PUBLIC IN-PERSON UNIVERSITY EDUCATION: DEMAND AND SUPPLY MISMATCH

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Abstract

This study explores the potential mismatch between demand and supply of university degrees in Spain in the context of structural change in labor demand. Our investigation analyzes the trend of students seeking studies in other regions that are not their usual residence. It is observed that certain universities have increased the number of courses offered without increasing the number of places available potentially worsening the mismatch between supply and demand. The courses with greater access barriers in 2022 yielded higher salaries for their graduates in previous years, although no direct relationship was found between the number of places offered and future job opportunities. In addition, we integrate a review of international literature shedding light on how income expectations, perceived skills, and personal preferences play a crucial role in the choice of degree. Our findings show that although there are moderate elasticities between the choice of degree and expected earnings, subjective expectations are the dominant factor.

Keywords: University, field of study performance, grade inflation.

JEL classification: I23, I26, J11, J24.

I. INTRODUCTION

Both the global labor market and, more specifically, the euro area, are facing new challenges. One of them is the shortage of labor in high-demand sectors, which is increasing and has a negative impact on business activity (European Commission, 2022). This imbalance in the labor market may result in higher labor costs and prices, as well as a possible reduction in production in the short term. In the medium term, this situation may hinder the necessary structural changes in the economy, especially in the sectors most affected by the transition to more sustainable and digital practices (Arpaia and Halasz, 2023).

In this analysis, we focus on the potential mismatch that may exist between supply and demand for public in-person university degrees, which is particularly important in the context of accelerated structural change. If the demand for degrees responds to job opportunities and the supply of degrees responds more slowly, the gap between the skills demanded by employers and the skills offered by graduates would widen rapidly in the context of structural change. Such a situation not only hampers firms in their search for qualified talent, but also limits equal opportunities for young people seeking to acquire skills in demand in the labor market, thereby increasing inequality.

This paper aims to examine these dynamics through a detailed analysis of the evolution of demand, supply and admission grades for different university degrees in Spain. Spain is an interesting case study because the data available allows us to correlate the demand, supply and employment outcomes of graduates by degree and university. Additionally, despite a high unemployment rate of 12.9% in 2023, Spanish companies complain of problems finding suitable workers. For example, the *Bank of Spain's Business Activity Survey (EBAE)* showed that in the first quarter of 2024, a significant 43.8% of Spanish companies reported that the lack of skilled workers had a negative or very negative impact, which is an increase of 34 percentage points since the beginning of 2021 (Fernandez and Izquierdo, 2024).

This paper examines whether there are significant mismatches between supply and demand for certain degrees and universities, with a particular focus on those with greater employment opportunities. We investigate whether the demand for university places in these areas exceeds the available supply, suggesting a possible inadequacy of the educational system to meet the demands of the current labor market.

To have a better understanding of this issue, the structure of this article is as follows: the second Section focuses on the influence of the potential job placement possibilities on the university students' choices, offering

a review of the international literature that examines the relationship between the choice of higher education and expected profitability and other influencing factors such as personal skills and preferences. In the third Section, we analyze the public in-person university access system in Spain, detailing the admission process and trends in cut-off grades that reflect the balance between supply and demand in different degrees. The fourth Section examines the recent evolution of the demand and supply of university degrees, highlighting changes in student preferences and the response of institutions. Then, the fifth Section establishes the relationship between various factors such as the contribution base, the minimum admission grade, the pre-enrolment applications and the supply of places and degrees, with particular emphasis on how these variables interact and influence the decisions of students and institutions. Finally, in the sixth Section, we summarize the main findings and reflect on their implications for education and employment policies. This Section highlights the need to better align the supply of education provision with labor market trends in order to reduce the mismatch between supply and demand for tertiary education.

II. THE INFLUENCE OF LABOR MARKET INSERTION ON THE UNIVERSITY STUDENTS' DEMAND: A REVIEW OF THE INTERNATIONAL LITERATURE

The choice of higher education is an important determinant of earnings. The composition of college degrees explains some of the long-term changes in gender and race wage gaps (Gemici and Wiswall, 2014). There are large wage differences between students with the same level of education who choose different fields of study (Altonji *et al.*, 2012). The choice of a profession is linked to college degree decisions because it represents a substantial investment in specific human capital (Wiswall and Zafar, 2015a). Policymakers have begun to link university funding to degree production in specific fields (Snyder and Boelscher, 2018) and to design financial aid programs that incentivize students to choose programs with high societal and labor market demand (Allen, 2019; Natanson, 2019). However, there is little evidence on the extent to which job opportunities influence students' program choices. Although expected earnings and perceived ability are important determinants, other heterogeneous preferences are the dominant factor when selecting a degree.

Altonji *et al.* (2016) provide a comprehensive review of the relationship between the rate of profitability to education and degree choice. Altonji *et al.* (2016) conclude that although the results vary depending on the context and methodology used, most recent evidence shows that there is a significant, but quantitatively small, elasticity of college degree choice with respect to expected

earnings. For example, Beffy *et al.* (2012) use data from France to develop a model that simulates students' sequential decisions about their degree selection process. In this model, students make their degree decisions based on both expected earnings and the non-monetary benefits associated with each field of study. To determine the income elasticity of degree choice, the study exploits fluctuations in the economic returns to different degrees over the business cycle. The results reveal significant but moderate elasticities, ranging from 0.09 to 0.14 for fields of study in sciences and in humanities and social sciences. Many subsequent studies find elasticities similar to Beffy *et al.* (2012).

Altonji *et al.* (2016) conclude that there are other aspects, such as preferences and skills, which have more influence on the decision to enroll in a particular degree. For example, mathematical skills play a more important role in the choice of specialization than verbal skills. Differences in degree preferences are the main driver of the gender gap in degree choice, while the distribution of degree-specific skills, while significant, is less important. Men responded more strongly than women to the increase in relative wages for science and business skills in the 1980s and 1990s, leading to a widening of the gender gap in college degree choice during this period.

Many of the studies take into account students' uncertainty about completing different degrees. Arcidiacono *et al.* (2015) also point out how students update their beliefs about their skills as they receive new information with the first grades in college. Parental approval is another important factor in explaining degree choice (Altonji *et al.*, 2016).

The review by Altonji *et al.* (2016) includes papers that, like the seminal work by Zafar (2013), use subjective expectation data to examine earnings beliefs in both real and hypothetical careers. These beliefs can then be used to see how expected earnings affect choices, providing another way to obtain wage elasticities.

In Table 1, we present more recent research than the papers included in the Altonji *et al.* (2016) study. The study by Wiswall and Zafar (2015a) implements an experimental design to explore the factors that influence students' choice of college degree. In this experiment, students at New York University (NYU) were provided with detailed data on the demographic profile and relevant characteristics of graduates in different fields of study. This approach allowed us to observe how students changed their beliefs and expectations in the face of new information, especially regarding their skills and job opportunities in different degrees. Wiswall and Zafar (2015a) found that both expectations about future earnings and perceived personal skills were important determinants of career choice. Specifically, they estimated that the average elasticities of career

choice to changes in future wages ranged from 0.03 to 0.07. Furthermore, they found that providing low-cost information to students led to significant improvements in their well-being as they made more informed decisions about their education.

