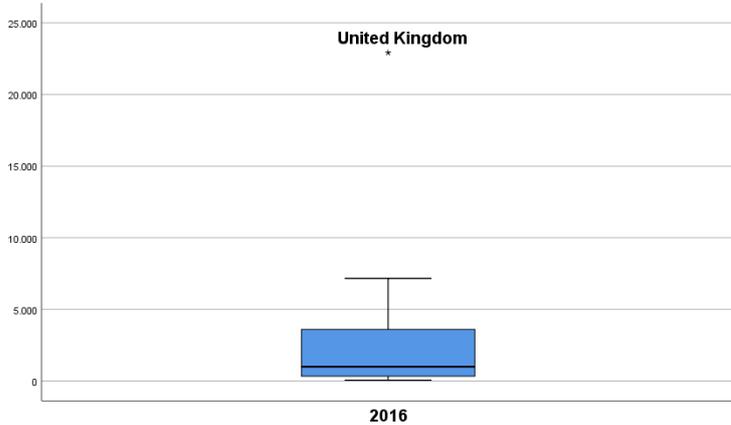
Appendix 1.9: Degree mobile graduates – Bachelor’s degree, year 2014



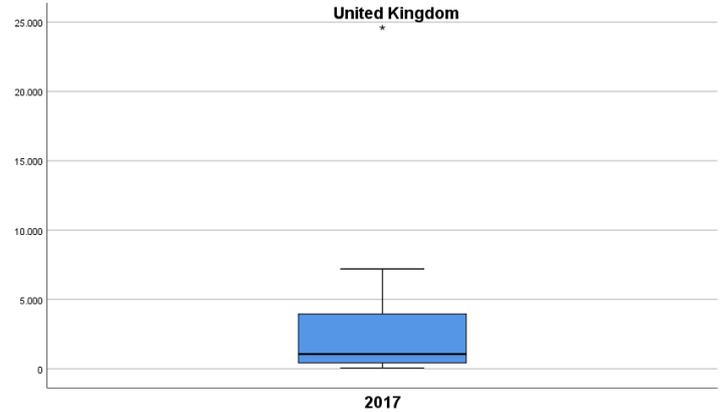
Appendix 1.10: Degree mobile graduates – Bachelor’s degree, year 2015



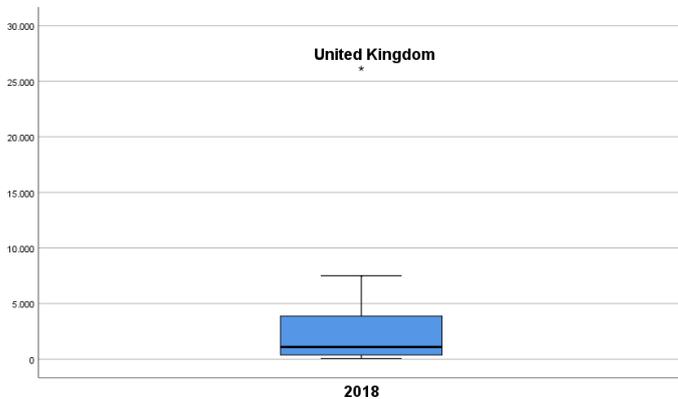
Appendix 1.11: Degree mobile graduates – Bachelor’s degree, year 2016



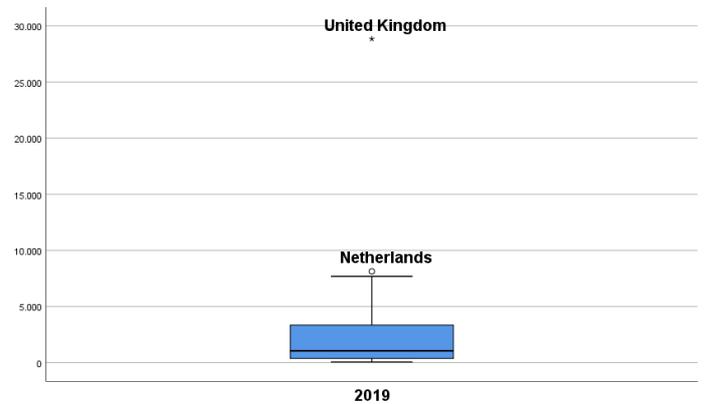
Appendix 1.12: Degree mobile graduates – Bachelor’s degree, year 2017



