

MASTER
ECONOMICS

Educational Pathways in the Portuguese Higher Education System: Evidence from 2012/2013 to 2021/2022

Marta Sofia Mesquita Fernandes

M

2024



Educational Pathways in the Portuguese Higher Education System: Evidence
from 2012/2013 to 2021/2022

Marta Sofia Mesquita Fernandes

Dissertation
Master in Economics

Supervised by
Pedro Luís Silva
Anabela Carneiro

2024

Acknowledgements

I thank the General Directorate for Education and Science Statistics (DGEEG, *Direção-Geral de Estatísticas da Educação e Ciência*) for the access to the dataset used in this dissertation. The dataset was used at the premises of DGEEG in their safe centre. Funding for this research was provided by the FCT – Foundation for Science and Technology (Portugal) under projects Ref. doi: <https://doi.org/10.54499/PTDC/CED-EDG/5530/2020>.

I would like to extend my gratitude to Professors Pedro Luís Silva and Anabela Carneiro for their academic guidance throughout my dissertation process. Professor Pedro Luís Silva's expertise, availability, and feedback were instrumental in shaping the direction of this research. I am also grateful for Professor Anabela Carneiro's support and insightful contributions, which helped refine and improve various aspects of this work.

To my parents, whose unconditional support and love have been fundamental during my journey. Mum and Dad, your selfless devotion and persisting patience have given me more than just the means to follow my dreams, you have taught me values of integrity and perseverance that I should never forget. In moments of doubt, it was your voices that I was most eager to hear. In times of triumph, it was your joy that amplified my own. For every unspoken word of encouragement, for every sacrifice, both seen and unseen, for every act of kindness, for every single day: Thank you. This achievement is as much yours as it is mine. With all my love and deepest gratitude, I dedicate this work to you.

Abstract

Research into factors influencing higher education decisions has largely focused on undergraduate programs, leaving a notable gap in the study of Master's level enrolment. This dissertation addresses this gap by examining how socioeconomic characteristics and academic background impact students' decisions to pursue a Master's degree in Portugal. Using population data at an individual level from the General Directorate for Education and Science Statistics, this study employs Logistic Regression Models to assess the determinants of Master's enrolment. The study revealed that demographic characteristics, socioeconomic factors, and academic background are significant determinants of postgraduate enrolment. In particular, younger male students and those from families with higher educational attainment are more likely to enrol in Master's programs. Graduates from universities and public institutions also show a higher likelihood to pursue Master's programs compared to those from private institutions and polytechnics. Despite these insights, the study has limitations. Unobserved variables such as specific institutional characteristics, personal preferences, and labour market conditions were not included. Additionally, the analysis excludes Integrated Masters typically pursued by STEM majors, potentially underrepresenting this group. Lastly, while the Portuguese higher education system resembles other European systems, the findings may not fully apply to different regulatory contexts. These findings enhance understanding of educational decision-making and are relevant to educational policies, especially in systems adopting the Bologna Process. Ultimately, this dissertation offers critical insights that can inform policy improvements and enhance higher education practices in Portugal and similar contexts.

JEL codes: I21, I24, C21, C25

Keywords: Educational Choices, Higher Education Transitions, Master Enrolment

Resumo

O estudo dos fatores que influenciam as decisões no ensino superior tem-se centrado, em grande parte, nos cursos de Licenciatura, deixando uma lacuna notável na análise das inscrições ao nível de Mestrado. A presente dissertação aborda esta lacuna analisando o impacto das características socioeconómicas e do histórico académico na decisão dos estudantes de prosseguir um Mestrado em Portugal. Através do uso de dados populacionais ao nível individual da Direção-Geral de Estatísticas da Educação e Ciência, este estudo utiliza Modelos de Regressão Logística para avaliar os determinantes da inscrição no mestrado. A análise revela que as características demográficas, fatores socioeconómicos e histórico académico são determinantes significativas da formação ao nível de Mestrados. Em particular, os estudantes mais jovens do sexo masculino e os provenientes de famílias com níveis de escolaridade mais elevados têm maior probabilidade de se inscreverem em programas de mestrado. Os diplomados de universidades e instituições públicas também apresentam uma maior tendência para prosseguirem estudos, em comparação com os de instituições privadas e politécnicas. Apesar destas constatações, o estudo tem limitações. Não foram incluídas variáveis não observadas, tais como características institucionais específicas, preferências pessoais e condições do mercado de trabalho. Para além disso, a análise exclui os Mestrados Integrados tipicamente frequentados por licenciados em STEM, o que pode sub-representar este grupo. Por último, embora o sistema de ensino superior português se assemelhe a outros sistemas europeus, os resultados podem não ser totalmente aplicáveis a diferentes contextos regulamentares. Estes resultados melhoram a compreensão da tomada de decisões educativas e são relevantes para as políticas educativas, especialmente nos sistemas que adotam o Processo de Bolonha. Em última análise, esta dissertação oferece uma visão crítica que pode contribuir para melhorar as políticas e as práticas do ensino superior em Portugal e em contextos semelhantes.

Códigos JEL: I21, I24, C21, C25

Palavras-chave: Escolhas Educacionais, Transições no Ensino Superior, Inscrição em Mestrado

Index

Acknowledgements.....	2
Abstract	3
Resumo	4
Table Index	7
Figures Index	8
List of abbreviations	0
1. Introduction.....	1
2. Literature Review	4
2.1. Overview of Higher Education Returns	4
2.2. Academic Achievement, Attendance, and Time to Graduate	4
2.3. Selectivity and Quality in Higher Education Institutions	6
2.4. Major Selection and Labour Market Outcomes	7
2.5. Gender Differences in Higher Education	8
2.6. Socioeconomic and Geographical Constraints in Higher Education.....	10
3. Higher Education in Portugal.....	12
4. Data Description and Descriptive Statistics	15
4.1. Data collection and Sample Selection	15
4.2. Demographic Analysis.....	17
4.3. Academic Performance and Enrolment Patterns	20
4.4. Regional Distribution.....	24
4.5. Transition Patterns	26
5. Econometric Strategy.....	34
6. Results.....	36
6.1. Probability of Master Enrolment	37
7. Discussion.....	40

8. Conclusions.....	43
Appendixes.....	44
Appendix I: Additional Tables	44
Appendix II: Additional Figures.....	56
9. Bibliographic Reference.....	58
Annexes	65
Annex I: ISCED-F 2013.....	65
Annex II: ISCED 2011	67

Table Index

Table 1: Descriptive statistics (mean and standard deviation) of the sample	16
Table 2: Transition Matrix by Field of Study from Bachelor to Master	27
Table 3: Transition Matrix by Institutional Sector and Subsector from Bachelor to Master	29
Table 4: Transition Matrix by Region from Bachelor to Master	32
Table 5: Marginal Effects of the Logistic Regressions for the Probability of Enrolling in a Master program within two years after completing a Bachelor's degree	36
Table 6: International Standard Classification of Education according to the 2013 broad, narrow, and detailed approaches	65
Table 7: International Standard Classification of Education according to the 2011 approach, and its aggregated levels	67

Figures Index

Figure 1: Number of students by Bachelor degrees and Master enrolments from 2013/2014 to 2021/2022	17
Figure 2: Students' distribution by age (from 20 to 24 years old) at Bachelor graduation, Master enrolment, and Master graduation.	18
Figure 3: Distribution of Bachelor and Master graduates by final GPA (10 to 20).	21
Figure 4: Tree map of Bachelor graduates by Field of Study	23
Figure 5: Number of Bachelor graduates by Portuguese District	25
Figure 6: Kernel Density Plot of GPA Distributions for Bachelor's and Master's graduates	31

List of abbreviations

AME: Average Marginal Effects

ECTS: European Credit Transfer and Accumulation System

GPA: Grade Point Average

ICT: Information and Communication Technologies

ISCED: International Standard Classification of Education

HEI: Higher Education Institution

HES: Higher Education System

LR: Logistic Regression

LRM: Logistic Regression Model

MLE: Maximum Likelihood Estimation

STEM: Science, Technology, Engineering, and Mathematics

1. Introduction

In today's competitive and economically uncertain environment, students' educational choices are becoming increasingly important, especially because these will impact their future employment opportunities, economic stability, and overall contribution to society Borland et al., 2000; Walker, 2020. The job market's demand for certain skills and qualifications places additional pressure on students to make informed judgements that are consistent with current and future industry trends. Because of that, the decision to pursue further academic education, particularly a Master's degree, has never been more important in shaping individuals' professional trajectories and overall social wellbeing.

Previous research demonstrated that the factors modelling that decision may vary significantly across institutional types, fields of study, and labour market conditions (Buonanno & Pozzoli, 2009; Long, 2010; Walker & Zhu, 2018). Other important factors exposed throughout the years are intellectual ability, demographic traits, cultural and family background, prior achievements, and regional preferences (Blom, et al., 2021; Sloane et al., 2021). However, the persistent heterogeneity in academic returns across various student clusters highlights the importance of understanding the drivers of educational disparities within the Portuguese higher education system (Brand & Xie, 2010; Declercq & Verboven, 2015; Porter & Umbach, 2006; Staniec, 2004).

Although substantial research has been conducted on undergraduate enrolment, there is a relative lack of studies specifically addressing the Master's level enrolment decisions. This dissertation aims to fill this gap by examining the factors that influence students' academic decisions in the Portuguese context. The way each academic level operates, and the needs intrinsically tied to them vary significantly from Bachelor's to Master's programs. Following that, appropriate research and policies would require a targeted approach on each level to better mitigate inequalities and promote a sustainable development. Adding to these differences, recent trends advocate for a decrease in the relative returns of Bachelor's degrees, complemented by an increase in returns from postgraduate studies. This may suggest that, over time, Master and Doctoral programs are being viewed as more valuable by students and employers (Almeida et al., 2017).

In this dissertation, the research question is framed as follows: What factors significantly influence students' decision to continue higher education studies? The analysis specifically examines the transitions from Bachelor's to Master's degrees within the Portuguese higher education system. The aim is to characterize educational pathways, particularly because, in the face of modern challenges, such as higher educational competition and growing pressure of a competitive labour market, it becomes increasingly important to analyse the mechanisms that sustain inequalities within higher education systems.

The use of Portugal as a case study has its comparative relevance due to the many similarities it shares with other European higher education systems. Furthermore, the alignment between educational structures, practices, and regulations gives space for a broader interpretation of the results. The analysis required the use of a dataset provided by the General Directorate for Education and Science Statistics (*Direção-Geral de Estatísticas da Educação e Ciência*) spanning from the academic years of 2013/2014 to 2022/2023, that has population data at an individual level for the higher education system. The data tracks whether Bachelor graduates enrolled in a Master's program within two years of completing their degree, as well as some other relevant demographic and academic information.

To address the proposed research question and objectives, this study adopts, firstly, a descriptive approach with the analysis of transition matrixes, and secondly, an econometric methodology, which employs a Logistic Regression analysis to identify the determinants of Master's enrolment. Key predictor variables include socioeconomic factors and academic background. The main results from this study show that approximately one-third of Portuguese Bachelor's graduates continue to a Master's program. Generally, men, younger graduates, and those with stronger academic records are more inclined to enrol. Additionally, students from universities and public institutions, along with those from more educated backgrounds, exhibit higher enrolment rates.

The most important thing about this research is that it will help in the understanding of Master's enrolment in Portugal. This research adds to the body of literature in the sense that it can serve as a basis of knowledge for the policy makers and institutions of higher learning, supplying them with essential information to formulate policies that will adapt to the shifting demands of the students and the changing conditions of the job market. Overall,

this study stems from a strong dedication to uncover the intricate link between social environments, economic standing, and scholastic trends in Portugal. If the research question is answered and the goals are met, the hopes are to make a significant and sustained impact on the fields of education, economics, and policy, and in doing so, improve not only the lives of the students, but the rest of Portuguese society as a whole.

This dissertation is organized as follows: Section 2 offers a review of the existing literature, emphasizing key findings and conflicts in previous research . Section 3 presents the Portuguese Higher Education context, providing a brief analysis of the evolution and structure of the Portuguese higher education system. Section 4 gives an empirical foundation for the econometric methodology that includes the data, some basic descriptive statistics, and transition patterns analysis. In Section 5, the empirical methodology is described, which includes the logistic regression technique and why it is appropriate for this study. The empirical findings are presented in Section 6, and Section 7 interprets these findings, analyses the limitation, and offers a few policy suggestions. Section 8 is the last section of the dissertation, and it outlines the conclusions and areas for future research.

2. Literature Review

2.1. Overview of Higher Education Returns

With higher education systems constantly adapting to the shifting needs of society and the economy, it becomes imperative to discern what influences students' choices in academic enrolment and persistence. These could range from socioeconomic status to accessibility to academic opportunities, and to personal goals. Ultimately, the progress has shown a significant need for a continuous evaluation of the costs and benefits of higher education, as heterogeneity in academic returns reveal a growing trend (Brand & Xie, 2010). Such evaluations help in ensuring that educational policies remain relevant and effective in addressing the diverse needs of the student population.

The general consensus on the economic effects of higher education is quite strong, with most researchers agreeing that it has particularly good returns. Some of these impacts could be higher salaries, less unemployment, and more stable jobs (Somani, 2021). The amount may differ among graduates, majors, and job markets, but college is a safe investment for the individual, for governments, and for society (Borland et al., 2000; Walker, 2020). Therefore, the returns to a college education are not limited to just monetary rewards but also include a large number of social and personal rewards (Brand Xie, 2010). These benefits highlight the necessity of higher education in a well-off society with healthier people and less criminals. In opposition, the saturation of the labour market can, over time, diminish the value of a degree as more individuals attain academic level education. Faced with the quick expansion of higher education, and the growing number of graduates, college degrees may progressively act as instruments for sustaining disparities, thus preserving, and even extending inequalities (Wolniak et. al, 2008).

2.2. Academic Achievement, Attendance, and Time to Graduate

Given the variability in the returns of higher education it is beneficial and increasingly valuable to understand individual student experiences and outcomes. Academic achievement, class attendance, and the time required to graduate come as a result of the relationship between a set of variables, such as intellectual ability, aspirations, and motivation

(Alyahyan & Düstegör, 2020; Kappe & Van Der Flier, 2012). All of these factors combined play a part in enrolment as well as overall success in higher education.

Academically successful students are much more likely to have the cognitive abilities to succeed in future educational undertakings, especially at the level of Master's degrees (Finn et al., 2014). Also, students who have good grades may just be more likely to think that they will excel in graduate school (Ward & Dixon, 2014). This is important because it is this confidence that keeps them going and enables them to endure the hardships that graduate studies entails. Another reason is that top scholars usually have a background of overcoming academic hardships and that experience has prepared them for rigorous courses and research (Kuncel et al., 2007).

This feeling also goes on to Master's enrolment decisions, which acts as a predictive indicator for the probability of obtaining higher levels of education (Pallas, 2007). Regular class presence is positively correlated with academic performance, which in turn affects students' decisions to stay enrolled and continue their studies (Bijsmans & Schakel, 2018). By going to class all the time, not only are the students keeping themselves involved in the subject, but they are developing habits that will lead to academic success in the long run. For instance, Gillen-O'Neel (2021) says that continual participation strengthens students' feeling of belonging and loyalty to their school.

Long graduation times usually mean that one is having trouble coping with the struggles higher education presents. For instance, academic failures like low grades or extended leaves of absence only extend graduation time and make the transition into higher levels of education a more difficult process (Finn et al., 2014). Cognitive deficits could make it difficult for students to maintain in the course load, but institutional factors such as lack of academic support and advising can only make these problems worse (Balduf, 2009).

In essence, consistent class attendance, meeting academic milestones, and timely graduation enhance students' readiness and motivation for advanced studies. These are all important to understand because they are the individual level academic factors that go into educational success as a whole. But these outcomes are also very much determined by the institutional setting a student attends. That is, the selectivity and quality of the HEI can impact both the educational experiences as well as the subsequent academical and professional opportunities students may face in the future.

2.3. Selectivity and Quality in Higher Education Institutions

Research consistently shows that the selectivity of the HEI students attended at Bachelor level not only affects their graduation rates, but also how likely they are to pursue a Master's, Doctorate, or Research program (Shamsuddin, 2016; Zhang, 2005). In the context of HEI, selectivity refers to the competitiveness and strictness of the admission process, which measures how hard it is for candidates to enter higher-ranked schools. Highly selective HEI accept fewer number of students which are usually the ones with the better grades and extracurricular activities (Walker & Zhu, 2018). More selective institutions typically foster environments favourable to academic success, probably because they have more resources, higher academic achievement standards, and a competitive student body. These are the types of atmospheres that allow students to excel and grow to their fullest.

