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How to Protect the Taste for Science? Working Conditions in European Higher Education Systems

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ABSTRACT

When a pronounced taste for science leads researchers to self-select themselves in academia, higher education systems must be able to protect it. By relying on the economic theory of higher education, the international mobility and the sociology of science literature, we compare the working condition in the four major European higher education systems: the United Kingdom, Germany, France and Italy. Remuneration level especially its variable component is of paramount importance for all researchers. Job security in terms of tenure-track positions and habilitation process as well as the career length are relevant for early-career scholars, whereas the institutional prestige and the funding availability together with the disciplinary-centre approach as well as the language biases are significant conditions for international researchers specifically. According to the target, policymakers should rely on specific leverages to increase a country competitiveness.

1 | Introduction

In the knowledge-based economy, higher education (HE) systems largely contribute to competitiveness of the national system, economic growth and social mobility (Altbach 2013; Jacob and Meek 2013). Having recognised that, governments started to take actions to improve the average quality of their HE systems (Hazelkorn 2011). Despite their attempts, European HE systems still struggle to attract and retain talented researchers compared to their transatlantic counterparts, as better working conditions incentivised a massive asymmetric mobility toward the United States (Heinze et al. 2009; Janger and Nowotny 2016; Lepori, Geuna, and Mira 2019; MacLeod and Urquiola 2021; Youtie et al. 2013).

Compared to the United States, European higher education system is still too fragmentary (Abramo and D'Angelo 2014). In this paper, we therefore focus on the European context to investigate the characteristics of the European academic labour market and the main differences between European HE systems. To do so, we select the United Kingdom, Germany, France and Italy as case studies. Those are the main populated countries in Europe and those that most contribute to the economy and the knowledge generation in Europe (Dosi, Llerena, and Labini 2006; Schiermeier 2020).

Contrary to other papers which mostly focus either on drivers of international mobility and the brain drain phenomenon on one hand (Baruffaldi and Landoni 2012; Franzoni, Scellato, and Stephan 2012; Janger, Campbell, and Strauss 2019; Jonkers and Cruz-Castro 2013) or on characteristics of academic job in contrast with industry career on the other hand (Agarwal and Ohyama 2013; Roach and Sauermann 2010; Sauermann and Roach 2012), we aim at merging the two streams. We are thus interested in understanding which are the differences in working conditions which drive academics to choose specific jobs in specific European national HE systems. This entails both national and international flows. As suggested by previous literature, researchers self-select themselves in the academic profession because of their taste for science and their passion for this profession (Agarwal and Ohyama 2013;

Roach and Sauermann 2010). Nonetheless, it is important to determine what can be done by national systems to protect such an intrinsic motivation toward academia in order to both retain and attract talented people. This is the research question our paper aims at addressing.

By comparing the United Kingdom, Germany, France and Italy, we analyse the relevant factors for an academic to engage in academic profession as suggested by three different streams of literature: economic theory of higher education, the international mobility of academics and the functionalist–structuralist sociology of science. To contribute to this reach literature, we seek for disentangling factors associated with the retention of domestic academics from those driving international academics. We also differentiate characteristics relevant for early career scholars from those for later stage researchers. In this way, we provide a more general framework of the working conditions of academics in Europe. What emerges is that Italy lags behind in talent attraction and retention for both national and international academic, losing the competition with other European systems. The United Kingdom emerges as the most open and attractive system in Europe for both the categories of academics. This is the result of the processes of selection that competitive systems like the United States have developed over the span of decades. France and Germany are in between, as France is mainly attractive for national academics and partially able to attract international academics, whereas Germany is trying to increase the attraction of international talents by at the same time retaining national academics, but not without effort.

This work has important practical implications as we suggest different policy interventions to improve conditions of the European countries, with a particular emphasis on Italy as the most problematic case study in our research.

The remainder of this paper is organised as follows. Section 2 reviews the literature. Section 3 outlines our empirical strategy and presents the case study selection as well as the main dimensions of analysis. Section 4 presents the comparison of the four European countries under investigation. Section 5 discusses the main results and formulates relevant policy advises and concludes.

2 | Literature Review

The topic has been studied from several angles. To provide a comprehensive theoretical framework for working conditions of academics in Europe, we rely, following the example of Janger and Nowotny (2016) on three different streams of literature: economic theory of higher education, the international mobility of academics and the functionalist–structuralist sociology of science.

2.1 | Economic Theory of Higher Education

The economic theory applied to HE investigates the choice of researchers to engage in academic profession instead of in the private sector. It suggests three main motivations driving academics: extrinsic monetary, extrinsic non-monetary and intrinsic motivations. Extrinsic monetary motivations are related to job market considerations like salary (Agarwal and Ohyama 2013; Courant and Turner 2017; Kwiek 2018; Levin and Stephan 1991; Unterlass et al. 2013). Levin and Stephan (1991) suggest that engaging in academia may be investment-motivated by the future financial rewards associated with the research activity. Thus, highly productive researchers are likely to be promoted with consequent increase in their financial rewards (Kwiek 2018). Agarwal and Ohyama (2013) complement the study by specifying that in academia, salary is lower than in the industry for researchers; yet there is a divergent salary trajectory in academia according to the type of research pursued. In particular, basic researchers earn more than applied ones in academia and over time they catch up the salaries offered in the industry. The drivers of academic salaries have been therefore studied by several scholars, who investigated the relevance of the physical capital provided by the HE institutions (Agarwal and Ohyama 2013), the university funding (Lepori, Geuna, and Mira 2019; Youtie et al. 2013), the university norms and values (Fairweather 2005) the individual productivity and cumulated human capitals of individuals (Kwiek 2018), the time allocated to research, teaching and service activities as well as the discipline and the type of institutions academics are affiliated (Courant and Turner 2017).

