

MASTER
IN ECONOMICS

Mobility Perspectives in the Portuguese Academic Teaching Career

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M

2024



FACULDADE DE ECONOMIA



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MOBILITY PERSPECTIVES IN THE PORTUGUESE ACADEMIC
TEACHING CAREER

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Dissertation

Master in Economics

Supervised by

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2024

Acknowledgements

I must express my gratitude to my supervisors Professor Paulo Guimarães and Professor Pedro Luís Silva for all their patience and support throughout the production of this dissertation.

I would also like to thank all the people who have helped me along the way, from friends to family.

My most special thanks belong to my mother. When they say “mãe é mãe”, they are absolutely right. I'm proud to be your son.

Funding for this research was provided by FCT – Foundation for Science and Technology (Portugal) under the projects Ref. PTDC/CEDEDG/5530/2020/01.

Abstract

Professor mobility in academia is an important topic of public discussion. In Portugal, however, despite plenty of debate on the subject, the numerical and analytical literature is scarce. This is due to the available data being under-explored. We refer to REBIDES, a publicly available statistical survey with microdata on the population of higher education teachers in Portugal, covering the academic years 2001/2002 to 2022/2023. We hypothesise that this is because of the problems the data raises. We have therefore prepared the data for research, with the dual aim of conducting our study and encouraging scientific production on the subject by making the treatment code available. The focus of our study is the mobility patterns of professors in Portuguese academia and their potential causes. We selected our effective sample, including non-military and police higher education institutions, and career professional categories, according to the statutes of the profession. To summarise the main results: the evolution of the share of career professors in the total has been decreasing in public institutions; the total number of career progressions has decreased in public universities over the years, recovering recently, but in a non-lasting movement; most movements between institutions are within the same hierarchical position, and the progressions we note, especially in public ones, tend to be for internal members; the increase in the number of non-career professors, and their maintenance in this condition for many years, may point to some precariousness in the profession, in a general perspective; the low proportion of progressions and the high numbers of professors remaining in the same position support the hypothesis of bottlenecks in the hierarchy of the profession.

JEL Codes: H5; I23; J24; J62.

Keywords: Academic Career; Academic Mobility; Career Status of the Professors; Higher Education Policy.

Resumo

A mobilidade dos professores na academia é um tema importante de discussão pública. Em Portugal, porém, embora haja bastante debate sobre o tema, a literatura numérica e analítica é escassa. Isto acontece devido aos dados disponíveis para tal serem sub-explorados. Referimo-nos ao REBIDES, um inquérito estatístico publicamente disponível que possui microdados acerca da população docente do ensino superior em Portugal, que cobre os anos letivos de 2001/2002 até 2022/2023. A nossa hipótese é que isto aconteça devido aos problemas que os dados levantam. Assim, preparámos os dados para investigação, com o objetivo duplo de fazermos o nosso próprio estudo, e de incentivar a produção científica sobre o tema, a partir da disponibilização do código de tratamento utilizado. O foco do nosso estudo são os padrões de mobilidade dos professores na academia portuguesa, e suas causas potenciais. Seleccionámos a nossa amostra efetiva, contando as instituições de ensino superior não militares e policiais, e as categorias de carreira, de acordo com os estatutos da profissão. Resumindo os principais resultados: a evolução da fatia de professores de carreira no total tem vindo a diminuir nas instituições públicas; o número total de progressões na carreira diminuiu nas universidades públicas, ao longo dos anos, tendo recuperado recentemente, mas num movimento não duradouro; a maioria dos movimentos entre instituições são dentro da mesma posição hierárquica, e as progressões que verificamos, sobretudo nas públicas, tendem a ser relativas a membros internos; o aumento do número de professores não carreira, e sua manutenção nessa condição durante largos anos, pode apontar a alguma precariedade na profissão, numa perspetiva geral; a baixa proporção de progressões e os números altos de professores a manterem-se na mesma posição alimentam a hipótese de estrangulamentos na hierarquia da profissão.

Códigos JEL: H5; I23; J24; J62.

Palavras-Chave: Carreira Académica; Mobilidade Académica; Situação da Carreira dos Professores; Política do Ensino Superior.

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1. Introduction

The education sector has an undeniable importance in the economy, mainly because it defines the qualification levels, affecting labour productivity (Becker, 1962). Accordingly, education policies have implications for the country's productive capacity, and recognising this, OECD countries spent nearly 5%, on average, of their gross domestic product on educational institutions, in 2020 (OECD, 2023).

In this context, professor¹ mobility in academia is a topic whose relevance in the literature has been growing (e.g., Yan et al. (2015) and Kim et al. (2020)). Mobility can be explored in different ways, as professors can move horizontally, between institutions, vertically, between hierarchical positions, or both, for instance. In Portugal, there are publicly available administrative microdata on the population of higher education teachers in the country, which allow an in-depth study on the subject. We are referring to REBIDES, the Biographical Register of Higher Education Teachers (*Registo Biográfico de Docentes do Ensino Superior*), a survey which contains a nominal list, along with the rank, type of contract, and other variables concerning the professors, spanning the academic years from 2001/2002 to 2022/2023².

In contrast to what might be expected, this database is under-explored in the literature, and studies based on it tend to originate from DGEEC, an institution that produces official statistics (DGEEC, 2023A; DGEEC, 2023B). We hypothesize that this is due to the fact that the database has several problems and needs complicated treatment before it can be used. Therefore, as well as carrying out our own study on academic teaching mobility in Portugal, we hope that by making publicly available the code used to process the data (and documentation on which it was based), we can encourage scientific production in the area. Following this, the research questions that we seek to answer are: “What are the patterns of professor mobility in Portuguese higher education institutions? What could have led to such patterns?”. Achieving these objectives could enable policymakers to reverse potential problems brought upon by events such as the Great Recession, or even assess the impact of policy changes.

¹ It should be noted that we use the term “professor” to refer to higher education teachers, as a matter of simplification, given the usual expressions used to characterise professors in different hierarchical positions.

² Although the data for the 2023/2024 academic year was made publicly available before this dissertation was submitted, this happened rather late, and there was not enough time to process, analyse and incorporate it into the study.

On a horizontal level, teaching mobility in academia can be perceived more pessimistically due to potential "brain drain" effects, as it can make capital more abundant where it is already abundant, and others with a shortage of capital even worse off (Docquier & Rapoport, 2012). Nevertheless, this is not always synonymous with disadvantages. Indeed, the creation of national and international networks between educational establishments offers the potential for research and knowledge sharing that can improve the entire educational system, impeding professors from just reproducing the methodologies used in their departments due to a lack of external experience (Mora, 2015).

On a vertical level, the analysis of mobility covers changes in the position of individuals in the social hierarchy (Shmatko & Katchanov, 2016). Another, more common, way of expressing this type of mobility is career progression, which is the level that is supposed to reward merit and consistency among professionals. This is a very contemporary issue on the Portuguese agenda, and a focus of public opinion, especially when it comes to the ageing problems of the teaching population and the sustainability of the educational system as a whole (DGEEC, 2023A; Guimarães & Barbosa, 2022).

In this dissertation, we explore these two aspects in a descriptive way and aim to grasp the patterns of mobility recorded linking them to the main events and policy changes that took place during the period. This was achieved by constructing a panel and selecting our effective sample. We included non-military and police higher education institutions, and career categories according to the statutes of the academic teaching profession (Decreto-Lei n.º 205/2009, 2009; Decreto-Lei n.º 207/2009, 2009). Moreover, we select the main affiliation of the professor, so that he only appears once a year in the database, and we can follow him over time, analysing the evolution of his rank and affiliation, for example. From the outset, we can expect our numbers to be different from those reported in official statistics, as we focus on different professors and not on occupied teaching positions (DGEEC, 2023A). This does not mean that either perspective is wrong, but just that the focus is different. Given this, and to support our study, in addition to analysing mobility flows, we also analyse the time trends that occurred during the period. Thus, we can assess, according to our assumptions, the general trends that have taken place, and how they may have affected the flows that follow.

Our study is organized in the following way: in section 2 we have a literature review. Section 3 describes the data used and section 4 entails the data analysis. Section 5 concludes.

2. Literature Review

2.1. The Latest Developments of the Teaching Class

In 2008, the teaching profession was significantly impacted by the Great Recession. Hence, in many cases, while teachers were relatively protected from unemployment since education provision is an essential good for society, their wages were an easy target for budgetary containment measures (Moored & Franck, 2013). In the USA, reductions in revenues in education were absorbed by increasing class size, reducing pay, and the frequency of instructional improvement initiatives, conducting layoffs (mostly amongst non-teaching staff) or closing schools (Moored & Franck, 2013). Although scrutinising these impacts is important for policymakers to address post-crisis challenges in the educational system, there is limited literature quantifying these effects for most countries. Moreover, descriptive evidence on this is scarce, as it often fails to encompass the necessary number of years to draw robust conclusions or to utilise the appropriate instruments.

In the case of Portugal, the comprehensive information we can find is mainly in the form of annual descriptive reports published by DGEEC (DGEEC, 2023A). From a higher education perspective, the focus of our analysis, the general trend verified for the education sector persists, but we can include other types of complications. Indeed, the changes in the statutes of the academic teaching career of 2009 brought a paradigm shift, with universities restricted to hiring candidates with a doctoral degree (Decreto-Lei n.º 205/2009, 2009). Consequently, many professors who only had a bachelor's or a master's degree were forced to pursue a doctorate, while those aspiring to enter the profession, had to delay their entry into the job market (Decreto-Lei n.º 205/2009, 2009). The individual decision-making process regarding integration into the teaching staff may have been affected by the direct and indirect price of obtaining a doctorate (fundamentally, money, time, and effort involved). Thus, data patterns can have different sources and an analysis that does not consider this can be overly simplistic.

As a consequence of the Great Recession (especially between 2010 and 2012 (FFMS, 2024)), there was a significant cut in resources and autonomy both in higher education and research sectors in Portugal (Rodrigues, 2015). On one hand, concerning higher education, the main implications were budgetary control rules set by the Ministry of Finance, and changes in the allocation of vacancies to higher education institutions, with the establishment of a direct link to the employability of courses (Rodrigues, 2015). On the other hand, the

research sector experienced a significant reduction in scholarships, for both doctoral and post-doctoral studies, cuts in the number of research centres supported by the multiannual financial programme and in the overall appropriations to support research projects (Rodrigues, 2015). These changes were accompanied by alterations in the rules and criteria for evaluating scholarships and research centres (Rodrigues, 2015). The combination of these factors with the increased requirements for entry into the teaching profession had implications for the hiring and promotion of professors, as it directly constrained the financial capacities of institutions, their freedom in hiring, and even the production of doctoral graduates (Rodrigues, 2015).

Indeed, it is impossible to dissociate academia from the research sector, because the process of completing a doctorate is an integral part of career progression (OECD, 2015). This is evident in the requirements for obtaining a doctorate, which demand original research, and a significant contribution to the area of study (OECD, 2015). Moreover, in many countries, a significant portion of doctorates tend to pursue academic or research professions, despite recent changes in the perceived purpose of doctoral degrees (Sarrico, 2022). Also, differences between disciplines should be considered, as some have higher demand outside of academia than others. An example of that are the differences between the job market for economists and mathematics that Freeman (1999) refers to, and Foster et al. (2023) mentioned, in their study about the career paths of economists inside and outside the academia. Certainly, career conditions are much better for economists (Freeman, 1999). Foster et al. (2023) note that, in the USA, just over half of the PhDs in economics begin their careers in academia, and that share is falling over time: it fell from 64% for 2001-05 graduates to 56% for 2014-17 graduates. One contributing factor was the increasing demand for economists in the public sector (Foster et al., 2023).

In Portugal, obtaining a PhD is mandatory for academics aspiring to pursue a tenure-track career at a university (Guimarães & Barbosa, 2022). A law (Decreto-Lei n.º 205/2009, 2009) approved in 2009 established a five-year transition period for academic staff to meet these requirements, and the universities had to promote the creation of conditions to support the process. Additionally, in polytechnics, a PhD was required for a professor to reach the top of the career (Decreto-Lei n.º 207/2009, 2009). Guimarães and Barbosa (2022) estimate

a total of 230 new assistant³ professors in research in the field of economics, between 2001 and 2009, with an abnormal influx of publications in the area, which is indicative of the importance of public policies linked to education. A large number of teaching assistants, therefore, found themselves needing to obtain a doctorate, and given that one of the requirements is scientific research, it naturally led to an increase in publications (Guimarães & Barbosa, 2022). The need to reform the statutes arose from the demands of the country's scientific development and the requirement to attract and train highly qualified human resources (Decreto-Lei n.º 205/2009, 2009). This reform aimed to align Portugal's recruitment, selection, and promotion criteria with international best practices, thus contributing to an improvement in its international competitiveness (Decreto-Lei n.º 205/2009, 2009). This was one of the most important changes in the period and will have implications for the study at hand.

The relative number of PhD graduates is growing consistently, with 0.8% individuals of 25–64 years old with a doctorate, in Portugal, a value still below the EU23 average of 1.093%, in 2018 (OECD, 2019). The most common explanations for this expansion are demands from the knowledge economy, economic growth and innovation (Sarrico, 2022). Nevertheless, Sarrico (2022) observes that the number of doctorates is growing faster than research activities, which probably means that the latter is not enough to provide research occupations for all PhDs produced. Indeed, the number of people entering doctoral programmes is expanding (and expected to keep growing) at a fast pace, in general (OECD, 2019), and cuts in financial resources might have affected them significantly (Rodrigues, 2015). New graduates are surpassing the demand for academics in higher education institutions, but the problems that Portugal and other European and North American countries are facing show otherwise (Sarrico, 2022). Thus, the efficiency in resource allocation, and the current organization of the higher education institutions, might be the real problems that need to be addressed. These countries are facing a situation where, while they have the necessary inputs to solve the complication, even in over-amount, they are not using them – after all, it is becoming more common to have professors with fixed-term contracts (Sarrico, 2022), and promotions are slow due to financial pressures (Guimarães & Barbosa, 2022). Hence, in a profession in which the average age is close to 50 years old

³ Note that we refer to the category of *professores auxiliares* and not *assistentes*. The latter are translated as “teaching assistants”.

(DGEEC, 2023A), the higher positions in the academic teaching hierarchy are naturally dominated by an ageing class of professors.

A recent study carried out on four cohorts of doctoral students who received grants from the FCT (Foundation for Science and Technology, or *Fundação para a Ciência e a Tecnologia*), in Portugal, between 1995 and 2012, revealed that the success rate in obtaining the doctorate is high and at the level of other EU countries and that the needed time to complete the course has been decreasing from the oldest to the most recent cohorts (Ramos & Ferreira, 2023). Moreover, in recent cohorts, there have been fewer scholarships carried out exclusively abroad (probable evidence of the greater maturity of the higher education system), and a growing number of foreign students and possible institutions of reception, which points to greater cooperation and attractiveness of the sector as a whole (Ramos & Ferreira, 2023). Particularly, there have been some disciplinary gender differences, with women having a higher weight in Social Sciences, Arts and Humanities (Ramos & Ferreira, 2023). The same study also tried to scrutinize the professional situation (career, category, sector and subsector of activity) of former scholarship holders at different times (5, 10, 15 and 20 years) after the doctorate (Ramos & Ferreira, 2023). Around 60% of the doctorates analysed were found to be involved in R&D activities, but the percentage decreased from the oldest to the most recent cohorts, which may indicate a difficulty in the retention of these individuals in academia and companies in R&D activities (Ramos & Ferreira, 2023). Former doctoral students with R&D activities are mainly in higher education, in line with what is seen for the total “pool” of doctorates, with Portugal as one of the OECD countries with the fewest researchers/doctorates outside this sector (Ramos & Ferreira, 2023). Overall, the authors suggest that more recent generations of academics may face greater career difficulties although some limitations in the study (recognized by the authors) such as the inability to differentiate contractual ties over time, prevent conclusive findings regarding job security/precariousness (Ramos & Ferreira, 2023).