TABLE 1

DEGREES WITH HIGHER SALARIES HAVE HIGHER GRADES, MORE PRE-ENROLLMENTS AND DEGREES BUT NOT MORE PLACES AVAILABLE (A)

	Minimum entry grade (b)		*Pre-enrollments ©*		*Supply ©*		*Qualifications ©*	
	All	*Without medicine and nursing*	*All*	*Without medicine and nursing*	*All*	*Without medicine and nursing*	*All*	*Without medicine and nursing*
Salary	1.96	2.10	0.60	0.54	0.32	0.30	0.42	0.42
	(.60)***	(.63)***	(.28)***	(.28)*	(0.25)	(0.26)	(0.17)***	(0.19)**
Field of study	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Undergraduate or Dual Degree	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
University	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remarks	652	587	652	587	652	587	652	587
R2	0.78	0.72	0.68	0.63	0.56	0.57	0.59	0.58

Notes: (a) The dependent variables are the access grade, the logarithm of the first choice pre-enrolment, the logarithm of the number of places offered, and the logarithm of the degrees in 2022. Each observation represents the average of the above variables for all degrees, distinguishing between undergraduate and double degrees offered in a field of study (there are 29 different ones) in each public university with in-person studies (there are 45). The salary corresponds to the annualized contribution base of the longest full-time affiliation episode in March 2020 for graduates who graduated in 2015-2016. All degrees are averaged, distinguishing between undergraduate and double degrees offered in a field of study at each university. The regression includes dummy variables for field of study, type of degree, and university. Total observations correspond to those pairs that have a wage. Standard deviation in parentheses: ***p less than 0.01; p less than 0.05:* p less than 0.1.

(b) A coefficient of 2 indicates that, controlling for differences in grades across fields, types of degrees, and universities, a degree whose graduates are paid 10% more would have a grade 0.2 points higher. If they are paid twice as much, 1.4 points higher.

(c) A coefficient of 0.5 indicates that, controlling for differences in pre-enrolment, supply, and completions across fields of study, types of degree, and universities, a program with graduates who earn 1% more than another would have 0.5% more pre-enrolment, supply, or completions. If it paid twice as much, it would have 50% more.

Source: Bank of Spain.

Wiswall and Zafar (2021) developed a survey of 493 top students at New York University (NYU), asking them about their expectations for obtaining various college degrees. The results show that both men and women expect significant benefits in the "marriage market" from earning a college degree. Women estimate that their chances of getting married at age 30 increase by 13% with a college degree, while men perceive an increase of more than 35% in their chances of getting married. In addition, there is a perceived marital disadvantage for women who choose a science or business degree over a humanities or social science degree, believing that these choices reduce their chances of marrying before age 30 by 15%.

In addition, both men and women believe that any degree will increase their likelihood of full-time employment at age 30, and in particular that a science or business degree rather than a liberal arts degree will increase their likelihood of full-time employment at age 30 by 15% (for men) and 9% (for women). These findings suggest that family-related variables such as marriage, future spouse's income, and family planning are important components in the choice of college degree. Ignoring these factors could lead to an overestimation of the importance of income in these decisions. Because investments in human capital tend to be directed toward specific occupations and jobs that have different levels of flexibility in working hours and work-life balance opportunities, individuals often evaluate how their educational choices will affect issues such as fertility and work-life balance.

Acton (2021) analyzes community college students' decisions about which field of study to pursue and finds that declining local employment in Michigan discourages students from applying to related programs. Students primarily shift their enrollment between programs that lead to occupations requiring similar skills. Local and occupational employment losses affect students' decision making because these young people tend to stay close to home during college and after graduation. In addition, community college programs are typically designed to be completed in two years or less, so students are likely to weigh short-term changes in labor demand more heavily in their degree choices than students at four-year institutions. Acton (2021) finds that, on average, each additional layoff per 10,000 working-age residents in a Michigan county reduces the proportion of high school graduates who enroll in related programs at community colleges the following year by 0.8%. An increase in one standard deviation in layoff risk reduces enrollment by 3.8%. This effect is due to students shifting enrollment to other community college programs rather than foregoing higher education opportunities all in all.

Beliefs are highly informative about future earnings and occupations and influence individual choices (Arcidiacono *et al.*, 2020). Correcting misperceptions about fields of study changes students' college intentions and, to

a lesser extent, their enrollment decisions (Conlon and Patel, 2023). Conlon and Patel (2023) show that there are large and persistent differences between the careers U.S. college students hope to follow and the actual occupations they end up carrying out. Students have stereotypes about their fields of study that greatly exaggerate the likelihood that degrees will lead to specific jobs. Students expect to get the job that matches the stereotype of their degree: 65% of prospective art students expect to be artists (when in fact 17% are), 42% of communication/journalism students expect to be writers or journalists (when in fact only 4% are). Conlon and Patel (2023) conduct a randomized controlled experiment to analyze an informational intervention that provided students in the Ohio State University sample with statistics on the joint distribution of university degree and subsequent career development. In this way, Conlon and Patel (2023) correct students' misconceptions about the career paths of undergraduate degrees and find that students change their initial intentions as a result of the information. Specifically, these authors find statistically significant effects of students' increased knowledge about the type of occupation to which each college degree leads. This effect is significantly larger by 7% percentage points for students who considered applying to a program that was more stereotypically associated with a subsequent occupation and with fewer employment alternatives. The authors also find that the information leads students who overestimate the prevalence of the stereotypical occupation of their degree to take about 0.5 fewer classes in that subject over the next two semesters.

Abramitzky *et al.* (2024) examine how economic incentives affect higher education decisions and degree choices. The study focuses on a significant transition in Israeli kibbutzim from an equitable income distribution system to a productivity-based wage system. The wage reform implemented in the kibbutzim led to differences in the returns of education by field of study. Prior to the reform, the kibbutzim's equitable distribution model implied that all university degrees conferred identical economic benefits. After the reform, a diversification of returns was observed, with disciplines such as STEM (science, technology, engineering, and mathematics) yielding higher returns than the humanities, in line with the general trend in Israel. This shift from a scenario of minimal financial returns of education to a context of market-based returns provides a unique opportunity to examine how economic incentives affect higher education decisions, without relying on assumptions about expectations and preferences.

Abramitzky *et al.* (2024) use the staggered implementation of the reform over the years to conduct a difference-in-differences analysis, comparing the proportion of arts degree attainment and the field of study chosen by the adult members of the kibbutzim that implemented wage reform early ("treatment

group"), with adults in kibbutzim that reformed later ("control group"), before and after the early reforms. In an environment where returns of education were initially low, the study finds that the marked increase in the rate of return of higher education, which varied significantly across fields of study, led to a substantial increase in the likelihood of completing a bachelor's degree, particularly in STEM fields. Young adults respond to the change in the returns of schooling by increasing their rate of bachelor's degree attainment and choosing fields of study in college that are expected to generate higher financial returns, primarily STEM subjects.