Remuneration is fundamental also when researchers are not primarily motivated by money. According to Merton (1957), due to the nature of science, what really motivates academics is the priority of discovery, namely being the first one to diffuse new knowledge. Extrinsic non-monetary motivation has been demonstrated to be fundamental because academics are driven by the desire to be recognised for their scientific merits (Heinze et al. 2009; Youtie et al. 2013) and due to the fact that individual recognition and prestige is reflected on the departments and universities where they are employed, HE institutions do everything possible to attract and retain star scholars, also through remuneration (Kwiek 2018; Melguizo and Strober 2007; Youtie et al. 2013). In a different way, economists observed that when researchers are motivated by the taste for science (Roach and Sauermann 2010), in order to pursue science they are willing to accept lower salaries by bearing even a significant opportunity cost (Agarwal and Ohyama 2013; Janger and Nowotny 2016). Whereas individuals with a strong taste of science are expected to self-select themselves in academia (see, e.g., Janger and Nowotny 2016; Roach and Sauermann 2010), literature on boundaryless career (Arthur 1994; Arthur, Khapova, and Wilderom 2005; Eby, Butts, and Lockwood 2003) provides evidence that these individuals are increasingly attracted by other intense-innovation industries such as data-driven jobs, artificial intelligence, biotech sector among others (Ortlieb and Weiss 2018; Shmatko, Katchanov, and Volkova 2020). In those sectors, they can find top equipment and support to perform outstanding research by earning a competitive salary. Therefore, remuneration becomes relevant also for intrinsically motivated researchers.

2.2 | International Mobility of Academics (Brain Drain)

At the base of the brain drain studies, academics are prone to move from origin HE systems when they exhibit low quality, lack of job positions and opportunity as well as low salaries

(Civera, Meoli, and Paleari 2021) toward HE systems characterised by better working conditions and opportunities (Janger and Nowotny 2016), high-quality colleagues (Franzoni, Scellato, and Stephan 2012) and differential earnings (Ackers 2005). Of course the benefits must exceed the cost of mobility including adjusting to the language, culture and way of life of the destination country; the loss of family and social ties; or the inability to contact the academic network in the home country (Baruffaldi and Landoni 2012).

Lepori, Geuna, and Mira (2019) identify as the main factor to attract and retain foreign researchers the university resources and attributes to it the US supremacy in terms of volume of publications and citations. Youtie et al. (2013) and Franzoni, Scellato, and Stephan (2012) instead stress the importance of the presence of outstanding faculty, colleagues or research team above all other reasons. According to other studies, a country's R&D spending level is a determining factor in international mobility since it affects financing and employment prospects in the academic labour market (Hunter, Oswald, and Charlton 2009).

According to this literature, we expect that the level of funding at a country and university level influence international academics more than national academics. By contrast, prestige of universities is important for both national and international academics, especially if driven by non-economic extrinsic motivations.

2.3 | Functionalist–Structuralist Sociology of Science

The functionalist–structuralist sociology of science relates the relative competitiveness of European HE systems to variations in university working unit organisation, which affects early-stage researchers' career prospects and freedom to do research (Janger and Nowotny 2016). HE systems organised in chairs like the German system favours the power concentration in the hand of the chair-holder and diminishes the freedom and autonomy of other researchers who are inevitably subordinates (Janger, Campbell, and Strauss 2019). At the same time, the autonomy in choosing research topics and the ways to pursue them represents a source of competitive advantage for HE institutions (Janger, Campbell, and Strauss 2019).

Formal established working conditions like career prospects, workloads and promotion mechanisms are also rationales at the basis of academic choices (Janger, Campbell, and Strauss 2019). Those are both important for national and international academics.

3 | Empirical Strategy

Our aim was to illustrate how remuneration schemes, national practices in terms of access to positions and career advancement as well as university characteristics may explain the different level of attractiveness of the European HE systems under consideration.

We conduct case study analysis of the university systems in the United Kingdom, Germany, France and Italy. These are the most representative countries in terms of population and GDP, and represent the largest academic job markets in Europe, affecting the overall capability of the EU to become a pole of attraction of human talent. In relation to research funds for instance, a recent article from Schiermeier (2020) about the allocation of the € 60 billion funds through the Horizon 2020 program over the period 2014–2020 illustrates that Germany receives €8.5 billion, the United Kingdom almost €7 billion, France €6.5 billion, Spain €5.5 billion and Italy €4.5 billion. Yet, they present profound differences in the capability of attracting talents. Previous studies have classified European countries in terms of internal versus external talents attraction. Afonso (2016) considered eight major western European academic job markets and classified France, Spain and Italy as systems closed to outsiders and relying on internal job markets, while Germany is a closed system relying on external job markets. By contrast, Denmark, the Netherlands and the United Kingdom are open systems relying on internal markets, while Switzerland is an open system relying on external job markets. Seeber and Mampaey (2022) starting from this classification investigated system's career norms and requirements which privilege the hiring of national candidates and/or candidates within the same national university system, by deepening the reasons why candidates from other systems struggle to apply and compete for open job positions. They focused on the norms regulating access to senior academic positions.

In this paper, we enlarge career norms and requirements considered in order to provide a more complete framework. Focusing on a limited number of cases, which still have a certain amount of differentiation, allows us to discuss the distinctive features of each HE system in relation to the national and international academics as well as early-career and late-career scholars. In this regard, Germany is the exception, where like in the United Kingdom, professors can negotiate their salary although their status of public employees. Moreover, the German system is the only one relying on a chair-based configuration whereas the others are based on departments.

In our analysis, we focus on public HE institutions only and all private institutions are excluded by the analysis. Private institutions are thus characterised by different practices in terms of both remuneration and career development. Specifically, in France, public universities encompass the *établissement public à caractère scientifique, culturel et professionnel*. In Germany, the University of Applied Sciences are excluded as their academic staff are not expected to conduct research, but to be devoted to teaching. Similarly, we exclude the Higher Technical Institutes (in Italian Istituti Tecnologici Superiori—ITS) in Italy. Modelled on the Universities of Applied Science in Germany, they are non-university tertiary education institutes which offer traditional education with specialised training in companies. Professors must have developed professional experience in the industry and do not necessitate to have academic experience. Therefore, there are profound differences in academic staff activities, workloads and promotion criteria compared to traditional universities in both Italy and Germany.

To ensure the greatest level of comparability, in our analysis we include only tenure-track and tenured positions, which are ascribable to the three academic ranks of assistant professors, associate professors and full professors.