Quality at universities includes elements from the excellence of the facilities and faculty to the individual accomplishments and rigour of education. Higher quality HEI usually challenge their students with a harder academic course load, offer greater learning and development assistance, and have a good career coordination. The perceived quality of the institution attended at Bachelor level can also influence students' subsequent academic decisions. Many students who graduate from "good" schools believe they are better prepared and more qualified to do graduate work. Better schools tend to provide greater academic support structures, research incentives, and just more professional opportunities, which in turn makes the student more likely to be committed and motivated to pursue a Master's degree (Dillon & Smith, 2019). The reputation of the institution, which is often a consequence of its perceived quality, is also a big factor in enrolment and retention rates (McCoy & Byrne, 2017). A strong reputation can attract high-achieving students and foster a culture of academic excellence, which ultimately impacts the decisions related to pursuing further academic education, such as Master's programs.

Depending on geographical context, private institutions can be perceived as having a stronger status of quality, which may make them more attractive to some students (Eide et al., 1998; Webb et al., 1997). This is usually due to their specialized curriculum, smaller classes, and broader flexibility in majors. But the financial strain that accompanies the private system often discourages Bachelor graduates from continuing to higher levels of academia within those environments or even at all (Zhang, 2005). In conclusion, attending a more

selective or higher-quality institution increases the chances of completing a Bachelor's degree, enhancing simultaneously the prospects for further education.

It is well known that students' performance in college, as well as their preparation for more advanced studies, is greatly influenced by the selectivity and quality of the higher education institution they attend. But it is not just the institutional characteristics that determine students' decisions, as the fields of study that students tend to prefer at the Bachelor's level also impact their outcomes in the labour market.

2.4. Major Selection and Labour Market Outcomes

Some of the significant influences on the number of Master's students are the differences in job availability and return on investment by major (Buonanno & Pozzoli, 2009). This variability in outcomes can drive students' choice of field, and thus alter the nature and structure of Master's programs. Choosing a major is a complicated process, and students usually consider a mix of their own personal interests, what they think they can get a job with, and what they feel pressure from their parents or peers to do (Quinlan & Renninger, 2022). Some students may go for intrinsic rewards like intellectual stimulation, but others may look at it in terms of career and financial security. The different priorities that people have, show why they make certain educational and career choices. Regardless of the motivations, the labour market implications of major selection can have lasting effects on an individual's educational and professional trajectory (Montt, 2015). And these are extremely important to know because they show how all areas of study play a part in the social and economic realms.

As mentioned, research has shown that the field of study chosen by students can have a significant impact on their employment opportunities, earnings after graduation, and academic progression (Montmarquette et al., 2002). For example, Engineering majors were more likely to want a job or to start a family right after they received their Bachelor's degree (Causer, 2008). Majors in Business and Math seem to be a good bet for the financially invested individuals, as these are the ones that experienced greater earnings for early labour market access. The fields of study relevant to Sciences and Economics may provide an easier attainment of a first job and expand employment prospects alongside early incomes (Thomas

& Zhang, 2005). This implies that since job opportunities are attractive right after receiving a Bachelors, there is less motivation for those with these majors to attend a Masters. However, according to recent studies these patterns seem to be changing due to the rising requirements of industries for more technical skills and the growing awareness of the benefits of a graduate education (Tomlinson, 2012). Another factor is the exponential growth of technology and the emergence of interdisciplinary fields like data science and biotechnology, which has in a sense opened up and encouraged more graduates to go to graduate school.

On the other hand, domains categorized as “qualitative”, such as Humanities and Social Sciences have faced, throughout time and space, the toughest disadvantages related to early labour market outcomes (Buonanno Pozzoli, 2009). These majors also unfortunately have the problem of not having jobs right out of college and starting salaries. So as a result, students in these fields tend to get a Master and even higher degree as a more strategic move. This kind of reflects the fact that they are trying to compensate for the initial setbacks that they experience at the beginning of their careers as opposed to those that go directly into work and don't have as much motivation to continue their pursuits in academia.

2.5. Gender Differences in Higher Education

Gender differences introduce an additional layer of complexity, reflecting more entrenched societal norms and biases that shape educational and career outcomes. Throughout history men have exceeded women in higher education. At least in quantity. But as the years went on, women became not only more likely to attain a college degree, but to have a better performance at doing so (Sloane et al., 2021). But even with this change, women still get a lower return for higher education degrees (Walker Zhu, 2011). That difference indicates that the battle for economic equality still continues. Not all studies agree with this sentiment because other research shows that men actually obtain the greatest returns to years of higher education and are still considerably more likely to pursue a Master's degree in some areas of study (Long, 2010).

Although men are known to crave status and control, women are more likely to focus on social change and family obligations instead of power (Sax, 2001). These preferences are evident in choice of major, women are more likely to be in interdisciplinary and Social

sciences, and men dominate in Business, Engineering, and Physics majors (Porter Umbach, 2006; Saadat et al., 2022). Furthermore, women are less likely to select majors portraying to Science, Technology, Engineering, and Mathematics (STEM), which could be a result from the perception of lower expected returns, namely when compared to male colleagues (Staniec, 2004). For the decision-making process, both genders seemed to heavily weight their personal satisfaction with the coursework and parents' approval (Zafar, 2013).

In terms of institution quality and type, women tend to benefit more from attending highly selective and private institutions, namely in male-dominated domains (Walker & Zhu, 2018). These results reinforce the idea that women have not only to do better, but also attend more prestigious schools to achieve the same labour market outcomes as men.

Women's enrolment in higher education gravitates towards countercyclical responses, meaning that when faced with economic contractions, they become more likely to pursue academic degrees, particularly Master's programs. In contrast, men's enrolment patterns are typically acyclic, implying that they are much more impermeable to economic shifts (*i.e.* less responsive to economic fluctuations) (Johnson, 2013). Overall, the evolving trends in higher education highlight not only the improvements women achieved made but also the enduring challenges they face in translating their educational achievements into equitable career opportunities. Despite advancements in enrolment and academic performance, women continue to encounter barriers that hinder their access to and progression within the workforce. These challenges underscore the need for continued efforts to ensure that educational attainment translates into meaningful and equitable professional outcomes for women across various economic contexts.

Gender disparities in higher education, such as women's underrepresentation in STEM and the benefits of attending selective institutions, are deepened by other socioeconomic factors. Lower socioeconomic status limits access to advanced degrees and prestigious institutions, exacerbating existing gender inequalities. Addressing these issues requires a combined focus on both gender and socioeconomic barriers to ensure equitable educational outcomes.

2.6. Socioeconomic and Geographical Constraints in Higher Education

As expected, students' personal and family socioeconomic statuses impact their enrolment and performance in higher educational levels, with graduates from minorities, and lower socioeconomic backgrounds being less likely to pursue Master's programs (Bowman, 2005). These disparities can be attributed to various factors, including sensitivity to costs of degree attainment, in particular the limited access to financial resources, lack of family support, and minor expectations regarding educational attainment (Declercq & Verboven, 2015; Ha, 2020; Mullen, et. al, 2003). Furthermore, students from lower socioeconomic backgrounds are more susceptible to interruptions during their higher education studies, which can delay and ultimately prevent its completion, thereby diminishing the returns to education (Karlson, 2019). These difficulties only serve to show that these types of social groups have a much more difficult time overcoming the challenges of higher education, which in turn may prevent them from pursuing graduate studies.

According to Zhang (2005), economically disadvantaged students and minorities are exceptionally sensible to institutional selectivity and quality. Many of these students have the advantage of developed support structures, such as mentoring programs, diversity programs, and individualized academic advising, which often help to balance the obstacles they normally encounter in less selective atmospheres. These supportive measures make it easier not only for students to be successful academically, but also increase retention rates and overall educational outcomes as a whole (Melguizo, 2007).

As time has passed, minorities have experienced the discriminatory obstacles associated with high education enrolment, job markets, and careers (Gao, 2023). More recently, and probably to try to close that gap, black and hispanic students have become more prone to attend to more selective and higher-quality institutions than any other social clusters (Montgomery, 2002). An interesting finding is that when faced with uncertainty on what college major to choose, a student is much less likely to opt for a Science degree. Which is very prominent for black and hispanic individuals who are more liable to live under permanent instability (Porter & Umbach, 2006). Asian students exhibit higher probability of entering and attaining majors in STEM. While factors like skills and family characteristics were close to irrelevant, relative higher earnings persuaded this group towards choices in said degrees (Staniec, 2004). Despite these results, black students remain the most probable group

of choosing STEM majors, even when ability, income, family context, and expected returns are accounted for. However, retention and achievement rates do not exactly mirror these findings (Staniec, 2004). Overall, black, and hispanic students were found to benefit the most from increased returns to years of education (Walker & Zhu, 2011).

Groups from wealthier and more educated families tend to perform better at undergraduate levels and, therefore, persist on having more and better academic and professional opportunities (Zhang, 2005). Therefore, the probability of entering a Master's program remains relatively high for these students. Inequality issues, although they may be more present or at least noticeable at schooling level, can very well still impact the access to and completion of a Bachelor's degree (Mullen, et. al, 2003). New studies show that financial aid and scholarships can greatly reduce many of these monetary obstacles and allow more students to continue their education (Dynarski et al., 2023).

In terms of geographical mobility, students are more likely to choose a Master's program offered by the same university or close to where they graduated from Bachelor. Some factors associated with this trend are familiarity with the institution, social and academic networks, and logistical convenience. Moreover, for Bachelor's and Master's degrees, students show a slight favoritism for universities inside their housing regions, mainly because of lower costs, family emotional support, and employment opportunities (Montgomery, 2002).

Overall, the interaction between academic achievement, institutional selectivity, gender, and socioeconomic status highlights the complexities and inequalities within higher education. An in-depth understanding of how these elements interact is critical for developing effective strategies that enhance access to and success in higher education, ultimately contributing to a more inclusive and equitable educational landscape.

3. Higher Education in Portugal

The higher education system in Portugal has changed significantly in the last few decades with the transition to European standards and the opening up of the institutions to a larger portion of the population. The political history of Portugal, with transitions from monarchy to republic, dictatorship to democracy, greatly affected higher education policy. Each political era brought its own set of priorities and challenges, influencing how education was offered and developed. Authoritarian regimes were much more conservative, directed towards the centralization of education and the reinforced patriotism. In contrast, democratic reforms over the years focused on decentralization, institutional autonomy, diversity, and inclusion. Over the decades, in particular after the 1974 Carnation Revolution, political and social pressures led to a considerable growth of the HE system. With an increased number of institutions and enrolled students, it evolved from a small and elitist construct to a more socioeconomically and regionally inclusive context (Almeida et al., 2017).

The contemporary system is characterized by a binary structure, composed of universities and polytechnic institutes, each serving distinct educational and professional purposes. Within this structure, there are fundamentally four types of institutions that come as an interaction between Public and Private systems with Universities and Polytechnics (Correia, 2002). Distinct properties make its differentiation relevant. The state basically funds public higher education. The institutions receive continuous financial support and supervision which guarantees a certain level of quality and responsibility. In Portugal, they generally have a long-standing history and are often perceived as more prestigious, encompassing approximately 77.79% (331,612 students) of the Portuguese higher education community from 2012/2013 to 2021/2022 (DGEEC, 2023). Divergently, Private HEI depend more on student tuition fees, alumni donations, and monetary awards to fund their academic programs, representing in the same period, 94,654 students (approximately 22.21%). although these institutions offer a variety of programs, they must work harder to establish their reputation and credibility. Well, universities have a lot more variety of majors in just about every subject, and they seem to concentrate on the theory behind the subject, and research. Well, Polytechnics on the other hand are more into applied learning and skills for straight away entry into a particular profession or technical career. For the same period of 2012/2013 to 2021/2022, the distribution of students by HEI subsector is noticeably

more homogeneous, with 53.07% attending Universities (226,224 students), and 46.93% enrolled in Polytechnics (200,042 students).

Portugal adopted the Bologna Process in the academic year of 2006/2007 as a European initiative to standardize higher education across member states. This reform provided a comparable framework for academic degrees, diplomas, and course credits, established mutual quality standards for the evaluation of academic institutions and programs, and encouraged the mobility of students and academic staff (Cardoso et. al, 2008). Following this process, the Portuguese HEI offered various programs: Bachelor's degrees, that last between 6 and 8 semesters (equivalent to 180 and 240 ECTS), Master's Degrees, that typically span from 3 to 4 semesters (equivalent to 90 and 120 ECTS) following a Bachelor's degree, Integrated Master's Degrees, with a duration from 10 up to 12 semesters (equivalent to 300 and 360 ECTS), and Doctoral Degrees, research-focused programs lasting from 6 to 8 semesters (equivalent to 180 and 240 ECTS). Additionally, professional and technical courses are available, particularly within Polytechnic institutes, targeting specific labour market needs.

Within this set of programs, the different educational degrees and available courses can be categorized according to the International Standard Classification of Education. The ISCED 2011 framework, adopted by the European Union, defines three aggregated educational levels, comprising nine broader ones (Table 7, in Annex I), where: “Low” level education comprises all the individuals with Early childhood education (“less than primary”), Primary education, and Lower secondary education, “Medium” is for all the individuals with Upper secondary education and Post-secondary non-tertiary education, and “High” is for all the individuals with Short-cycle tertiary education, Bachelor's, Master's, Doctoral or equivalent levels. The ISCED-F 2013, which focuses on fields of study, has been in use since 2016, and organizes courses into eleven broad fields, twenty-nine narrow fields, and approximately eighty detailed fields. For a detailed breakdown of these classifications, see Table 6, in Annex I.

Higher education enrolment has expanded considerably in the last years, an indication of the growing availability and desirability of advanced education in Portugal. For example, the number of students in higher education has grown continuously from 370,996 in 2013 to 433,217 in 2021 (DGEEC, 2023). The gender distribution among higher education

students is fairly balanced, with 54.11% female and 45.89% male Bachelor graduates. Most of the people are between the ages of 17 and 22, which is about the usual age for attending college. In the academic year of 2022/2023, approximately 18% of the student body consisted of international students.

In Portugal, admission to higher education at the Bachelor level is centralized and based on high-school GPA and results of National Exams, which everyone takes at the end of secondary education. Some HEI might have other supplementary criteria such as interviews. In order to qualify for a Master's in Portugal, the student must have a Bachelor's or an equivalent qualification from a related field. The selection of students then works by a ranking system based on undergraduate GPA, relevant work or volunteer experience, and sometimes specific courses or a minimum. For most cases, candidates are admitted based on this combined score with the people with the highest scores filling the available spots first (Rodrigues Heitor, 2015). All Doctoral programs require a Master's or an equivalent, but beyond that, the applicant must demonstrate a strong academic background and show great potential for research, which is usually evidenced through a research proposal. The selection process for Doctoral programs follows a similar pattern, where candidates that rank higher based on their academic and research qualifications are chosen.

Tuition fees in Portugal vary most significantly between public and private institutions (Teixeira et al., 2013). Currently, on average, public establishments charge tuition fees well below €1,000 per year for Bachelor's programs, whereas this value can range from approximately €3,000 to €6,000 per year in private settings. At the Master level, public universities' tuition fees typically range from €1,000 to €1.500 per year, contrasting with the ones charged by private universities, ranging between €3.000 and €10.000 per year. These discrepancies in tuition fees can reflect, to an extent, the institution's prestige, geographical accessibility, and available resources, but also further justify students' preferences.

In summary, the higher education system in Portugal has evolved to meet the demands of a modern, knowledge-based global labour market. With its structure providing a range of academic and vocational pathways, making higher education accessible and attractive to a diverse range of national and international students.

4. Data Description and Descriptive Statistics

4.1. Data collection and Sample Selection

The dataset used in this dissertation was provided by the DGEEC. The administrative data (*i.e.* information collected by governments or other organizations primarily for management purposes, rather than research) collection process was achieved through a national survey, RAIDES (*Registo de Alunos Inscritos e Diplomados do Ensino Superior*). Since 2013, this assessment has been yearly conducted in Portugal and aims to gather microdata on higher education population data at an individual level (*i.e.* enrolees and graduates), scrutinizing various aspects of students' academic journeys, such as enrolment status, major selection, completion rates, and socioeconomic characteristics. Fundamentally, it provides a snapshot of everyone who is part of the national higher education system.

With this information, a cross-section dataset was built, pertaining to all Bachelor graduates in Portugal for the period of 2012/2013 to 2021/2022. For this study, the dataset was organized to focus on Bachelor graduates' posterior educational patterns. Specifically, the analysis tracked these graduates' decisions regarding Master's programs at two key points in time: one year and two years after they completed their Bachelor's degree. This approach was chosen, because it captures the students who might need a brief period before deciding to pursue a Master's program. If information was not available for the first year after graduation, the data from the second year was used instead. Since Integrated Masters were only extinct in 2021, students from those educational structures were left out, because the focus of the dissertation is specifically on students who graduated with a Bachelor's degree and were confronted with the decision to pursue or not a Master's program. Consequently, students from those educational structures may be underrepresented.

In sum, for the undergraduate graduates, it is possible to observe if they enrolled in a Master's program for the first time in the following two years. Furthermore, for the demographic part, the variables included each students' gender, year of birth, each parents' educational level (ISCED 2011), and whether they were or not the first in the family to complete a higher education degree. Concerning academic related data, the variables used were the year of graduation, final Bachelor final GPA, number of enrolments until Bachelor completion, the sector (public or private) and subsector (university or polytechnic) of the

Bachelor HEI, and the field of study chosen during Bachelor (ISCED-F 2013). For more detailed and comprehensive descriptions of the variables, see Table A1.