Conzelmann *et al.* (2023) analyze how four-year university degrees in the United States respond to variations in specific labor demand in each degree. To that end they develop a methodology that combines information from online job postings with geographic location data on alumni obtained from a professional networking platform. This approach allows them to identify an average elasticity of 1.3 in the production of four-year university degrees in response to labor demand. Conzelmann *et al.* (2023) provide further evidence that the magnitude of the aggregate response depends on both student demand and supply-side constraints on the part of universities. Specifically, they find that less selective and less research-intensive institutions are much more responsive to changes in skill demand than selective and research-intensive institutions. Limitations in the provision of specific degrees and restrictions due to requirements for certain degrees can lead to racial or socioeconomic stratification of students. Differences in educational production costs across degrees may also affect their responsiveness to changes in demand. Conzelmann *et al.* (2023) find that the overall elasticity is driven by degrees in the lower and middle tertiles of the average cost of each credit/hour. Social sciences, health, and communications show the most elastic responses to changes in skill demand.

On balance, the magnitude of the effect of working conditions on the choice of a degree is small, suggesting that factors outside the labor market play an important role in determining students' choices. Subjective expectations about income and perceived skills are a significant determinant of the students' current university degree choices but their heterogeneous taste is the dominant factor in the final choice.

III. ACCESS TO THE PUBLIC IN-PERSON UNIVERSITY IN SPAIN

88% of the new students enter the university after having passed the baccalaureate and after having passed the university entrance exams (EvAU, in Spanish). These two elements make up an individual grade that qualifies the student to access the degree of choice in the public in-person university.

The individual grade can reach a maximum of 14 points. The structure of the grade is calculated as follows: 60% is the baccalaureate grade (in which the student can obtain from 5 to 10 points) and 40% is the general entrance exam grade (from 4 to 10 points). This base entrance grade is a maximum of 10 points, and it is necessary to have at least 5 points to enter the university. This base grade is not the actual final admission grade used to apply for a place in the undergraduate program at the University. The final admission grade is calculated by adding the base grade plus the weighting of up to two subjects taken in the voluntary phase of the EvAU tests. Each subject of the voluntary phase can contribute between 0.1 and 0.2 points to the final admission grade, depending on the weighting parameters established in each Autonomous Community/University, up to a maximum of 14 points.

If a program at a public university has a limited number of places, *i.e*. the number of available places is less than the number of students applying for a place, the only criterion used to allocate a place is the admission grade. Applications are ranked from highest to lowest and students with the highest scores are offered a place until the program is full. The cut-off grade for admission to each public university program is the admission grade of the last student admitted.

If, after the first round of allocations, a student gives up the place he/she has obtained, it will be offered to the next student on the waiting list, and if he/she accepts it, a new place will become available in the other program to which he/she had been admitted as a second choice, and so on. In this way, the grade of the last enrolled student is lower than the cut-off grade. As a result, the enrollment of these last arrivals may be delayed until after the start of the course in the most popular programs.

Each student must submit a pre-enrolment application in which he/she must indicate, in order of preference, up to twelve degrees chosen from all the public universities of an Autonomous Community. If the student wants to apply for different degrees in different Autonomous Communities, they must submit a pre-enrolment application in each region, so if there are two pre-enrolment applications submitted by the same student but in two different regions, they will be treated as if they were the pre-enrolment applications of two different people.

Once all the grades of the pre-enrolled students are collected, each Autonomous Community ranks them from best to worst, and the students are assigned to the degrees according to their preferences in the pre-enrolment application. The student with the highest grade gets access to his or her first preference, the second preference, and so on until each program is full. If a person cannot get into their first preference because it is full of students with

higher grades, they will be assigned to their second preference, in this way students are gradually assigned to programs according to their grades and order of preference.

Since there are students who are pre-enrolled in different Autonomous Communities or in private universities and who may decide not to finally enroll in the assigned degree, students who are assigned to preferences other than the first one may decide to wait for a better option that becomes available as a result of dropouts. Thus, the assignment process is iterative and consists of several rounds of assignments. Since the student who enrolls last with the lowest grade in each program determines the minimum admission grade, this minimum admission grade determines the difficulty of access to a program. Given the same distribution of grades, the higher the cutoff grade, the harder it is to get into the program.

It is also important to note that public universities may have incentives to behave strategically in determining the number of places they offer due to their funding system, internal politics, or simply for image reasons. In Spain, the program with the highest cut-off grade is the double degree in mathematics and physics. This means that, although the demand is not particularly high, the cut-off grades are very high, even higher than for medicine, which is the course that traditionally has the highest unmet demand, justified by the very high cost per place and the limited number of specialization places offered by the healthcare system. Universities consider that a high cut-off grade creates prestige to attract the best students.

The existence of very similar programs within the same university creates diseconomies of scale. Similar programs competing for students leads to a greater need for faculty, which ensures the growth of departments. This situation has, in some cases, led to having programs with a very small demand, which has forced the Autonomous Communities governments to include in their funding systems limitations on the viability of programs based on the number of students enrolled. A principal-agent problem arises, since the administrative authorities want to offer the greatest number of places at the lowest cost, while the academic authorities want to maximize the size of their organization with the public funds available.

It is also important to mention that the existence of scholarships can influence the mobility of students between the Autonomous Communities. The Spanish Ministry of Education offers several scholarships for undergraduate and graduate students. One of them is known as the Mobility Grant, a grant of 2,500 euros to help the student to move during the school year. In addition, until 2013, the Spanish Ministry of Education also offered a scholarships program for inter-university mobility, known as the Seneca

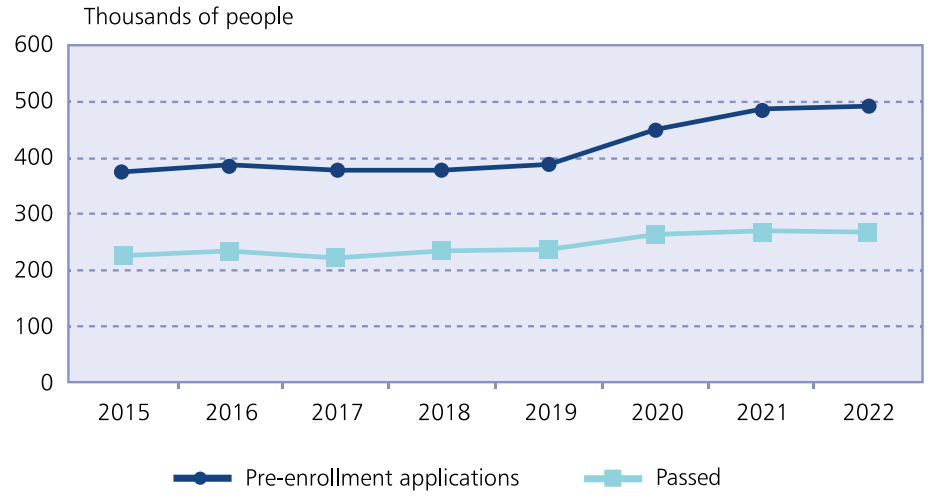
Scholarships, as financial support for the inter-university mobility program called the Spanish University Exchange System (Sicue). In addition to these scholarships, the governments of the Autonomous Communities and the universities themselves may offer other scholarship programs. Data on students who have received scholarships of this type are rather limited. However, the total number of beneficiaries of general government scholarships (general scholarships that include income-related scholarships in addition to mobility) was 372,111 students, which represents 32% of the total number of students enrolled in undergraduate studies in public universities in school year 2020-2021.