Table 1 shows some key facts and figures of national HE systems. The number of public universities is higher in the United Kingdom (130 institutions) than in the other three countries, where they vary between 74 in France and 78 in Germany, while in Italy, the number is slightly lower and equal to 68. Germany exhibits the lower staff level, 12% less than Italy, 33% less than France and 83% less than the United Kingdom. If we look at the composition of faculty, in the United Kingdom, only 8% of the staff hold a full professorship, whereas in the other countries, at least one third of the staff is full professor. These differences are intrinsically related to the academic career structure and promotion, which we deepen in the next section.

We complement this analysis with considerations about monetary remuneration. We calculate the exact average annual net salary for young and senior academic staff in order to make a more precise comparison and measuring the salary gaps between countries. Gross salaries may be thus misleading at a first sight, and one may be better off going to a country which pays slightly lower salaries, but which has lower taxes, than he is moving to a country with high salaries but extremely unattractive tax rates. Moreover, also in case of no mobility, the net salaries ensure the better comparability of national system attractiveness. Nevertheless, to make a comparison, due to the profound differences existing among German states and to the discretionary amount of variable component of gross salary in both Germany and United Kingdom in virtue of the private negotiations between professors and universities, some assumptions have been taken. First, for Germany, we select the most populous state, North-Rhine Westphalia which is the north of the country and Bayern, which is in the south and is the most economically advanced state. In this way, two rather different situations can be caught within the same national HE system. Second, according to official Labor Act, 20% of the gross salary is the average amount of the variable component of the gross salary for an academic. Of course, the university can vary this amount according to the contingencies in the respect of the institutional budget. For this reason, we refer to the figures in the table as average numbers. A similar reasoning has been done for the United Kingdom. In virtue of the private negotiation and the discipline differences related to the market supplement, the percentage variation of the gross salary ranges between 10% and 100%. For this reason, 50% is the assumed as the amount of the variable component of the gross salary for an academic in the United Kingdom. Also in the case of remunerations, some key assumptions have been done to allow a comparative analysis. For France, the United Kingdom and Italy, it is effective gross annual remuneration; for Germany, it is a re-elaboration basing on the nominal gross annual remuneration and the age distribution of staff per position. The average tax rate for each country was considered (excluding the effects of deductions).

The case studies are developed via the analysis and triangulation of qualitative and quantitative sources, namely (a) scholarly sources, such as scientific articles describing the organisation and evolution of academic career rules as well as inputs from national experts via interview or email; (b) official documents from national authorities and buffer agencies[1]; and (c) data retrieved through the statistical offices of each HE system.[2]

Moreover, we interviewed a national expert for each country. The selection of experts is based on their expertise in career structures and contractual conditions, and they are representatives from higher education institutions. Alongside, two academics per position from different institutions were interviewed for each country. The interviews lasted from 45 min to 1 h. They were recorded and transcribed through a software. Afterwards, two of the authors of the paper have analysed the content.

4 | Results

Based on the theories discussed above, we analyse the attractiveness of HE systems in the four countries by distinguishing between characteristics which affect (a) researchers as a whole, (b) early-career compared to senior researchers and (c) national versus international scholars.

4.1 | Researchers as a Whole

The economic theory emphasises the role of remuneration. Table 2 exhibits the annual gross and net average salary per academic position across countries. The United Kingdom and Germany offer systematically higher salaries compared to Italy and France, which are mostly aligned. To quantify the difference, taking Italy as a benchmark, the full professors' net salary is 31% and 45% higher in Germany, respectively in North-Reine Westphalia and Bayern, and 61% higher in the United Kingdom than in Italy. The gap is even larger when considering the entry-level positions, as Italian net salaries should be increased from a minimum of 74% to a maximum of 86% to be comparable to those in the United Kingdom and in Germany (Bayern).

The remuneration can be split in two components, the basic and the variable component. The first one is fixed and established

TABLE 1 | Key figures of HE systems: Number of public universities, number of students and academic staff by rank.

	The United Kingdom	Germany	France	Italy
Number of public universities	130	78	74	68
Average number of students per public university	21,200	37,179	28,813	25,441
Number of academic staff	222,453	37,325	55,400	42,677
Assistant professors	204,058	1700	—	5347
Associate professors		21,800	35,300	23,150
Full professors	18,395	13,825	20,100	14,180

TABLE 2 | Annual gross and net average salary per academic position in 2020.

		Germany			
	The United Kingdom	**Bayern**	**North-Reine Westfalia**	**France**	**Italy**
	Lecturer	*Junior professor*			*RTD-B*
Gross salary (basic)	52,175	62,142	57,516		39,638
Gross salary (variable)	10%–100%	—	—		—
Net salary	49,168	52,689	50,006		28,256
	Senior lecturer/reader/ associate professor	*W2 professor*		*Maître de conférences*	*Associate professor*
Gross salary (basic)	76,062	77,136	75,692	46,428	60,354
Gross salary (variable)	10%–100%	20%	20%	8628	—
Net salary	69,385	70,333	69,328	44,522	40,988
	Professor	*W3 professor*		*Professeur des universités*	*Full professor*
Gross salary (basic)	107,434	94,800	83,609	63,132	88,327
Gross salary (variable)	10%–100%	20%	20%	8.800	—
Net salary	91,973	82,627	74,838	56,335	57,178

Note: The gross salary is broken up into the basic and the variable component.

by law. It can be increased according to different national logics and this amount makes up the variable part of the remuneration. Considering the basic component, France offers the lowest salary, whereas Italy, although to a lesser extent than Germany and the United Kingdom appears to be competitive. The situation changes when the variable component is considered. In Italy, it is not provided, in France it is established by law, while in Germany and the United Kingdom, it can be negotiated. When negotiated on average it equals to 20% of the base salary but it eventually reaches the whole amount. In France and Germany, welfare policies in favour of families and the geographical location are of prominent importance. In the former, those who live in the metropolis receive an increase ranging from 1% to 3% of the salary (accounted in the variable component), in the latter, the basic salary is different region by region to consider the diverse living costs. By contrast, what is relevant in the United Kingdom to the salary determination is the discipline of belonging. The fixed component can vary due to the so-called *market supplement*, adjustments taking into accounts the alternative job opportunity a candidate can receive from the private sector as well as from other universities. For instance, in Accountability, Finance and Economics, the starting salaries are 10%–15% higher than they potentially would be for an equivalent member of staff starting in another department due to the international marketplace where the staff operate. In all three countries, a monetary bonus is nonetheless expected for outstanding research production, which make the commitment for research a clear incentivised behaviour.