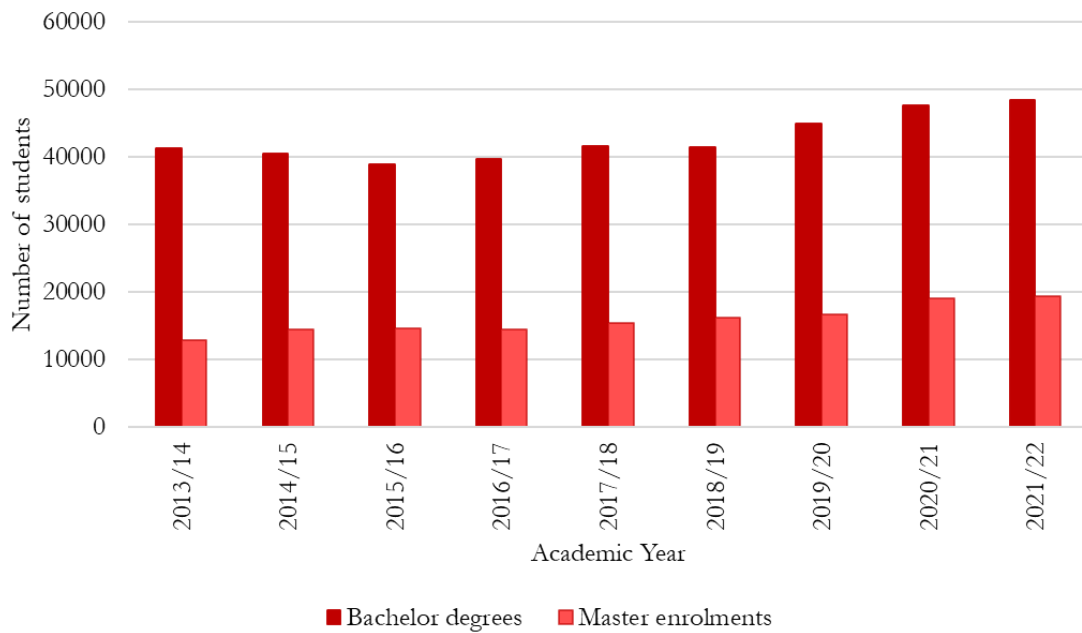
Table 1: Descriptive statistics (mean and standard deviation) of the sample

		Bachelor Graduates (N = 426,266)	Master Students (N = 163,696)	Master Graduates (N = 56,643)
Entering Master		0.38		
Female		0.60	0.60	0.64
Age		23.85 (6.39)	23.38 (4.71)	24.21 (4.14)
Mother Education	Low	0.43	0.40	0.39
	Medium	0.25	0.26	0.26
	High	0.22	0.26	0.28
Father Education	Low	0.47	0.45	0.44
	Medium	0.23	0.25	0.25
	High	0.17	0.20	0.22
First in Family to attain higher education		0.60	0.58	0.56
Final GPA		13.85 (1.49)		16.04 (1.38)
Enrolments until completion		3.69 (1.22)		2.33 (0.66)
Institutional Sector and Subsector	Public	0.78	0.83	0.83
	University	0.53	0.70	0.73

Note: Standard deviations are in parentheses

The cross-section dataset comprises 426,266 Bachelor graduates, of whom 163,696 (38.40%) have enrolled in a Master's program in the two consecutive years after finishing a Bachelor's degree (33.07% one year after completing their Bachelor degree, and 5.33% two years after). Of the remaining 262,570 (61.60%) some entered the labour market, some became unemployed and others continued to pursue academic interests outside of the country. Out of all the Master students, only 34.6% (56,643 individuals) graduated for the period in analysis. As shown in Figure 1, there has been an expansion in higher education, with the number of Bachelor graduates growing from 42,551 in 2013/2014 to 48,283 in 2021/2022 (an increase of 13.47%), and Master enrolments rising by 51.44% over the same period (12,790 to 19,369 individuals).

Figure 1: Number of students by Bachelor degrees and Master enrolments from 2013/2014 to 2021/2022. *Source: Own computation*

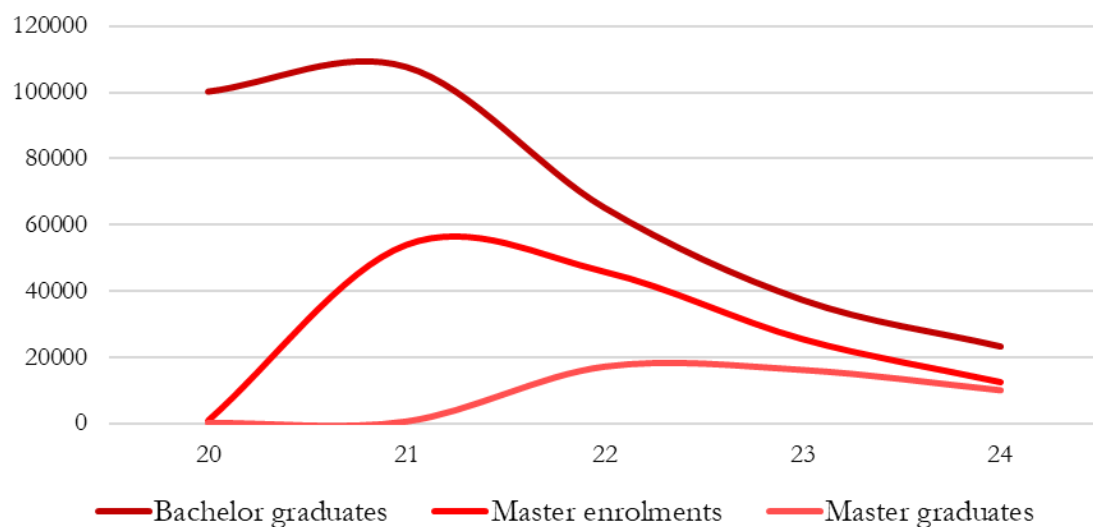


4.2. Demographic Analysis

Concerning Bachelor graduates, the average age was 23.85 years, as documented in Table 1, encompassing values that range from 17 to 82 years old (Figure A1). The standard deviation, 6.39, shows an average spread of ages around that mean. The same goes for

Master's, with an average of 23.38, and a standard deviation of 4.71. This indicates a relatively swift transition from undergraduate to graduate studies, with most students completing a Master's program shortly after obtaining their Bachelor's degree, at 24.21 years old. The smaller standard deviation for Master graduates of 4.14, points to a more consistent age range among these students. The periodic spikes in Figure 2 really illustrate the traditional educational cycle. The highest point observed for bachelor graduates, 21 years old, corresponds to the typical age at which students complete their undergraduate education (three years after 18 years old, the standard Bachelor enrolment age). In the same way, most Master's programs have enrolment around this time, which shows a quick tendency to want to stay continuous in their education. The next spike at the age of 22 among Master graduates also supports this average length of advanced studies, with most students apparently completing their graduate work in the allotted two years.

Figure 2: Students' distribution by age (from 20 to 24 years old) at Bachelor graduation, Master enrolment, and Master graduation. *Source: Own computation.*



Note: This is an enlarged version of Figure A1

Women's access to higher education was a result of huge efforts, social developments, and cultural shifts. Remembering the beginning of the XX century, in Portugal and many other countries, female enrolment in higher education was largely restricted to a narrow range

of fields, reflecting widespread gender biases. However, a shift is evident in the data presented in Table 1. Over the analysed period, the gender distribution among students has remained remarkably stable, with females constituting approximately 60.15% (256,388 individuals) of the sample, compared to 39.85% (169,878 individuals) for males. This trend extends to Master's programs as well, where female graduates number 36,229, representing 63.96% of the degrees, while male students totalled 20,414, or 36.04%. Nonetheless, some significant disparities can still be noticed at field specific level both for Bachelor graduates and Master students (Table A8 and Table A9). Fields of study such as Education and Health and Welfare gather more than 75% of women, and fields like ICT and Engineering, construction, and manufacturing are much more attractive to men (representing up to 70% individuals).

By assessing the parents' educational background (see Table 7, in Annex I, for further characterization of each educational level), it is clear that the relative majority of Bachelor graduates come from families where at least one parent has "Low" level education, which is, at most, lower secondary education, equivalent to the 3rd cycle in the Portuguese system. Specifically, 42.50% of mothers and 47.43% of fathers have "Low" level educational attainment. Among Master students and graduates, however, there is a noticeable shift: a higher proportion of students have parents with medium or high levels of education. For instance, 27.89% of Master graduates' mothers and 22.00% of fathers have attained higher education. This suggests that students from families with more educational resources are more likely to pursue advanced degrees, reinforcing the impact of parental education on academic trajectories.

Despite these trends, "Low" parental education remains the most common category even for Master graduates, representing 39.21% of mothers and 44.47% of fathers. This persistence suggests that while students from less educated families do reach higher education, they are less present in postgraduate levels. The data also reveals a significant drop in first-generation students at the Master's level. While 59.53% of Bachelor graduates are the first in their family to attend higher education, this percentage decreases to 57.56% for Master students and to 55.97% for Master graduates. That difference implies that students who come from more highly educated families are more likely to attend Bachelor's and Master's program, which then of course reinforces the socioeconomic status inequalities.

4.3. Academic Performance and Enrolment Patterns

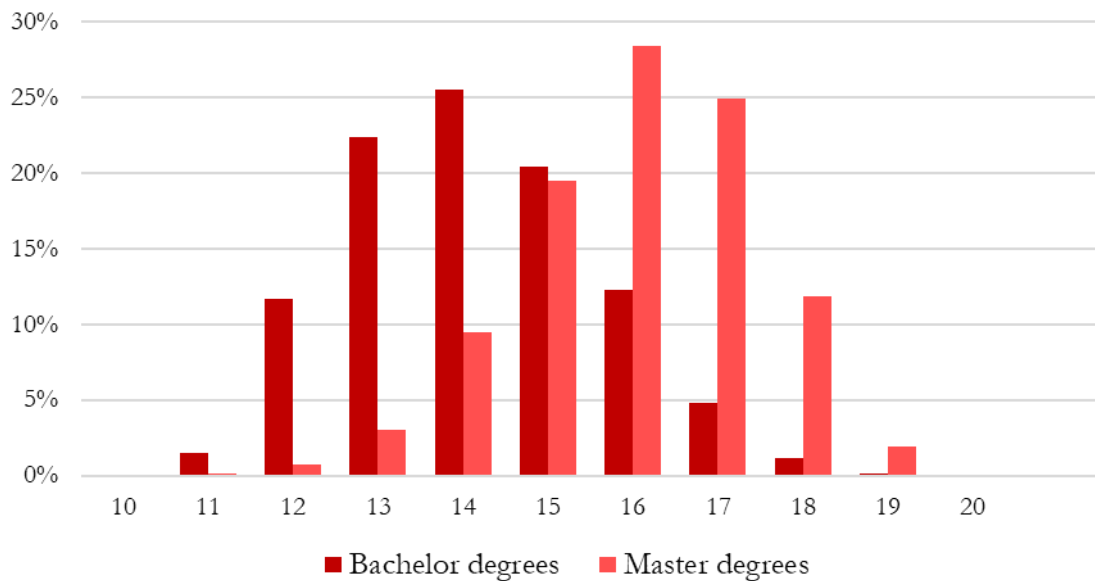
The average grade for Bachelor students provides an insight into the overall academic performance at the undergraduate level. As shown in Table 1, the sample's Bachelor GPA was 13.85 (with a standard deviation of 1.49). Over the years, the academic performance at the undergraduate level has gradually increased, likely reflecting changes in educational quality, student preparedness, or in grading measures and rigorousness over time.. At Master level, the mean GPA was 16.11, fairly higher, revealing the stronger academic performance at the postgraduate level. Additionally, the narrower standard deviation (1.34). compared to Bachelor students suggests a more homogeneous performance among Master's students.

In light of the significant difference between grades among distinct educational levels, the majority of Master students display a clear easiness in achieving higher grade levels, with 61.24% of students registering grades up to 16 values, while Bachelor graduates are more clustered at lower grades, with 67.29% of students earning grades up to 14 (Figure 3).

The higher academic performance observed at the Master's level compared to Bachelor's programs is likely due to several factors beyond the assumption that Master's studies are simply "easier.". In graduate school they have more specialization and therefore the students are working in fields they are interested and knowledgeable in so there is increased motivation and performance. Fewer exams and more research-based projects (*e.g.* the dissertation), give students a chance to demonstrate what they have learned through a more personalized approach. Exams, as known by the educational community, can be incredibly stressful and underrepresent a student's actual knowledge on a subject. Other basis for the outperformance at Master level are the "self-selection" process, in which highly motivated students tend to pursue postgraduate education, and the increased academic support and mentoring that they receive. These patterns, which are of course driven by larger economic and social energies, indicate not just individual but systemic progress in student achievement.

Figure 3: Distribution of Bachelor and Master graduates by final GPA (10 to 20).

Source: Own computation



Note: The values presented for Bachelor graduates only account for students that also enrolled in a Master's program in order to better identify the differences in grade transitions

Furthermore, the dataset revealed that the mean number of enrolments until the completion of a Bachelor degree was 3.69 (standard deviation of 1.22), with 49.5% of students finishing within the expected three-year timeframe (Table A2). This value indicates that, while some students complete their degrees on time, others may take longer due to various academic or personal factors. For Master programs, students took on average 2.33 years to complete their programs (standard deviation of 0.66), with 70.59% graduating on time (*i.e.* within the two-year timeframe). The differences in completion patterns, while not significant, could be attributed to a higher rate of major or field of study changes among Bachelor students, whereas Master's students tend to have once again more specific career goals and greater focus on their studies, which likely contributes to their higher rate of timely completion.

The distribution of students between Public and Private institutions was noteworthy as well. For the period in analysis, 77.79% of students graduated Bachelor from Public institutions, while the remaining 22.21% did so from Private institutions. When analysed at Master level, public institutions are even more preferred than before, collecting around 83%

of both Master students and graduates. These distributions go hand-to-hand with the quantitative predominance of public institutions in the Portuguese higher education system. Furthermore, variables such as tuition fees, reputation, and networking opportunities could be leading Portuguese students' preferences towards this institutional sector. Although the Public system enrolled and graduated more Bachelor and Master students than Private institutions in all districts, the weights varied regionally. For example, Portalegre does not provide private higher education, therefore all the students graduated Bachelor in the public system (Table A3). On the other hand, and unlike most districts, Porto and Lisboa registered the highest relative rates of Bachelor graduates in private institutions, 30.32%, and 19.46%, accordingly. As for Master graduates, the preference for public institutions is more accentuated, with its representativity exceeding 90% in 16 out of the 20 districts.

The distribution between universities and polytechnics was also analysed. The results are coherent with the positive evolution in the quality and diversification of higher education institutions. Results showed that 53.07% of Bachelor graduates were enrolled in Universities, whereas 46.93% were in Polytechnics. This indicates a small preference for Universities, which traditionally offer a broader range of more theoretical academic programs. In the postgraduate context some differences are more noticeable, as 69.54% and 72.93% of Master students and graduates, accordingly, attended Universities. Reasons behind this significant change could be related to career advancement opportunities, international recognition, or desire to follow through with a PhD Program. Regarding district distribution, Beja, Guarda, Portalegre, and Santarém only offer Bachelor programs at Polytechnics, while the regions of Évora and Vila Real have the highest relative values of Bachelor degrees in Universities, 91.95% and 87.42%, respectively (Table A4).

Persistently, the most common field of study was Business, administration and law, averaging 24.88% of Bachelor graduates (Figure 4), followed by Health and welfare (16.10%). These preferences can be attributed to broader career expectations, higher earning possibilities, and the perceived versatility of these degrees. In a diverging manner, Agriculture, forestry, fisheries and veterinary gathered only 1.37% of the academic undergraduate population, possibly due to narrower job opportunities, rural associations, and fewer educational resources and opportunities.

At the Master level (Figure A2), the most common field of study remained Business, administration and law, gathering 24.88% of students throughout the period analysed. Among this group the least preferred fields of study were ICT and Agriculture, forestry, fisheries and veterinary. Although the disregard for the second field may be justifiable as aforementioned, the low preference for ICT could result from immediate employment after Bachelor completion, high demand for entry-level positions or even a perception of diminishing returns from pursuing further studies.