IV. RECENT EVOLUTION OF THE DEMAND AND SUPPLY OF UNIVERSITY DEGREES

Figure 1 shows the evolution of the total number of students who passed the University Entrance Examinations and the number of pre-enrolment

FIGURE 1

INCREASE IN EBAU (EVALUATION OF THE SPANISH BACCALAURATE TO ACCESS TO UNIVERSITY) PASS RATES AND PRE-ENROLLMENT APPLICATIONS IN PUBLIC ON-SITE UNIVERSITIES



Notes: Total number of students passing the exams, excluding exams for students over 25 years of age, 45 years of age and 40 years of age with work experience, and total pre-enrolment in undergraduate and bachelor's degree programs in public personal universities. The pre-enrolments are the sum of the first options, so for each student, one pre-enrolment per Autonomous Community is taken into account. The pre-enrolments in each year include the applications made in the academic year that begins in that year and ends one year later.

Source: Integrated University Information System (SIIU).

applications submitted (one per person and per Autonomous Community where it was submitted). The number of students passing the EvAU has gradually increased in recent years, from 223,000 in 2015 to 266,000 in 2022. The change in demand is equally due to the dynamism of the young population and its increased desire to access university studies. Figure 2a shows that the 19-year-old population will increase steadily between 2015 and 2022, from 428,000 to 484,000. During the period 1995-2008, fertility in Spain experienced a certain upturn, in line with the economic expansion that took place in those years. This led to a recent increase in the number of young people of university age. According to the population forecast of the Spanish National Statistics Institute (INE), the 19-year-old population will reach 586,000 in 2028. However, due to the lower fertility observed since the financial crisis, this population will tend to decline to around 440,000 people after 2040. On the other hand, Figure 2b shows that the probability that a 19-year-old will enroll in university has also increased, from 35 to 42% between 2015 and 2022. A tight supply of university places combined with a larger number of young people wanting to go to university increases the difficulty of access, especially to the most in-demand courses.

FIGURE 2

INCREASE IN THE POPULATION WISHING TO PURSUE UNIVERSITY STUDIES IN A DIFFERENT AUTONOMOUS COMMUNITY FROM THEIR PLACE OF RESIDENCE

2a. 19 years old population

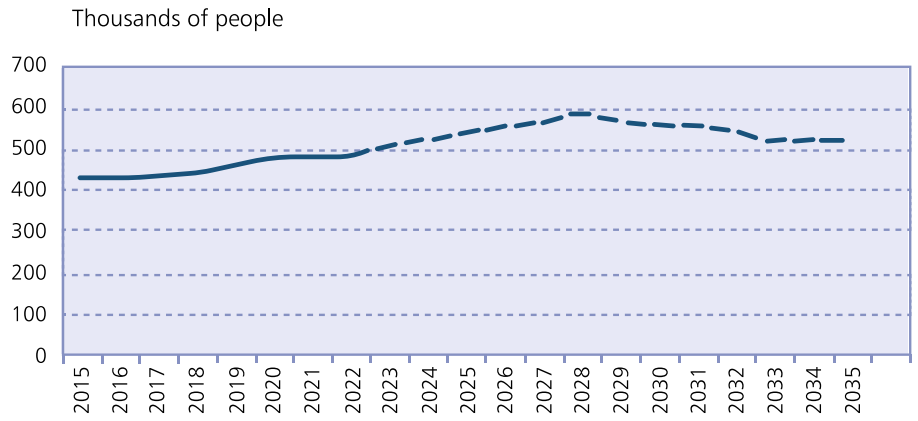
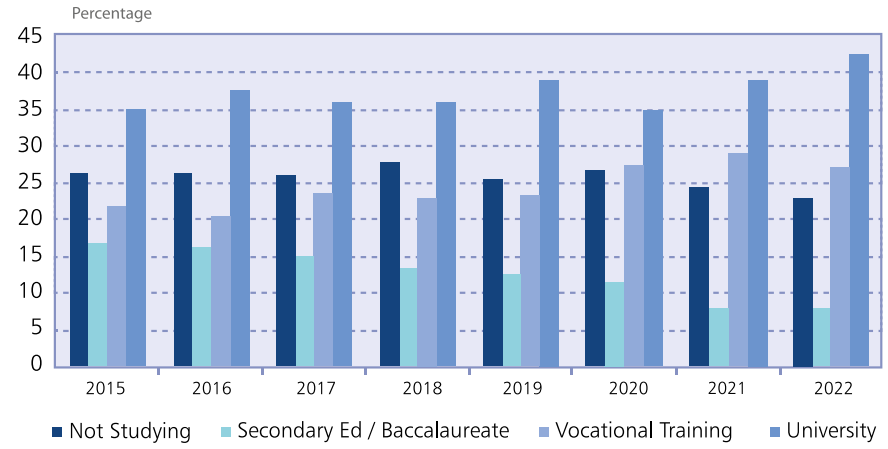


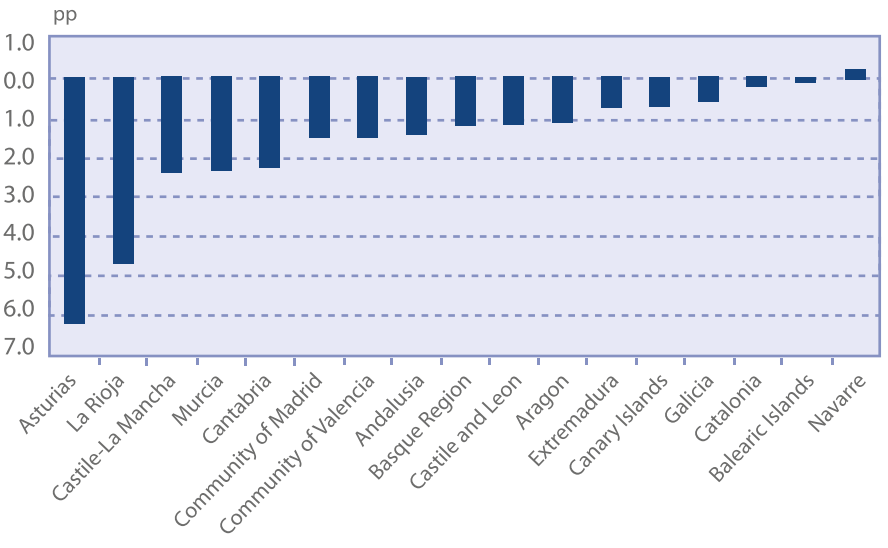
FIGURE 2 (*continued*)