Finally, to sum up, the last twenty years have brought about significant disruptions to higher education in Portugal. Financial instability (such as during the Great Recession) led to reductions in available financial and human resources as well as a loss of autonomy for institutions related to research and higher education (Rodrigues, 2015). Moreover, policies aimed at increasing the quality of teaching, such as Decreto-Lei n.º 205/2009 (2009) and Decreto-Lei n.º 207/2009 (2009), which linked the doctorate to progression in the teaching

career, have further complicated the situation. From the perspective of the teaching staff, tenure-track positions are only available at higher costs of time and capital, which, from a rational perspective, combined with relatively smaller benefits linked to slow career progression, leads to a lower labour supply (*ceteris paribus*). The combination of a slowdown in career progression together with increased entry requirements may have decreased the incentives to enter the teaching profession.

2.2. Academic Teaching Career Status

In the context of this dissertation, it is important to clarify how the academic teaching profession is organized in Portugal, in terms of career positions. Contractually, at the university, the profession is divided hierarchically (from highest to lowest position) between full (*professor catedrático*), associate (*professor associado*) and assistant professor (*professor auxiliar*) (Decreto-Lei n.º 448/79, 1979). In addition, we also have the teaching assistant (*assistente*), which was abolished as a career category in 2009 (Decreto-Lei n.º 205/2009, 2009). In the British system, this is the equivalent of teaching assistant or teaching associate positions, if we focus solely on their role in teaching.

According to the present law, professors in Portugal are selected through a public competition, allowing any qualified individual to compete for open positions (Decreto-Lei n.º 205/2009, 2009). This serves the purpose of trying to guarantee the highest possible quality of service, enabling a global job market for the profession, and creating pressures for human capital improvement, both nationally and internationally (Decreto-Lei n.º 205/2009, 2009). This competitive process is repeated during the professors' career progression (Decreto-Lei n.º 205/2009, 2009). In fact, one of the prerequisites for approval to move up the career ladder is competition (Decreto-Lei n.º 205/2009, 2009). The decision on which candidates to hire is based on an evaluation of the candidate's abilities and performance in the different aspects associated with the set of functions to be performed in the higher education institution, such as scientific performance, pedagogical capacity and performance in other relevant activities (Decreto-Lei n.º 205/2009, 2009). However, for full professors, international public competitions present challenges due to the requirement of the “aggregate title” (*agregação*) which is granted by Portuguese higher education institutions (Decreto-Lei n.º 205/2009, 2009). Naturally, candidates from other countries are at a disadvantage as they do not have such an easy time obtaining this title, owing to the bureaucracy involved. The

title was created with the aim of attesting, in a specific branch of knowledge, the quality of the curriculum, the research capacity and the aptitude to direct and carry out independent scientific work (Decreto-Lei n.º 239/2007, 2007). Furthermore, in the case of recruitment of full and associate professors, the participants must be holders of a doctorate for more than five years (Decreto-Lei n.º 205/2009, 2009).

Full professors and associate professors benefit from a reinforced status of employment stability, in general (Decreto-Lei n.º 205/2009, 2009). However, the law provides for a trial/temporary period of one year, if the contract is not preceded by a contract for an indefinite period as a professor in higher education or as a researcher in a career in scientific research (Decreto-Lei n.º 205/2009, 2009). This relationship can become permanent, in the form of a contract for an indefinite period, under normal circumstances, at the end of the period, if there is sufficient satisfaction with the performance of the professor/researcher (Decreto-Lei n.º 205/2009, 2009). The status of job stability occurs in the form of a guarantee of job maintenance, in the same category and career, even if in a different institution (as for the case of a reorganization of the higher education institution, in a practical illustration) (Decreto-Lei n.º 205/2009, 2009). Exemplifying all the aforementioned, associate professors with an indefinite tenure contract, once promoted to full professor, maintain their employment contract for an indefinite period under the same regime (Decreto-Lei n.º 205/2009, 2009). Assistant professors also have a similar hiring system but with a five-year trial period (Lei n.º 8/2010, 2010).

Universities have the possibility of having guest professors, who can fit into any of the categories mentioned, and are usually hired on a part-time, short-term basis (guest assistant professor is the most common category). Commonly, these professionals are individuals who excel in their respective areas due to their competence (Decreto-Lei n.º 448/79, 1979) and serve to fill a "void" within the university, left by retired professors, for example, and as a way of cost contention - after all, it is cheaper, simpler and more flexible, to have fixed-term contracts than to hold hiring competitions, since universities are not making long-term commitments. This reality seems favourable in the short term, as vacancies are being filled, but in the medium/long term can be unsustainable. Among other issues, the lack of practical experience can have a major impact on the quality of education (see Ballou and Podgursky (2002) for an evaluation of seniority effects on education, and Ronfeldt et al. (2013) in an investigation on teacher turnover on student achievement), and the very

maintenance of the university's culture can be compromised. In order to control the growth of this increasingly popular instrument in academia (Castellacci & Viñas-Bardolet, 2021), the law takes into account a maximum number of guest professors in each higher education institution (Decreto-Lei n.º 205/2009, 2009). Indeed, for example, full and associate professors must represent between 50% and 70% of the total professors, and there is a maximum value of 1/3 of each in the guest format (Decreto-Lei n.º 205/2009, 2009).

In terms of obligations, university professors perform several functions in addition to teaching, such as research and scientific dissemination activities, and supervising students in their doctoral and master's dissertations, for instance (Decreto-Lei n.º 205/2009, 2009). The law also establishes additional functions for professors according to their ranking (Decreto-Lei n.º 205/2009, 2009). For example, the full professor has the function of coordination of the pedagogical and scientific orientation of a discipline, group of subjects or department, or subject design, while the associate professors have, essentially, functions of support to full professors (Decreto-Lei n.º 205/2009, 2009). The assistant professor may do the same tasks as the associate professors, following five years of effective service as a university professor and the conditions of service which allow it (Decreto-Lei n.º 205/2009, 2009).

Working time in higher education institutions can be classified into full-time or part-time regimes (Decreto-Lei n.º 205/2009, 2009). A full-time regime is understood as one that corresponds to a working duration in line with the majority of workers with an employment contract in public functions, while a part-time regime refers to a lower total number of hours of service contractually fixed (Decreto-Lei n.º 205/2009, 2009). Also, there is an exclusive dedication regime that can be applied, which requires professionals to renounce the exercise of any paid function or activity, public or private, outside the scope of the higher education institution that hired the professional (Decreto-Lei n.º 205/2009, 2009).

As far as polytechnic institutions are concerned, there is a resemblance to the universities. We will only point out the main differences that might affect our study. Firstly, the profession division is different but follows the same standards. In the context of this dissertation, we decided to translate the different hierarchical positions of universities and polytechnics in the same way, considering their role and position within the higher education institutions. Thus, they are treated as equivalent. As in university education, the positions are: full professor (*professor coordinador principal*), associate professor (*professor coordinador*), and

assistant professor (*professor adjunto*) (Decreto-Lei n.º 185/81, 1981; Decreto-Lei n.º 207/2009, 2009). *Professor coordenador principal* has many similarities with *professor catedrático* from universities, given their role in the educational institution, and remuneration system (Decreto-Lei n.º 207/2009, 2009). Likewise, *professor coordenador* is similar to *professor associado* and *professor adjunto* to *professor auxiliar*. The category of *professor coordenador principal* was created by Decreto-Lei n.º 207/2009 (2009). Its access requires a doctorate, for more than five years, and the “aggregate title” (Decreto-Lei n.º 207/2009, 2009). Moreover, similarly to the universities, polytechnics also had an increase in requirements for entry into career positions in 2009 (Decreto-Lei n.º 207/2009, 2009). The doctorate or specialist title is now required as a requirement to enter the career, and in the same way as in universities, the category of teaching assistant (*assistente*) was abolished at the level of career positions (Decreto-Lei n.º 207/2009, 2009).

2.3. Mobility in the Academic Teaching Career

Mobility is a complex phenomenon which is not limited to a simple physical reallocation, but in fact, is accompanied by a range of social causes and consequences (Shmatko & Katchanov, 2016). Hence, mobility relates to changes in one’s position, geographical and social, consequently varying an individual’s social status or “value” (Shmatko & Katchanov, 2016). An ample example of this mechanism, from an economic perspective, excluding the social part, is the reallocation of resources, from resource-rich to resource-poor areas, through redistributive policies, or even international trade. Moreover, analysing mobility covers the individuals’ positional changes in the social hierarchy, and its ability to mobilize resources (Shmatko & Katchanov, 2016).

In particular, the study of mobility in higher education institutions concerns two main lines: studying the mobility of professors or students (see Altbach et al. (2015) and Rostovskaya et al. (2020) for a case of each, respectively). Within the scope of this dissertation, we will only explore the first case.

The academic mobility of the professors can be perceived in various ways as professors can move horizontally, between institutions, vertically, between hierarchical positions, or both, for instance. In the same way, we can think of the act of higher education institutions training their professors as “career immobility”, with the emergence of one-

university careers (Altbach et al., 2015). However, academic inbreeding is not always synonymous with a lack of mobility. The simple act of taking a PhD at one university, starting a career there, and eventually changing to another higher education institution, contradicts this hypothesis. Furthermore, the movement of the professors in the hierarchical chain has a clear link with academic career development, the process by which employees with teaching or research roles in a higher education institution, for example, manage various tasks and experiences within and across jobs and organizations over time, with implications for his work-related identity (Zacher et al., 2019).

The literature on academic teaching mobility tends to follow a line of study in which it focuses on a single point of academic mobility, such as academic inbreeding, or mobility inside the same higher education institution. In Russian Universities, with data collected in 2012, on the one side, high-level academic inbreeding is explained by cultural, infrastructural, and financial reasons (Sivak & Yudkevich, 2015). It is perceived that a student who has spent his academic career within an institution can more easily reproduce its culture in practice, in addition to the selection process being simpler and faster (Sivak & Yudkevich, 2015). Yan et al. (2020), on the other side, investigate the academic mobility of U.S. professors (only ORCID profiles updated from October 2016 onwards were included), revealing patterns of academic mobility from the aspects of institution types, locations, regions, funding mechanisms of institutions, and gender. The authors concluded that professors tended to move to institutions with higher research intensity, from rural to urban institutions, that female professors tend to move more within the same geographic region, and when they move to a more research-intensive institution, they are less likely to retain their rank or to attain a promotion (Yan et al., 2020).

In another research for the USA, it was found, additionally, that between 2003 and 2013, discriminating by country of origin does not bring significant differences in tenure-track positions in general, with the exception of administration positions where foreign-born were less likely to move (Kim et al., 2020). Foreigners, therefore, do not tend to be disadvantaged in the U.S. academia, when faced with tenure-track positions, which points to a greater importance of human capital in comparison to cultural characteristics, for example (Kim et al., 2020). Since only relatively objective issues were mentioned, it is also important to note that more subjective aspects are also relevant factors concerning mobility.

A study on faculty mobility in China concluded that Chinese faculty members' low level of satisfaction with the organizational environment is operative as the "push" factor, but often the local where one university is located works as the most critical cause for their mobility or stability (Yan et al., 2015). Thus, there is a psychological articulation between objective aspects, such as location, and subjective aspects, such as satisfaction, regarding decision-making on academic mobility (Yan et al., 2015).

As academic mobility can be explained in various ways, there is no single, universal answer for all countries, regions, or higher education institutions (Delicado, 2010). Some authors look at prestige as a means of university loyalty, both institutional and professional (Lewis, 1967). Therefore, if a professor acknowledges that he is at a top-tier higher education institution, and values this aspect, he will not have many reasons to change workplace. Individual observable characteristics such as gender can also be relevant (Abraham et al., 2019; Docquier & Rapoport, 2012). For example, in Germany, the willingness to move for interregional job offers, within a couple, is lower for women, which may come from inherent characteristics, since women tend to be more sentimental, or even responsible for taking care of their children, within a family group (Abraham et al., 2019). The latter can also lead to the withdrawal of women from the job market during their children's childhood and directly affect their mobility in the hierarchy of the teaching profession, due to the fact that men will have accumulated more time of service and work experience, *ceteris paribus*.

In the same way, we can think about an international PhD as an important asset to better enable mobility, obviously depending on where it was taken (normally, a PhD taken at the MIT will have an enormous impact on the curriculum of the professor, for example). An international PhD might even grow network possibilities and research productivity, and these effects can be even greater in countries in system transition towards the internationalization and digitalization of education (Morano-Foadi, 2005; Patrício et al., 2018). For instance, a professor with a PhD at a good USA university, *ceteris paribus*, might be at a better place in a competition for a tenure-track position. The number of international PhDs that we can find teaching at Portuguese universities serves as direct evidence of its importance: with data for 2021/2022, using the two examples of the *Universidade do Porto* and *Universidade Nova de Lisboa*, and not discriminating by faculty, the first has 18% international PhDs, and the second 22%, in total professors (DGEEC, 2023B). If we look at economics, the values go, respectively, to 44% and 86%, which is indicative of different characteristics

between courses or areas of study (DGEEC, 2023B). Hence, there are differences between fields of study which can be explained by the greater existence of international opportunities, the demand for international courses, due to their recognized quality, factors related to what an international network can bring to the educational institution, or even the number of opportunities outside academia, in the labour market.

Even though an international PhD might be positive for an academic career, it does not mean that all international experience brings success. In fact, internationally mobile and foreign scientists might struggle in universities that do not prevent inbreeding, and with little opportunity to teach in English (Seeber et al., 2023). Furthermore, the process of creating a larger international network may lead them to neglect the native networks, and thus harm their return. Regarding the PhD, additionally, Portugal has only consolidated its higher education system recently (Rodrigues, 2015). A portion of Portuguese professors, especially those with older degrees, had to move abroad to complete their doctorates out of necessity, as a result of the higher education institutions' lack of capacity to cope with demand, and this must be taken into account in this type of assessment so that we do not end up with biased conclusions (Rodrigues, 2015).

In the literature on Portugal, the focus of our dissertation, we can find work about academic inbreeding (e.g., Tavares et al. (2015) and Tavares et al. (2022)), but not much about mobility within the professional hierarchy, or between higher education institutions. We hypothesise that, perhaps, this is due to the fact that the publicly available administrative microdata on the population of higher education professors in Portugal has hardly been explored. Nevertheless, there are available reports about the teaching profession in higher education, such as DGEEC (2023A) or DGEEC (2023B). The biggest problems are the absence of a pattern analysis, or a large data span to draw more robust conclusions and implications as these reports are highly demonstrative. Although the dataset has a relatively extensive temporal profile (2001/2002 until 2022/2023), it does not tend to be used to its full potential.

The scientific work that is found about Portugal is mainly in a field of studies on European countries, or relative to internationalization in the education sector, with faculty-exchange programs among early career researchers. The first is based on research such as Morano-Foadi (2005) did: the author explored the relationship between competitiveness, excellence, and mobility in scientific research in the European Union, focusing on Austria,

Greece, Italy, Portugal, and the United Kingdom. The author concludes that European mobile scientists are often driven by necessity more than choice, and the longer they are away the more complicated it is to return (Morano-Foadi, 2005). Patrício et al. (2018) are an example of the second point, with an investigation of the effects of participation in a particular faculty exchange program. The researchers scrutinized the Carnegie Mellon University-Portugal Faculty Exchange Program, an international academic mobility program that aimed to change higher education in Portugal, and, through interviews, discovered that the complex transposition of individual experiences to the institutional level may be impeded by cultural resistance as well as resource and organizational constraints (Patrício et al., 2018). Beyond all this, what drives this international academic mobility might depend on several different observable characteristics, although researchers are often perceived as a rather homogenous group: gender, age, scientific discipline, career status, host country and time of migration play a relevant role in affecting relocation choices and attitudes (Delicado, 2010).