Figure 4: Tree map of Bachelor graduates by Field of Study. *Source: Own computation.*



Note: For some fields of study only the first word(s) was(were) displayed (full names available in Table 6, Annex I). The percentages corresponding to each field of study are: Education (3.16%), Arts and humanities (13.60%), Social Sciences, journalism, and information (12.97%), Business, administration, and law (24.88%), Natural Sciences, mathematics, and statistics (5.48%), Information and communication technologies (1.61%), Engineering, manufacturing, and construction (12.43%), Agriculture, forestry, fisheries, and veterinary (1.37%), Health and Welfare (16.10%), and Services (8.41%)

Concerning to gender presence in each field of study, at the Bachelor level (Table A8), Education, and Health and welfare gathered the highest proportions of female graduates, 92.69% and 83.39%, respectively. The only fields where male students represented more than half of the academic group were ICT (82.10%), Engineering, manufacturing, and

construction (74.07%), and Services (55.07%). This gender disparity is mirrored at the Master's level, where women remain predominant in Education and Health and welfare, representing 76.10% and 85.51%, respectively. Men continue to be the majority in ICT (69.68%), Engineering, manufacturing, and construction (67.03%), and Services (55.40%), with an increased presence in Agriculture, forestry, fisheries, and veterinary (54.79%). These persistent gender patterns are explained by Sax (2001) conclusions, women rank social change and family responsibilities higher than social status and authority, not the case for men, choosing fields of study with a significant social impact.

4.4. Regional Distribution

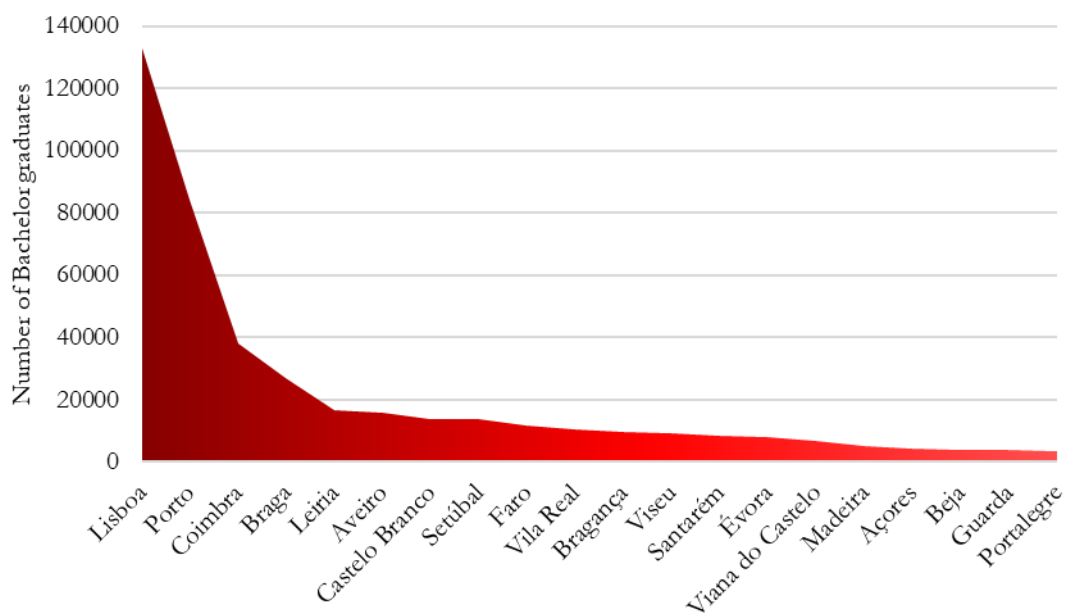
Rural and Urban areas have a lot of distinctive properties, including the demand for HEI and majors. In Portugal, this differentiation is quite significantly felt, as urban areas, particularly Lisbon and Porto, dominate in higher education enrolment, with Lisbon accounting for 31.17% and Porto 19.73% of Bachelor graduates (Table A5). In contrast, rural districts such as Beja (0.93%), Guarda (0.91%), and Portalegre (0.77%) show much lower figures. This disparity can be explained by the fact that there are fewer HEI in rural areas, as well as more significant economic and job opportunities and stronger educational systems in the cities.

Master students displayed a similar regional distribution (Table A6) with Lisbon leading at 36.41% and Porto at 22.14%, accumulating over 58% of total enrolments. Rural districts also exhibit low enrolment rates, with some regions like Beja and Guarda showing figures below 1%. The reputation that some of the HEI have in the urban areas, connected to a larger spectrum of Master degrees probably explain the large amount of students shown.

In terms of achievement (Table A7), the GPA for Bachelor's and Master's graduates across various districts show a cohesive pattern where Master's graduates achieve higher grades than their Bachelor's counterparts. Notably, Madeira Island has the highest average final grade for both Bachelor's (14.05) and Master's (16.69) programs. Conversely, Viana do Castelo reports the lowest average grade for Bachelor's (13.61) and Master's (15.71).

Regional policies and initiatives have played a significant role in influencing enrolment patterns. For instance, the implementation of Regional Development Plans in the northern districts, aimed at improving educational infrastructure, resulted in a 21.51% increase in Bachelor graduates (from 2012 to 2021), and a 153.51% increase in Master enrolments (from 2015 to 2022) in those districts (Table A5 and Table A6). In contrast, regions with less targeted educational policies, such as Beja, Guarda, and Portalegre, experienced minimal changes in enrolment figures.

Figure 5: Number of Bachelor graduates by Portuguese District. *Source: Own Computation*



In summary, the demographic and academic analysis highlights key characteristics of the “mean” student in each academic level. Bachelor and Master graduates are generally in their early 20s, though there is some variation due to delayed enrolments and graduations.. Women make up approximately 60% of the student population, reflecting gender parity. Many students come from families with lower educational backgrounds but demonstrate strong academic performance, specifically with Master graduates often completing their degrees on time and achieving higher grades. Public institutions dominate Portuguese higher education, likely due to their wider presence, reputation and lower tuition fees. Regional disparities are evident, with urban areas like Lisbon and Porto having higher concentrations

of students. Business, administration, and law remained the most popular field of study across educational levels, aligning with job market trends and career aspirations.

4.5. Transition Patterns

The journey from undergraduate to graduate studies is a transformative phase in every student's academic career, characterized by evolving interests, career aspirations, and educational transitions. This chapter aims to explore the transition patterns within higher education, examining the various shifts students make upon enrolling in a Master's program. These transitions include changes between different fields of study, mobility across institutional sectors and subsectors, variations in academic grades, and relocations across distinct regions. Studying these transition patterns provides valuable insights into student aspirations, guiding the formulation of educational practices and policies that align to better and effectively support their journey.

From Bachelor to Master, students often change their fields of study based on evolving interests, career aspirations, or economic opportunities. While only around 12% of graduate level students opted for field of study mobility from Bachelor to Master, Table 2 reveals several notable patterns. The most frequent transitions occurred between the same broad fields of study, signalling the preference for academic continuity. For example, a vast majority of the students who chose Education, Business, administration, and law, and Engineering, manufacturing, and construction as undergraduates remained in the same field for their Master, representing 94.34%, 84.28%, and 86.89%, of students in each field, respectively. It seems that students are least likely to "branch out" into other fields of study, especially those aforementioned, which implies that undergraduate and graduate studies are closely related to stable or lucrative career paths. This reflects the socioeconomic incentives, by which students may perceive continued education in the same area as a way to enhance job security and future income. However, ICT and Services seem to be exceptions, as less than half of students with a Bachelor's degree (42.10% and 47.18%, correspondingly) stayed in the same field for their Master. The lower retention rates in these fields may indicate either a search for better opportunities or the realization that the skills and knowledge acquired at the undergraduate level may need to be complemented by different or more specialized expertise

in other areas. It may also reflect the rapidly changing nature of these fields, where interdisciplinary knowledge is increasingly valuable.

The relatively greater changes in transition between distinct fields occurred from Social sciences, journalism, and information to Business, administration, and law (26.93%), from ICT to Engineering, manufacturing, and construction (42.10%), and from Services to Education (25.65%). The significant transitions observed between some fields highlight a growing interest in interdisciplinary and practical education, as students are becoming increasingly aware that they need to have a wide range of skills and be able to apply their knowledge in many different types of contexts. Overall, the data shows that, while the majority of graduates stays in their original fields of study for their Master's degree, a good amount still transitions to other areas, but mostly to the applied or interdisciplinary fields.

Table 2: Transition Matrix by Field of Study from Bachelor to Master

Master Bachelor	Education	Arts and Humanities	Social Sciences	Business	Natural Sciences	ICT	Engineering	Agriculture	Health	Services
Education (N = 10,069)	94.34%	0.38%	1.03%	1.82%	0.09%	0.03%	0.20%	0.05%	1.64%	0.43%
Arts and Humanities (N = 21,556)	16.42%	63.95%	9.41%	6.48%	0.13%	0.57%	1.10%	0.03%	0.35%	1.56%
Social Sciences (N = 29,039)	2.31%	3.47%	59.18%	26.93%	2.92%	0.76%	2.05%	0.09%	0.76%	1.53%
Business (N = 36,955)	0.10%	1.26%	8.31%	84.28%	1.02%	1.62%	1.74%	0.08%	0.11%	1.48%
Natural Sciences (N = 16,538)	2.11%	0.24%	1.72%	2.66%	67.42%	1.56%	13.27%	2.44%	8.17%	0.41%
ICT (N = 1,760)	0.45%	3.86%	0.34%	8.86%	2.16%	42.10%	42.10%	0.06%	0.00%	0.06%
Engineering (N = 24,355)	0.07%	0.48%	0.31%	1.99%	3.66%	4.38%	86.89%	0.93%	0.82%	0.46%

Agriculture (N = 2,034)	0.00%	0.05%	0.10%	2.65%	4.08%	0.05%	8.80%	83.58%	0.25%	0.44%
Health (N = 9,478)	6.01%	0.33%	7.54%	9.49%	8.84%	0.32%	4.64%	0.05%	59.38%	3.40%
Services (N = 11,912)	25.65%	1.13%	2.53%	20.12%	0.60%	0.27%	1.84%	0.18%	0.50%	47.18%

Note: For simplification, only the first word(s) or abbreviations of each Field of Study were displayed (full names available in Table 6, Annex I).

Bachelor graduates also tend to remain within the same type of institutions for their Master's studies, specifically those from public universities, of whom 89.79% chose to enrol in a Master's program at that same institutional type (see Table 3). This loyalty reflects a strong preference for continuity, which could be driven by factors such as established social and academic networks, comfort with the institutional environment, and the perceived value of progressing within a known system. Similarly, Bachelor graduates from public polytechnics demonstrated a pronounced tendency to continue their studies in the same institutional type, with 70.90% choosing this path. However, almost one-fourth (24.87%) transitioned to public universities, suggesting a degree of flexibility in their educational decisions and preferences.

Undergraduates at private universities still showed a preference for pursuing further education within the same type of institution, with more than half (57.29%) enrolling in private universities for their Master's programs. Additionally, 32.95% of these graduates chose to move to public universities, while movements to public polytechnics and private polytechnics remained less frequent. In the case of private polytechnic Bachelor graduates, choices become more spread out through different HEI sectors and subsectors at the Master level. The largest proportion, 42.86%, opted to continue at private polytechnics. Additionally, 21.09% moved to public universities, while 22.48% chose public polytechnics. Overall, public institutions, particularly universities, have the highest transition rates from other institutional types, and retain the highest percentage of their Bachelor graduates for Master's programs.

In sum, the data highlights a clear preference among Bachelor graduates to remain within their original type of institution when pursuing further education. Nonetheless, there is a noticeable degree of movement from all the other institutional types to public universities. These HEI have the highest transition rates from other institutional types and retain the highest percentage of their Bachelor graduates for Master's programs. These results may imply the strong appeal due to factors such as lower tuition fees, broader program offerings, and higher institutional reputation. This trend suggests that public institutions are seen as providing better value for money and offering more opportunities for advanced academic pursuits, which is particularly important for students from lower socioeconomic backgrounds. In addition, there was a substantial number of students changing from polytechnics to universities, from Bachelor to Master studies, with motivations often aligned with a pursuit of theoretical knowledge, research opportunities, and academic prestige. The exhibited flexibility indicates that, while institutional familiarity plays a significant role, other factors, such as financial considerations, perceived quality, and available vacancies are also of the upmost importance.

Table 3: Transition Matrix by Institutional Sector and Subsector from Bachelor to Master

Master Bachelor	Public Universities	Public Polytechnics	Private Universities	Private Polytechnics
Public Universities (N = 90,602)	89.79%	4.30%	5.58%	0.33%
Public Polytechnics (N = 44,532)	24.87%	70.90%	3.00%	1.23%
Private Universities (N = 23,233)	32.95%	8.09%	57.29%	1.67%
Private Polytechnics (N = 5,329)	21.09%	22.48%	13.57%	42.86%

Note: 131 – Public Universities: Military and Police was incorporated in Public Universities.

The kernel density estimates for Bachelor and Master GPA reveal a clear distinction in students' academic trajectories as they transition between these two educational levels (full

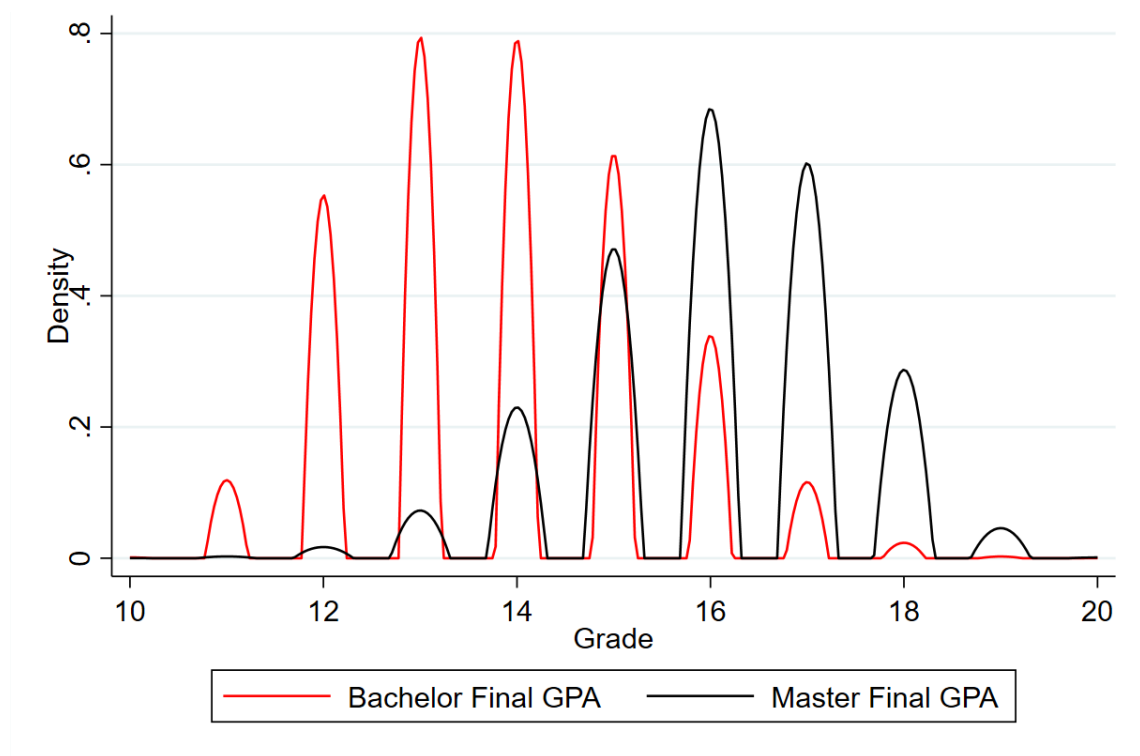
transition matrix available in Table A10). The data shows that students, on average, exhibit a significant tendency to achieve higher grades from the first academic cycle to the second.

The Bachelor GPA curve displays a more dispersed distribution, with significant concentrations around grades of 13 and 14 values. In contrast, the Master's GPA distribution moves towards the right side of the graphic, as the majority of students achieve grades between 16 and 18 values. The analysis of transitions from Bachelor's to Master's programs shows not only a positive achievement pattern but also a more specific trend where most students with mid-range Bachelor's GPAs (12 to 15) generally see an increase of 2 to 3 points in their Master's grades. The smoothness of the Master GPA distribution, with fewer peaks compared to the Bachelor GPA distribution, implies a reduction in grade variability, possibly indicating a more standardized or focused level of performance at the graduate level.

The generally positive transition may reflect several factors, including the selective nature of Master's admissions, where students with stronger academic records are more likely to continue. It could also indicate that the specialized and rigorous nature of Master's programs encourage students to focus more deeply on their subjects, thereby enhancing their academic outcomes.

Overall, the kernel density estimates, and transition matrix results reinforce the argument that academic performance generally improves as students transition from Bachelor's to Master's degrees. This improvement is not only indicative of the skills and knowledge acquired but also may suggest that the structure of Master's programs may better align with students' academic strengths (*e.g.* less theoretical evaluations and more empirical-based ones, such as the dissertation) enabling them to achieve higher levels of success.

Figure 6: Kernel Density Plot of GPA Distributions for Bachelor's and Master's graduates



To simplify regional transitions, districts were grouped by geographical proximity, according to the NUTS II 2013 approach (North, Centre, South, Lisboa, Azores, and Madeira), along with the district of Porto. The full transition matrix by district can be found in Table A11.