INCREASE IN THE POPULATION WISHING TO PURSUE UNIVERSITY STUDIES IN A DIFFERENT AUTONOMOUS COMMUNITY FROM THEIR PLACE OF RESIDENCE

2b. Population aged 19 by formal education attainment



2c . Changes in the percentage of Students who enrolled in the Autonomous Community where they took the University Entrance Exam between 2018 and 2021

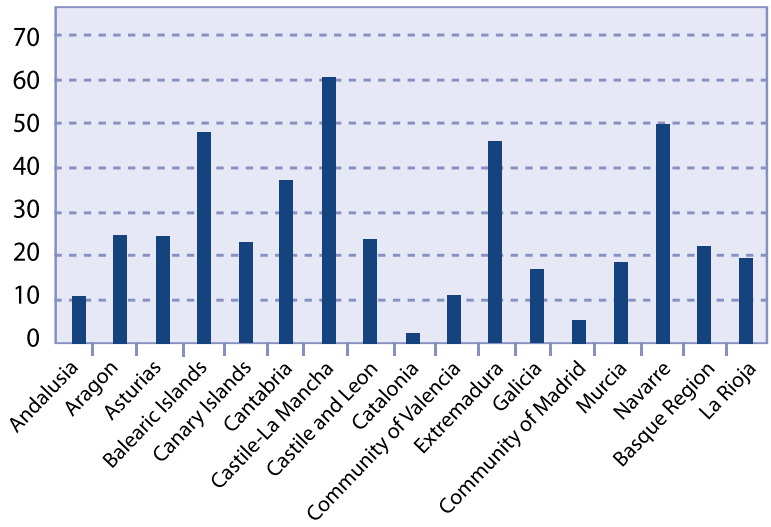


Sources graphs 2a to 2c: INE population figures, INE population projections, Labor Force Survey (fourth quarter of each year) and Integrated University Information System (SIIU).

FIGURE 2 (*continued*)

INCREASE IN THE POPULATION WISHING TO PURSUE UNIVERSITY STUDIES IN A DIFFERENT AUTONOMOUS COMMUNITY FROM THEIR PLACE OF RESIDENCE

2d. Percentage of students by Autonomous Community enrolled outside their Autonomous Community in undergraduate programs, academic year 2021-2022



Source: Integrated University Information System (SIIU).

The fact that students can pre-enroll in different Autonomous Communities generates a certain multiplier effect of the pre-enrollment figures. Although in 2019 there were 237,000 students who passed the university entrance exams, pre-enrollments reached 390,000 (Figure 1). And this gap has increased since then. Thus, in the school year that began in 2022, there were 100,000 more pre-enrollments than in 2019 (26%), but only 30,000 more students passed (13%). This increase in pre-enrollments between the 2019 and 2022 academic years suggests a greater predisposition on the part of students to enroll in different autonomous communities. As an indicator of the greater interest to move to other regions, Figure 2c shows the evolution of the percentage of students who enrolled in the region where they took the university entrance exams between 2018 and 2021. For most regions, this percentage has decreased, with the change being particularly marked in Asturias and La Rioja, with a decrease of 6.2 and 4.7% points, respectively. Reducing the cost of attending universities outside the student's region of residence allows for a better allocation of students and desired degrees regardless of where they are located, leading to greater degree discrimination. Young people who have a strong preference for a particular degree are increasingly applying to study

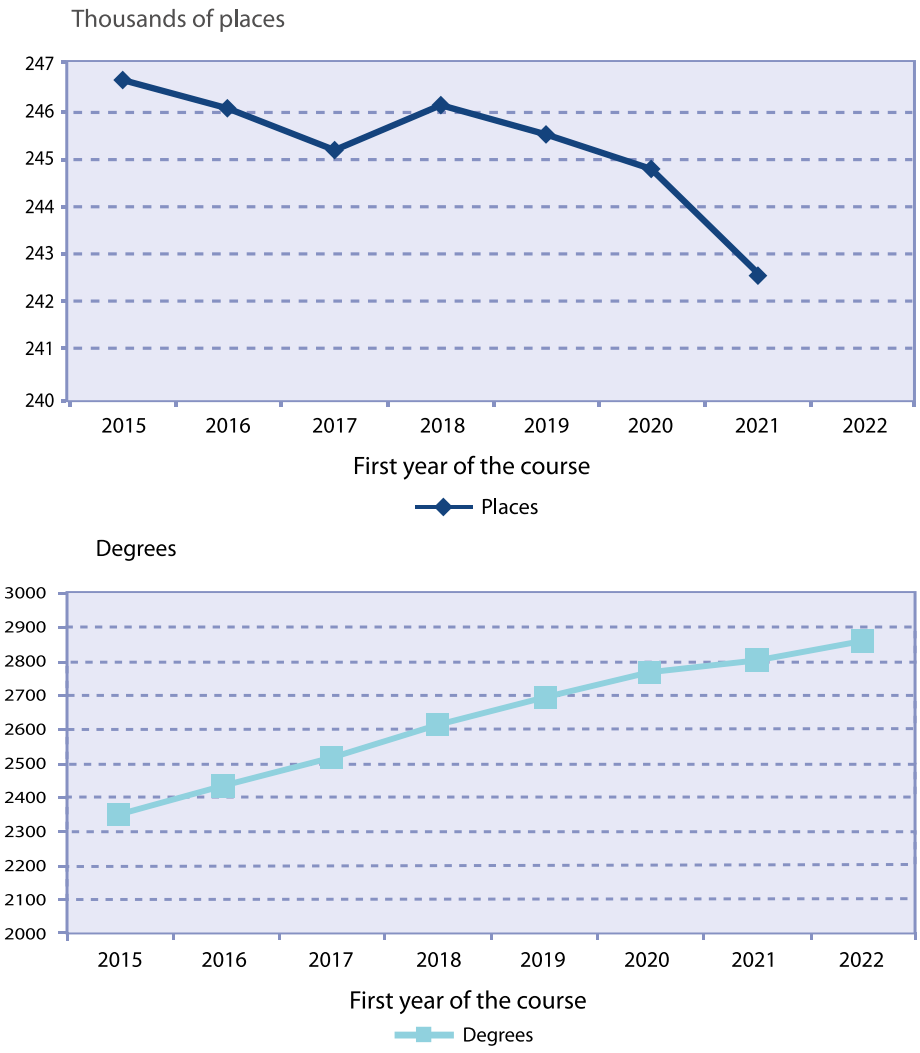
that degree in municipalities other than where they live if they are not accepted at universities in their region. This greater willingness to pursue specific higher education, even if it is outside their region, explains why there is a convergence in minimum admission grades across regions of the most in-demand degrees (from the 90 percentiles of degrees with the highest minimum grade) between 2015 and 2022. Figure 2d complements the detailed perspective on interregional student mobility, showing the percentage (in levels rather than variation) of students by autonomous community who choose to pursue their university studies outside their region of residence.