Regarding academic inbreeding, it refers to the recruitment of professors at the same institution that awarded their degree (DGEEC, 2023B; Horta et al., 2010). It does not need to be an intentional mechanism and can be simply based on the fact that the higher education institution itself recognizes the qualities of its best students, as it has privileged information on this subject. This is an important indicator since the majority of doctorates in tenure-track positions at public universities got their degree in the same institution they teach, in Portugal, with 68% in 2021/2022 (DGEEC, 2023B). Moreover, it is possible to measure academic mobility by comparing the institution of study, with the one where professors teach. Therefore, in the same academic year, higher hierarchical professional positions, younger ages, and locations such as Algarve, Alentejo and the Autonomous Region of Madeira tend to have more academic mobility (DGEEC, 2023B). Discriminating the areas of study, “Natural sciences, mathematics and statistics”, “Social sciences, journalism and information”, and “Information and communication technologies (ICTs)” are those with the lowest percentages of academic inbreeding, with a variation between 61% and 64% (DGEEC, 2023B).

This concept has been a topic of discussion, especially about its effects on research information exchange and scientific output (Horta, 2013; Horta et al., 2010). Indeed, the focus of the analysis on academic inbreeding usually is its effects on the research sector itself

(e.g., Karadag & Ciftci (2022), Sivak & Yudkevich (2015) and Tavares et al. (2019)), although it does not need to be always the case.

In an analysis of the effects of university system features on academic inbreeding, in France, Germany, Italy and Spain, it is revealed that career rules designed to guarantee quality may have unintended effects in terms of academic inbreeding (Seeber & Mampaey, 2022). National license procedures, while aiming to reduce the chances of low-quality hiring and institutional inbreeding, discourage candidates from other countries with burdensome bureaucratic requirements, and create relevant disadvantages relative to national ones, since there are disciplinary differences between countries, which result in further inbreeding (Seeber & Mampaey, 2022).

For Spain, despite recent reforms linked to the Bologna Process, a study describes that most professors are just reproducing the methodologies used in their departments due to a lack of external experience (Mora, 2015). It is found that the negative effect of academic inbreeding is more notorious at the institutional level, and is a phenomenon slowing down the competitiveness of Spanish universities in a globalized world, and its development in the knowledge economy (Mora, 2015). Besides, the association between academic inbreeding and “immobility” has been made clear in the literature (Altbach et al., 2015). As Altbach et al. (2015) refer, inbreeding can be caused by the absence of an efficient domestic academic labour market, housing anomalies that directly affect the possibilities (easily seen in the Portuguese scenario) and cultural values within the organizations (probably stronger in older universities, or with older professors) – all of this can lead to a single-university career (e.g., Sivak and Yudkevich (2015) note these aspects in Russia). Regardless, inbred do not get tenure with less scientific merits than their counterparts from other institutions, which points to the possibility that, at least initially, scientific productivity does not vary significantly between inbred and not inbred (Cruz-Castro & Sanz-Menéndez, 2010).

3. Data Description

3.1. Data Context

This study will be based on REBIDES (Biographical Register of Higher Education Teachers, or *Registo Biográfico de Docentes do Ensino Superior*), a publicly available statistical survey that is collected annually and whose completion is mandatory for all⁴ higher education institutions in Portugal (Decreto-Lei n.º 15/96, 1996). The dataset consists of microdata on the population of higher education teachers in the country, namely concerning their rank, type of contract, degree, and other variables (Decreto-Lei n.º 15/96, 1996). It also covers the academic years 2001/2002 through 2022/2023.

Effectively, the survey was created by law (Decreto-Lei n.º 15/96, 1996) as a response to the problems of a lack of control over the teaching profession in higher education, and it has survived to this day (with occasional changes). According to the law, at the end of the 1990s, there was a significant expansion of higher education, and thus a growth in teaching staff in the area, not always accompanied by the appropriate level of qualifications (Decreto-Lei n.º 15/96, 1996). Furthermore, there was a large increase in the forms of collaboration between professors from one institution in other institutions, beyond the limits considered acceptable, taking advantage of the more liberal state of regulation of the profession (Decreto-Lei n.º 15/96, 1996). However, there was no instrument to monitor this type of situation (Decreto-Lei n.º 15/96, 1996). Numerous people and organisations were aware of the situation, but there was no legal, public onus to show it directly. Thus, to increase transparency regarding the qualifications of professors and their collaborative relationships between institutions, the annual publication of the composition of the teaching staff of all higher education institutions was made compulsory (Decreto-Lei n.º 15/96, 1996). In essence, it was a way of controlling the profession based on the availability of information, which could be used to monitor both the activity of higher education institutions and the professors themselves. If there were unusual situations, such as a professor being affiliated with too many institutions simultaneously, this information would be publicly available, facilitating the implementation of corrective measures.

⁴ The survey contains information about all types of higher education teaching subsystems in Portugal, regardless of whether they are universities or polytechnics, public or private.

The survey has undergone some changes since its creation, with the most recent and significant occurring in 2019, dating to the creation of the Scientific and Teaching Employment Observatory (*Observatório do Emprego Científico e Docente*), and the official extinction of REBIDES (Decreto-Lei n.º 156/2019, 2019). Although it no longer exists with the REBIDES name, the new survey extends the information that was previously collected. Throughout this dissertation, we will continue to refer to the datasets REBIDES for the sake of simplicity.

On the one hand, the observatory was created mainly to continue the monitoring of academic employment and the promotion of a more effective connection between society and science, including as part of its focus the collection of data on human resources, institutions, scientific activity, projects, programmes and funding (Decreto-Lei n.º 156/2019, 2019). Hence, the datasets from 2019 onwards will encompass a larger number of individuals, as they include not only teaching employment but also scientific employment in general (Decreto-Lei n.º 156/2019, 2019). An example of the new layer of information is the fact that after 2019 we have access to data on researchers with FCT grants in the establishments, which would normally be outside the scope of REBIDES (Decreto-Lei n.º 156/2019, 2019). On the other hand, with the extinction of REBIDES and the creation of other instruments to replace it, it is expected that the data processing related to human resources and academic institutions will be facilitated, following international practices and European rules (Decreto-Lei n.º 156/2019, 2019). As such, nowadays, the survey occurs under two documents: IEESP (Public Higher Education Employment Survey or *Inquérito ao Emprego no Ensino Superior Público*) and IECDES (Survey of Scientific and Teaching Employment in Higher Education or *Inquérito ao Emprego Científico e Docente no Ensino Superior*) (DGEEC, 2024A). The first includes all public higher education establishments (except military and police ones), while the second assembles data from all private higher education establishments and military and police public higher education establishments (DGEEC, 2024A). The data is collected by the General-Directorate of Education and Science Statistics (*Direção-Geral de Estatísticas da Educação e Ciência*, or DGEEC) and General-Directorate of Higher Education (*Direção-Geral do Ensino Superior* or DGES) (DGEEC, 2024A).

The most significant change that occurred in the data was related to the collection criteria (DGEEC, 2024A). Until 2018, institutions reported the status of the individuals on the 31st of December (DGEEC, 2024A). However, from 2019 onwards, institutions were

required to report the status of all individuals using the calendar year as a reference (DGEEC, 2024A). Therefore, in reality, the dataset offers an accurate picture of the first half of the academic year until 2018, and in the last 4 years, the data refers to the calendar year (DGEEC, 2024A). If we are talking about career professors, this change is likely to have a negligible impact. The problem will be with non-career professors, such as guest professors or part-time professors. These will probably see their values inflated by short-term contracts, which may have been signed in the previous academic year, for example. Hence there will be a need for redoubled attention when drawing conclusions.

Table 1 shows the most important variables in our database, with information about their origin:

Table 1: Variables

Variable	Description	Academic Year		
		2001/2016	2016/2019	2019/2023
name	(Full) name of the professor	E		
teaching_subsystem**	Type of teaching subsystem	E		
establishment_code**	Higher education institution identifier code	E		
establishment**	Higher education institution name	E		
organic_unit_code**	Organic unit identifier code	E		
organic_unit	Organic unit name	E		
gen_categ**	Professional category	E		
prov_reg**	Service provision regime	E		
perc_part_reg**	Fraction of full-time equivalent	E		
guest**	Dummy = 1 if the professor is a guest	E	C/E*	C
contract_start_date	Contract start date	NE		E
class_hours**	Teaching hours	E		
degree**	Highest degree of the professor	E		
cnaef_area	CNAEF area the degree refers to	NE		E
id_rebides	Unique identifier code (general)	C		
service_years	Duration of the current contract	NE		C
genarea	CITE classification of the degree			C
nuts2	Organic unit location (NUTS II)			C

Notes: “E” means that the variable exists; “NE” indicates that the variable does not exist; “C” denotes that we have created the variable.

*In these years, public and private institutions had differences in the available information.

**We applied changes to the variable in relation to its original categories. See the code and treatment applied on GitHub for more information.

***For information on the other variables, see the VARS.xlsx file on <https://github.com/JulioHenrTeixeiraFEP/REBIDES>.

3.2. The Original Data

As for the data itself, it is important to emphasise from the outset that it requires substantial work before it can be used for analysis. This may be one reason why this rich database has been hardly used for research. The structure of the data has changed over the period. For example, while in the beginning we only had basic information, based on the institutions where the professor was working, rank, type of contract, and degree, in the latter years we have access to the ORCID author codes and the area of specialisation of the professor.

The data is also organised differently over time. Since the survey is carried out annually, it is published on the DGEEC website on an annual basis. Therefore, we have a different Excel file for each year. However, these files have different structures and inconsistent naming and codification. Even slight differences in the way the data is presented can pose challenges in the association of variables. Using as an illustration the variable that refers to the establishment, it has been labelled differently over the years as a result of changes in the names of some higher education institutions.

Problems also arose within the codification of variables. There were several differences between the way the same category was identified between different years, and even missing values or spelling errors in certain cases (problems with how the data was filled in). Considering only the first twelve years of the survey, the way the data about qualifications was completed was anything but consistent, for instance, as the diploma could be labelled in any language. On that note, the available information was another issue addressed. Certain years only had information about the highest degree held by the professor, while others had information about all their diplomas. Supposedly, this issue could be solved simply by selecting the highest degree in the years when there was more information than necessary. The problem was that it could be difficult to link the available information to a specific study cycle, at least in the way it was presented, and it seemed that it wasn't always completely up-to-date.

Turning to another variable, class hours were one of the most difficult pieces of data to treat. In some years, this variable has data for two semesters and in others only for one, in addition to the fact that it can refer to weekly, semestral or annual hours. All this means

that different years need to be treated differently, which, considering that the survey has 22 years available, can become a complicated task.

The last variable we are going to mention is that of professional categories. Indeed, they are described very differently throughout the period, and this complicates any attempt to use the data. On top of this, in the initial years of the survey we had access to a dummy that referred to the status of guest professor at the higher education institution, and from a certain point onwards, this information was integrated into the name of the professional category that the professor occupied, which created a greater variety of categories.

3.3. Data Processing

The challenges identified led to the need for complex data processing, in line with the objectives of this dissertation. Indeed, as well as preparing the data for our research, we have also aimed to make it so that any other researcher who is interested in exploring the data can do so easily. Thus, besides making the processing code publicly available, we have also documented the process. As part of this work, we hope to encourage other researchers to explore the microdata and enrich the literature on higher education in Portugal, whether in the form of a completely new study, or even one that improves on our work. Therefore, in this subchapter, we explain the main changes made to the original microdata.

To begin with, the first change was to the variable names. There were different names for each of the variables, and this had to be taken into account when assembling the panel. Fundamentally, the work was to find out what information corresponded between each of the years and to assemble them under a common name.

Within the variables, the treatment was somewhat more complex. As the aim was to build a panel so that we could analyse the professors over time, there was a need to standardise the names of all relevant categories. The problem is the number of categories that exist in each of the variables, and the difficulty that can arise in associating them into common groups.

Thus, we place the professor's highest degree in a format in which we only have the first (bachelor), second (master) and third cycles (doctorate) in their simplest form, placing everything else that is below, or that may have an ambiguous classification, as “Not Defined” (ND). For instance, if a professor appears with a post-doctorate, the highest degree is

considered the third cycle. Similarly, we also standardized the career categories and service provision regimes. As our study will focus on the career professional categories, the standardisation was carried out based on what was mentioned in point 2.2. of this dissertation, with equivalence between categories in different teaching subsystems.

Another two categorical variables that were treated and which deserve attention are those relating to the teaching subsystem and the establishment code. Focusing on the teaching subsystem, the way establishments are categorised has changed significantly over the 22 years of microdata. In the past, for example, *Universidade Católica* had its own classification. Therefore, to be able to evaluate the data by subsystem more consistently, we decided to standardise this classification on the current terminology. In some cases, this process was relatively simple, since the subsystem included a reference to public or private establishments, universities or polytechnics, in some manner. The biggest problem emerged in the early years when some establishments were classified as "Other Establishments". The adopted solution was to analyse one by one how the establishments were classified in 2005, the year in which the most ambiguous classifications disappeared, and to use that classification from 2001 to 2004.

Regarding the establishment codes, we must first explain that this was the variable chosen as the marker of horizontal mobility. Perhaps, the most correct and usual way of measuring mobility would be to use the organic units (faculties, e.g.), since we would be dealing with the unit of measurement at the lowest level concerning higher education. For that, we could use the codes of the different organic units, and thus avoid the constant changes in their names. However, given the multiple changes and reorganizations that occurred in the organic units throughout the period, this would be a difficult task in itself. Effectively, these changes would create a situation of "false positives", in which, as a result of a professor changing their organic unit code from year to year, it would be understood that they had changed their place of work, even if they had not. If we wanted to use these codes, we would need to standardise them, considering all changes that occurred during the period. Another essential point is the fact that some of the most important higher education institutions for the sector do not distinguish between different organic units with different codes (or names) in the dataset (for many years). This is the case of *Universidade de Aveiro* and *Universidade do Minho*, among others. Therefore, since measuring mobility between the few remaining institutions would be very limiting, we decided to use the establishment level.

The establishment codes, in addition to being relatively stable over time, compared to those of organic units, are easier to shape. They refer to the nucleus unit of the various organic units, being represented, for example, by *Universidade do Porto* as a whole, and not just by the *Faculdade de Economia* of *Universidade do Porto*. This indicator, although better, is not perfect either. There are establishments (codes) that disappear from the dataset for various reasons, such as integrations, dismantling, or even mergers, and if this is not considered, we are faced with “false positives” of mobility. So, since no one has ever done such a task in the literature, as far as we know, we decided, manually, to identify which establishments disappeared in the period (based on REBIDES), and research why. If they were annexed or integrated, we use the code of the new institution for the entire period.

To summarize the process: we use establishment codes as a basis for measuring mobility; codes can change for various reasons over time; we decided to carry out an independent investigation into this matter, based on the establishments (codes) that disappear from the dataset; if they have been integrated in some way, we use the general code that was formed for the entire period, so that there are no “false positives” of mobility. The result of our work is summarised in Table A1 in the annex.

As this was done manually, we may have inadvertently left some cases out. Nevertheless, we still believe that we have recognised the cases that would generate the greatest flows of professors. It should be noted that we decided to accommodate establishment code changes when they occur, giving equal treatment to all higher education institutions. Therefore, for example, the fact that the *Universidade Técnica de Lisboa* and the *Universidade de Lisboa* merged, creating a new code, led to the need for its correction. The change in the nursing institutions of Coimbra, Lisboa and Porto is another example, in which numerous institutions were integrated. The only case in which we decided not to follow this rule completely was at *Universidade Lusíada*. This higher education institution underwent several changes throughout the period. At a certain point, it started to have two distinct establishment codes: one for the units in the North (Porto and Famalicão), and another for those in Lisboa. In 2022, nonetheless, the institution started to have a single code for all its establishments. In this case, given the distance between the establishments, and that the change only occurred in the last year we are using, it was decided to keep the two different codes. Hence, we always regard the code changes, at their legal level (since they are published in *Diário da República*), except for this case. This means that some establishments that belong

to the same nucleus, but have different codes, continue to be considered different establishments. We believe this has no implications for our study in terms of its quality. After all, formally, by the codes, they are considered different establishments and if a professor moves between them, there is still mobility.