Appendix 1.13: Degree mobile graduates – Bachelor’s degree, year 2018

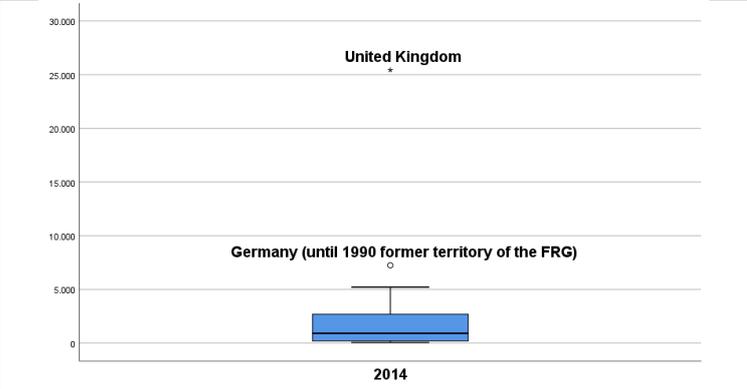


Appendix 1.14: Degree mobile graduates – Bachelor’s degree, year 2019

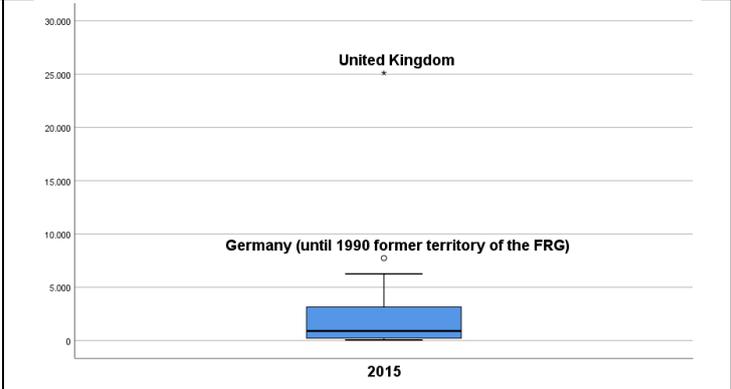


Source: own calculations based on Eurostat, ([educ_uae_mobg02](#))

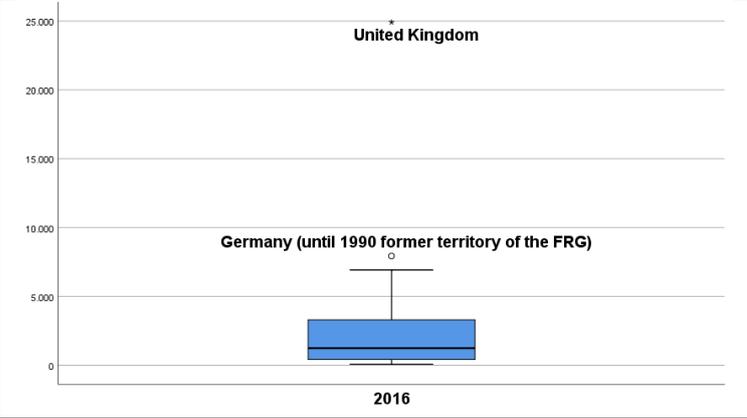
Appendix 1.15: Degree mobile graduates – Master’s degree, year 2014