The figure shows that some autonomous communities, such as Castile-La Mancha (60.6%), Navarre (49.9%), the Balearic Islands (48.3%) or Extremadura (46.0%) or Cantabria (37.2%) had in the school year 2021-22 more than a third of their usual local university students enrolled in another region. In contrast, in Catalonia (2.1%) and the Community of Madrid (5.3%) percentage is less than 10% and in Andalusia (10.4%) or the Community of Valencia (11.2%) it is slightly over 10. This mobility could also be interpreted as a reflection of a potential shortfall of the academic offer in the community of origin. The high mobility of students from some regions suggests a lack of options that meet the student's aspirations and needs. On the other hand, the low mobility observed in communities with larger populations, such as Catalonia, the Community of Madrid, Andalusia or the Community of Valencia, indicates that their size allows them to offer a wider range of higher education.

Figure 3 shows the number of places available in all public in-person universities and the number of degrees awarded (undergraduate and double degrees). Throughout the period of study (2015-2022) there was a slight decrease in the supply of university places (2%). This figure contrasts with the supply of private in-person universities, measured in terms of new students, which increased by 34% to 51,000 students, reflecting both the increase in the number of private in-person universities over this period, from 27 to 31, and the increase in places available in most of them. However, in terms of the number of degree programs offered, in the school year that began in 2022, there were 2,863 undergraduate or double degree programs at public in-person universities, 22% more than in the academic year that began in 2015. This growth is more in line, although somewhat lower, than the growth in the private universities, which increased their offering of degrees by 40%, from 864 to 1,206, in the same period. An example of the growth in both types of universities is the case of the degrees in data analysis. In the 2017-2018 school year, neither private nor public universities offered this type of degree, while in the 2022-2023 school year there were 34 degrees taught at public universities, 74% of the total number of these degrees.

FIGURE 3

THE OFFERING OF IN-PERSON PUBLIC UNIVERSITIES DECREASED THE NUMBER OF NEW PLACES AVAILABLE AND INCREASED THE NUMBER OF DEGREE PROGRAMS



Notes: Sum of the number of places available in undergraduate and double degree programs at public in-person universities and the number of degree programs. The data on the number of places available are from the publication *Datos y cifras del Sistema Universitario español 2023-2022* which provides information up to the school year 2021-22.

Source: Integrated University Information System (SIIU).

In higher education, it is costly to increase the number of places available per degree due to the need to invest in infrastructure and staff in order to ensure that the quality of education is not compromised. In some cases, such as medicine, the actual size of the healthcare professional sector may impose its own limits on the capacity to absorb resident students. Launching a new degree program may also require such type of investment and staff recruitment or to use infrastructure and faculty from other, less in-demand programs. Another requirement for a new degree is to go through a complex review process involving the Spanish National Evaluation and Accreditation Agency (ANECA) or the Autonomous Community agencies, which in many cases takes more than one or two years. In addition, before the proposal can be submitted to these agencies, the project for a new degree program must be approved internally by the corresponding school and by the Governing and Social Councils of each university, on the basis of necessity and feasibility reports. In this sense, the fact that public universities have chosen to increase the number of courses without changing the total number of places available indicates that other factors, unrelated to cost, may be influencing the universities' decisions on what to offer.

Understanding the reasons that motivate a change in university provision is important because increasing the number of places available or degrees taught has very different implications for student access. An increase in the number of places available in a program makes it easier for students to enter as the minimum entry grade is lower. However, this need not be the case if there is an increase in the number of degrees, but they maintain the same number of places available. For example, suppose there are 20 pre-enrolments and 10 places available for a program. The minimum entry grade will be the tenth lowest grade. If a new program is added and the places available are divided between the two programs, the cut-off grade of the less popular program will not change because the last student to enter is the tenth, but the more popular program will have a higher cut-off grade, automatically increasing the average of the cut-off grades. There could be several explanations for the scarce increase in university places. Some of them could be related to how the increase in demand is interpreted. In particular, the increase in demand could be interpreted as something cyclical or the result of an increase in demand from students with low ex ante expectations of completing their degree. Other reasons may be related to the structure of demand in this market. A context in which individual demand is a function of the demand of others would be consistent with the maintenance of excess demand in universities in order to maintain the quality signal of their degrees. Becker (1991) gives the example of individual demand for social activities such as restaurants or entertainment. In the case of restaurants, they would rather have a line of people waiting at the door than expand their business. This serves as a lure for other customers since the line serves as a signal of their quality.

The changes in supply and demand explained in the previous section have contributed to the increase in the minimum entry grade. The creation of new degrees with high grades is not the only factor behind the increase in the average minimum grade. The sample includes the degrees and double degrees that have existed since the 2015-2016 school year and the minimum entry grade would also have increased by 1 point, from 6.8 to 7.8, especially from the 2020-2021 school year onwards. Figure 4a shows the recent evolution of the average minimum entry grade for all public in-person degrees. An increasing trend can be observed between the admission grade of students who took the entrance exams in 2015 and those who took them in 2022. Until 2019, there was an increase of 4 decimals, reaching 7.3. However, after the pandemic, the average cut-off grade increased at an accelerated rate, reaching 8.2. By field of study, the degrees in mathematics, computer science, psychology, nursing and physical sciences are the ones that have increased the minimum admission grade the most. On the other hand, journalism and information science, tourism and hotel management, and languages are the fields with the smallest increases.

An increasing trend in grades, both in the two-year baccalaureate and in the EvAU, may also imply an improvement in students' education or a relaxation of quality standards, which the education economics literature has termed grade inflation (Denning *et al.,* 2023). This phenomenon raises concerns because the grade signal loses its value in determining the relative changes in demand between occupations and the real possibilities of access for students at the time of pre-enrolment. Grade inflation could therefore also create a mismatch in the process of matching supply and demand.