From the perspective of monetary remuneration, the attractiveness is low for the Italian, medium for French and high for German and UK HE system.

4.2 | Early Career versus Senior Researchers

Whereas remuneration affects the whole category of researchers equally, other characteristics may benefit researchers to a different extent based on the seniority. In the United Kingdom, Germany and Italy diverse tenure-track systems are in place. Those are fixed-term positions which make the academic job less secure for the early-career researchers.

In the United Kingdom, lecturer is the entry level position achieved. It can be either research or teaching position, as research and teaching are two distinct career paths. Lecturers usually have an initial probation period of 3–4 years after which their appointment becomes permanent if a positive internal evaluation has been achieved.

In Germany, two main career tracks exist for early career scholars. The traditional track consists of a 6 + 6-year period based on an 'up-or-out' principle: 6-year doctoral period (*wissenschaftlicher Mitarbeiter*), eventually followed by a 6-year postdoctoral period (*wissenschaftlicher Assistent*) aimed to achieve a habilitation. The habilitation is a sort of second PhD and can be either a thesis (opus magnum) or a collection of scientific publications (cumulative habilitation). The habilitation traditionally includes the production of a habilitation treatise and an examination process that certifies the ability to teach in an academic subject. Once achieved its validity does not expire. Non-tenured researchers work at other professors' chair waiting for finding a vacant job position, for which apply. They must achieve a good rank among the other candidates if they hope to be hired. The alternative career track was introduced in 2002 to facilitate early independence and make careers less uncertain (Hüther and Krücken 2018): the junior professorship. The junior professor

(W1) positions have a fixed duration of 6 years and are divided into two phases. In the first phase, junior professors undergo an evaluation after 3 years. If successful, they are eligible to apply for tenured professorship. Following a positive evaluation, junior professors often choose to extend their position to the full 6-year duration. In the second phase, they can use the additional time to develop teaching experience or to publish papers. In both cases, researchers are obliged to apply for the professorship at a university other than their starting institution. Mobility is an important aspect for hiring and promotion criteria.

In Italy, there are two tenure-track positions: a non-tenured 3-years researcher position that can be renewed for 2 years (*Researcher type A*, or RtdA), followed by a non-tenured position of 3 years (*Researcher type B*, or RtdB). After a minimum of 5 years, the tenure professorship can be achieved after the positive evaluation from an evaluation committee devoted to assessing the teaching skills of the candidate. For the professorship, like in Germany, a habilitation must be achieved. The habilitation (Abilitazione Scientifica Nazionale) happens at the national level and is aimed to assess the scientific merits of the candidates. The application must be uploaded on the dedicated ministerial portal and includes a selected list of scientific publications as well a detailed curriculum vitae where research and teaching experiences, awards and qualifications are reported. It is valid for 11 years. The habilitation requirements vary according to the discipline for which the candidate applies for. In Italy, there exist 190 different disciplinary sectors, bibliometric and non-bibliometric-based. The recruitment procedure foresees that the department proposes a call for a new position to the university's central decision-making bodies and the institution publish an open call which must specify the disciplinary recruitment sector for the new hire. An on-purpose evaluation committee composed of a minimum of three academics in the sector and with most members external to the institution evaluates the applications. Finally, the university can hire the successful candidate.

In France, there is no tenure-track system. The entry position is the permanent position of *Maître de conférences* (MCF), which is equivalent to a tenured assistant/associate professor. To access the position, a national habilitation must be achieved. The national qualification is assessed by one of the 81 discipline-based national committees of the Conseil national des universités (CNU), which allows one to be included on a national list of those qualified for the position. The assessment occurs once a year, and the applicant must submit a detailed application form to two 'rapporteurs' nominated by the CNU by mid-December (and eventually, concomitantly defend the PhD). The application includes the doctoral thesis, and in given fields, a French translation of the thesis is mandatory. In humanities, it is also preferable that candidates have obtained the *agrégation du secondaire* and are hence able to teach as *professeur agrégé* (PrAg) (Seeber and Mampaey 2022). The qualification is valid for 4 years. The success in the rate varies considerably across fields, from 35% to 90% (Musselin 2019). Qualified candidates can apply for job openings, although only a small minority obtain a MCF position in the same year (15.2% in 2013, Musselin 2019). New positions are announced mostly by the Ministry of Education (Crosier et al. 2019), by general calls that do not consider the needs of a specific institution. The selection is run at university level by a disciplinary committee composed of an equal number of assistant and full professors and re-elected every 3 years. The selection committee invites potential candidates and ranks three to five of them. The ranks are published on the ministry portal and successful candidates can decide to accept or not, in order of ranking.

Once the tenure is professorship is achieved, the HE systems exhibit different configurations across countries. In the United Kingdom, the first category is Senior Lecturer or Reader, the first being a teaching-focused position and reader being a research-focused position.[3] Associate Professor has been adopted recently in place of senior lecturer or reader to improve international recruitment. Associate professors are initially appointed for 5 years after which they go up for review. If they are successful, they are reappointed and can hold the position until retirement. Professor is the most senior academic position in the United Kingdom and is equivalent to a full professor or even an endowed chair in the United States. In addition to research and teaching, UK professors are expected to take on an academic leadership role in the department or faculty. Professors hold a "chair" in a subject which can be either established or personal. Established chairs exist independently of the person who holds it, and if they leave the chair can be filled by someone else. A personal chair is awarded to a specific individual in recognition of high levels of achievement. If they leave, there is no guarantee the chair will be available for someone else.