Although from different housing and academic regions, individuals show similar transition preferences, with a notable number remaining within their Bachelor's region for further studies. On average, 11.75% of Master students continue their education within their original district, while 88.25% reallocate to different districts. This indicates a substantial degree of regional continuity in higher education. Districts such as Lisboa and Porto are prominent educational hubs with a concentration of higher education institutions, diverse academic programs, and research opportunities. This draws students from other regions, particularly from those with fewer educational resources or specialized programs. Besides, Lisboa and Porto are not only educational centres but also economic hearts, with plenty of jobs and internships and professional contacts available. This in turn makes them very desirable places for students who wish to capitalize on those elements for a job. Lisboa had

the highest retention rate, with 94.02% of its Bachelor's graduates remaining within the district for their Master's studies, and Porto follows with an 84.18% retention rate.

In contrast, the Islands show lower retention rates, with Madeira at 71.05% and the Azores at 59.69%. These lower results could indicate that students from more isolated regions move to other, in-continent, districts for their Master's programs, as a way to gain proximity to more dynamic and prestigious HEI and labour markets.

Of course most of the students want to stay in their home district, but there is still a notable trend towards relocating to Lisboa and Porto. The transition from regions like the North to Porto (13.19%) and from the South to Lisboa (27.75%) is facilitated by the geographical proximity and ease of transportation, making these mobility patterns more feasible for students. Students from the Islands also display a significant trend towards the mainland. Madeira's graduates show a 10.69% transition rate to Lisboa and a 5.45% rate to Porto. The Azores has a notable 15.99% of its graduates transitioning to Lisboa, further illustrating Lisboa's role as a central educational destination. In summary, most of the students do stay within their original Bachelor's districts, but it is obvious that many transition to the more major educational cities of Lisboa and Porto.

Table 4: Transition Matrix by Region from Bachelor to Master

Bachelor \ Master	Master						
	North	Centre	South	Lisboa	Porto	Azores	Madeira
North (N = 22,762)	79.95%	3.37%	0.41%	2.95%	13.19%	0.08%	0.06%
Centre (N = 36,920)	3.50%	74.24%	1.48%	10.77%	9.87%	0.08%	0.06%
South (N = 15,638)	1.20%	6.01%	62.18%	27.75%	2.62%	0.13%	0.12%
Metropolitan Area of Lisboa (N = 51,530)	0.42%	1.74%	2.49%	94.02%	1.23%	0.06%	0.04%

Metropolitan Area of Porto (N = 33,639)	7.09%	3.09%	0.41%	5.16%	84.18%	0.05%	0.02%
Azores (N = 1,468)	3.41%	6.74%	2.59%	10.69%	5.45%	71.05%	0.07%
Madeira (N = 1,739)	3.51%	9.20%	2.47%	15.99%	9.03%	0.12%	59.69%

Note: The results are aggregated as follows: North (Braga, Bragança, , Viana do Castelo, Vila Real), Centre (Aveiro, Castelo Branco, Guarda, Leiria, and Viseu), South (Beja, Évora, Faro, Portalegre, Santarém, and Setúbal).

In summary, most students remain in the same field for their Master's, public institutions see higher retention rates than private ones, students generally improve their scores in their Master's degrees, and regional transition trends show significant relocations to major cities like Lisbon and Porto for Master's studies. Ultimately, these transition patterns reveal critical insights into the choices and movements of students within the academic landscape.

5. Econometric Strategy

This chapter describes the econometric strategy employed to analyse the factors that significantly impact students' decision to enrol, or not, in a Master's program. Due to the binary nature of this variable, LRM were employed, where the dependent variable was coded as 1 if the individual enrolled in a Master's program, and as 0 if otherwise. This approach allows for the estimation of the predicted probability of enrolment based on the individual influence of various personal and institutional characteristics.

Furthermore, fixed effects for graduation year, field of study, and district were incorporated to account for systematic differences that could influence the outcomes and bias the results. Graduation year was controlled to adjust for temporal variations, such as changes in labour markets or education policies that might impact students differently depending on when they graduated. Field of study was included to account for disciplinary differences, recognizing that various fields have distinct job prospects and educational requirements, which could shape students' mobility and higher education enrolment choices. District was controlled to account for regional disparities, such as variations in educational resources or local economic conditions, which could affect access to opportunities for higher education and career mobility. For the estimation of the parameters, a MLE approach was employed, as it is well-suited for binary outcome models and provides efficient, consistent estimates by maximizing the likelihood of observing the given data.

The methodology involved building five LRM, progressively adding more independent variables. The final model and the probability of student i entering a Master can be specified as follows:

$$\begin{aligned} P(\text{Entering a Master}) = f(&\beta_0 + \beta_1 \text{Female}_i + \beta_2 \text{Age}_i \\ &+ \beta_3 \text{Mother Medium Education}_i \\ &+ \beta_4 \text{Mother High Education}_i \\ &+ \beta_5 \text{Father Medium Education}_i \\ &+ \beta_6 \text{Father High Education}_i + \beta_7 \text{Public}_i \\ &+ \beta_8 \text{University}_i + \beta_9 \text{Final Undergraduate GPA}_i \\ &+ \beta_{10} \text{Number of Enrolments}_i + \gamma_F + \delta_D + \theta_T) \end{aligned} \quad (1)$$

Where:

- f is the logistic cumulative distribution function
- β_0 is the intercept.
- $\beta_1, \beta_2, \dots, \beta_{10}$ are the coefficients for the respective independent variables.
- γ_F represents the fixed effects for the Bachelor field of study.
- δ_D represents the fixed effects for the Bachelor HEI district.
- θ_T represents the fixed effects for the graduation year.

The incremental framework allowed for a dynamic inclusion of different predictors, and a clear assessment of the models' explanatory power and significance of the added variables. The first model accounts for basic demographics, such as gender, age at bachelor graduation, and bachelor graduation year. For the second model, variables related to the mother's and father's "Medium" and "High" education levels were included. In the third model were incorporated institutional characteristics, with variables pertaining to the sector (private or public) and subsector (university or polytechnic) of the institutions attended at Bachelor level. The fourth model additionally considers Bachelor final GPA and number of enrolments until the completion of the degree. For the fifth model were added the field of study (ISCED-F 2013 broad approach) and the district of Bachelor institution, both as fixed effects.

6. Results

This chapter presents the findings from the econometric analysis aimed at understanding the determinants of students' enrolment decisions in Master's programs. Building upon the econometric strategy outlined in the previous section, this chapter provides an analysis of the results obtained from the five LRM, in more detail for the last one. In Table A12 are presented the results for the predicted coefficients, and in Table 5 can be found the AME of the LR analysis. Unlike coefficients (β) that indicate changes in the log-odds scale, AME provide an intuitive interpretation by showing how the predicted probability of the outcome changes with each predictor, while holding all other variables constant. This makes AME a useful tool for interpreting the practical impact of the predictor variables on the likelihood of the outcome.

Table 5: Marginal Effects of the Logistic Regressions for the Probability of Enrolling in a Master program within two years after completing a Bachelor's degree

	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Female	-0.027	***	-0.027	***	-0.019	***	-0.032	***	-0.008	***
	(0.001)		(0.002)		(0.002)		(0.002)		(0.002)	
Age	-0.022	***	-0.023	***	-0.019	***	-0.014	***	-0.013	***
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Mother Education (Medium)			0.008	***	0.000		0.003	*	0.009	***
			(0.001)		(0.002)		(0.002)		(0.002)	
Mother Education (High)			0.035	***	0.010	***	0.013	***	0.014	***
			(0.002)		(0.002)		(0.002)		(0.0020)	
Father Education (Medium)			0.012	***	-0.001		0.002		0.004	**
			(0.002)		(0.002)		(0.002)		(0.003)	
Father Education (High)			0.036	***	0.008	***	0.012	***	0.012	***
			(0.002)		(0.002)		(0.002)		(0.003)	
University					0.250	***	0.248	***	0.188	***
					(0.001)		(0.001)		(0.002)	
Public					0.119	***	0.130	***	0.102	***
					(0.002)		(0.002)		(0.002)	
Final GPA							0.158		0.031	***
							(0.002)		(0.001)	
Number of Enrolments							-0.103		-0.048	***
							(0.001)		(0.001)	
Field of Study Fixed Effects	No		No		No		No		Yes	

District Fixed Effects	No	No	No	No	Yes
N	426,266	370,672	370,672	370,672	370,672
AIC	1.280	1.285	1.208	1.181	1.105
BIC	-4,980,000	-4,277,000	-4,305,000	-4,315,000	-4,343,000
LR	22,108.513	20,533.421	48,985.379	59,286.682	87,261.105
McFadden's R-squared	0.039	0.041	0.097	0.119	0.175

*Significance levels: *** p -value < 0.01; ** p -value < 0.05; * p -value < 0.10.*

6.1. Probability of Master Enrolment

Overall, the results demonstrate strong statistical significance across most variables (p -value < 0.01), with notable improvements in model quality as additional variables were incorporated. From the first basic specification to the fifth that included socioeconomic status, institutional characteristics, academic background, field of study, and regional factors, the McFadden's Pseudo-R-squared increased from 0.039 in the first model to 0.175. This indicates that the inclusion of these variables contributed to the final model's ability to explain the likelihood of students enrolling in a Master's program.

When examining the variable for gender, being female consistently decreases the likelihood of enrolling in a Master's program. The AME for Model (5) (to be considered onwards) reveal that women are 0.8 percentage points less likely to enrol in a Master's program compared to men. Despite this lower likelihood, women still outnumber men at both the Bachelor's and Master's levels. This is because more women enrol in Bachelor's programs, and their overall numbers remain higher, even though a slightly smaller percentage move on to postgraduate studies.

Age also plays a negative role in Master's enrolment. The AME indicate that each additional year of age reduces the predicted probability of enrolling by 1.3 percentage points. Therefore, younger students are more prone to continue their studies shortly after completing their Bachelor's degree, whereas older students might face different career priorities, family responsibilities, or financial constraints, which diminish their likelihood of pursuing further education.

Parental education exhibits a strong positive influence on the decision to pursue a Master's degree. The AME indicate that having a mother with medium educational attainment increases the probability of enrolling by 0.9 percentage points, while a mother with a higher education level increases this likelihood by 1.4 percentage points. A similar trend is observed for father's education, where medium and high educational attainment raise the probability of Master's enrolment by 2.7 and 2.9 percentage points, respectively. These findings highlight the role of family background and parental expectations in shaping educational pathways, where higher parental education levels likely provide better social and financial support for continued studies.

The type of institution attended for a Bachelor's degree has a significant impact on Master's enrolment as well. Graduating from a university, as opposed to a polytechnic, increases the likelihood of enrolling in a Master's program by 17.8 percentage points. This substantial effect emphasizes not only the perceived prestige associated with universities but also the wider range of majors they offer. With more diverse academic programs, universities are able to fulfil the preferences of a broader group of students. Furthermore, attending a public institution at the Bachelor's level increases the likelihood of enrolling in a Master's program by 9.1 percentage points. This could be partly due to the lower tuition fees at public HEI, which relieve the financial burdens of pursuing further education. Additionally, many Portuguese public HEI are highly ranked internationally, enhancing their academic reputation and appeal.

A higher final GPA at the Bachelor's level significantly increases the likelihood of pursuing a Master's program. The AME suggest that for each additional GPA point, the probability of enrolling in a Master's rises by 13.6 percentage points, emphasizing the strong influence of academic success on future educational pursuits. According to other researchers, this happens because students with higher GPA are often more competitive for Master's programs and are more likely to meet the entry requirements. Furthermore, high academic performance may reflect greater academic ability and ambition, leading these students to pursue further education.

Lastly, the variable representing the number of enrolments (*i.e.* years taken to complete a Bachelor's degree) negatively affects Master's enrolment. The AME show that each additional enrolment reduces the probability of continuing to a Master's by 7.1 percentage

points. This seems to suggest that students who take longer to complete their Bachelor's studies might face greater academic or personal challenges, which could diminish their incentives or capacity to pursue further education.

In summary, these results provide a nuanced understanding of the factors influencing Master's enrolment, with gender, age, parental education, institutional characteristics, academic performance, and time to complete a Bachelor's degree all playing significant roles. The findings highlight the interplay between individual characteristics and broader systemic factors in shaping educational trajectories, emphasizing the importance of both personal circumstances and institutional contexts in students' decisions to pursue advanced degrees

7. Discussion

The growing recognition of the value of academic qualifications has led an increasing number of students to pursue postgraduate studies, with the intention to reinforce their career prospects and maximize their earning potential (Borland et al., 2000; Malgwi, et al., 2005). Furthermore, previous research has consistently emphasized the deep impact that decisions regarding higher education can have on both individual progress and societal development. After analysing the data provided by DGEEC, significant remarks can be made, revealing a complex relationship between demographic, socioeconomic, and academic factors, and how they interact to shape Master's enrolment decisions and the overall higher education structure.

One of the primary findings is the significant gender disparity in Master's enrolment. The consistent negative coefficient for the gender variable across all models underscores a persistent challenge: women are less likely to pursue advanced degrees compared to their male colleagues. This is consistent with other research that finds that there are structural barriers that block women's educational and occupational progress. For instance, Sloane et al. (2001) point out that although improvements have been noticed in gender parity, equal economic returns have not been yet achieved. The fact that relatively fewer women go to Master's programs may also account for the continuing gender wage gap, seeing as how advanced education generally results in better jobs and higher income (Somani, 2021).

Besides the gender gap, the econometric analysis showed an inverse relationship between age and the probability of pursuing a Master's degree. (Alyahyan Düşteğör, 2020) This could be due to the fact that many older students have a hard time balancing their education with their personal and/or professional lives. Also, students who come from more educated families tend to go on to get more advanced degrees because they have stronger family support systems, and many other resources (Zhang, 2005). To foster a more equitable educational environment, policies must account for these intersecting challenges, supporting students from diverse backgrounds and those encountering additional obstacles due to demographic characteristics.

The reasons for entering a Master's program are not solely due to individual qualities, but also largely due to an academic background and institutional biases. It turns out that those who graduate from university are more likely to go on to doing a masters, and those

who graduate from a polytechnic are much less likely to do so. This finding is consistent with Shamsuddin (2016) view, who notes that the selectivity and perceived prestige of an institution can influence students' educational trajectories. On the other hand, students graduated from public HEI are more likely to continue with Master's programs than students graduated from private HEI. Public institutions, in particular universities, typically have extensive networks, robust academic support systems, and a diverse range of majors, which can foster the motivation behind Master's enrolment. Then again, most private schools will have fairly expensive tuition which will incur great debts that not all will be able or willing to afford.

The results of the research also show that there is a very high correlation between the final undergraduate GPA and deciding to enrol in a Master's program, proving once again that performance in previous years really does matter not only for the ranking at the admission process. This finding aligns with Finn et al. (2014), who suggest that high academic achievement is a predictor of further educational pursuits. Conversely, the negative impact the number of enrolments has on the likelihood of pursuing a Master's program, suggests that extended undergraduate studies undermine the probability of Master's enrolment, potentially due to financial or motivational challenges.

For the final remarks, some policy suggestions are worth mentioning. Besides from affecting the individual directly, investments in higher education have shown to yield high returns to societies and governments. These impacts may justify the implementation of government policies targeting increased investments in higher education (Borland, et. al, 2000) as we have seen happen over the last couple decades. Additionally, the geographic and temporal variability of economic returns to higher education emphasizes the necessity for localized policies, able to capture regional and temporal trends (Moretti, 2004). As for government subsidies, if they impact and transpire to all disadvantaged students, instead of just the low-income ones, enrolment gaps can be decreased without changes in total participation or governmental costs (Declercq & Verboven, 2015).

Understanding students' behaviours and long-term outcomes can be relevant since school education levels. Students should therefore be provided with a clear and meaningful guidance, such as robust career and academic counselling structures, capable of aligning the individuals' interests with personal preferences and labour market demands enrolment and

major selection (San Pedro et al., 2015). This information could be helpful to policy makers in creating more targeted intervention programs to try to boost the number of Master students, specifically the ones that come from more underrepresented segments of the population. Financial aid programs, mentorship programs, career counselling services that target the socioeconomic gaps discussed could help eliminate some barriers and create more educational equality. Further research could build off of this research in many aspects. It would be interesting to see some longitudinal studies following people's careers in the labour market and the results of their Master's acceptance/denial and other academical decisions. Additionally, qualitative research methods could explore the subjective experiences and motivations driving educational choices among diverse student clusters, complementing the quantitative findings of this investigation. Comparative analyses across different national contexts could also enrich the knowledge about educational systems' unique properties and their similarities and interaction with other systems.

While the findings offer valuable insights, a few limitations must be acknowledged. Although the study includes both public and private institutions, universities and polytechnics, unobserved institutional characteristics may still exist. Factors such as support mechanisms, facility quality, or internal policies could still influence Master's enrolment decisions, but were not captured by this analysis. In line, other pertinent variables, such as personal preferences and labour market conditions were not included. These factors can impact decisions about continuing education but can be difficult to quantify and measure reliably. Also, STEM majors might be underrepresented because people in those majors tend to go straight to Integrated Masters, and those aren't included in the study. Lastly, even though the Portuguese HE system is similar to other European countries in their educational structures, the conclusions may not completely transfer to other higher education systems that function under different controlling environments

8. Conclusions

In recent times, the popularity of higher education has escalated, largely due to the increasing labour market returns linked with advanced degrees. This trend has intensified the study of factors influencing students' decisions to pursue further education, however, there remains a notable lack of attention dedicated to the transition from Bachelor's to Master's programs. This dissertation addresses that issue by examining factors such as demographic characteristics, institutional background, and academic achievements, which drive or deter students from continuing their academic studies. The findings reveal significant disparities in enrolment patterns, highlighting the need for targeted policies and interventions.