FIGURE 4

INCREASE OF THE MINIMUM GRADE FOR ACCESS TO PUBLIC IN-PERSON UNIVERSITIES

4a . Minimum access grade (a)

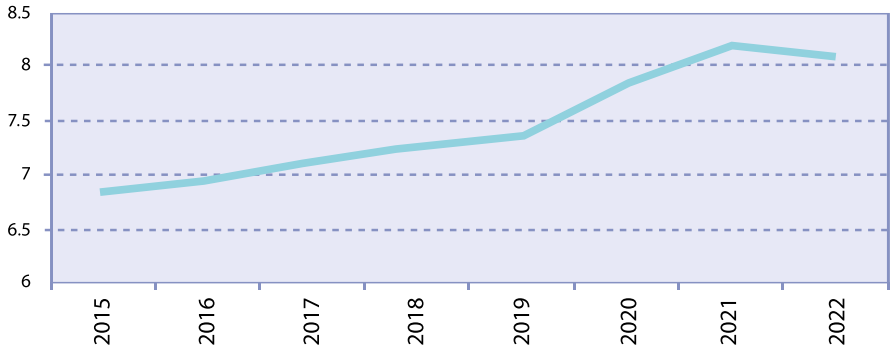
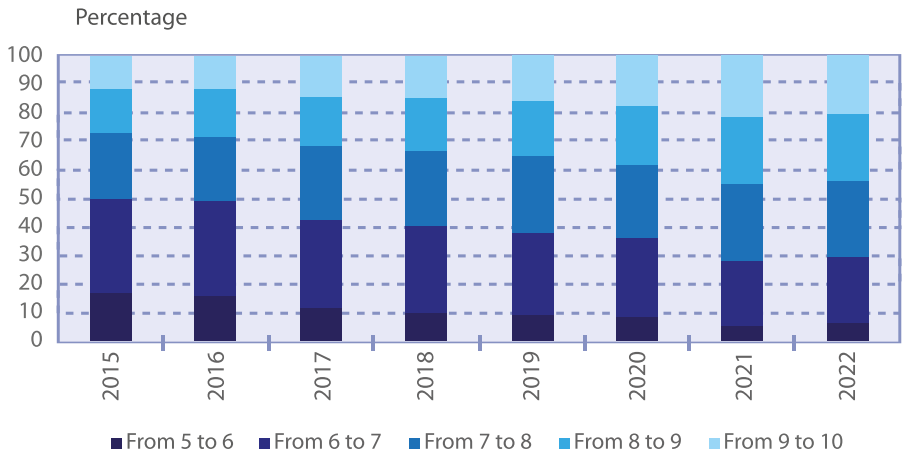


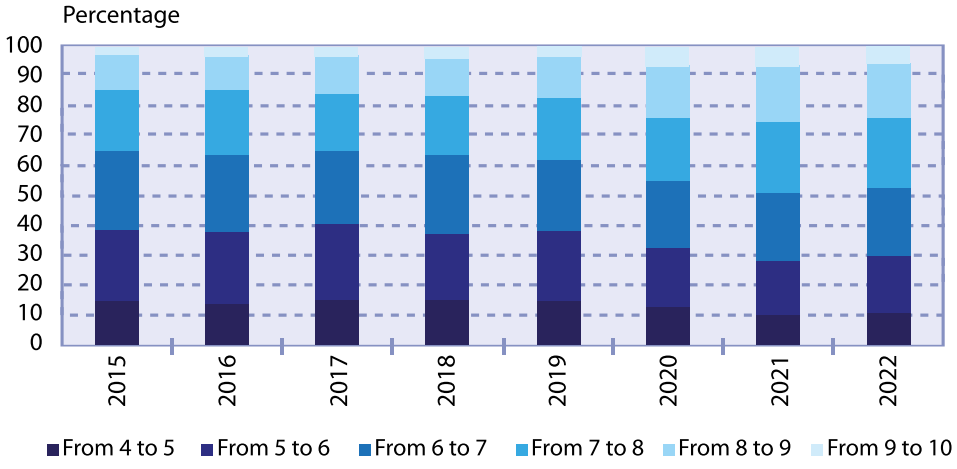
FIGURE 4 *(continued)*

INCREASE OF THE MINIMUM GRADE FOR ACCESS TO PUBLIC IN-PERSON UNIVERSITIES.

4b . Distribution of Baccalaureate grades



4c . Distribution of general phase grades of the qualifiel candidates



Note: (a) Average of the minimum access grade of all undergraduate and double degree programs at public in-person universities.

Source: Integrated University Information System (SIIU).

Cobreros *et al.* (2023) provided evidence that part of the increase in admission grades between 2013 and 2020 was due to a process of grade inflation, caused partly by various changes in the design of the EvAU. Figures 4b and 4c show the evolution of the distribution of baccalaureate grades of students who took the entrance exam and the general EvAU from 2015 to 2022. In 2015, 11.6% of students completed the two years of the baccalaureate with an average grade of *sobresaliente (A, 9 or more out of 10)*, a proportion that almost doubled in 2022, reaching 20.6%. There was also an increase in the number of *notable (B, 7 to 9 out of 10)*, with the percentage of students increasing from 38.5% in 2015 to 49.3% in 2022. This inflation in baccalaureate grades is only partially due to the relaxation that occurred during COVID-19, as it was already observed before the pandemic. Cobreros *et al.* (2023) suggest that the 2017 reform, which made the specific EvAU operational, led to a compensatory increase in baccalaureate grades. Other reforms, such as raising the grade threshold for scholarship eligibility from 5.0 to 6.5 in 2013, may have had a similar effect on how baccalaureate teachers awarded grades.

The percentage of students with B or A grades increased from 50.0% in 2015 to 59.2% in 2018 and reached 69.9% in 2022. If we compare the grades in the general phase of the EvAU with the baccalaureate grades, the former is significantly lower than the latter (with 46.2% of Bs or As in the general phase of the EvAU in 2022, compared to 69.9% in the baccalaureate). In the general phase of the EvAU, there is also an upward trend in the distribution of grades. However, unlike the baccalaureate, the increase in grades in the EvAU began in the pandemic year, when the proportion of students with 7 or more grades increased from 36.8% in 2019 to 45.4% in 2020. Possible reasons for the increase in grades include of this phase of the EvAU since the pandemic could be the increased optionality of the university entrance exams (Cobreros *et al.*, 2023). Among the reasons that could explain the increase in EvAU grades after the pandemic could be the change in the classical model of the university entrance exam. Until the 2018-2019 school year, there were two types of exams (A and B) that students could choose as a block. Since 2019-2020, students can choose questions from both types of exams, giving them more combinations to choose from. In addition, before the COVID-19 pandemic, the EvAU was held over three days, while now it is held over four days (five in regions with co-official languages).

Overall, the grade inflation in the general phase of the EvAU does not originate from the years before COVID-19, while in the case of the baccalaureate the trend was already there. In any case, beyond the importance of changes in the design of university entrance exams, there is evidence that grade inflation is not limited to Spain or non-university education. Finn *et al.* (2022) analyze the changes that A levels have undergone since the beginning of the pandemic

in the United Kingdom. Results for the 2020-2021 school year continued the trend of grade inflation, with 44.8% of students receiving A* or A grades in 2021, compared to 38.5% in 2020 and 25.2% in 2019. Meanwhile, Denning *et al.* (2022) show that there has been a significant increase in graduation rates at U.S. universities over the past three decades. The researchers conclude that the increase at nine large public universities, one liberal arts center, and a nationally representative survey does not reflect better student preparation or an increase in the educational attainment of students' parents, but rather grade inflation.