Outside the scope of the categorical variables, other variables were treated or created to complement our study or future studies. Starting with the variables that were reported directly in the survey, there are two whose transformation/creation must be explained: teaching hours and time of contract. On the one hand, concerning teaching hours, two processes had to be carried out so that the variable was ready to use. Firstly, we put the hours into a single unit of measurement, weekly working hours, so that we could compare different years, semesters and even professors. Secondly, with the hours in the same unit of measurement, we averaged the hours worked in different semesters for the (few) years in which we had this layer of information. In this way, we were left with a single, homogeneous variable of teaching hours that we could use in our study. On the other hand, since the microdata has started to include, in the last four years, a variable referring to the year in which the contract was signed, we decided to calculate the contract years up to the year in which that contract appears. Although the variable is relatively recent, it can still be quite useful, as it gives us a measure of seniority in the establishment.

Turning to the variables that we created independently as a complement to the microdata, there are three points which deserve attention. Firstly, in the last four years, we have had the availability of the CNAEF (*Classificação Nacional de Áreas de Educação e Formação* or National Classification of Education and Training Areas) area to which the professor's highest qualification is attributed. This allowed us to create a general classification for the professors' qualifications using CITE 2013 (*Classificação Internacional Tipo da Educação* or International Standard Classification of Education), available at the Statistics Portugal (*Instituto Nacional de Estatística*, or INE) website (INE, 2024A).

Furthermore, as the survey does not have information about the location of the higher education institutions, we crossed REBIDES with a new dataset, made available by DGEEC, the Network of Higher Education Establishments (*Rede de Estabelecimentos de Ensino Superior*), which has information about the district, municipality and address where Portuguese higher education institutions are located (DGEEC, 2024B). Along with this, we created a variable at the NUTS II level (using information from INE (2024B)). It should be

noted that this is only done for the last 4 years, as the dataset only contains information from the most recent institutions (DGEEC, 2024B). We also had to add external information, in some cases, about the location of some organic units that were not available (from their websites).

The data processing we had done until this point was enough to enable us to combine all the data in a single database and thus draw descriptive statistics at a sectional level. However, we intended to carry out a longitudinal analysis, and this is only possible if we can follow the professors over time. Normally this would be done using a unique identifier code for each professor. The problem is that this does not exist in these data. Or rather, it only exists for each specific year. The objective of the codes available in the datasets is not to link the individual across different years, but rather to connect different Excel spreadsheets in the same year. Having a spreadsheet that leaves us with the professor's contractual information, we can use the codes to link it to their degrees, for instance. This is useful, but it raises another question. The codes do not necessarily identify all observations of a single professor in a given year. This happens since, after a certain point, the data is produced separately between public and private institutions. Thus, if a professor works in two institutions, one public and the other private, he will appear, in these cases, with two different codes. The information filled in by each institution may also be different. One of them may fill out everything correctly and the other may have missing information, for example. Taking advantage of the hook, this means that, when some Portuguese institutions (DGEEC, e.g.) make statistics on the number of professors in higher education, these might not refer to different professors, but rather to the number of registered positions, which could include the same or different individuals. This implies that if a professor is working in five different organic units, this might not count as one professor, as would be expected, but rather as five. Depending on the type of information we're looking for, this could be sufficient or limiting. As a consequence, we can understand that the simple act of describing the academic situation in Portugal can greatly contribute to general scientific knowledge and provide valuable information to policymakers.

Therefore, it was necessary to create a unique identifier code for each individual. As the name suggests, unique identifier codes mean that different people will be identified differently and uniquely. The question is how to do it. This led us to take the pragmatic option of identifying individuals by their (full) name (depending, especially as sometimes

middle names were not written, e.g.), as documented in the dataset, and manually correcting any errors that may exist. The essential issue is that the individual's name may be misspelt in the database, or not be complete in some years, or even be different from year to year. Thus, we made more than two thousand and five hundred changes to the database that identified individuals by name, manually.

In our experience, as a general rule, women tend to gain or lose surnames when they get married or divorced, and men, when they have naming problems, these tend to involve misspelt or incomplete names. The fact that we did all this manually may have created imperfections, since we may have associated individuals who were not the same with the same code, or left some who were the same with different codes, especially because the data has numerous writing errors. We believe, however, that it is the best solution that was possible to adopt for two reasons: firstly, it is difficult to find two people with the same full name, normally, and even worse, in the same profession and sector (teaching profession in higher education). Everything is very specific and this should have increased our success rate; secondly, we corrected some cases manually and carried out robustness tests, while also imposing a condition on our code based on the professor's degree. Indeed, if the same individual has a lower degree in one year than in the previous year, he will be assigned a different code. As there may be cases of poor filling, we added the condition that if the establishment is the same for different years and degrees, the code remains. This means that the code will only change if the same name appears in different institutions with different degrees. To test the robustness of this condition, we did a manual check and realised that this strategy tends to work satisfactorily, as errors tend to be occasional.

3.4. Effective Sample

After carrying out all the data processing, we restricted the sample to use in our study. Thus, we removed military and police institutions from our sample and kept only career professors, and part-time professors or other similar schemes, who occupy the same professional categories (non-career professors). The former can be explained by the inherent specificities of these types of institutions, namely their different professional categories. The latter can be justified by the focus of our study on issues related to career mobility, and the possibility of analysing patterns between career and non-career, for instance. We consider career professors to be those who have a full-time contract (which may or not be exclusive)

and are not guest professors. The remaining professors are part of what we call the non-career group.

An essential point is the fact that to study professor flows, we need them to appear only once a year in the dataset. An individual can work at different institutions and even at different organic units in the same institution. Thus, it is necessary to select its main affiliation. In this way, we decided to adopt a set of six main conditions: first, we put the type of service provision regime, in which we prioritize exclusive contracts, and at the same time give less importance to the title of guest professor. Hence, if a professor is in a high category but is a guest on a part-time basis, this will not be chosen over an exclusive contract in a lower position. This criterion will prioritize the time dedicated to the institution and contractual exclusivity; the second and the third criteria are similar and serve to reinforce the first. The second has to do with teaching hours and the third with the part-time percentage. This will, above all, choose between similar contracts that a professor may have, selecting those that require the most teaching and dedicated hours; the fourth criterion has to do with the profession's hierarchy. We included in the dataset an equivalence between university and polytechnic positions, respecting the statutes of the teaching profession, and thus, with the criterion, it is possible to choose the most important contractual links at the career level, without discriminating against any type of teaching subsystem; the fifth criterion is only applicable to the last four years of the time interval, but is necessary due to the format in which the data is presented. This is based on the choice of the oldest contract signed by the professor which is recorded for the year. Given that at the moment we only have cases in which the professor has the same type of contract and position in the same institution (two contracts signed in the same year), or in different institutions, we prioritize the oldest one, which corresponds, as the name suggests, to the establishment to which the professor has been linked for the longest time. For example, if a professor has been linked to a university for decades, it is unlikely that this is not his main affiliation. This logic has its advantages, because it is dynamic, considering the length of time a professor has been employed at an establishment, but it has its disadvantages, especially when we think that the new contract may indicate mobility. In any case, as this criterion is applied next to others that guarantee that the professor's position and the service provision regime, in addition to the teaching time, must be the same, we believe that it is a satisfactory way of choice of the professor's main affiliation. For the remaining years, this information does not exist, so we cannot apply this criterion; at this point, there are very few professors left who repeat the same year. Even

so, we decided to apply one last criterion which, although it may be more controversial, didn't have a major impact on the data. We chose between types of higher education institutions, placing university institutions at the top of the hierarchy, and within institutions, the public ones. The underlying logic is linked to the perceived greater (relative) prestige of most universities and, within higher education institutions, the public ones, as a general rule; finally, as there were a few cases of repeated professors in the same year, we decided to manually try to understand which they were. We found that, for the most part, these were cases in which a professor was at only one higher education institution until a certain year when he became registered at two, the first and a new one, and, in the year immediately afterwards, began to appear only at the new one. The solution we decided to adopt was to ignore all but the first institution that appeared in these cases, in the year of repetition. Although it may seem like an arbitrary criterion, it does not significantly affect the study of mobility, especially since the years in which this happened were very scattered, and the cases were also very specific (they were less than four hundred cases).

Applying the selection criteria, we were presented with what is shown in Table 2:

Table 2: Effective Sample Descriptive Statistics

Data Structure		
Initial Year	2001/2002	
Final Year	2022/2023	
No. Years	22	
No. Observations	687,674	
No. Professors	81,231	
No. Higher Education Institutions*	143	
Professors Structure		
Teaching Subsystem	Public Universities	45.83%
	Public Polytechnics	30.05%
	Private Universities	15.87%
	Private Polytechnics	8.25%
Professional Category (Career)	Full	6.79%
	Associate	17.80%
	Assistant	55.09%
	Teaching Assistant	20.32%
Service Provision Regime	Full-Time	63.40%
	Part-Time and Others	36.60%
Career Professors	58.71%	
Fraction of Full-Time Equivalent**	36.60% (18.91***)	

*Using the corrected establishment codes

**For part-time professors

***Standard deviation

Effectively, we have 687,674 observations of professors over the 22 years of data, with 81,231 being different professors. Furthermore, we have 143 different higher education institutions, after correcting the codes according to Table A1 in the annex. Most professors are employed in public universities, accounting for almost 50% of the total. The most occupied professional category is assistant professor, and the least occupied is full professor. Of all these professors, only 58.71% are career professors. This division is further explored in the practical section.

Finally, it's important to explain what the fraction of full-time equivalent is. The variable shows the proportion that a professor works concerning a standard full-time professor. This concept is used mainly with part-timers and serves as the basis for calculating their pay. Thus, in our data, the average working time of a part-time professor is about a third of a standard full-time one.

4. Data Analysis

The data analysis of this dissertation is divided into two parts: the first looks into the time trends of the academic teaching profession, and the second analyses the flows over time, with a focus on mobility. The two are carried out using our effective sample.

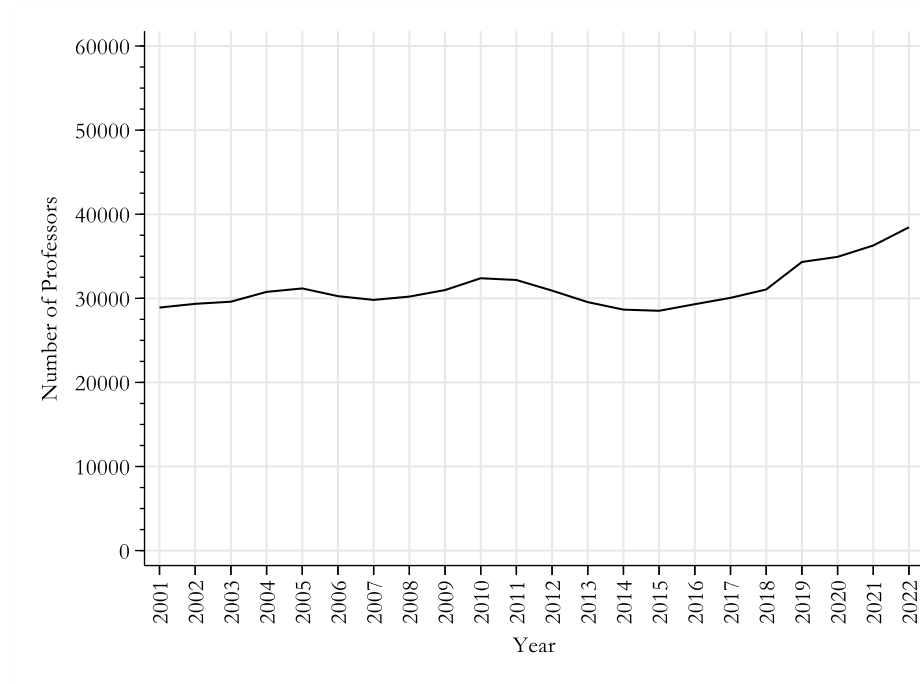
4.1. Time Trends

This sub-chapter reviews the state of the academic teaching profession in Portugal by analysing the time trends that have occurred over the 22 years of data. We begin with a general analysis of the evolution of the number of professors, and move on to a particular one, in which we evaluate mainly shares.

Figure 1 is our starting point. As we can see, the total number of professors has remained relatively stable over time, fluctuating around 30,000 professors, and rose considerably in 2019. However, we should be careful when making interpretations from the graph since, as we mentioned earlier, the data collection criteria have changed since 2019. Between 2001 and 2018, the data referred to the first semester of the academic year (reported as of 31 December), but from 2019 onwards, it relates to the calendar year, counting two semesters. If we're referring only to career professors, this probably won't significantly affect the results, as these professors will tend to appear for many years in the dataset. The problem is the short-term contracts of non-career professors, where we count the part-time professors. Contracts of six months or a year, for instance, can inflate the number of this type of professors. Despite this, we can analyse the period from 2019 to 2022 separately and understand that the trend has been towards an increase in the number of professors.

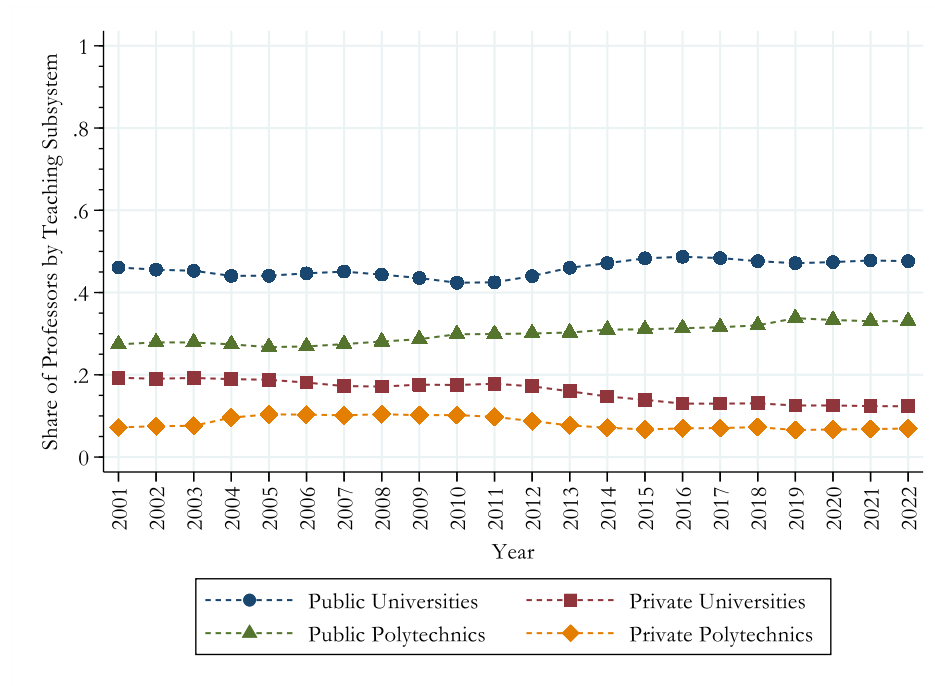
Moreover, if we compare our numbers with the official statistics, we realise that there are some differences, with our numbers being lower for the majority of the years. These persist even taking into account the selection of categories and teaching subsystems that we have made. This can be explained by the fact that we only count different professors. Therefore, if a professor works at a university in two organisational units, we only count that professor once, in their main affiliation. The common practice in official statistics is to count occupied teaching positions, so we hope that, in this sense, our analysis can enrich the existing literature on the profession.