In Germany after junior (W1) professorship, tenured professors are distinguished between W2 and W3. The main distinction is based on owning a chair or not. W2 professors are usually associated with a particular chair they do not hold and carry out research in the same field. These are not chaired positions, but they do involve many of the same tasks and duties. W2 professors have their own research focus and conduct their research independently. The greatest difference is that there is less personnel management compared to chaired positions. W2 professors can also be tenure-track professors. If W2 professors have fixed-term positions, they may also have the option of tenure. They usually undergo several assessments and performance reviews throughout their appointment, ending with a final evaluation. A successful evaluation can lead to a tenured W2 position, or promotion to a W3 professorship. W3 professors lead their own chair (*Lehrstuhl* in German). Chaired professors are responsible for teaching and research in a specific subject area at a university. Chairs have their own academic and administrative staff who support the professors with technical and organisational tasks. While W3 professors generally have a larger research budget than W2 professors, both are in charge of research associates, advise doctoral candidates and teach and produce new research. W3 professors must demonstrate leadership as well as fundraising sills and competencies.

In Italy, associate and full professors are the two tenured positions. To become full professors, associate professors must apply and achieve another national habilitation, which is similar in the duration and in the process to the previous one but is characterised by more stringent requirements in terms of both scientific productivity and personal experience in leadership roles.

Also in France, applications for *professeur des universités*—equivalent to full professor—require an additional habilitation

à *diriger des recherches*, which is like another doctoral dissertation, and it is judged by one of the 81 disciplinary evaluation committees. This procedure is less selective than for the MCF (Musselin 2019). The examination is national and consists of the evaluation of the dissertation and publications, and after a positive evaluation, of an oral examination focused also on very idiosyncratic criteria, like the ability to master the common presentation style in French academia (Seeber and Mampaey 2022). Successful candidates are ranked by the committee and can choose, in order of ranking, a position from the list of available full professorships in their field. In Economics, Law, Management and Political Science, the habilitation is required but it is of secondary importance compared to the more selective *agrégation du supérieur*, in which national selection committees of professors in the discipline interview and select the candidates through a series of tests that last about 6 months. Part of the vacant positions in both cases are filled by transfer (mutation) of people who are MCFs and PUs at another university rather than by new recruitment.

Once becoming a professor, in Italy, France and Germany the privileged lifelong condition of civil servant one enjoys makes the career attractive. This is not the case for the United Kingdom where university researchers are not civil servant. The age at which researchers get tenured changes significantly across countries. The average age for MCF is thus 34 and for PU is 54 years, which makes according to the Table 3 French associate professors the youngest among the countries under study. In the United Kingdom, the age of full professors is almost the same, whereas early career researchers get tenure positions at 43 years old. In Germany, the average age for becoming W2 and W3 professor is 47 and 52, respectively (Destatis 2022), denoting a long period of uncertainty before getting tenured. Nevertheless, Italy exhibits even a longer path as associate and full professors on average are 52 and 58 years old, respectively, the oldest among the countries under study.

Along with the age, also the number of tenure and non-tenure positions in the system make a country more or less attractive. The chair system characterising the German system implies that the number of positions available is rather low. The 1700 junior professors are counterbalanced by 21,800 W2 professors and 13,825 W3 professors. The case of the United Kingdom is diametrically opposed as $<10\%$ out of the 222,453 academic staff holds a (full) professorship position. In France, the situation is less extreme but can be considered somehow comparable. French MSCs are 35,300 whereas the Pus are 20,100. Italy presents a less pyramidal structure as early-career scholars are about 10,000, associate professors 23,150 and full professors 14,180.

TABLE 3 | Average age of the academic staff in 2020.

	The United Kingdom	Germany	France	Italy
Associate professors	43	47	34	52
Full professors	55	52	54	58

4.3 | National versus International Researchers

The differences between early-career and senior researchers hold both for national and international researchers. Yet, there are additional features that may be attractive in the eyes of international researchers compared to the national counterparts.

According to the literature, scientific productivity has gained great importance for academia, as it is used as a parameter for funding allocation (Lepori, Geuna, and Mira 2019; Youtie et al. 2013), hiring and promotion criteria (Abramo and D'Angelo 2014), salary differentiation (Kwiek 2018) and quality signal (Melguizo and Strober 2007; Youtie et al. 2013). Recognition for their scientific merits is one of the motivation at the base of an academic career choice for both national and international scholars (Heinze et al. 2009; Youtie et al. 2013).

Universities are competing to attract the most prominent scholars in terms of scientific productivity (Melguizo and Strober 2007; Youtie et al. 2013), and offer them the best conditions to perform research such as funding (Lepori, Geuna, and Mira 2019), research autonomy and less teaching duties (Fairweather 2005; Janger and Nowotny 2016). To take into account these dimensions, previous research has compared the R&D expenditures of countries (Hunter, Oswald, and Charlton 2009) as well as their position in university rankings (Abramo and D'Angelo 2014; Hazelkorn 2015).

With reference to the countries under investigation, Table 4 shows the government expenditure in R&D in terms of percentage of GDP and government expenditure as euro per student according to the data retrieved from the OECD database (OECD 2023b). Italy exhibits the lowest expenditure on R&D, followed by France, the United Kingdom and Germany. Except from the United Kingdom that has experienced an increase of R&D expenditure $>80\%$ between 2013 and 2020, Italy has increased its quota by 16%. Germany exhibits an increase by 10% whereas France remained almost stable (2% increase). Similarly, when comparing the euro per student invested in the HE sector, France Germany and the United Kingdom invested, respectively, 1.5, 1.7 and 2.3 times more than Italy. HE sector appears as a non-priority for Italy also from the political point of view, which discourage both national and international candidates to start a career in HE in this country.

With reference to the ARWU ranking, the United Kingdom boasts 64 universities ranked, eight among the top 100 institutions. Germany has 45 universities ranked, four of which in the top 100. Similarly, four out of 27 French institutions are ranked in the first 100 universities worldwide. Italy has no universities among the 40 ranked in the ARWU among the top 100. This place Italy in an uncompetitive position compared to the others as the country values the average quality of its institutions instead of pursuing a "winner takes all" strategy inspired to the principle of rewarding the excellence (Abramo and D'Angelo 2014; Civera et al. 2020). This translates into a lack of competitiveness in the eye of international researchers, who value the most the prestige of the institution in the university ranking as well as the chance to work with prestigious peers (Franzoni, Scellato, and Stephan 2012; Youtie et al. 2013).