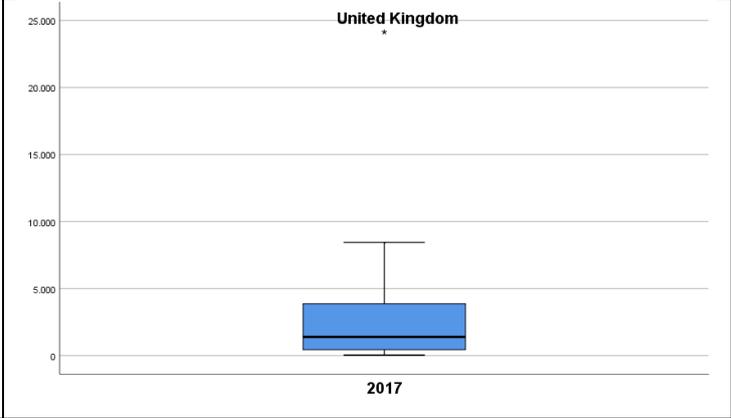
Appendix 1.16: Degree mobile graduates – Master’s degree, year 2015



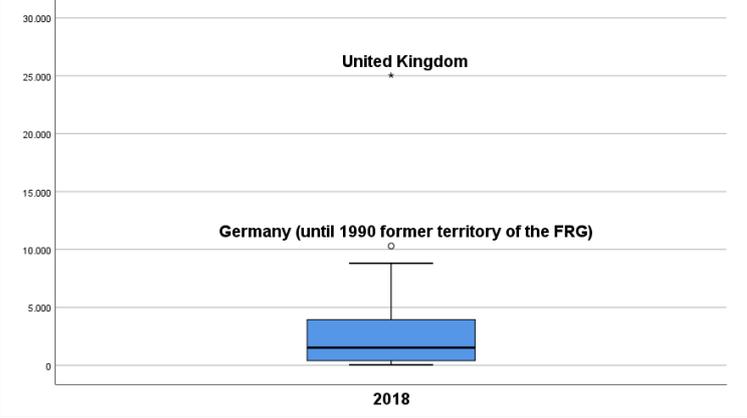
Appendix 1.17: Degree mobile graduates – Master’s degree, year 2016



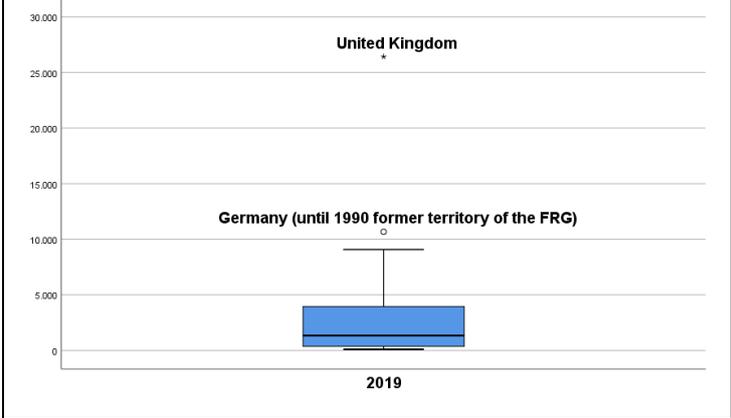
Appendix 1.18: Degree mobile graduates – Master’s degree, year 2017



Appendix 1.19: Degree mobile graduates – Master’s degree, year 2018



Appendix 1.20: Degree mobile graduates – Master’s degree, year 2019



Source: own calculations based on Eurostat, ([educ uoe mobg02](#))

Appendix 2. Table of indicators and indicator ID, from GCI Report of 2019

Indicator ID	Indicator
566	Tertiary education enrollment gross % - Rank
568	Quality of the education system - Rank
570	Quality of math and science education - Rank
584	Capacity for innovation - Rank
600	Quality of scientific research institutions - Rank
40944	Country capacity to attract talent, 1-7 (best) - Rank
40946	Country capacity to retain talent, 1-7 (best) - Rank

Source: Schwab, K. (2019), Appendix A, p. 611-632.