Figure 1: Evolution of the Number of Professors over Time



From this perspective, we can also explore the division of professors between teaching subsystems. Figure 2 shows us that public institutions concentrate the largest share of professors and that this has increased slightly over time. This was backed up by a decline in the relative importance of private universities, especially since 2012. As expected, due to the relative size of their institutions, public universities had around 50% of the entire academic teaching population for most of the period.

Figure 2: Evolution of the Share of Professors by Teaching Subsystem

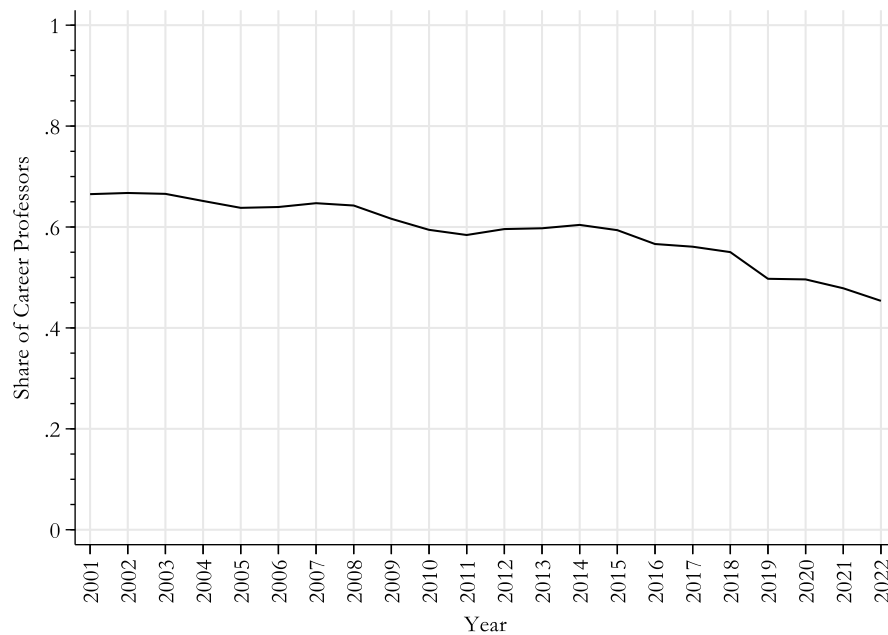


An important aspect of our study is the difference between career and non-career professors. In fact, in the ordinary sense of the expression, if we're dealing with career progression, the focus will be on career professors. Nevertheless, competitions for career positions are open, so anyone can apply for them, given certain minimum requirements. This makes it interesting to consider non-career professors as a separate classification, so that we can analyse whether a professor has always been a non-career professor and has decided to stay that way, or whether they have decided to move into career positions, or even whether a career professor has decided to make the teaching profession a secondary profession and join a company, for instance. The flows between categories will be explored in the next sub-chapter. In the meantime, it is relevant to understand how the number/share of career and non-career professors evolved over the period.

Figure 3 shows the evolution of the share of career professors in the total. The share has been decreasing over time, falling from above 65% in 2001 to below 60% in 2018. As mentioned, we can't make a direct comparison of this period with 2019 to 2022, but we can see that the share continues to fall. This drop can be divided into two distinct stages: one after the 2008 crisis, and the other from 2014 onwards. The first is self-explanatory, but the second may raise some questions. Our hypothesis has to do with the effects of the 2009

reform of the statutes of the academic teaching profession. Effectively, and taking the case of universities, which comprise the majority of professors, and which had the most restrictive changes, it brought in a 5-year limit for professors to finish their doctorates in order to maintain their career positions. Thus, if this time limit was not respected and the professor was still teaching, he would no longer be considered a career professor. Furthermore, the post-crisis budget cuts may themselves have led to this decline because, after all, part-time work is cheaper and more flexible, as it doesn't require long-term commitments, and offers the opportunity for institutions to hire only for the specific hours they need to fill. The increased hiring of non-career professors may have been a way of absorbing the budget cuts.

Figure 3: Evolution of the Share of Career Professors in the Total



From this perspective, in which we distinguished between career and non-career professors, it is interesting to understand whether there really was an over-increase in the number of professors in 2019 as a result of the short-term contracts of non-career professors, and what was the behaviour, in absolute terms, of career professors from then on. Analysing the data directly, we were able to confirm our hypothesis and realise that the number of career professors even decreased from 2018 to 2019, very slightly, and then increased, also very slowly, until 2022. On the other hand, the number of non-career

professors increased significantly, thus supporting the increase in the total number of professors.

As the proportion of career professors has been decreasing, the proportion of non-career professors has increased. In this sense, since part-time professors make up a considerable proportion of non-career professors, it may be relevant to understand how the hours worked by this type of professor have evolved, given that more part-time professors may have been hired, working fewer hours, for instance. Figure 4 shows the evolution of the number of part-time professors, according to how many hours they work in relation to the standard full-time professor. To put it simply, if the standard full-time professor corresponds to 1, and we have part-time professors who work a fifth of that, we need to add 5 to get the equivalence of a standard full-time professor. In essence, the values in the graph are obtained by adding up the percentages of the part-time professors and dividing by 100.

From Figure 4, we conclude that the number of full-time equivalent professors, counting only part-timers, has been increasing steadily over time. The only notable drop occurred between 2011 and 2015, which we can attribute to the budget cuts in higher education due to the financial crisis. Again, the period from 2019 to 2022 cannot be compared with the one before it, but we can see a similar growth trend underway.

In light of the trends that have been observed so far, it is important to discern whether those were distinct between different types of institutions and/or professional categories. Figure 5 shows the evolution of the share of career professors within each teaching subsystem. Indeed, we can see that it has decreased over time, especially in public institutions, with the trend beginning in 2008. We can attribute this to both the economic crisis and the change in the teaching profession's statutes. On the one hand, institutions have seen a decrease in funding, and on the other, an increase in the difficulties of hiring for career positions, and the two factors may have interacted with each other and led to a more marked decrease. If we recognise the differences in the information available from 2019 onwards, we can also deduce that the share of career professors at private institutions should probably have increased considerably under normal conditions, given the significant drop in the share at private universities between 2018 and 2019.

Figure 4: Evolution of the Number of Full-Time Equivalent Professors (Part-Timers)

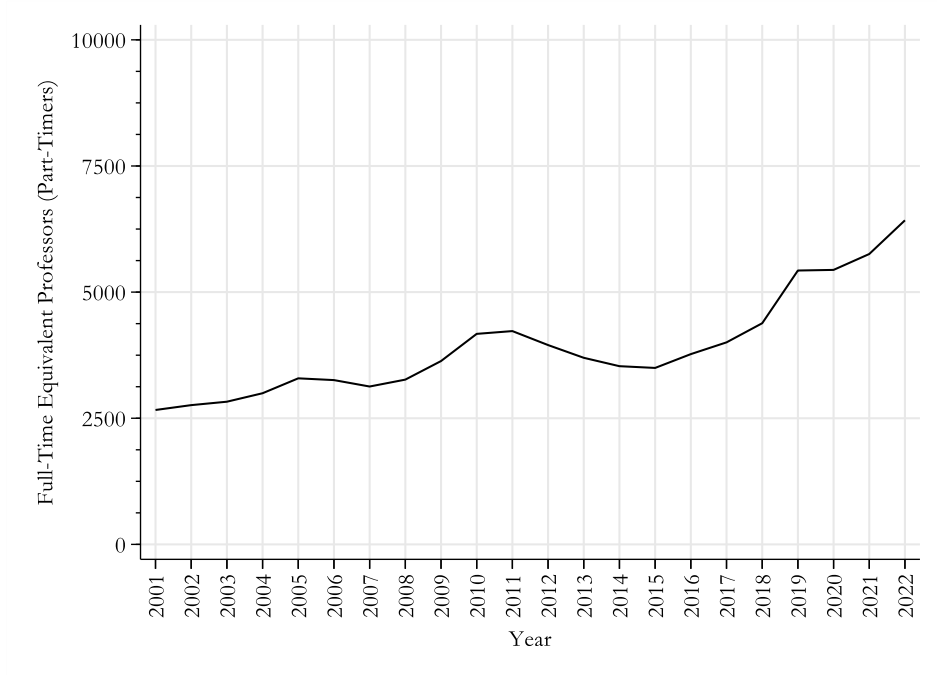
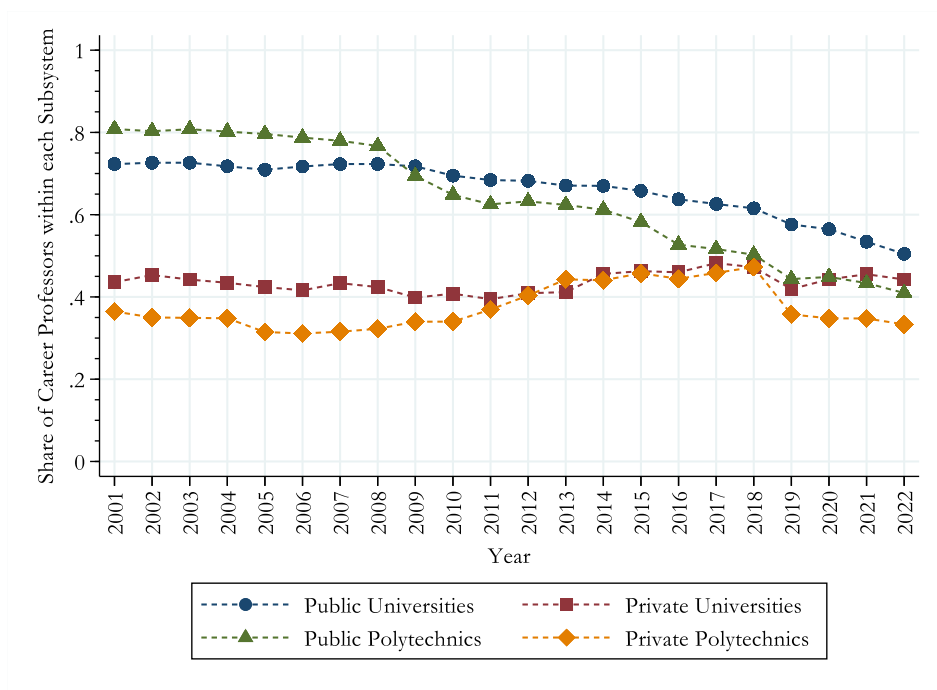
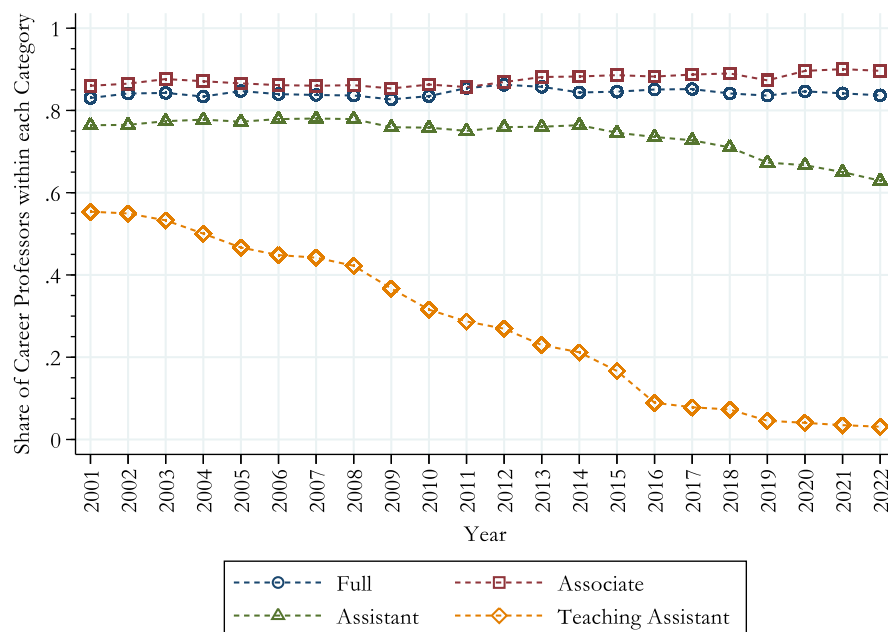


Figure 5: Evolution of the Share of Career Professors within each Teaching Subsystem



Moving on to analyse the number of career professors in each of the professional categories, Figure 6 shows us that the share of career professors in the positions at the top of the hierarchy is high, even higher in relative terms for associate professors than for full professors (but always in very similar percentages, close to 85%). On the other hand, the share of career professors at the rank of assistant professor has been falling, from close to 80% in 2001 to around 70% in 2018. Although 2019 did bring about a drop in the percentages, the trend is downwards even from then on. This is reasonable if we realise that the majority of part-time professors in the career categories are concentrated in this position, and that the number of non-career professors has been increasing. Finally, career teaching assistants saw their numbers drop significantly over the period. This movement is normal considering that the category was abolished by the 2009 statutes, which meant that professors at universities had a deadline for obtaining a doctorate in order to move up the career ladder, and at polytechnics there could no longer be any hiring of this type (Decreto-Lei n.º 205/2009, 2009; Decreto-Lei n.º 207/2009, 2009). Surprisingly, however, their share had already been falling before that, but not as sharply.

Figure 6: Evolution of the Share of Career Professors within each Professional Category



To conclude this sub-chapter, we decided to analyse how the total number of career professors is distributed by professional category, discriminating by teaching subsystem. The aim is to understand, fundamentally, if the share of each of the career positions has different

importance for the total number of career professors, and if the distribution differs according to the type of establishment. Figure 7 illustrates this in the context of public universities. Indeed, we can notice that the share of the top two positions in the hierarchy is very low, compared to the total number of career professors, and has also been relatively constant. It is worth mentioning, however, the increase in the share of career associate professors from 2020 onwards. On the other hand, the evolution of the positions at the bottom of the hierarchy has been much more dynamic, with a completely opposite movement between teaching assistants and assistant professors. Thus, we can say that the decrease in the number of career teaching assistants throughout the period was supported by the increase in the relative number of assistant professors. In line with what was decreed by law in the statutes, the number of teaching assistants dropped steadily towards zero, while the relative weight of career assistant professors remained above 60%. The movement is normal both because the basis of the hierarchy has changed from teaching assistant to assistant professor, and due to the fact that career teaching assistants, as they fulfilled the minimum requirements for entry into the teaching career, moved directly to the position of career assistant professor, in universities, following changes to the statutes in 2009 (Decreto-Lei n.º 205/2009, 2009).

Rather surprisingly, most of the drop in the share of career professors in the teaching assistant position in the total number of career professors occurred before the change in statutes. We suspect that this happened mainly because the progression from teaching assistant to assistant professor was greater than the new hires of teaching assistants, which leads us to believe that the flows between hierarchical positions used to be much smoother. This will be explored in more depth in the next subchapter.

On the private university side, and in comparison with the public universities, the general evolution was very similar, with the difference that the initial share of assistant professors compared to total career professors was quite small (Figure 8). This means that the rise of career assistant professors was much stronger relatively. Initially, more than 60% of the career professors were teaching assistants, and these institutions have been reshaped over time. The impact of the change in statutes is consequently much more pronounced in private universities, with the greatest acceleration in the share of assistant professors occurring from 2009 onwards.