The findings of this study align with and contribute to existing literature on educational decision-making and socioeconomic determinants of educational outcomes. Similar studies in other national contexts have identified gender, age, and parental education as influential factors in educational transitions. By focusing specifically on the Portuguese higher education system, the main results are congruent, since being female, older, and from less educated families, grants the individual a lower likelihood of enrolling in Master's program in Portugal.

In conclusion, this dissertation has clarified some of the determinants of Master enrolment within the Portuguese higher education system. As the nature of higher education continues to change, it becomes even more imperative to understand this and other decisions and interactions, in order to provide truly inclusive educational experiences and to help students realize their academic and career goals. In order to do so, however, policymakers and stakeholders must compete with the intricacies of educational preferences, and hopefully, in doing so, lay the groundwork for a more egalitarian and accessible system of higher education, one that enables all students to not only survive, but flourish and participate in the society that they will inherit.

Appendixes

Appendix I: Additional Tables

Table A1: Variables considered for the research, and respective descriptions

Variable name	Description
<i>Entering master</i>	Dummy variable, 1 if the student enrolled in a Master within two years after completing a Bachelor degree, 0 otherwise.
<i>Female</i>	Dummy variable, 1 if the Bachelor graduate is female, 0 otherwise.
<i>Age</i>	Age, in years, at Bachelor graduation.
<i>Mother Education Low</i>	Dummy variable, 1 if Bachelor students' mothers have "Low" levels of education, 0 otherwise (Table 7, Annex I)
<i>Mother Education Medium</i>	Dummy variable, 1 if Bachelor students' mothers have "Medium" levels of education, 0 otherwise (Table 7, Annex I)
<i>Mother Education High</i>	Dummy variable, 1 if Bachelor students' mothers have "High" levels of education, 0 otherwise (Table 7, Annex I)
<i>Father Education Low</i>	Dummy variable, 1 if Bachelor students' fathers have "Low" levels of education, 0 otherwise (Table 7, Annex I)
<i>Father Education Medium</i>	Dummy variable, 1 if Bachelor students' fathers have "Medium" levels of education, 0 otherwise (Table 7, Annex I)
<i>Father Education High</i>	Dummy variable, 1 if Bachelor students' fathers have "High" levels of education, 0 otherwise (Table 7, Annex I)
<i>First in Family</i>	Dummy variable, 1 if the student is the first in the family to attain a higher education degree, 0 otherwise.
<i>Final GPA Undergraduate</i>	Final grade (10 to 20) of the Bachelor degree.
<i>Number of enrolments</i>	Number of enrolments in Bachelor until completion.
<i>Public</i>	Dummy variable, 1 if the higher education institutions is public, 0 otherwise.
<i>University</i>	Dummy variable, 1 if the higher education institution is a university, 0 otherwise.
<i>Graduation year</i>	Year of Bachelor graduation.
<i>District</i>	Geographical classification according to Portuguese districts.
<i>Field of Study</i>	Student's Bachelor field of study according to the ISCED-F 2013 broad approach – Table A20.

Table A2: Number of Bachelor and Master graduates by enrolments until completion (in years).

Enrolments until completion	Bachelor graduates (N = 426,266)	%	Master graduates (N = 56,643)	%
1	7,658	1.80%	1,014	1.79%
2	14,691	3.45%	39,985	70.59%
3	210,992	49.50%	12,493	22.06%
4	122,135	28.65%	2,490	4.40%
5	39,180	9.19%	528	0.93%
6	16,083	3.77%	88	0.16%
7	7,432	1.74%	36	0.06%
8	3,569	0.84%	6	0.01%
9	4,526	1.06%	3	0.01%

Table A3: Number of Bachelor graduates and Master students by institutional subsector

District	Bachelor graduates (N = 426,266)				Master students (N = 163,696)			
	Public	%	Private	%	Public	%	Private	%
Aveiro	2,934	97.02%	90	2.98%	7,356	95.24%	368	4.76%
Beja	201	97.10%	6	2.90%	666	95.69%	30	4.31%
Braga	2,532	86.65%	390	13.35%	13,304	86.94%	1,999	13.06%
Bragança	351	99.15%	3	0.85%	1,626	98.97%	17	1.03%
Castelo Branco	1,430	98.01%	29	1.99%	4,627	98.11%	89	1.89%
Coimbra	4,747	92.30%	396	7.70%	12,763	93.54%	882	6.46%
Évora	878	97.99%	18	2.01%	2,596	97.59%	64	2.41%
Faro	924	95.95%	39	4.05%	2,621	93.71%	176	6.29%
Guarda	64	98.46%	NA		367	99.46%	NA	
Leiria	1,239	97.56%	31	2.44%	3,481	96.72%	118	3.28%

Lisboa	17,473	80.54%	4,223	19.46%	46,543	78.08%	13,064	21.92%
Portalegre	118	100.00%	NA		412	98.80%	5	1.20%
Porto	10,278	69.68%	4,473	30.32%	25,396	70.07%	10,846	29.93%
Santarém	406	94.86%	22	5.14%	1,317	92.29%	110	7.71%
Setúbal	901	84.76%	162	15.24%	3,308	85.54%	559	14.46%
Viana do Castelo	460	97.05%	14	2.95%	1,512	97.11%	45	2.89%
Vila Real	792	98.26%	14	1.74%	3,783	97.30%	105	2.70%
Viseu	411	94.70%	23	5.30%	1,211	96.11%	49	3.89%
Island of Azores	308	99.04%	3	0.96%	1,150	99.22%	9	0.78%
Island of Madeira	258	99.61%	NA		1,095	97.77%	25	2.23%

Table A4: Number of Bachelor graduates and Master students by institutional sector

District	Bachelor graduates (N = 426,266)				Master students (N = 163,696)			
	University	%	Polytechnic	%	University	%	Polytechnic	%
Aveiro	9,456	59.98 %	6,308	40.02 %	5,694	73.72 %	2,030	26.28 %
Beja	NA		3,965	100.0 0%	76	10.92 %	620	89.08 %
Braga	17,481	65.04 %	9,396	34.96 %	11,918	77.88 %	3,385	22.12 %
Bragança	19	0.20%	9,570	99.80 %	59	3.59%	1,584	96.41 %
Castelo Branco	7,544	54.50 %	6,298	45.50 %	3,260	69.13 %	1,456	30.87 %
Coimbra	19,285	50.46 %	18,931	49.54 %	9,296	68.13 %	4,349	31.87 %
Évora	7,238	91.95 %	634	8.05 %	2,423	91.09 %	237	8.91%
Faro	5,097	44.27 %	6,417	55.73 %	1,708	61.07 %	1,089	38.93 %
Guarda	NA		3,892	100%	26	7.05%	343	92.95 %

Leiria	129	0.78%	16,364	99.22%	315	8.75%	3,284	91.25%
Lisboa	95,648	71.98%	37,225	28.02%	47,971	80.48%	11,636	19.52%
Portalegre	NA		3,289	100%	22	5.28%	395	94.72%
Porto	43,257	51.43%	40,855	48.57%	22,978	63.40%	13,264	36.60%
Santarém	NA		8,506	100%	127	8.90%	1,300	91.10%
Setúbal	3,895	28.57%	9,740	71.43%	2,130	55.08%	1,737	44.92%
na do Castelo	104	1.55%	6,611	98.45%	127	8.16%	1,430	91.84%
Vila Real	9,179	87.42%	1,321	12.58%	3,407	87.63%	481	12.37%
Viseu	407	4.40%	8,833	95.60%	134	10.63%	1,126	89.37%
and of Azores	3,529	82.47%	750	17.53%	1,107	95.51%	52	4.49%
nd of Madeira	3,956	77.68%	1,137	22.32%	1,057	94.38%	63	5.63%

Table A5: Number of Bachelor graduates by graduation year

District	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Aveiro (N = 15,764)	1,532	1,452	1,451	1,450	1,535	1,575	1,491	1,587	1,749	1,942
Beja (N = 3,965)	535	457	502	376	347	340	332	370	328	378
Braga (N = 26,877)	2,514	2,706	2,461	2,378	2,373	2,475	2,510	2,656	2,942	3,862
Bragança (N = 9,589)	1,042	959	871	782	874	915	824	1,053	1,210	1,059
Castelo Branco (N = 13,842)	1,485	1,353	1,316	1,341	1,264	1,332	1,363	1,424	1,513	1,451

Coimbra (N = 38,216)	3,624	3,649	3,569	3,659	3,671	3,575	3,591	4,007	4,607	4,264
Évora (N = 7,872)	710	700	769	781	726	806	771	868	906	835
Faro (N = 11,514)	1,411	1,261	1,093	992	944	1,045	1,047	1,097	1,321	1,303
Guarda (N = 3,892)	380	363	377	337	331	420	395	343	537	409
Leiria (N = 16,493)	1,757	1,661	1,555	1,431	1,528	1,618	1,660	1,732	1,834	1,717
Lisboa (N = 132,873)	12,646	12,337	12,553	12,104	12,578	13,443	13,195	14,468	14,786	14,763
Portalegre (N = 3,289)	438	387	316	305	243	316	311	326	315	332
Porto (N = 84,112)	8,174	7,922	7,682	7,579	7,744	8,181	8,322	9,024	9,400	10,084
Santarém (N = 8,506)	945	846	802	686	837	769	841	946	890	944
Setúbal (N = 13,635)	1,611	1,404	1,386	1,210	1,178	1,221	1,326	1,372	1,431	1,496
Viana do Castelo (N = 6,715)	691	683	625	642	733	700	657	617	689	678
Vila Real (N = 10,500)	1,028	1,061	1,133	1,081	956	958	999	1,051	1,154	1,079
Viseu (N = 9,240)	1,086	1,002	946	786	911	924	834	933	947	871
Island of Azores (N = 4,279)	444	504	529	494	513	500	482	520	600	507
Island of Madeira (N = 5,093)	498	488	450	440	398	366	416	448	466	309

Table A6: Number of Master graduates by graduation year

District	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021	2021/2022
Aveiro (N = 3,024)	4	216	292	396	335	382	384	449	566

Beja (N = 207)	NA	32	25	34	19	25	24	12	36
Braga (N = 2,919)	4	173	195	307	285	438	562	484	472
Bragança (N = 354)	NA	25	38	33	39	43	56	33	86
Castelo Branco (N = 1,459)	15	152	232	157	120	108	208	202	265
Coimbra (N = 5,139)	14	348	519	533	499	460	869	971	926
Évora (N = 896)	5	49	98	98	127	111	157	135	116
Faro (N = 963)	NA	54	91	124	116	131	164	139	144
Guarda (N = 65)	NA	NA	24	3	9	3	5	6	13
Leiria (N = 1,270)	12	95	124	170	155	159	208	180	167
Lisboa (N = 21,682)	103	1,574	1,914	2,367	2,698	3,039	3,229	3,436	3,322
Portalegre (N = 118)	NA	4	13	10	24	13	16	14	24
Porto (N = 14,715)	26	1,091	1,467	1,738	1,748	1,698	1,881	2,169	2,897
Santarém (N = 428)	NA	35	73	57	44	59	53	51	56
Setúbal (N = 1,063)	6	101	107	117	119	117	108	155	233
Viana do Castelo (N = 474)	NA	32	72	73	60	71	39	85	42
Vila Real (N = 806)	NA	48	149	121	117	109	112	127	23
Viseu (N = 434)	NA	49	67	85	47	44	61	59	22
Island of Azores (N = 309)	NA	34	53	43	NA	17	32	74	56
Island of Madeira (N = 259)	NA	45	17	NA	31	39	39	69	18

Note: The 58 students missing from the 56,643 Master graduates are students who graduated in 2022/2023 (53 individuals) or are expected to complete their degrees by 2025/2026 (5 individuals).

Table A7: Average Bachelor and Master final GPA by District

Academic Year	Bachelor graduates' GPA (N = 426,266)	Master graduates' GPA (N = 56,643)
Aveiro	13.97	16.26
Beja	13.65	15.58
Braga	13.90	16.18
Bragança	13.39	15.50
Castelo Branco	13.53	16.02
Coimbra	13.62	16.00
Évora	13.85	15.98
Faro	13.80	16.14
Guarda	13.60	15.83
Leiria	14.37	16.06
Lisboa	13.97	16.05
Portalegre	13.82	15.64
Porto	13.80	15.96
Santarém	13.72	15.86
Setúbal	14.01	16.30
Viana do Castelo	13.61	15.71
Vila Real	13.74	16.13
Viseu	13.62	15.62
Madeira Island	14.06	16.69
Açores Island	13.72	16.00

Table A8: Distribution of female and male Bachelor graduates by field of study

Field of Study	Male (N = 169,878)	%	Female (N = 256,388)	%
Education	983	7.31%	12,471	92.69%
Arts and Humanities	21,249	36.67%	36,704	63.33%
Social Sciences, Journalism, and Information	18,541	33.54%	36,745	66.46%
Business, Administration, and Law	41,492	39.12%	64,560	60.88%
Natural Sciences, Mathematics, and Statistics	8,829	37.82%	14,514	62.18%
Information and Communication Technologies	5,632	82.10%	1,228	17.90%
Engineering, Manufacturing, and Construction	39,259	74.07%	13,740	25.93%
Agriculture, Forestry, Fisheries, and Veterinary	2,755	47.05%	3,100	52.95%
Health and Welfare	11,400	16.61%	57,221	83.39%
Services	19,738	55.07%	16,105	44.93%

Table A9: Distribution of female and male Master students by field of study

Field of Study	Male (N = 65,363)	%	Female (N = 98,333)	%
Education	4,241	23.90%	13,507	76.10%
Arts and Humanities	5,446	34.71%	10,243	65.29%
Social Sciences, Journalism, and Information	7,017	29.52%	16,757	70.48%
Business, Administration, and Law	16,683	37.09%	28,294	62.91%
Natural Sciences, Mathematics, and Statistics	5,512	38.46%	8,821	61.54%
Information and Communication Technologies	2,142	69.68%	932	30.32%
Engineering, Manufacturing, and Construction	17,716	67.03%	8,714	32.97%
Agriculture, Forestry, Fisheries, and Veterinary	1,328	54.79%	1,096	45.21%
Health and Welfare	1,122	14.49%	6,623	85.51%
Services	4,156	55.40%	3,346	44.60%

Table A10: Transition Matrix by Final GPA from Bachelor to Master

Master Bachelor	10	11	12	13	14	15	16	17	18	19	20

10 values (N = 3)	0.00%	0.00%	33.33%	33.33%	0.00%	0.00%	0.00%	0.00%	33.33%	0.00%	0.00%
11 values (N = 850)	0.00%	2.24%	5.88%	15.65%	30.35%	26.12%	14.35%	4.00%	1.41%	0.00%	0.00%
12 values (N = 6,614)	0.05%	0.38%	2.25%	9.56%	23.07%	30.89%	23.03%	9.00%	1.71%	0.08%	0.00%
13 values (N = 12,693)	0.00%	0.12%	0.99%	4.10%	14.40%	28.63%	31.66%	16.21%	3.73%	0.15%	0.00%
14 values (N = 14,457)	0.00%	0.03%	0.39%	2.08%	8.07%	21.12%	34.67%	25.77%	7.42%	0.44%	0.00%
15 values (N = 11,588)	0.00%	0.00%	0.13%	0.87%	3.90%	13.14%	30.73%	35.23%	14.73%	1.27%	0.00%
16 values (N = 6,979)	0.00%	0.00%	0.04%	0.21%	1.86%	6.95%	21.59%	38.70%	26.85%	3.75%	0.03%
17 values (N = 2,717)	0.00%	0.00%	0.00%	0.15%	1.03%	3.17%	10.49%	29.67%	41.99%	13.25%	0.26%
18 values (N = 657)	0.00%	0.00%	0.00%	0.00%	0.61%	1.98%	4.87%	16.29%	47.18%	27.85%	1.22%
19 values (N = 85)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.71%	8.24%	32.94%	42.35%	11.76%
20 values (N = NA)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Note: This transition matrix only considers students who graduated Master's, as those are the ones with the most reliable final GPA.