TABLE 4 | Government expenditure on R&D as percentage of GDP and government expenditure as euro per student in the years 2013 and 2020.

	R&D expenditure (% GDP)			Euro per student		
	2013	2020	Delta (%)	2013	2020	Delta (%)
The United Kingdom	1.62	2.931	81	18,573	24,068	30
Germany	2.836	3.131	10	12,291	16,918	38
France	2.237	2.282	2	11,771	15,386	31
Italy	1.301	1.507	16	8196	10,320	26

Note: Delta percentage are included.

Except from the United Kingdom, where academic recruitment is open to national and international candidates with no distinctions, the accessibility to the system for international candidates is different in Germany, France and Italy. Researchers from other systems may be reluctant to embark on a demanding qualification procedure like the French one since compared to national candidates they are less likely to know the functioning of the evaluation procedures and French academia in general, to which of the 81 disciplinary panels they should apply, and what the evaluation criteria consist of. Moreover, the evaluation in certain fields requires that thesis and articles be written in or translated into French, and the website of the CNU is only in French. Second, while the calls are announced centrally, the ranks for MCF are made by a local committee and, since there is no rule or informal norm that prescribes scientists to change institutional affiliation, internal careers are very common. For example, Godechot and Louvet (2008) found that local applicants are 18 times more likely to obtain a position than external applicants. Regarding candidates from other systems, they can be exempted from the requirement to be accredited by the CNU under demonstrated qualifications, yet this implies convincing a selection committee to pass over a long list of accredited French candidates. In a similar vein, in Germany, the habilitation is not required for candidates from other systems, but those willing to apply will often be younger than the national competitors and, similarly to the French system, they will need to outcompete national candidates that have been formally habilitated for the job and that can rely on the networks of their mentors. Thus, German chairs typically recruit PhD students from graduates they have taught, and postdocs from their own pool of PhD graduates (Seeber and Mampaey 2022). Network connections and having a highly respected mentor are also important predictors of appointment at professorial positions (Jungbauer-Gans and Gross 2013; Plümper and Schimmelfennig 2007). While the system tries to avoid institutional and to keep high standards of quality through deadlines, pressure and mobility, there may be unintended consequences for attracting candidates from other systems.

The Italian system is even more difficult to access from international researchers. Like France, the ministerial website and the habilitation procedure is mostly in Italian and discipline based. A candidate aspiring to a permanent professorship must possess a habilitation at the national level precisely in the scientific sector of the position (or an equivalent position abroad). Since there is a very large number of disciplines, each habilitation gives access to few positions, and each habilitation requires a very specific profile (Donina, Seeber, and Paleari 2017). Scientists nurtured within the Italian system tend to grow within a disciplinary sector, meaning that they will fit well in one sector while they rarely must waste their time in multiple habilitation attempts. On the contrary, potential candidates from other systems will rarely fit one specific sector and could be more reluctant to invest time to obtain a habilitation that grants the right to apply to few positions. Moreover, there are very few tenured professorial positions that can be accessed by outsiders from other institutions or countries because almost all new (permanent) associate professor positions result from positive evaluations of RtdBs from the same institution. Also, most RtdBs result from 'upgrading' of RtdA positions and possessing a habilitation is an important informal factor for obtaining a RtdB position.

The openness of the UK system towards international candidates is demonstrated also by the fact that a mobility package is formally included in the job offering. It can take different forms ranging from lump-sum monetary rewards to ad hoc family support services such as accommodation for spouses and children, childcare centres, as well as support for visa permissions. The variability of mobility packages can be attractive for both early career and senior scholars, according to their family status. In Germany, a mobility package is not formally offered but can be negotiated. Nonetheless, operationally university international offices oversee making mobility as smooth as possible and aid in guiding mobile researchers to find an accommodation or fulfil bureaucratic duties and burden. This configuration is less attractive in the eyes of international researchers than the one offered in the United Kingdom, but still may represent a good compromise especially for early career researchers who are more likely to move alone. By contrast, in Italy and in France, no mobility package is provided. This discourage international mobility especially in Italy, where the support from the university is particularly unstructured.

We summarise the country level of attractiveness by distinguishing between nationality and seniority in Table 5.

5 | Discussion and Conclusions

From previous studies reviewed on the topic, early national career scholars are attracted by remuneration (Janger and Nowotny 2016; Kwiek 2018) and career conditions in terms of stability and length (Civera, Meoli, and Paleari 2021; Janger, Campbell, and Strauss 2019), whereas international early career scholars consider also the prestige of the institutions (Melguizo and Strober 2007; Youtie et al. 2013) and research funds (Janger

TABLE 5 | Country level of attractiveness.

	The United Kingdom	Germany	France	Italy
National				
Early career	High salaries (negotiation) Tenure-track (5 years) Permanent position after probation Internal assessment (no habilitation) Many positions available	High salaries (variable component) Long tenure-track (6/12 years) Habilitation Old age Very few positions available Mobility	Low salaries (variable component) No tenure-track Habilitation (at national level) Fast career (young age) Positions available	Low salaries (fix component only) Double tenure-track (5 years) Habilitation (at national level) Old age Positions available
Senior	High salaries No civil servant Permanent position after probation Internal assessment (no habilitation)	High salaries (negotiation) Civil servant life-long position Old age Chair-based system	Low salaries (variable component) Civil servant life-long position Habilitation (at national level) Fast career (young age) Few positions available	Low salaries (fix component only) Civil servant life-long position Habilitation (at national level) Old age
International				
Early career	High salaries (negotiation) Tenure-track (5 years) becoming permanent Internal assessment (no habilitation) Many positions available Mobility package High R&D investment High university ranking	High salaries (variable component) Long tenure-track (6/12 years) No habilitation Very few positions available Network-based hiring High R&D investment Medium university ranking	Low salaries (variable component) No tenure-track No habilitation but high competition Disciplinary sectors French language Fast career (young age) Positions available Medium R&D investment Medium university ranking	Low salaries (fix component only) Double tenure-track (5 years) Habilitation (at national level) Disciplinary sectors Italian language Positions available Small R&D investment Low university ranking
Senior	High salaries No civil servant Permanent position after probation Internal assessment (no habilitation) Mobility package High R&D investment High university ranking	High salaries (negotiation) Civil servant life-long position No habilitation Chair-based system Network-based hiring High R&D investment Medium university ranking	Low salaries (variable component) No habilitation but high competition Disciplinary sectors French language Fast career (young age) Few positions available	Low salaries (fix component only) Civil servant life-long position Habilitation (at national level) Disciplinary sectors Italian language Small R&D investment Low university ranking

Note: Low, Medium/low, Medium, Medium/high, High.

and Nowotny 2016; Lepori, Geuna, and Mira 2019) as particularly relevant.