Figure 7: Evolution of the Share of Career Professors by Professional Category, Public Universities

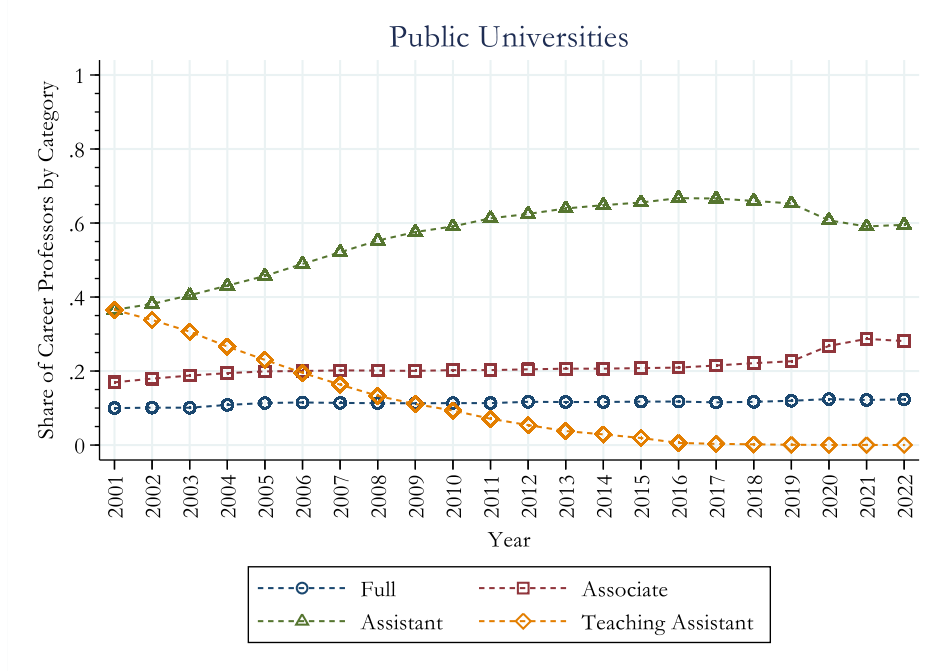


Figure 8: Evolution of the Share of Career Professors by Professional Category, Private Universities

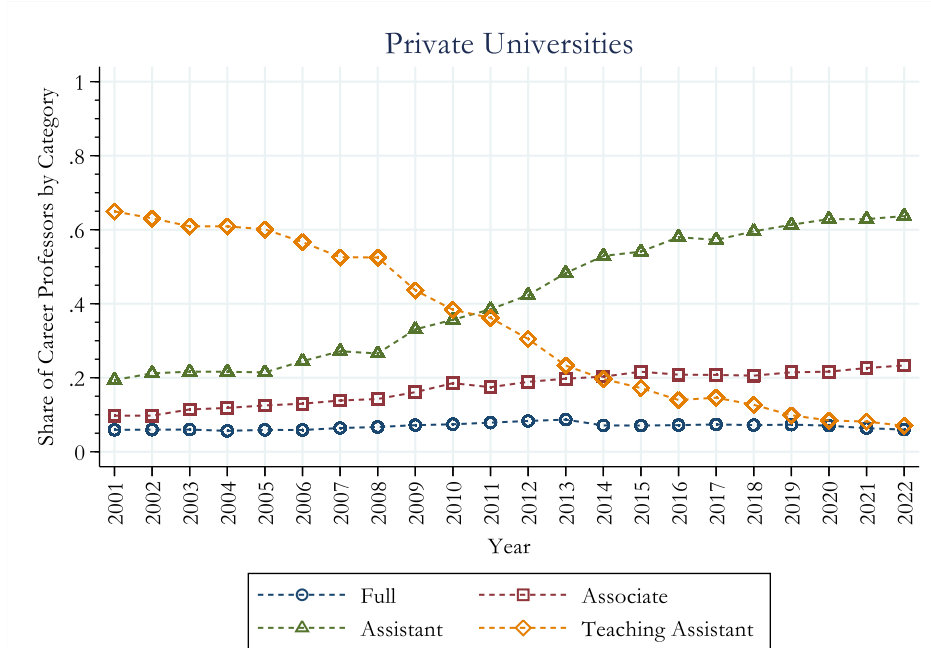
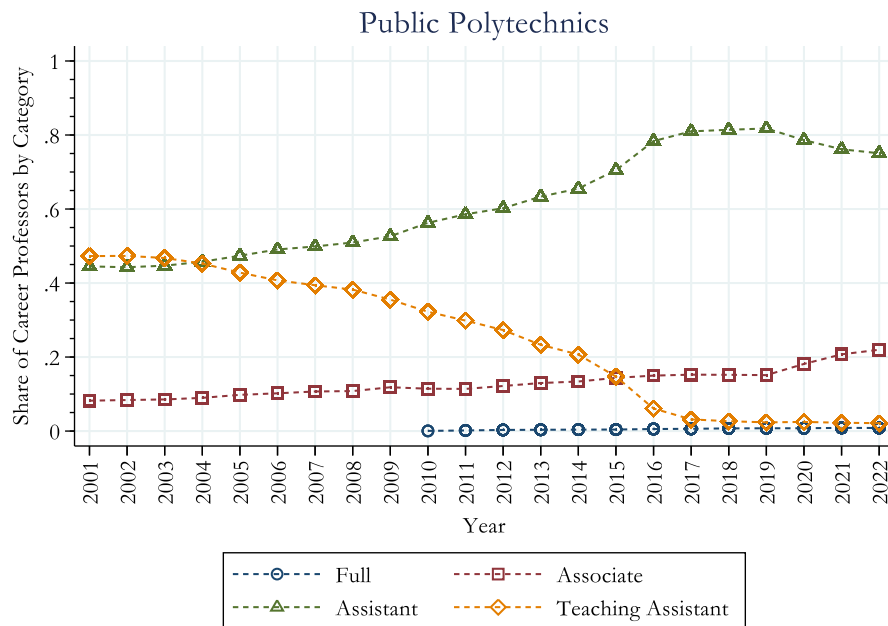


Figure 9 shows the same evolution but for public polytechnics. We can notice very similar trends to the public universities, especially at the bottom of the hierarchy. Nevertheless, we should emphasise some differences in the two positions at the top of the hierarchy. On the one hand, the position of full professor was only created as a career position for polytechnics when the statutes were changed in 2009, and this explains the very low numbers of professors in these positions in the first few years after the law was launched. If we look at the low figures at the end of the period, however, the argument doesn't work so well, which leads us to believe that there may be a lack of resources and motivation to realise this type of progression. On the other hand, the associate professor position has seen its relative importance increase fairly consistently over time, meaning that progression might be taking place, but mainly towards the second highest position, rather than the top of the hierarchy. The biggest jump in the share of associate professors occurs at the same time as public universities, and therefore their source will probably be the same.

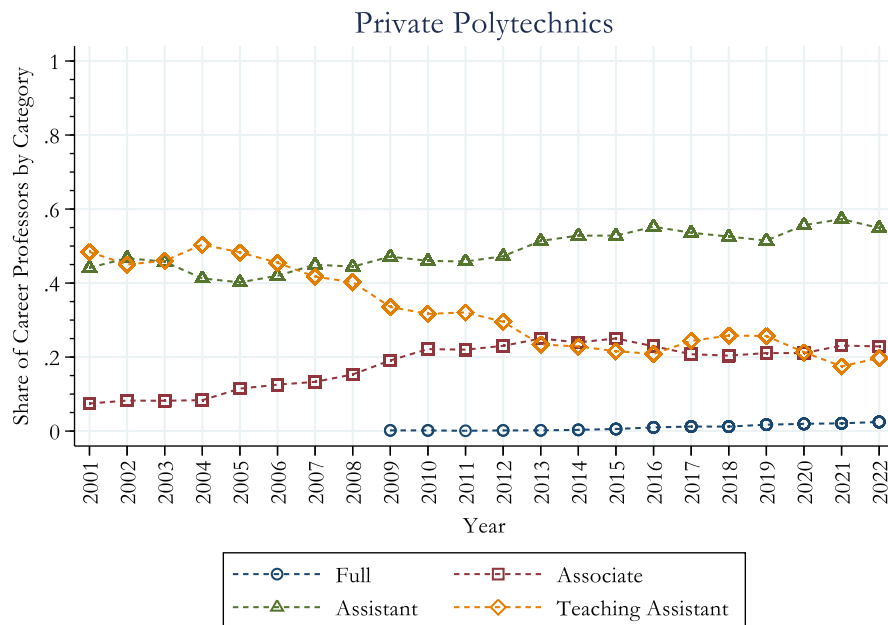
Finally, we have Figure 10, which refers to private polytechnics. In this case, the share of career assistant professors has always been very high and has increased only slightly over the period. Meanwhile, this is the type of subsystem in which career teaching assistants persist the most, which may explain why the share of career assistant professors hasn't increased much. In fact, in polytechnics, the transition regime for teaching assistants was different. While in universities conversion was compulsory, with a fixed deadline for obtaining a doctorate, in polytechnics, there was more flexibility in this regard, due to the valuing of other qualities of the academic teaching staff, such as professional experience and a specialist degree (Decreto-Lei n.º 207/2009, 2009). Thus, although polytechnics were prevented from hiring new teaching assistants, those who had been hired before 2009 were not forced to convert to the new categories.

Figure 9: Evolution of the Share of Career Professors by Professional Category, Public Polytechnics



Note: The full professor line only exists from the moment the category was officially created as a career category in polytechnics. There are residual records of professors in this category before 2009, but they are not included.

Figure 10: Evolution of the Share of Career Professors by Professional Category, Private Polytechnics



Note: The full professor line only exists from the moment the category was officially created as a career category in polytechnics. There are residual records of professors in this category before 2009, but they are not included.

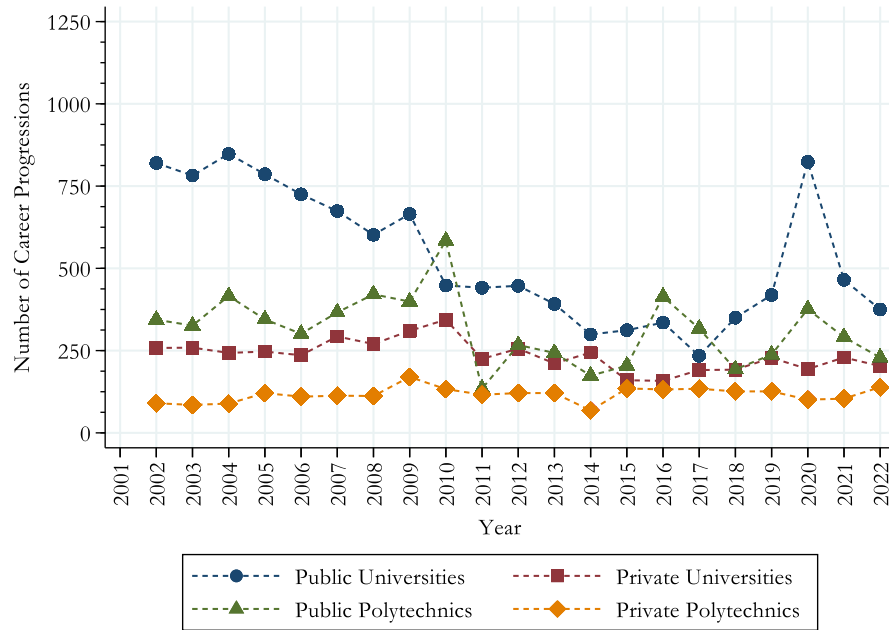
4.2. Flow Analysis

As we move on to the last sub-chapter of our empirical section, we are now faced with a flow analysis. In essence, we are going to compare the professor's position at two different points in time, and try to draw some patterns and link them to events that have occurred during the 22 years of the database.

Starting with an overall year-by-year analysis, Figure 11 shows the evolution of the total number of career progressions by teaching subsystem. To capture as much information as possible, we consider moves from non-career to career as a type of vertical progression. Thus, we end up considering four career positions (teaching assistant, assistant professor, associate professor and full professor), and one extra non-career position. We regard career progression to be movements along the hierarchy, from teaching assistant up to full professor (progressing to assistant professor and then associate professor), taking into account changes from non-career to career. The basis for identifying horizontal mobility is the position the individual occupies in a year in relation to the previous one.

Analysing the graph, we realize that career progression fell sharply from 2002 to 2017 in public universities. This was already the case before the Great Recession, and after 2009 there seems to have been a moment of stabilisation in the number of progressions at low levels, although still on a downward trend. From 2017 onwards we can see a brief improvement in progression, especially in 2020. This is explained by the increase in funds and agreements that existed to carry out internal competitions within the institutions (Decreto-Lei n° 84/2019, 2019). If we look at the official data, for instance, we can see that the number of associate professors grew considerably. Nevertheless, soon afterwards, we can realise what appears to be a tendency for the number of annual progressions to return to their low trend values. In this sense, it seems that the policy measure had a very strong immediate effect, but no lasting effects. Polytechnic institutes and private universities, on the other hand, have experienced much more stable flows, although it should be mentioned that some of the trends seen in public universities are also found, to a much lesser extent, in public polytechnics.

Figure 11: Evolution of the Total Number of Career Progressions by Teaching Subsystem

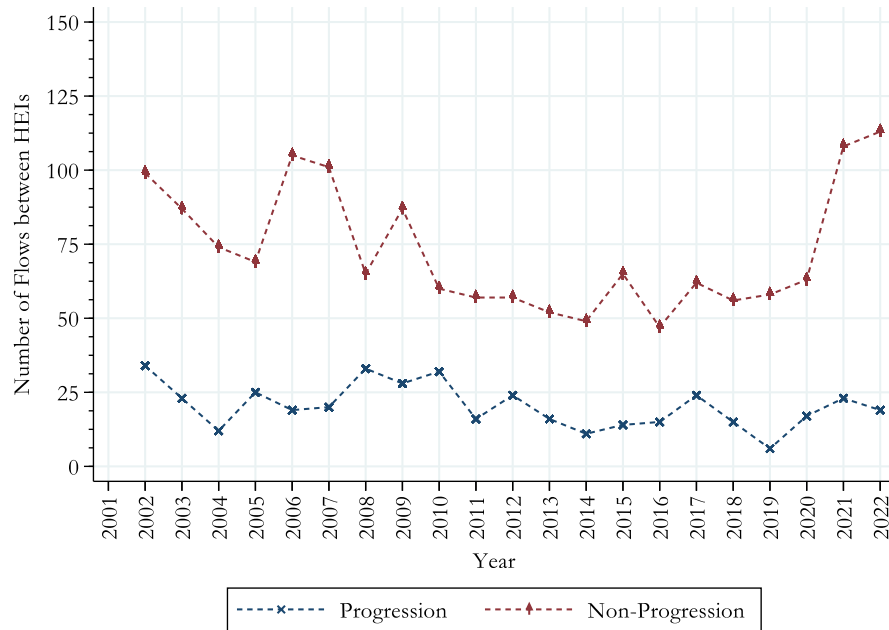


In contrast, Figure 12 explores horizontal mobility, showing whether or not it is linked to career progression. The biggest difference from the previous figure is that it doesn't include non-career professors. Therefore, the focus is on moves between institutions by career professors. Effectively, we can detect that mobility between higher education institutions (HEIs) is higher for moves that don't require career progression, in all the years in the database. This means that when a professor changes teaching institutions in Portuguese academia, they tend to maintain their position in the hierarchy, rather than moving in order to progress. Another interesting fact is that, while the number of changes of institution that imply progression is relatively stable over time, the number that don't imply changes has tended to vary more. Between 2002 and 2009, it had peaks and declines, and since the crisis, it has remained fairly stable at lower values, probably as a result of the lower funds available for hiring. In 2021 and 2022, on the other hand, flows between institutions that do not involve progression increased significantly, a possible effect of recent measures aimed at increasing investment in higher education and science.

If we consider that the change in the statutes of the academic teaching profession took into account a measure aimed at changing the way public competitions worked, forcing the jury to be mostly external to the institution, it would be expected that the number of changes of establishment involving progression would have increased (Decreto-Lei n.º

205/2009, 2009; Decreto-Lei n.º 207/2009, 2009). As we mentioned, however, their numbers remain very low and stable throughout the period, which may, in a way, mean that the measure hasn't had the intended results.