Table A11: Transition Matrix by Region from Bachelor to Master

Master Bachelor	1 Aveiro	2 Beja	3 Braga	4 Bragança	5 Castelo Branco	6 Coimbra	7 Évora	8 Faro	9 Guarda	10 Leiria	11 Lisboa	12 Portalegre	13 Porto	14 Santarém	15 Setúbal	16 Viana do Castelo	17 Vila Real	18 Viseu	31 Madeira Island	42 São Miguel Island	43 Terceira Island
1 Aveiro (N = 55,700)	70.9 %	0.0 %	3.2 %	0.0 %	0.3 %	4.3 %	0.1 %	0.2 %	0.0 %	0.5 %	5.1 %	0.0 %	14.5 %	0.0 %	0.5 %	0.0 %	0.3 %	0.2 %	0.1 %	0.0 %	70.9 %
2 Beja (N = 42,130)	0.3 %	62.7 %	1.1 %	0.0 %	0.4 %	1.1 %	6.6 %	5.3 %	0.1 %	1.4 %	13.5 %	0.5 %	1.6 %	0.3 %	4.5 %	0.0 %	0.1 %	0.0 %	0.3 %	0.0 %	0.3 %
3 Braga (N = 36,986)	0.9 %	0.0 %	82.8 %	0.1 %	0.1 %	0.5 %	0.0 %	0.1 %	0.0 %	0.1 %	3.0 %	0.0 %	11.5 %	0.0 %	0.0 %	0.4 %	0.3 %	0.1 %	0.0 %	0.0 %	0.9 %
4 Bragança (N = 26,877)	2.8 %	0.0 %	8.0 %	61.3 %	0.5 %	1.5 %	0.0 %	0.3 %	0.2 %	0.6 %	2.7 %	0.0 %	14.8 %	0.1 %	0.2 %	0.6 %	5.7 %	0.4 %	0.2 %	0.4 %	2.8 %
5 Castelo Branco (N = 38,216)	3.8 %	0.0 %	3.6 %	0.1 %	67.0 %	4.0 %	0.4 %	0.3 %	0.3 %	0.7 %	10.9 %	0.2 %	6.1 %	0.5 %	0.9 %	0.0 %	0.5 %	0.6 %	0.1 %	0.0 %	3.8 %
6 Coimbra (N = 132,873)	3.6 %	0.0 %	2.2 %	0.1 %	0.4 %	67.2 %	0.1 %	0.2 %	0.1 %	1.1 %	12.9 %	0.0 %	10.4 %	0.2 %	0.5 %	0.2 %	0.4 %	0.3 %	0.0 %	0.1 %	3.6 %
7 Évora (N = 84,112)	3.0 %	0.5 %	1.1 %	0.0 %	1.0 %	3.6 %	52.8 %	1.3 %	0.0 %	0.8 %	28.1 %	0.2 %	2.7 %	0.3 %	3.6 %	0.0 %	0.5 %	0.2 %	0.1 %	0.0 %	3.0 %
8 Faro (N = 4,279)	1.6 %	1.4 %	1.0 %	0.0 %	0.5 %	2.3 %	1.8 %	63.4 %	0.0 %	0.6 %	21.4 %	0.0 %	3.8 %	0.1 %	1.4 %	0.0 %	0.3 %	0.1 %	0.1 %	0.2 %	1.6 %
9 Guarda (N = 5,093)	7.4 %	0.0 %	2.4 %	0.3 %	6.7 %	8.0 %	0.4 %	0.7 %	46.1 %	2.1 %	5.8 %	0.0 %	10.7 %	0.6 %	1.2 %	0.6 %	3.1 %	3.6 %	0.0 %	0.3 %	7.4 %
10 Leiria (N = 5,093)	3.0 %	0.0 %	2.0 %	0.1 %	1.0 %	6.0 %	0.3 %	0.5 %	0.0 %	65.1 %	15.0 %	0.0 %	3.9 %	1.3 %	0.8 %	0.1 %	0.2 %	0.4 %	0.1 %	0.1 %	3.0 %

11 Lisboa (N = 5,093)	0.3 %	0.1 %	0.3 %	0.0 %	0.3 %	0.7 %	0.4 %	0.3 %	0.0 %	0.4 %	94.0 %	0.0 %	1.2 %	0.3 %	1.5 %	0.0 %	0.1 %	0.0 %	0.0 %	0.1 %	0.3 %
12 Portalegre (N = 5,093)	1.00 %	0.67 %	1.67 %	0.33 %	4.67 %	2.50 %	4.17 %	1.00 %	0.00 %	3.01 %	12.3 5%	60.6 0%	1.84 %	1.84 %	3.34 %	0.17 %	0.17 %	0.50 %	0.00 %	0.17 %	1.00 %
13 Porto (N = 5,093)	1.75 %	0.00 %	6.42 %	0.05 %	0.15 %	1.01 %	0.07 %	0.17 %	0.01 %	0.11 %	5.16 %	0.00 %	84.1 8%	0.02 %	0.15 %	0.22 %	0.40 %	0.07 %	0.02 %	0.05 %	1.75 %
14 Santarém (N = 5,093)	0.70 %	0.00 %	0.35 %	0.05 %	0.75 %	4.47 %	1.46 %	0.65 %	0.05 %	4.72 %	25.3 6%	0.20 %	2.31 %	56.0 0%	1.41 %	0.10 %	0.85 %	0.05 %	0.20 %	0.30 %	0.70 %
15 Setúbal (N = 5,093)	0.49 %	0.20 %	0.27 %	0.07 %	0.07 %	1.28 %	0.40 %	0.20 %	0.00 %	0.25 %	38.6 8%	0.04 %	1.97 %	0.16 %	55.6 7%	0.00 %	0.11 %	0.02 %	0.04 %	0.07 %	0.49 %
16 Viana do Castelo (N = 5,093)	0.99 %	0.00 %	23.0 4%	0.04 %	0.00 %	0.65 %	0.13 %	0.17 %	0.04 %	0.26 %	1.04 %	0.00 %	14.4 8%	0.04 %	0.17 %	57.4 6%	1.34 %	0.04 %	0.04 %	0.04 %	0.99 %
17 Vila Real (N = 5,093)	3.44 %	0.00 %	13.3 2%	0.48 %	0.29 %	2.27 %	0.35 %	0.15 %	0.04 %	0.18 %	3.70 %	0.00 %	15.8 1%	0.02 %	0.33 %	0.48 %	58.6 9%	0.26 %	0.15 %	0.05 %	3.44 %
18 Viseu (N = 5,093)	7.37 %	0.00 %	3.13 %	0.15 %	1.92 %	9.39 %	0.05 %	0.25 %	0.66 %	0.45 %	5.86 %	0.05 %	12.7 3%	0.05 %	0.91 %	0.30 %	4.44 %	52.0 2%	0.15 %	0.10 %	7.37 %
31 Madeira Island (N = 5,093)	2.36 %	0.06 %	3.16 %	0.00 %	1.21 %	4.83 %	0.69 %	1.15 %	0.00 %	0.81 %	15.9 9%	0.00 %	9.03 %	0.12 %	0.46 %	0.00 %	0.35 %	0.00 %	59.6 9%	0.12 %	2.36 %
42 São Miguel Island (N = 5,093)	3.13 %	0.07 %	2.66 %	0.00 %	1.09 %	2.04 %	0.48 %	1.29 %	0.00 %	0.41 %	10.6 9%	0.00 %	5.45 %	0.00 %	0.75 %	0.14 %	0.61 %	0.07 %	0.07 %	71.0 5%	3.13 %
43 Terceira Island (N = 5,093)	70.8 8%	0.00 %	3.16 %	0.03 %	0.28 %	4.29 %	0.10 %	0.15 %	0.00 %	0.52 %	5.07 %	0.01 %	14.4 5%	0.04 %	0.46 %	0.03 %	0.29 %	0.15 %	0.07 %	0.03 %	70.8 8%

Table A12: Coefficients of the Logistic Regressions for the Probability of Enrolling in a Master program within two years after completing a Bachelor's degree

	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Female	-0.120 (0.007)	***	-0.121 (0.007)	***	-0.089 (0.007)	***	-0.158 (0.008)	***	-0.045 (0.008)	***
Age	-0.096 (0.001)	***	-0.102 (0.001)	***	-0.091 (0.001)	***	-0.067 (0.001)	***	-0.070 (0.001)	***
Mother Education (Medium)			0.035 (0.009)	***	0.001 (0.009)		0.015 (0.009)	*	0.047 (0.010)	***
Mother Education (High)			0.153 (0.010)	***	0.048 (0.010)	***	0.062 (0.011)	***	0.076 (0.011)	***
Father Education (Medium)			0.051 (0.009)	***	-0.004 (0.009)		0.011 (0.009)		0.023 (0.010)	**
Father Education (High)			0.159 (0.010)	***	0.041 (0.011)	***	0.060 (0.011)	***	0.063 (0.012)	***
University					1.195 (0.007)	***	1.222 (0.008)	***	1.005 (0.010)	***
Public					0.569 (0.010)	***	0.640 (0.010)	***	0.548 (0.011)	***
Final GPA							0.062 (0.003)	***	0.163 (0.003)	***
Number of Enrolments							-0.334 (0.004)	***	-0.258 (0.004)	***
Field of Study Fixed Effects	No		No		No		No		Yes	
District Fixed Effects	No		No		No		No		Yes	
N	426,266		370,672		370,672		370,672		370,672	
AIC	1.280		1.285		1.208		1.181		1.105	
BIC	-4,980,000		-4,277,000		-4,305,000		-4,315,000		-4,343,000	
LR	22,108.513		20,533.421		48,985.379		59,286.682		87,261.105	
McFadden's R-squared	0.039		0.041		0.097		0.119		0.175	

Significance levels: *** $p\text{-value} < 0.01$; ** $p\text{-value} < 0.05$; * $p\text{-value} < 0.10$.

Appendix II: Additional Figures

Figure A1: Students' distribution by age at Bachelor graduation, Master enrolment, and Master graduation. *Source: Own computation*

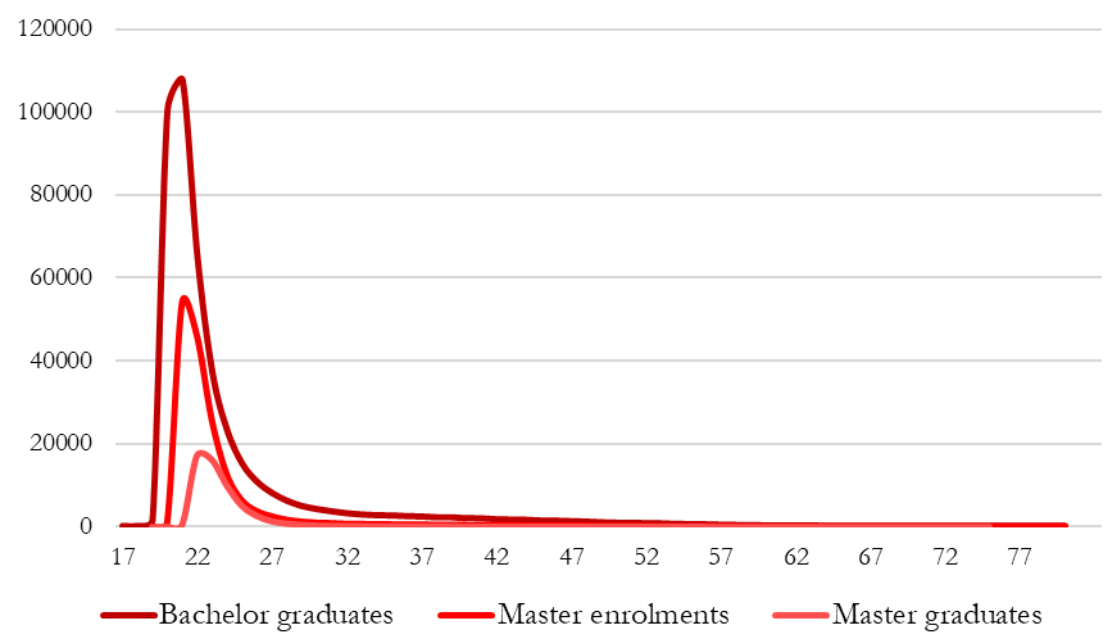
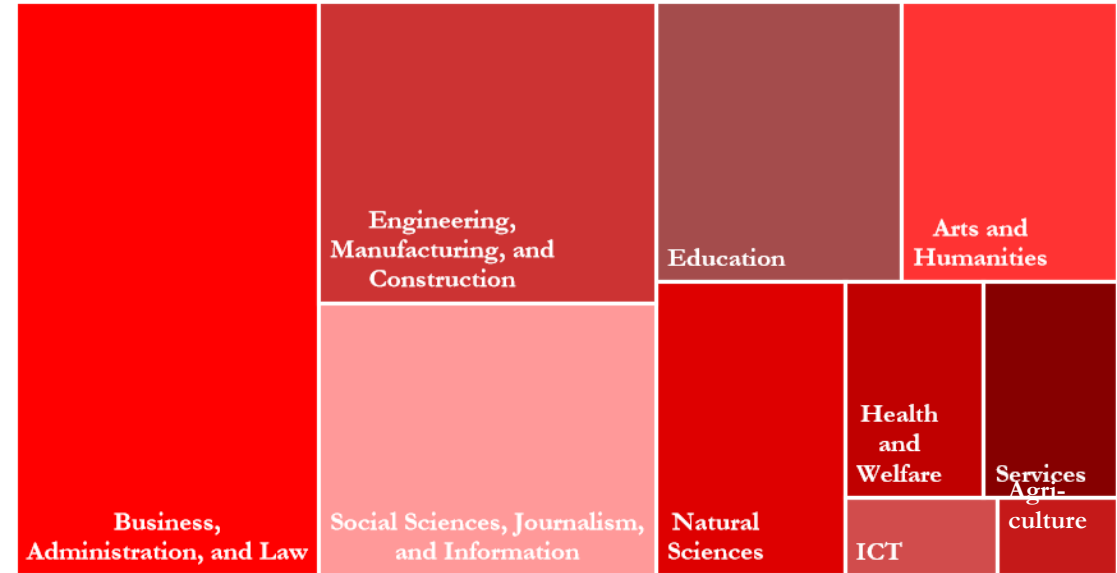


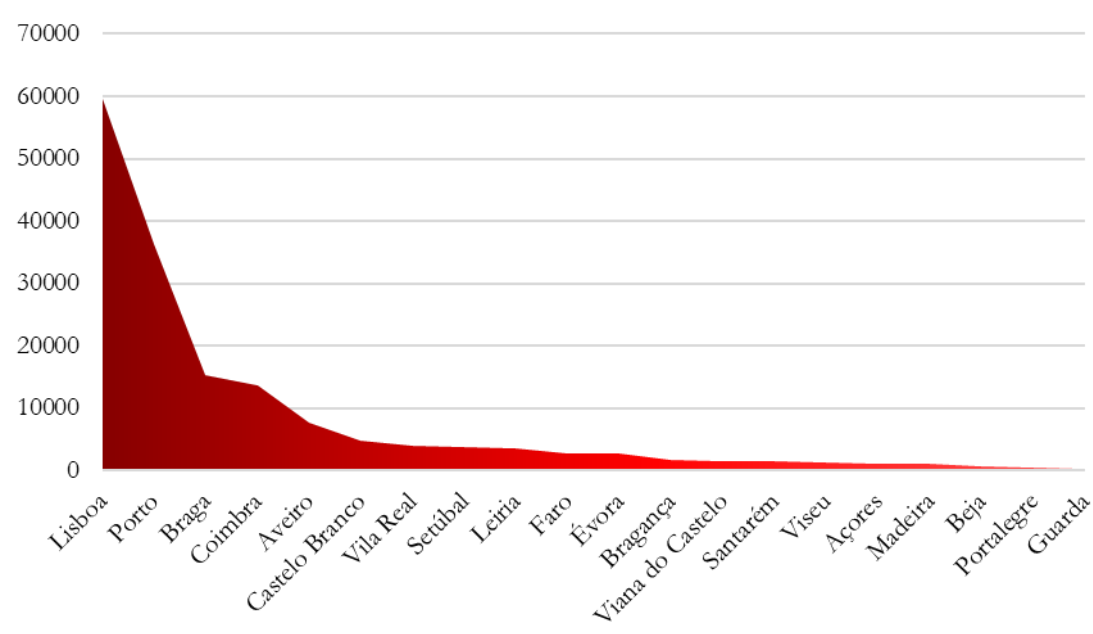
Figure A2: Tree map of Master students by Field of Study. *Source: Own computation*



Note: For some fields of study only the first word(s) was(were) displayed (full names available in Table 6, Annex I). The percentages corresponding to each field of study are: Education (10.84%), Arts and humanities (9.58%), Social Sciences, journalism, and information (14.52%), Business, administration, and law (27.48%), Natural Sciences, mathematics, and statistics (8.76%), Information and communication technologies (1.88%), Engineering,

manufacturing, and construction (16.15%), Agriculture, forestry, fisheries, and veterinary (1.48%), Health and Welfare (4.73%), and Services (4.58%)

Figure A3: Number of Master students by Portuguese District. *Source: Own Computation*



9. Bibliographic Reference

Almeida, A., Figueiredo, H., Cerejeira, J., Portela, M., Sa, C., & Teixeira, P. (2017). Returns to postgraduate education in Portugal: holding on to a higher ground? *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2949112>

Alyahyan, E., & Düşteğör, D. (2020). Predicting academic success in higher education: literature review and best practices. *International Journal of Educational Technology in Higher Education*, 17(1). <https://doi.org/10.1186/s41239-020-0177-7>