From this perspective, what emerges from our analysis is that there is no country which is systematically better than the other but according to the nationality and seniority, the researchers can be attracted to a different extent by a specific country configuration. Specifically, the United Kingdom as an open and market-oriented system is attractive for early-career candidates thanks to the high salaries offered, the chance of obtaining a permanent position after a probation period and a positive internal evaluation. International early-career researchers are attracted also by the high visibility of the UK He system in the university ranking, the expenditure in R&D and the lack of a habilitation process, which makes the promotion criteria transparent and unbiased in their eyes. The availability of positions for early career researchers creates a large pool of candidates and give the chance to select those with an outstanding research profile. This in turn allows universities to receive more funds either from international research projects (such as ERC) or from the national system itself through great assessment during the Research Exercise Framework (REF). Otherwise, senior researchers may be attracted by high salaries with possibility of negotiation, especially if they belong to disciplines and sectors attractive for the private sector and can negotiate the *market supplement*. But, compared to the other countries, university professors are not civil servants and cannot benefit from the long-life position typical of professorship in other systems. Nevertheless, university researchers are included in a special working category—the teacher's category that ensures advantages in terms of retirement plans and taxation.

By contrast, Germany is only partially attractive for early-career researchers due to the long tenure-track system up to 12 years. Tenured positions are in fact obtained at a relatively late age. At that age, most scientists in other systems have either left academia or obtained a tenured position, or they might be reluctant to move to a new country. Moreover, there is a small number of positions available due to the chair-based configuration of the system that make early-career scholars experience the authority of the chair-holder, who have a say in the matter in terms of research topic in contrast with department-based systems where junior researchers enjoy in principle levels of research autonomy similar to full professors (Janger, Campbell, and Strauss 2019; Janger and Nowotny 2016). To contribute to making academia less attractive, it is also the fact that doctoral studies are well recognised and remunerated from the private sector that offer greater salaries. According to the report from the OECD (2023a), the gross wage earning are €75 thousands for Germany higher than the €64 thousands for the United Kingdom, €59 thousands for France and €53 thousands for Italy. By contrast, the privileges granted for chair-holder tenured professors as civil servants with broad negotiation power make the profession appealing for late-career scholars. On the other hand, international scholars may be discouraged in applying to German professorship positions because of the great importance of network and relationship. Yet, policies such as the Excellence Initiative is striving to gain international visibility in order to increase the competitiveness of the system in attracting international candidates, and the high salaries offered are a good incentive.

Similarly, France results to be more attractive for national than international researchers. Although the low salaries offered in virtue of the security of the job, professorship is still a prestigious job. Moreover, the career is fast, and candidates can reach a stable and secure position early. This is relevant for both early- and late-career scholars. For foreign candidates, the habilitation system mainly in French and biased towards national candidates makes the French system less competitive. Nonetheless, in the case of France, part of the issue might be solved when considering that there is a very well-established private HE system involving Business Schools. They offer higher salaries than public institutions and do not require the knowledge of the French language, which make them more open and attractive to international candidates. The openness to the international candidates is at the expenses of higher teaching loads than traditional universities.

It must be noted that for both France and Germany, research centres are a viable option for researchers which are committed to research but do not get access to the university system. The National Centre for Scientific Research (CNRS) in France and the Max Planck Institutes in Germany are among the world's leading research institutions. The differentiation of the system may therefore be beneficial for both national and international researchers, offering a valid alternative career path.

Italy does not really represent a competitive system neither for national nor for international candidates. Although professorship is a life-long civil servant position, low salaries, no room for negotiation, the obligation for habilitation and the lengthening of the academic career result to country unattractiveness in the eyes of senior researchers. Professorship is achieved late in time, and consequently, they retire later than others. The retirement age is the lowest in France and is around 60–62 years; in the United Kingdom and in Germany it is around 65 years and in Italy it is 70 years for full professorship. The civil servant pension is perceived as in Germany and France and is proportional to the tax paid on the income. Since Italy offers the lowest remuneration, it offers also the smallest pension. Similar to what happens with the remuneration, the basic pension can be supplemented in every country except from Italy, based on performance, family allowance and function-based allowance (e.g., dean, vice-dean, gender equality representative, etc.).

Early-career researchers are even more disadvantaged by the Italian HE sector's configuration as they experience a double tenure-track system (RtdA and RtdB) and thereby a high level of job insecurity. In countries where the top-level salary is high and the gap between entry level and top level is small, salaries overall are clearly attractive (Altbach, Reisberg, Yudkevich, et al. 2012). Where entry-level and top-level averages are both low, it is easy to see that an academic career will be less attractive and that these countries will be vulnerable to brain drain. It is not a case thus that Italy is affected by a massive brain drain phenomenon (Civera, Meoli, and Paleari 2021). Finally, the poor positioning of Italy in the university rankings, the low amount of R&D spending along with the recruitment and promotion mechanisms mainly biased towards Italian-speaking candidates contribute to make Italy as the least attractive country for international scholars.