Figure 12: Evolution of the Total Number of Career Flows between HEIs



Note: Cases of career decline are not considered, as they are residual.

A limitation of the data presented is that it does not give an idea of the proportion of internal or external progressions. In other words, it doesn't reveal which of the total progression flows in an institution occurred through internal progression, for instance. This is particularly important if we consider that the number of progressions has generally decreased over the years, and the shares may therefore have changed. Figures 13, 14 and 15 provide an answer to this type of question, focusing on career progression between different hierarchical positions.

Analysing figures 13 and 14, they represent the share of progressions from assistant professor to associate professor that do not require a change of institution, compared to the total. We can discern that, especially in public institutions, the share of internal progression is very high and relatively stable, while in private institutions it tends to be lower and more variable (but still in high values). Looking at some of the most important events, we were unable to verify any significant effects of the 2009 change in the statutes on the composition

of the competition jury. The exception could be the private polytechnics, but since the trend was already towards an increase in progression through external recruitment before the change in the law, and that there are many peaks in their share, we can't draw any precise conclusions.

Figure 15 goes beyond the previous two and shows the progression from associate professor to full professor, the top of the career hierarchy. We only considered universities, since the numbers at the top of the hierarchy in polytechnics are very low and not quite representative. If we look at the data, we can see that private universities, again, tend to have a smaller share of internal progression flows. Meanwhile, internal progression at public universities tends to be very high, concerning total progression. Once more, it seems that the 2009 alteration to the statutes did not have its desired effects.

Figure 13: Evolution of the Share of Internal Career Flows, Universities (Assistant – Associate)

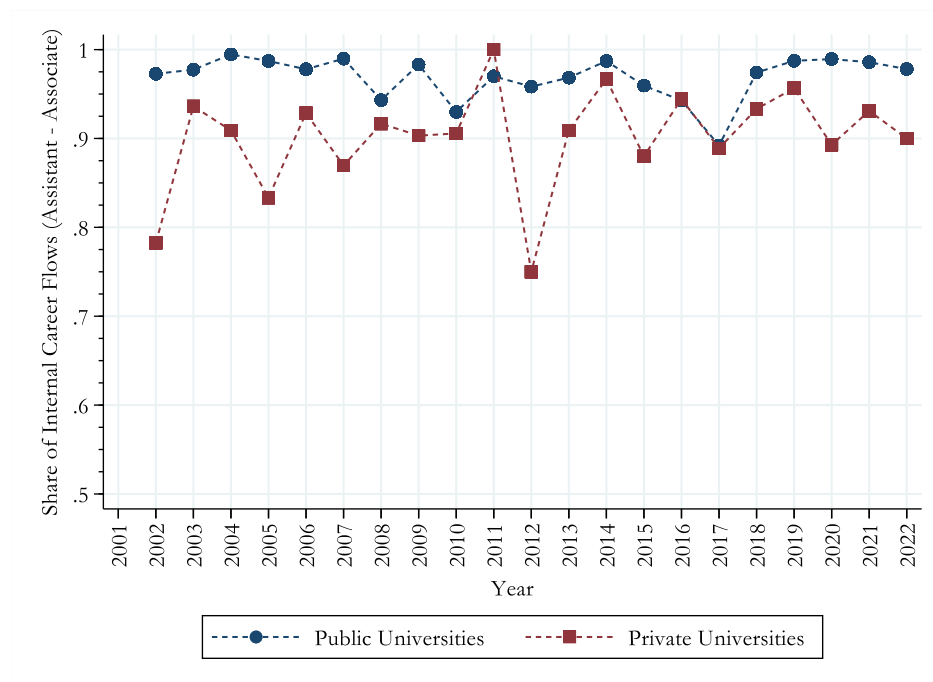


Figure 14: Evolution of the Share of Internal Career Flows, Polytechnics (Assistant – Associate)

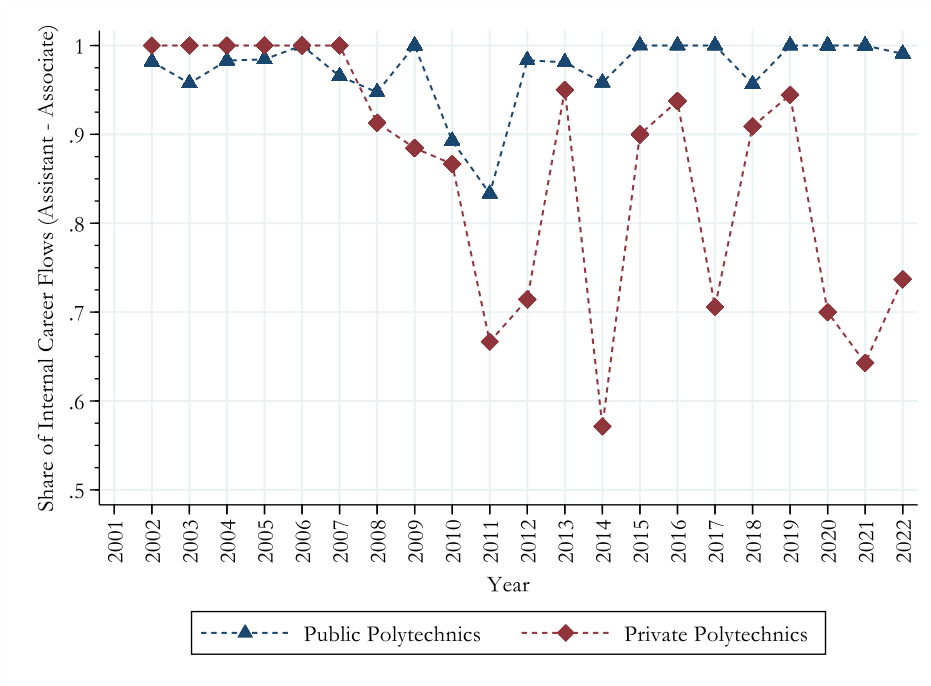
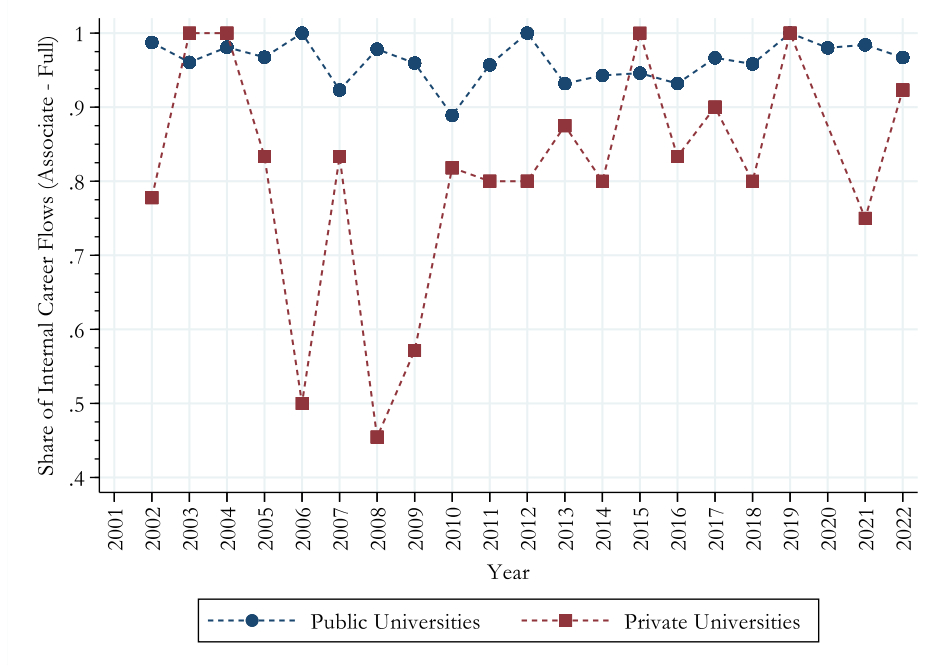


Figure 15: Evolution of the Share of Internal Career Flows, Universities (Associate – Full)



To finalise our empirical component, we decided to do a deeper, vertical flow analysis, selecting specific dates and checking what happened to the professors from one moment to the next. In order to understand their progress over the period, we separated them into six categories: exit, non-career (as a whole), teaching assistant, assistant professor, associate professor and full professor. Therefore, we have looked at the initial number of professors, and seen which ones have progressed in their careers, remained in the same position, left their careers, left the market or entered the non-career category, or even which ones belonged to the non-career category and became career professors.

This required selecting the periods on which to focus our attention. We selected three time frames. The longest is the one that comprises the entire database, namely from 2001 to 2022. We know that there is a large number of professors who persist over the 22 years, making the analysis worthwhile. Also, to take more professors and situations into consideration, we decided to select two sub-periods: 2001/2012 and 2013/2022. The ranges can be debatable, especially because they have no common elements. However, these were used for three reasons: until 2012, the data was filled out more homogeneously overall, in terms of categories and variables; the way the data is filled out began to change in 2013, in addition to some variable categories having disappeared or fallen into disuse; we wanted to capture as many different people as possible, without wasting information (this way we did not take into account those who left before 2013, but rather the new people who appeared that year).

Tables 3, 4 and 5 show the results of our calculations directly, in matrix form, while figures 16, 17 and 18 represent the data in the format of an Arc Diagram Plot. To begin by explaining the tables, the rows show the position of the professor in the base year, and the columns their position in the final year of the period. The values are calculated as percentages to make them more perceptible. The diagrams, in turn, show the flows between categories, excluding the outflows (exit) of the profession, since they have a significant expression. We will be discussing these further, but we decided not to represent them in the diagrams in order to make the flows between categories more noticeable. With this in mind, the line above the category name is as big as the share of that type of professor in the initial total. It has a darker part and a lighter part, the former representing the flows out of that category and the lighter the flows in. The larger the flow, the thicker the arc. If the professor remains in the same category, the arc moves out and in, so that it is clear what proportion of the

professors have remained in the same position. In view of the difficulties in representing the results explicitly, this was the most dynamic way we found: an arc diagram in which everything is represented according to its proportion to the total.

Analysing the results, we can see that around 75% of the initial non-career professors are not in the sample in 2022, which, given their significant initial numbers, turns out to be the strongest movement of the period. If we take into account the changes in the statutes of the academic teaching profession, this can be explained by the greater difficulties in entering the career, for example, with around 60% having already left the career in 2012. Furthermore, it may have ceased to be worth continuing in the academic environment for these professors, given the economic crisis and the consequent reduction in funds allocated to higher education institutions.

A somewhat significant number, given the size of the time-span, is the 10% of professors who remain non-career after 22 years, which may point, to some extent, to some precariousness in the profession, from a general perspective. This phenomenon seems to be stronger today, given that the number of non-career professors has increased and so has the percentage of maintenances (around 40%). In the end, this type of work is cheaper and more flexible for the institutions, which are free to hire as many hours as they need, and not to renew contracts if they don't need teaching staff. Bearing in mind the cuts in funding they have suffered, and the greater difficulty in hiring for career positions, with the higher requirements imposed in 2009, this type of contracting has become essential to the normal running of institutions.

Looking at teaching assistants, we can notice that almost 30% left the market between 2001 and 2012, which can be explained to some extent by the increase in the minimum entry requirements for teaching careers. A considerable proportion may have left the profession because they felt that, in a cost/benefit analysis, it wouldn't be worth it to do a doctorate to continue teaching at the career level, moving on to other professions. The general rule, however, was for professors who belonged to this category to be transferred to the category of assistant professor, in accordance with the profession's statutes.

If we focus on professors who remain in the same position, we can still see that there is a large proportion of professors who have remained in the same position from 2001 to 2022. Almost 30% of assistant professors, 20% of associate professors and 12% of full professors have held their position for 22 years. This highlights some of the current problems

related to difficulties in career progression and even the ageing of the teaching population, since if professors don't progress, and vacancies at the top of the hierarchy haven't changed much, there won't be positions to fill. After all, for them to do so, those who are there would have to leave.

Regarding career progression, on the other hand, there is strong evidence that the 2013/2022 sub-period was much worse than 2001/2012, with lower percentage values. The only exception seems to be the progression from assistant professor to associate professor, which we can link to recent policies of opening internal competitions for progression (Decreto-Lei n° 84/2019, 2019). This was also an exception to the rule of open competitions, as there was an imperative need at the time to progress professors who had been unable to do so for too long.

Table 3: Flows of Professors between Professional Categories (2001/2022)

Destination Source	Non-Career	Teaching Assistant	Assistant	Associate	Full	Exit
Non-Career	10.84%	0.22%	9.23%	3.41%	1.12%	75.19%
Teaching Assistant	5.72%	1.69%	40.76%	12.43%	1.51%	37.90%
Assistant	1.84%		28.10%	23.68%	5.94%	40.43%
Associate	2.21%			18.57%	17.10%	62.12%
Full	3.59%				11.86%	84.55%

Note: We decided to leave out some rare cases of career decline, as they are residual. We analyse the movement of professors from one year to the other, and not the flows during the period. For example, of the total non-career identified in our effective sample in 2001, 10.84% remained as such in 2022.

Table 4: Flows of Professors between Professional Categories (2001/2012)

Destination Source	Non-Career	Teaching Assistant	Assistant	Associate	Full	Exit
Non-Career	21.81%	2.63%	10.33%	2.41%	0.72%	62.09%
Teaching Assistant	6.32%	13.30%	47.65%	3.23%	0.14%	29.35%
Assistant	2.71%		50.66%	20.87%	2.67%	23.08%
Associate	2.71%			39.93%	21.79%	35.57%
Full	2.53%				39.91%	57.56%

Note: We decided to leave out some rare cases of career decline, as they are residual. We analyse the movement of professors from one year to the other, and not the flows during the period. For example, of the total non-career identified in our effective sample in 2001, 21.81% remained as such in 2012.

Table 5: Flows of Professors between Professional Categories (2013/2022)

Destination Source	Non-Career	Teaching Assistant	Assistant	Associate	Full	Exit
Non-Career	38.78%	0.64%	11.49%	1.39%	0.33%	47.38%
Teaching Assistant	13.28%	7.41%	51.86%	1.03%	0.04%	26.38%
Assistant	2.58%		62.20%	20.35%	1.22%	13.65%
Associate	2.61%			57.44%	13.82%	26.13%
Full	4.67%				55.03%	40.31%

Note: We decided to leave out some rare cases of career decline, as they are residual. We analyse the movement of professors from one year to the other, and not the flows during the period. For example, of the total non-career identified in our effective sample in 2013, 38.78% remained as such in 2022.