Balduf, M. (2009). Underachievement among college students. *Journal of advanced academics*, 20(2), 274-294. <https://doi.org/10.1177/1932202X0902000204>

Beffy, M., Fougère, D., & Maurel, A. (2012). Choosing the field of study in postsecondary education: Do expected earnings matter? *Review of Economics and Statistics*, 94(1), 334–347. https://doi.org/10.1162/rest_a_00212

Bijsmans, P., & Schakel, A. H. (2018). The impact of attendance on first-year study success in problem-based learning. *Higher Education*, 76(5), 865–881. <https://doi.org/10.1007/s10734-018-0243-4>

Blom, E., Cadena, B. C., & Keys, B. J. (2021). Investment over the Business Cycle: Insights from College Major Choice. *Journal of Labor Economics*, 39(4), 1043–1082. <https://doi.org/10.1086/712611>

Borland, J., Dawkins, P., Johnson, D., & Williams, R. (2000). Returns to investment in higher education. *University of Melbourne*, 1. https://doi.org/10.1007/978-1-349-26255-7_3

Bowman, H. (2005). ‘It’s a year and then that’s me’: masters students’ decision-making. *Journal of Further and Higher Education*, 29(3), 233–249. <https://doi.org/10.1080/03098770500166835>

Brand, J. E., & Xie, Y. (2010). Who Benefits Most from College?: Evidence for Negative Selection in Heterogeneous Economic Returns to Higher Education. *American Sociological Review*, 75(2), 273–302. <https://doi.org/10.1177/0003122410363567>

- Buonanno, P., & Pozzoli, D. (2009). Early labour market returns to college subject. *Labour*, 23(4), 559–588. <https://doi.org/10.1111/j.1467-9914.2009.00466.x>
- Cardoso, A. R., Portela, M., Sa, C., & Alexandre, F. (2008). Demand for higher education programs: The impact of the Bologna process. *CESifo Economic Studies*, 54(2), 229–247. <https://doi.org/10.1093/cesifo/ifn013>
- Causer, C. (2008). Masters of their domain. *IEEE Potentials*, 27(4), 17–18. <https://doi.org/10.1109/mpot.2008.928027>
- Correia, F., Amaral, A., & Magalhães, A. (2002). Public and Private Higher Education in Portugal: unintended effects of deregulation. *European Journal of Education*, 37(4), 457–472. <https://doi.org/10.1111/1467-3435.00121>
- Declercq, K., & Verboven, F. (2015). Socio-economic status and enrollment in higher education: do costs matter? *Education Economics*, 23(5), 532–556. <https://doi.org/10.1080/09645292.2015.1047822>
- Dillon, E. W., & Smith, J. A. (2019). The Consequences of Academic Match between Students and Colleges. *The Journal of Human Resources*, 55(3), 767–808. <https://doi.org/10.3368/jhr.55.3.0818-9702r1>
- Dynarski, S., Page, L., & Scott-Clayton, J. (2023). College costs, financial aid, and student decisions. *Handbook of the Economics of Education*, 227–285. <https://doi.org/10.1016/bs.hesedu.2023.03.006>
- Eide, E., Brewer, D. J., & Ehrenberg, R. G. (1998). Does it pay to attend an elite private college? Evidence on the effects of undergraduate college quality on graduate school attendance. *Economics of Education Review*, 17(4), 371–376. [https://doi.org/10.1016/s0272-7757\(97\)00037-x](https://doi.org/10.1016/s0272-7757(97)00037-x)
- Finn, A. S., Kraft, M. A., West, M. R., Leonard, J. A., Bish, C. E., Martin, R. E., Sheridan, M. A., Gabrieli, C. F. O., & Gabrieli, J. D. E. (2014). Cognitive skills, student achievement tests, and schools. *Psychological Science*, 25(3), 736–744. <https://doi.org/10.1177/0956797613516008>

Gao, F. (2023). Examining the role of institutional agents and school-based social capital in minority university choice and access. *Educational Review*, 1–16. <https://doi.org/10.1080/00131911.2023.2243394>

General Directorate for Education and Science Statistics (2023). Quarterly Informative Report (1). <https://info.dgeec.medu.pt/1/>

Gillen-O’Neel, C. (2021). Sense of belonging and student engagement: A daily study of first-and continuing-generation college students. *Research in higher education*, 62(1), 45-71. <https://doi.org/10.1007/s11162-019-09570-y>

Ha, H. (2020). The impact of family socio-economic status on access to higher education in Vietnam. *International Journal of Educational Sciences*, 28(1–3). <https://doi.org/10.31901/24566322.2020/28.1-3.1124>

Habes, M., Salous, M. H., & Jwaniat, M. I. A. (2022). Applying the Uses and Gratifications theory to college major choice using social networks online video. *The 8th International Conference on Advanced Machine Learning and Technologies and Applications*, 388–400. https://doi.org/10.1007/978-3-031-03918-8_33

Johnson, M. T. (2013). The impact of business cycle fluctuations on graduate school enrollment. *Economics of Education Review*, 34, 122–134. <https://doi.org/10.1016/j.econedurev.2013.02.002>

Kappe, R., & Van Der Flier, H. (2012). Predicting academic success in higher education: what’s more important than being smart? *European Journal of Psychology of Education*, 27(4), 605–619. <https://doi.org/10.1007/s10212-011-0099-9>

Karlson, K. B. (2019). College as equalizer? Testing the selectivity hypothesis. *Social Science Research*, 80, 216–229. <https://doi.org/10.1016/j.ssresearch.2018.12.001>

Kuncel, N. R., & Hezlett, S. A. (2007). Standardized tests predict graduate students' success. *Science*, 315(5815), 1080-1081. <https://doi.org/10.1126/science.1136618>

Long, M. C. (2010). Changes in the returns to education and college quality. *Economics of Education Review*, 29(3), 338–347. <https://doi.org/10.1016/j.econedurev.2009.10.005>

Long, M. C., Goldhaber, D., & Huntington-Klein, N. (2015). Do completed college majors respond to changes in wages? *Economics of Education Review*, 49, 1–14. <https://doi.org/10.1016/j.econedurev.2015.07.007>

Malgwi, C. A., Howe, M. A., & Burnaby, P. A. (2005). Influences on students' choice of college major. *Journal of Education for Business*, 80(5), 275–282. <https://doi.org/10.3200/joeb.80.5.275-282>

McCoy, S., & Byrne, D. (2017). Student retention in higher education. *Springer eBooks*, 111–141. https://doi.org/10.1007/978-3-319-48553-9_5

Melguizo, T. (2007). Quality Matters: Assessing the impact of attending more selective institutions on college completion rates of minorities. *Research in Higher Education*, 49(3), 214–236. <https://doi.org/10.1007/s11162-007-9076-1>

Montgomery, M. (2002). A nested logit model of the choice of a graduate business school. *Economics of Education Review*, 21(5), 471–480. [https://doi.org/10.1016/s0272-7757\(01\)00032-2](https://doi.org/10.1016/s0272-7757(01)00032-2)

Montmarquette, C., Cannings, K., & Mahseredjian, S. (2002). How do young people choose college majors? *Economics of Education Review*, 21(6), 543–556. [https://doi.org/10.1016/s0272-7757\(01\)00054-1](https://doi.org/10.1016/s0272-7757(01)00054-1)

Montt, G. (2015). The causes and consequences of field-of-study mismatch. *OECD Social Employment and Migration Working Papers*. <https://doi.org/10.1787/5jrxm4dhv9r2-en>

Moretti, E. (2004). Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data. *Journal of Econometrics*, 121(1–2), 175–212. <https://doi.org/10.1016/j.jeconom.2003.10.015>

Mullen, A. L., Goyette, K. A., & Soares, J. A. (2003). Who Goes to Graduate School? Social and Academic Correlates of Educational Continuation after College. *Sociology of Education*, 76(2), 143. <https://doi.org/10.2307/3090274>

Pallas, A. M. (2007b). Educational transitions, trajectories, and pathways. *Springer eBooks*, 165–184. https://doi.org/10.1007/978-0-306-48247-2_8

Porter, S. R., & Umbach, P. D. (2006). COLLEGE MAJOR CHOICE: An Analysis of Person–Environment Fit. *Research in Higher Education*, 47(4), 429–449. <https://doi.org/10.1007/s11162-005-9002-3>

Quinlan, K. M., & Renninger, K. A. (2022). Rethinking employability: how students build on interest in a subject to plan a career. *Higher Education*, 84(4), 863–883. <https://doi.org/10.1007/s10734-021-00804-6>

Rodrigues, M. D. L., & Heitor, M. (2015). 40 Anos de Políticas de Ciência e Ensino Superior em Portugal. *Coimbra, Almedina*. <https://doi.org/10.1050/24974307.2015.6791248>

Saadat, Z., Alam, S., & Rehman, M. (2022). Review of factors affecting gender disparity in higher education. *Cogent Social Sciences*, 8(1). <https://doi.org/10.1080/23311886.2022.2076794>

San Pedro, M. O., Baker, R. S., Heffernan, N. T., & Ocumpaugh, J. L. (2015). Exploring college major choice and middle school student behavior, affect and learning: What happens to students who game the system?. *Educational Data Mining*, 36-40. <https://doi.org/10.1145/2723576.2723610>

Sax, L. J. (2001). Undergraduate Science Majors: Gender differences in who goes to graduate school. *Review of Higher Education*, 24(2), 153–172. <https://doi.org/10.1353/rhe.2000.0030>

Shamsuddin, S. (2016). Berkeley or Bust? Estimating the causal effect of college selectivity on bachelor's degree completion. *Research in Higher Education*, 57(7), 795–822. <https://doi.org/10.1007/s11162-016-9408-0>

Sloane, C. M., Hurst, E. G., & Black, D. A. (2021). College majors, occupations, and the gender wage gap. *Journal of Economic Perspectives*, 35(4), 223-248. <https://doi.org/10.1257/jep.35.4.223>

Somani, R. (2021). The returns to higher education and public employment. *World Development*, 144, 105471. <https://doi.org/10.1016/j.worlddev.2021.105471>

Staniec, J. F. O. (2004). The effects of race, sex, and expected returns on the choice of college major. *Eastern Economic Journal*, 30(4), 549-562. <https://www.jstor.org/stable/40326147>

Teixeira, P., Rocha, V., Biscaia, R., & Cardoso, M. F. (2013). Competition and diversification in public and private higher education. *Applied Economics*, 45(35), 4949–4958. <https://doi.org/10.1080/00036846.2013.808310>

Tomlinson, M. (2012). Graduate Employability: A review of conceptual and Empirical themes. *Higher Education Policy*, 25(4), 407–431. <https://doi.org/10.1057/hep.2011.26>

Thomas, S. L., & Zhang, L. (2005). Post-Baccalaureate Wage Growth within Four Years of Graduation: The Effects of College Quality and College Major. *Research in Higher Education*, 46(4), 437–459. <https://doi.org/10.1007/s11162-005-2969-y>

Walker, I. (2020). Heterogeneity in the returns to higher education. *The Economics of Education*, 75-90. <https://doi.org/10.1016/B978-0-12-815391-8.00006-9>

Walker, I., & Zhu, Y. (2011). Differences by degree: Evidence of the net financial rates of return to undergraduate study for England and Wales. *Economics of Education Review*, 30(6), 1177–1186. <https://doi.org/10.1016/j.econedurev.2011.01.002>

Walker, I., & Zhu, Y. (2018). University selectivity and the relative returns to higher education: Evidence from the UK. *Labour Economics*, 53, 230–249. <https://doi.org/10.1016/j.labeco.2018.05.005>

Ward, G., & Dixon, H. (2014). The research masters experience: The impact of efficacy and outcome expectations on enrolment and completion. *Journal of Further and Higher Education*, 38(2), 163-181. <https://doi.org/10.1080/0309877X.2012.706804>

Webb, M. S., Coccari, R. L., Lado, A., Allen, L. C., & Reichert, A. K. (1997). Selection Criteria Used by Graduate Students in Considering Doctoral Business Programs Offered by Private vs. Public Institutions. *Journal of Marketing for Higher Education*, 8(1), 69–90. https://doi.org/10.1300/j050v08n01_06

Wolniak, G. C., Seifert, T. A., Reed, E. J., & Pascarella, E. T. (2008). College majors and social mobility. *Research in Social Stratification and Mobility*, 26(2), 123–139. <https://doi.org/10.1016/j.rssm.2008.02.002>

Zafar, B. (2013). College major choice and the gender gap. *The Journal of Human Resources*, 48(3), 545–595. <https://doi.org/10.3368/jhr.48.3.545>

Zhang, L. (2005). Advance to Graduate Education: The effect of college quality and undergraduate majors. *Review of Higher Education*, 28(3), 313–338. <https://doi.org/10.1353/rhe.2005.0030>

Annexes

Annex I: ISCED-F 2013

Table 6: International Standard Classification of Education according to the 2013 broad, narrow, and detailed approaches

Broad Field	Narrow Field	Detailed Field
00 Generic programmes and qualifications	001 Basic programmes and qualification	0011 Basic programmes and qualifications
	002 Literacy and numeracy	0021 Literacy and numeracy
	003 Personal skills and development	0031 Personal skills and development
01 Education	011 Education	0111 Education Science
		0112 Training for pre-school teachers
		0113 Teacher training without subject specialization
		0114 Teacher training with subject specialisation
02 Arts and Humanities	021 Arts	0211 Audio-visual techniques and media production
		0212 Fashion, interior and industrial design
		0213 Fine arts
		0214 Handicrafts
		0215 Music and performing arts
	022 Humanities (except languages)	0221 Religion and theology
		0222 History and archaeology
		0223 Philosophy and ethics
	023 Languages	0231 Language acquisition
		0232 Literature and linguistics
03 Social Sciences, Journalism, and Information	031 Social and Behavioural Sciences	0311 Economics
		0312 Political sciences and civics
		0313 Psychology
		0314 Sociology and cultural studies
		0321 Journalism and reporting
	032 Journalism and Information	0322 Library, information, and archival studies
04 Business, Administration, and Law	041 Business and Administration	0411 Accounting and taxation
		0412 Finance, banking and insurance
		0413 Management and administration
		0414 Marketing and advertising
		0415 Secretarial and office work
		0416 Wholesale and retail sales
		0417 Work skills
	042 Law	0421 Law
05 Natural Sciences, Mathematics, and Statistics	051 Biological and related Sciences	0511 Biology
		0512 Biochemistry
	052 Environment	0521 Environmental sciences
		0522 Natural environments and wildlife
	053 Physical Sciences	0531 Chemistry
		0532 Earth sciences
		0533 Physics
	054 Mathematics and Statistics	0541 Mathematics
		0542 Statistics

06 Information and Communication Technologies	061 Information and Communication Technologies	0611 Computer use 0612 Database and network design and administration 0613 Software and applications development and analysis
07 Engineering, Manufacturing, and Construction	071 Engineering and engineering trades 072 Manufacturing and processing 073 Architecture and construction	0711 Chemical engineering and processes 0712 Environmental protection technology 0713 Electricity and energy 0714 Electronics and automation 0715 Mechanics and metal trades 0716 Motor vehicles, ships and aircraft 0721 Food processing 0722 Materials (glass, paper, plastic and wood) 0723 Textiles (clothes, footwear and leather) 0724 Mining and extraction 0731 Architecture and town planning 0732 Building and civil engineering
08 Agriculture, Forestry, Fisheries, and Veterinary	081 Agriculture 082 Forestry 083 Fisheries 084 Veterinary	0811 Crop and livestock production 0812 Horticulture 0821 Forestry 0831 Fisheries 0841 Veterinary
09 Health and Welfare	091 Health 092 Welfare	0911 Dental studies 0912 Medicine 0913 Nursing and midwifery 0914 Medical diagnostic and treatment technology 0915 Therapy and rehabilitation 0916 Pharmacy 0917 Traditional and complementary medicine and therapy 0921 Care of the elderly and of disabled adults 0922 Childcare and youth services 0923 Social work and counselling
10 Services	101 Personal services 102 Hygiene and occupational health services 103 Security services 104 Transport services	1011 Domestic services 1012 Hair and beauty services 1013 Hotel, restaurants, and catering 1014 Sports 1015 Travel, tourism, and leisure 1021 Community sanitation 1022 Occupational health and safety 1031 Military and defence 1032 Protection of persons and property 1041 Transport services
99 Unknown		

Annex II: ISCED 2011

Table 7: International Standard Classification of Education according to the 2011 approach, and its aggregated levels

ISCED Aggregated levels	ISCED 2011
Low education	ISCED 0: Early childhood education ('less than primary' for educational attainment) ISCED 1: Primary education ISCED 2: Lower secondary education
Medium education	ISCED 3: Upper secondary education ISCED 4: Post-secondary non-tertiary education
High education	ISCED 5: Short-cycle tertiary education ISCED 6: Bachelor's or equivalent level ISCED 7: Master's or equivalent level ISCED 8: Doctoral or equivalent level

FACULDADE DE ECONOMIA