V. RELATIONSHIP BETWEEN THE CONTRIBUTION BASE, THE MINIMUM ADMISSION GRADE, PRE-ENROLLMENT APPLICATIONS, THE NUMBER OF PLACES AVAILABLE AND THE DEGREES OFFERED

From a macroeconomic point of view, the mismatch between supply and demand will be of greater concern when there is greater demand than supply for those degrees that offer greater job opportunities. Specifically, this suggests that the education system is not adequately addressing a growing demand for certain profiles in the labor market. In order to analyze this possibility, the data on minimum entry grades for each field of study, type of degree (bachelor or double degree) and university in 2022 are correlated with the average social security contribution base in March 2020 of graduates in that field of study, type of degree and public university four years earlier, in 2016. The salary information is the gross annual remuneration of graduates in the 2015-2016 school year, using the annualization of the base for common contingencies corresponding to the longest contract during the month of March 2020 for employees with a full-time contract. Among other information, the Ministry also publishes the affiliation rate, which refers to whether the graduate was affiliated with Social Security for at least one day during the month of March 2020.[1]

Similarly, the contribution bases are correlated with the number of people who choose that degree at that university as their first choice (pre-enrolment application), the number of places available (supply) and the number of degrees offered. The minimum grades reflect separately the average of all bachelor's

[1] In this chapter, information on the first three years after graduation was not used because the estimates were more imprecise, although qualitatively similar results were obtained. We did not use information on affiliation to the social security because a low affiliation rate does not necessarily indicate that there is a high percentage of graduates who are unemployed, as there are people who, after completing their degree, may be abroad or may have decided to continue studying. More information on the variables available in Ministerio de Ciencia, Innovación y Universidades (2023).

degrees within a field of study at a university as well as the double-degree programs. Pre-enrolment applications and supply are calculated in the same way as minimum grades, but as a sum to get the total amount rather than an average.

The regression is run with field of study fixed effects, so that differences in demand, supply, and job opportunities for different degrees at different universities within the same field of study are computed. In particular, note that there may be different degrees and double degrees within these fields. For example, while in the field of medicine there is only the possibility of obtaining a medical degree, in the field of economics there are several degrees such as economics, economics and finance, or economics and international business. There are also double degrees, such as economics and mathematics, or economics and history. The various exercises have been carried out for all degrees, both retaining and eliminating medicine and nursing, two fields of study whose degrees are characterized by more job opportunities, high minimum grades, and also high pre-enrollment ratios per student, which may bias the aggregate estimates. There is a large variation in contribution bases among graduates by field of study.

As an illustration, in March 2020, the highest average of social security contribution bases of 2016 graduates working on any day in that month corresponded to medicine (38,328 euros per year) and the lowest to psychology (21,901).

The results in Table 1 show that admission grades are correlated with differences in contribution bases. The coefficient in the first column shows that a degree with a salary that is 10% higher than another degree has an admission score that is 0.2 points higher, and the difference would be as much as 1.4 points if the salary four years after graduation in one degree were twice as high as in another degree. A degree with a salary that is 10% higher than another will have a difference in the log of the salary of 0.1, so according to the regression shown in Table 1, the grade of the program with the higher income will be 0.2 points higher, which is the result of 2*0.1. Likewise, a degree that makes twice as much money has a difference of 0.7 in (salary), so the grade is 1.4 points higher, which is the result of 2*0.7. This correlation between the access grade and the salary of the graduates of this degree remains robust when we exclude the degrees of Medicine and Nursing, two degrees for which vocation is a very important determinant in the choice of students (column 2).

Column 3 shows the positive relationship between the number of pre-enrollment applications, which largely reflects student demand for a degree, and the contribution base of graduates four years after graduation. The coefficient

in the third column indicates that a degree with a 10% higher salary than another degree has 6% higher pre-enrollments. This semi-elasticity is robust if we exclude medical and nursing degrees in column 4, with a similar coefficient (0.5372, significant at 10%). These results are consistent with the economic literature reviewed in Section 2, which has found a small but significant elasticity of higher education choice with respect to expected earnings.

In Spain, the SM Foundation (2023) survey, conducted online among 400 students aged 15-29, found that the search for good job opportunities and vocation were the main reasons for choosing a degree. Other motivations such as skills, qualifications or the ease of obtaining a degree were far behind. The report also found that 54% of respondents would have studied something else if they could have had their future guaranteed.

Columns 5 and 6 analyze the extent to which the offering of places by universities is correlated with the variation in salaries. In other words, this is an analysis that explores whether the universities take into account the contribution bases when designing their degrees, so that they would increase (decrease) the number of places available in the courses whose graduates receive a higher (lower) salary. As can be seen, there is no correlation between the contribution bases and the number of places available in each degree. In any case, it is possible that this lack of association between the job opportunities of university degrees and the number of places offered occurs because higher education institutions take time to process before they can respond to changes in the labor market.It is possible that the initial effect of a relative increase or decreasein the salaries of graduates of a program will have an impact on demand, on the number of pre-enrolled students. From there, changes in enrollment send a signal to universities about the possibility of changing the number of places offered. In addition, the implementation of a new university degree requires verification by the National Evaluation and Accreditation Agency (ANECA) or the agencies of the Autonomous Communities, which takes more than a year. In addition, before the proposal can be submitted to external agencies, the proposal for a new degree must be approved internally by the corresponding faculty, the Quality System, the Governing Council and the Social Council.

Finally, columns 7 and 8 have the same regressions with the number of degrees within the same field of study. In this case, the number of degrees is higher in those fields whose graduates receive a higher contribution base. Therefore, the results suggest that within the fields of study with higher salaries, specialization has increased by increasing the number of degrees without increasing the number of vacancies per degree.

VI. CONCLUSIONS

This paper has shown various indicators of the demand and supply of degrees that are consistent with an increase in the mismatch between the two, especially after the health crisis. These proposals require detailed analysis and debate to ensure that the measures reinforce equity in access to university education while maintaining quality. Moreover, when these indicators are combined with other labor market indicators, it is observed that there are greater access problems in those programs with higher contribution bases of their graduates four years after graduation. This is because, as the literature in other contexts and countries has shown, student demand responds, among other things, to job opportunities. However, the supply of places in public in-person universities has not adjusted to the differences in salaries between degrees. The reasons for the increase in demand for degrees include factors such as the increase in the number of young people and their greater desire to go to university. These structural factors suggest the need to introduce mechanisms that allow a faster adaptation of the supply of public university places to demand, for example by taking into account the employment opportunities of the degrees. To address these challenges, it is proposed to strengthen the ex-post quality assessment of educational programs, allowing for a more efficient adjustment of academic supply. It is also crucial to take into account the employment opportunities and contributions of graduates in the planning of university places in order to better adapt education to the needs of the labor market. These measures will help to optimize the value and relevance of higher education, benefiting both students and the labor market in general. One possible measure worth exploring is the possibility of coordinating university places between the Autonomous Communities and the Spanish Ministry of Universities in a more agile and adapted way to the changing needs of the labor market.

These findings are consistent with Mountjoy (2024), who analyzes the impact of public universities in Texas and shows that students who are marginally admitted complete an additional year of education, are 12% more likely to earn a college degree, and earn 5 to 10% more than their rejected peers. Cost-benefit calculations show significant internal rates of return for students, society, and the public budget.

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