Taking Italy as a benchmark, and by focusing on remuneration as a common lever to both national and international, early scholar and senior researchers, we can quantify in monetary terms, the cost of the eventual implementation of some reforms dedicated to fill the gap in its attractiveness. It may be of special interest for policy makers. First, the level of the basic salary should be aligned to the main international competitors. For Italy, this would be achieved through a one-off recovery of the salary block implemented over the period 2010–2015. By assuming a € 2000 salary increase for the staff who suffered the block, which equals to 40,000 units, the investment would be € 80 million per year. Second, a variable component based on research performance like in the United Kingdom and in Germany should be introduced as the supplement to the basic salary as it plays a key role in being an attractive system. An eventual manoeuvre would include the introduction of a reward component up to 20%–30% of the fixed component financed through competitive funds and the allocation of resources destined to accelerating salary steps movements. By hypnotising a 20% increase addressed for one tenth of the academic staff would imply € 60 million per year not consolidated because self-financed (6000 people receiving 10,000 € each). Third, a geographical differentiation like in Germany and France would imply a salary increase for the academics residing in regions characterised by a high cost of living. Considering a supplement of maximum 10% of the salary for roughly half of the academic personnel would cost € 150 m per year. Finally integrating some benefits, like a supplementary health policy like that offered in the United Kingdom would include a € 1500 scheme for the tenure staff which lead to a € 90 million per year investment. Altogether, these reforms would cost less than the German and French Excellence Initiatives, which cost € 400 and €1500 million per year, respectively.

With different amounts, these policy recommendations could be suitable also for other countries. Starting, for example, from those included in the study of Altbach, Reisberg, and Pacheco (2012) and Janger, Campbell, and Strauss (2019), it is possible to identify other European countries to whom recommendations we formulate can be ascribable. In particular, Eastern and Southern European countries like Spain and Poland, feature the same peculiarities of Italy, the country suffering the most attractiveness gap in our analysis.

More in general, it is possible to identify countries in the world which are ascribable to the four countries we have studied in depth. In particular, the United Kingdom characterised by marketisation and managerialism is, in Europe, the paradigm of the Anglo-Saxon model, also featuring USA, Canada and Australia. As far as the other countries in our analysis are concerned, Italy, France and Germany, the similarities among them overcome the differences, when compared to the worldwide context. There are indeed specific similarities, though the overarching framework of faculty remuneration varies substantially, as described by our paper, requires the understanding of the higher education context as a whole. For instance, countries differ by the total number of degree-granting universities, by the size of the private sector, and simplifying our recommendation to a single aspect may lead to unintended consequences.

Therefore, the current study can be adopted as a starting point for different comparative analysis, where specific dimensions mentioned like net salaries, average age, the structure and the evolution of the academic career can be studies as determinants of attractiveness in the eyes of both national and international staff as well as of both young and senior scholars. There is a disproportional attention devoted by extant literature to the attraction of early careers scholars only because they are those who move more frequently (Laudel 2005). Nonetheless, there is evidence that mobility patterns do depend on the career phase (Cañibano, Otamendi, and Andújar 2008; Laudel and Bielick 2018) and looking at (international) mobility determinants of young scholars is just a part of the story about attractiveness of the academic career.

What can be argued from our study is that to be attractive, academic profession must be a competitive alternative to the private sector. Therefore, incentives to leverage on can be the remuneration and the security of the job that should be reached as soon as possible. The United Kingdom offering a market adjustment for those discipline which are highly attractive in the private sector can be retained a best practice concerning the first matter. By contrast the high-speed characterising the French system, where academics become tenure when they are considerably young provides the best conditions when the second matter is considered. When considering the academic profession in a cross-country perspective, remuneration and a conducive environment in terms of resources available for performing outstanding research must be guaranteed for a country to be defined attractive. In general, as suggested by Altbach, Reisberg, and Pacheco (2012), the prestigious role of academic profession must be restored. It has been lost in some countries like Italy, whereas it is still recognised in countries like France.

Nevertheless, the list of aspects which would be interesting to study is extensive. At the top of it, workload and work conditions at large have been the object of our qualitative analysis, though an extensive comparison would require a better understanding of institutional conditions that was out of the scope of our analysis. The amount of teaching, research and outreach activities varies across countries and academic ranks. They can be defined by law as in Italy where the teaching hours required are the lowest among the countries under study (120 for tenured professors vs. the average 200 h of the other systems). Otherwise, they are negotiated as in the United Kingdom, Germany and France according to either individual or departmental (or chair-based) performance in terms of fundraising or scientific merits. Concerning the scientific quality of the environment. The presence of outstanding colleagues delivering high quality and innovative research is an important aspect to consider as well (Janger, Campbell, and Strauss 2019).

Another important institutional aspect which would require a dedicated, and substantial, effort for a proper analysis, is the understanding of outreach opportunities to increase the individual remuneration. This is not only a matter of legal conditions, but also of real opportunities to interact. Even in Italy, where these opportunities do not formally vary at large between institutions, in practice, an academic in the North have access to a number of industry relationships which are unavailable in the Southern regions of the country.

Beyond institutional aspects, other characteristics of the context that may shape immigration movement from and towards specific countries, for instance the quality of life, would deserve

special attention. In this way, more general implications for migration flow could be derived.

In addition to theoretical aspects, the topic could be investigated by applying a more quantitative approach where statistical inferences are detected. This would imply, however, a numerical definition of what attractiveness is—which is extremely complex (see Janger, Campbell, and Strauss 2019 for an exemplification). In a similar vein, as our paper is mainly based on secondary data only, primary data based on semi-structure interviews would allow to include individual subjective considerations shading light on individual preferences, for instance, work–family balance.

These promising and challenging research venues are left for future investigations.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Endnotes

[1] France (MESRI 2022); Germany (Destatis 2022); the United Kingdom (HESA 2022); Italy (Ministerial Decree on 12 March 2022 published on Gazzetta Ufficiale G.U. n. 120 on 24 May 2022). Data about taxation from Mistura (2020).

[2] For the United Kingdom, the HESA portal https://www.hesa.ac.uk/; for Germany, the DESTASIS portal https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Bildung-Forschung-Kultur/Hochschulen/Publikationen/_publikationen-innen-hochschulen-personal.html; for France, the Ministry of Education portal https://www.enseignementsup-recherche.gouv.fr/fr/l-etat-de-l-enseignement-superieur-de-la-recherche-et-de-l-innovation-en-france-84954; for Italy, the Ministry of Education portal http://ustat.miur.it/ and the direct interaction with the personnel in the minister statistical offices.

[3] In some universities, a senior lecturer can be promoted to a reader—the more senior rank. In these cases, the senior lecturer can be seen as an associate professor and the reader as a full professor without a chair.

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