Figure 16: Flow of Professors by Professional Category (2001/2022)

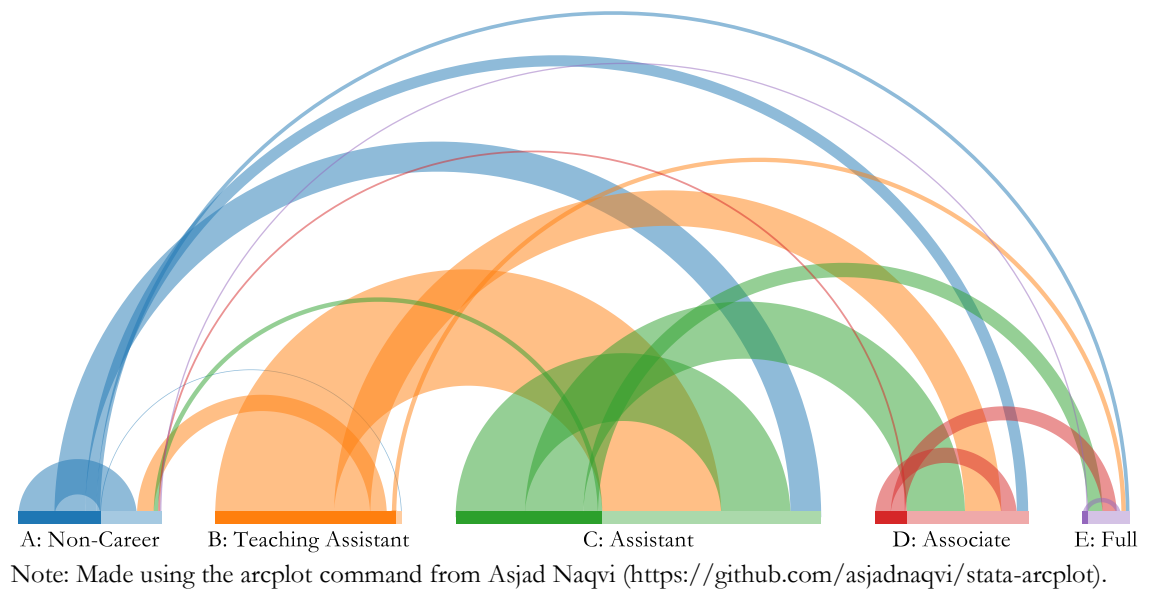


Figure 17: Flow of Professors by Professional Category (2001/2012)

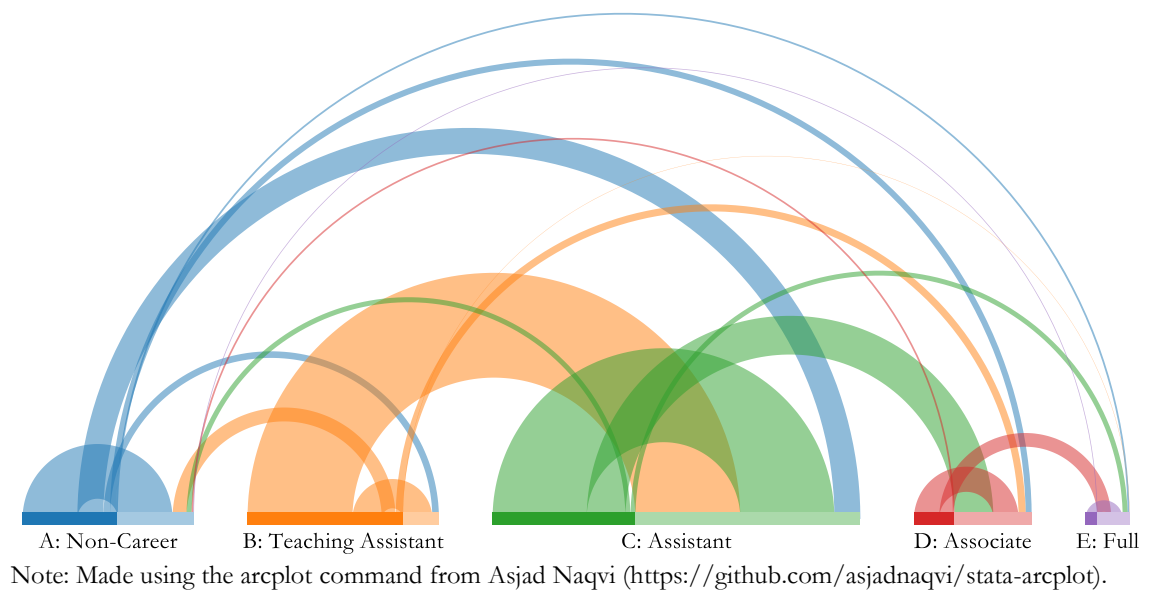
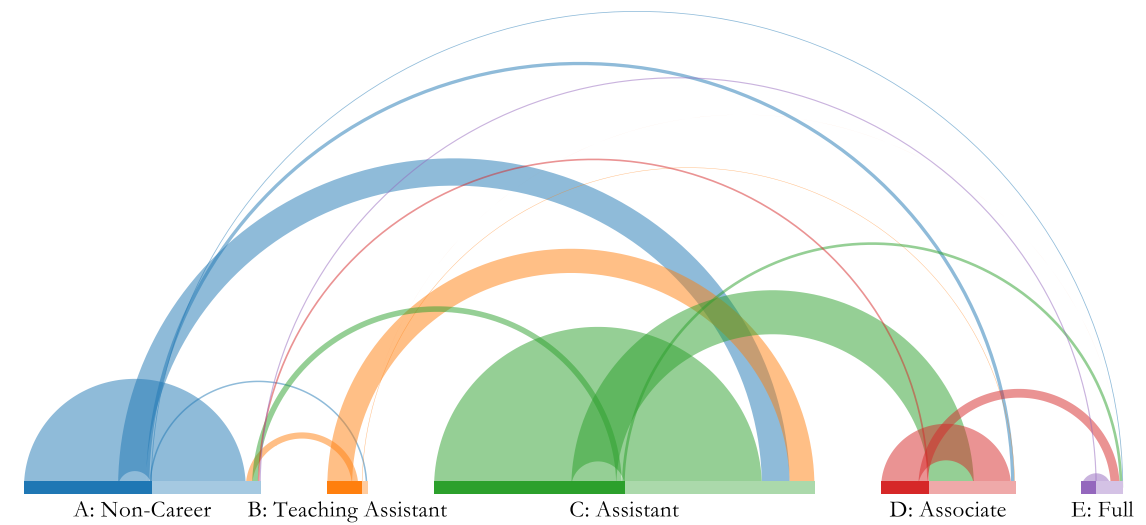


Figure 18: Flow of Professors by Professional Category (2013/2022)



5. Conclusion

The mobility of professors has become an important topic of public discussion, both from the perspective of reclaiming their rights and from that of academic studies into its patterns and effects. In Portugal, however, although there is a considerable amount of debate on the subject, the literature that studies it numerically and analytically is scarce or non-existent, to the best of our knowledge.

This results from the fact that the data available for this type of research is underexplored. We are referring to REBIDES, a publicly available statistical survey with microdata on the academic teaching population in Portugal, which covers the academic years 2001/2002 to 2022/2023. We hypothesise that this rich source of information has not been fully exploited due to its problems, which range from the simple fact that variables have different names between years to the absence of unique identifier codes for each professor. With this in mind, we decided to take the initiative to gather and process the data in order to carry out our study, and to publicly share the code we used to do so. In this way, we hope to enable and encourage researchers interested in topics related to Portuguese academia to carry out their studies.

Our study aimed to analyse the patterns of professor mobility in Portuguese academia, investigating its causes and consequences. To this end, we set up a panel and selected our effective sample: all non-military and police higher education professors who belonged to the professional career categories according to the statutes of the teaching profession, and who could effectively fulfil them as career or non-career professors. We considered career professors to be those who work full-time and are not guest professors, and non-career professors to be the rest, most of whom are part-time professors. Furthermore, we selected the main affiliation of the professors so that each one only appeared in the dataset once a year at most.

Our empirical component was divided into two parts: time trends and flow analysis. To begin by summarising the main results of the time trends analysis, the majority of professors in higher education are in public higher education institutions, and this share has been increasing to the detriment of private universities. The evolution of the share of career professors in the total has been negative, being supported by public institutions, in a trend that began after the 2008 crisis and change in the statutes of the teaching profession in 2009 (Decreto-Lei n.º 205/2009, 2009; Decreto-Lei n.º 207/2009, 2009). As the number of professors in public institutions has increased and it has become more difficult to hire for

career positions, given the higher entry requirements and budget cuts in the sector (which mainly affect public institutions), we can conclude that this has been the solution found by institutions to maintain their activity. Moreover, and as expected, we found that the professional categories with the highest share of career professors are those at the top of the hierarchy, and that of the total career professors, the bottom of the hierarchy is the most represented in all types of institutions.

In the flow analysis, we analysed both horizontal and vertical mobility. We found that while career progression has remained relatively constant over the years for other institutions, it has dropped significantly over the years at public universities. On a downward trend even before that, after 2008 they fell more sharply and stabilised at very low levels, considering the number of professors these universities cover. Only after 2017 there is a recovery, and there is a peak in the number of progressions in 2020, which can be explained by a greater distribution of funds and the opening of internal competitions (Decreto-Lei n° 84/2019, 2019). Nevertheless, this recovery is rather short-term, with the numbers soon returning to their downward trend. From a realistic perspective, part of the career regularisations that should have taken place in the post-crisis period were probably carried out this year, and this is reinforced by the large drop in the number of promotions the year after.

Besides this, we found that mobility between institutions tends to occur for the same hierarchical position, rather than meaning career progression. Hybrid movements (horizontal and vertical) were low and stable throughout the period, which leads us to believe that the new imposition of the 2009 statutes of the teaching profession of placing the majority of the jury in open competitions as members from outside the institution did not have the desired effects (Decreto-Lei n.° 205/2009, 2009; Decreto-Lei n.° 207/2009, 2009). Taking three different periods, to get a more direct flow analysis of what has happened to the professors over time, we found some signs of precariousness in the profession, in a general perspective, with a large percentage of professors remaining as non-career during the 22 years of the dataset. This seems to have increased over time, as the number of non-career professors has risen. The situation regarding progression also seems to have worsened from 2001/2012 to 2013/2022, with progression percentages decreasing. In view of the number of professors who remain in the same position in the hierarchy throughout the period and the low levels of progression, there are strong symptoms of bottlenecks in the hierarchical ladder.

Finally, in this dissertation, we are aware that we were far from covering all the themes that could be explored with the data. We believe that there is great potential to be realised that could improve scientific production on education in Portugal as a whole, and even provide support for policy making. This can be achieved through the future use of our processing code⁵ by researchers interested in the topic. Some lines of future research could be to change some of the assumptions applied, or to measure horizontal mobility at the level of the organic unit, as this could change the results obtained. Exploring gender differences could also lead to interesting results, as we know that the proportion of women in the profession has increased significantly over time. In this context, we hope to have contributed to increasing the wealth of information on the subject, offering the tools needed to do so and stimulating the curiosity of researchers.

⁵ Available on GitHub at: <https://github.com/JulioHenrTeixeiraFEP/REBIDES>. For any questions about the code, feel free to contact me: juliohenri2001@gmail.com.

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Annex

Table A1: Changes in Higher Education Institutions (2001/2022)

Legislation	Old	New
Decreto-Lei n.º 175/2004	Escola Superior de Enfermagem Cidade do Porto	Escola Superior de Enfermagem do Porto
	Escola Superior de Enfermagem de D. Ana Guedes	
	Escola Superior de Enfermagem de São João	
	Escola Superior de Enfermagem do Dr. Ângelo da Fonseca	Escola Superior de Enfermagem de Coimbra
	Escola Superior de Enfermagem de Bissaya Barreto	
	Escola Superior de Enfermagem de Artur Ravara	Escola Superior de Enfermagem de Lisboa
	Escola Superior de Enfermagem de Maria Fernanda Resende	
	Escola Superior de Enfermagem de Francisco Gentil	
	Escola Superior de Enfermagem de Calouste Gulbenkian de Lisboa	
	Escola Superior de Tecnologia da Saúde de Coimbra	Instituto Politécnico de Coimbra
	Escola Superior de Tecnologia da Saúde do Porto	Instituto Politécnico do Porto
	Escola Superior de Tecnologia da Saúde de Lisboa	Instituto Politécnico de Lisboa
	Escola Superior de Enfermagem de Vila Real	Universidade de Trás-os-Montes e Alto Douro
	Escola Superior de Enfermagem de São João de Deus	Universidade de Évora
	Escola Superior de Enfermagem de Calouste Gulbenkian	Universidade do Minho
	Escola Superior de Enfermagem de Angra do Heroísmo	Universidade dos Açores
	Escola Superior de Enfermagem de Ponta Delgada	
	Escola Superior de Enfermagem da Madeira	Universidade da Madeira
	Decreto-Lei n.º 194/2004	ISMAG Portimão
ISHT Portimão		
Decreto-Lei n.º 56/2005	Instituto Superior de Humanidades e Tecnologias - Marinha Grande	Instituto Superior D. Dinis

	Instituto Superior de Matemática e Gestão - Marinha Grande	
Decreto-Lei n.º 82/2005	Instituto Superior de Humanidades e Tecnologias - Torres Vedras	Instituto Superior Politécnico do Oeste
	Instituto Superior de Matemática e Gestão - Torres Vedras	
Aviso n.º 3103/2006	Instituto Superior de Administração e Gestão	Instituto Superior de Administração e Gestão
	Instituto Superior de Assistentes e Intérpretes	
Aviso n.º 8572/2006	Instituto Superior de Humanidades e Tecnologias de Lisboa	Instituto Superior de Ciências da Administração
	Instituto de Estudos Superiores de Contabilidade	
Despacho n.º 13624/2010	Instituto Superior de Educação de Santa Maria	Instituto Superior Politécnico Gaya
Decreto-Lei n.º 266-E/2012	Universidade Técnica de Lisboa	Universidade de Lisboa
	Universidade de Lisboa	
Decreto-Lei n.º 206/2012	Escola Superior de Design	Instituto de Arte, Design e Empresa - Universitário
	Escola Superior de Marketing e Publicidade	
Decreto-Lei n.º 147/2013	Instituto Superior de Línguas e Administração de Vila Nova de Gaia	ISLA Instituto Politécnico de Gestão e Tecnologia
Despacho n.º 2349/2015	Universidade Lusíada - Famalicão	Universidade Lusíada - Norte
	Universidade Lusíada - Porto	
Aviso n.º 15743/2016	Instituto de Arte, Design e Empresa - Universitário	Universidade Europeia
Decreto-Lei n.º 4/2019	Escola Superior de Educação Jean Piaget de Almada	Instituto Politécnico Jean Piaget do Sul
	Escola Superior de Saúde Jean Piaget - Algarve	
	Escola Superior de Tecnologia e Gestão Jean Piaget	
Decreto-Lei n.º 77/2019	Escola Superior de Saúde Ribeiro Sanches	Instituto Politécnico da Lusofonia
	Instituto Superior de Ciências da Administração	

Aviso n.º 14027/2019	Escola Superior de Enfermagem Dr. José Timóteo Montalvão Machado	Escola Superior de Saúde Cruz Vermelha Portuguesa - Alto Tâmega
Decreto-Lei n.º 45/2020	Universidade Fernando Pessoa - Escola Superior de Saúde	Escola Superior de Saúde da Fundação «Fernando Pessoa»
Decreto-Lei n.º 61/2021	Escola Superior de Tecnologias Avançadas de Lisboa (Porto)	Escola Superior de Tecnologias Avançadas do Porto
	Instituto Universitário da Maia	Universidade da Maia
	Escola Superior de Saúde Jean Piaget de Vila Nova de Gaia	Instituto Politécnico Jean Piaget do Norte
	Escola Superior de Desporto e Educação Jean Piaget Vila Nova de Gaia	
Decreto-Lei n.º 79/2021	Universidade Lusíada - Norte	Universidade Lusíada (NA)
	Universidade Lusíada - Lisboa	

Note: The codes of the establishments located in the "Old" column were changed to those in the "New" column, considering the publications in *Diário da República* appearing in the first column. The changes that were not applied in this study are marked with NA (Not Applied). Furthermore, only the changes for which we have found official legislation are represented here. For more information, visit the Ado file `estabsysclean` available on GitHub (<https://github.com/JulioHenrTeixeiraFEP/REBIDES>).

This table, although it has some empirical validity, must be analysed considering the objectives of this study: to study academic mobility, but only natural mobility, as far as possible. By this, we refer to what happens without integrations or mergers, for example. To this end, although it is a method with limitations, we normalize the higher education institution's codes, to regard the integrations that have occurred, based on a manual recognition of the establishments that disappear at some point in the dataset. If two institutions belong to the same controlling group, but have different establishment codes, persisting throughout the period, we choose not to standardize their codes. When an institution disappears without being integrated into a group, at least as far as our knowledge goes, we do not carry out any treatment. Some cases may have been missed as the study was performed manually using the dataset, but we believe we identified most of the cases.