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Synthetic Indicators of Spanish Universities

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Acknowledgments

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The ISSUE (acronym in Spanish for *Indicadores Sintéticos del Sistema Universitario Español* [Synthetic Indicators of the Spanish University System]) project, developed by the Ivie (The Valencian Institute of Economic Research) and the BBVA Foundation, is an essential part of a program of activities carried out by both institutions to document and analyze the role of knowledge in social and economic development. This report presents the basic products of the project, U-Ranking and U-Ranking Volume, including the methodology and results for 2022 (10th edition).

The approach of ISSUE, the selection of variables on which the rankings compiled are based and the methodology used when treating the data have been thoroughly discussed by the Ivie team with a large group of experts on the assessment of universities, university information and management. We would like to thank these specialists from fourteen universities for their invaluable collaboration.

We would also like to acknowledge the support of the Valencian public universities in the initial stages of the project and the suggestions made by members of different Spanish universities since the presentation of the first results in June 2013, which have been followed with interest by many people. From then until May 2022, the U-Ranking website has received nearly 1.2 million hits, many of which have resulted in the calculation of personalized rankings (over 220,000). In addition, the project is being followed with interest from abroad: 29% of the visits to the website come from outside of Spain, the majority from Latin America and the United States which jointly represent almost one-fourth of total foreign visits. Visits from major European countries such as United Kingdom, France, Germany, Italy and Portugal also have significant percentages. These data provide a stimulus to maintain the continuity of the project while making improvements.

Two main developments have improved last year's edition. The first is the new web, launched in March 2022, with a more practical and mobile friendly design, offering dynamic graphs that can be customized and downloaded by the user. Dynamic sections have replaced the previous static information on university rankings allowing users to choose from a set of options in order to compare the results of the universities in the system as a whole, by region or from a selection of benchmarks. More than 2,000 queries have been made in this section in only two months. The new edition also includes two guides, one for students and families and a separate guide for guidance counselors, explaining how to use the “Choose a University” tool.

We would like to give special thanks the IUNE Observatory[1] for their collaboration with research and innovation and technological development data, as well as participating in meetings on the availability and suitability of various sources and the problems of their treatment. In this regard, the IUNE Observatory, and specially the INAECU team, directed by Professor Elías Sanz-Casado, have provided complete Bibliometric data on all the Spanish universities (based on information provided by Thomson-Reuters), from which many of the indicators relating to research have been calculated.

Also, the U-Ranking team acknowledges the cooperation of the General Secretariat of Universities and, in particular, the General Sub-Directorate of University Research Activity of the Spanish Ministry of Universities, whom, for another consecutive year, has provided us access to the Integrated System of University Information (SIIU). In addition, the Ivie team would like to acknowledge collaboration from the Spanish Ministry of Science and Innovation, through the State Bureau of Investigation, by providing information on the research resources available to universities. The collaboration of all these institutions offers proof of their commitment to transparency and accountability, which are key elements for the university sector to be a profitable investment. It also makes the ranking independent from the information provided by the university institutions that appear in it, thus favouring independence with respect to them.

The Ivie also acknowledges the important contributions made by the following people in developing the methodology of the project: Antonio Villar (Universidad Pablo Olavide and Ivie Research Professor), Antonio Ariño (Universitat de València), Álvaro Berenguer (Universidad de Alicante), Gualberto Buela-Casal (Universidad de Granada), José Miguel Carot (Universitat Politècnica de València), Fernando Casani (Universidad Autónoma de Madrid), Daniela De Filippo (Universidad Carlos III), M.ª Ángeles Fernández (Universitat Jaume I), José M.ª Gómez Sancho (Universidad de Zaragoza), Juan Hernández Armenteros (Universidad de Jaén), Joan Oltra (Universitat de València), Carmen Pérez Esparrells (Universidad Autónoma de Madrid), José Antonio Pérez (Universitat Politècnica de València), Fernando Vidal (Universidad Miguel Hernández) and Carlos García Zorita (Universidad Carlos III).

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The results of the U-Ranking project are, therefore, the results of the collaboration of many people and institutions that share the same interest in analyzing the performance of Spanish universities and facilitating comparable and synthetic images of them. With this 10th edition, we celebrate the continuity of a project that, by its nature, offers results that are more and more reliable as the data and basic indicators become more refined.

The authors of the report are grateful to the BBVA Foundation and the Ivie for their long-standing support and, in any case, assume sole responsibility for the indicators presented and the resulting conclusions.

[1] The IUNE Observatory is the result of work carried out by a group of researchers from the universities that make up the "Alianza 4U" (Universidad Carlos III de Madrid, Universidad Autónoma de Madrid, Universitat Autònoma de Barcelona and Universitat Pompeu Fabra). The general coordinator of IUNE is Elías Sanz-Casado, professor at the Department of Librarianship and Documentation of the Carlos III University Carlos III in Madrid and director of INAECU (Research Institute for Higher Education and Science).

Introduction

01

This report presents the results of the research undertaken by the Ivie to develop the 10th edition of Synthetic Indicators of the Spanish Public University System (ISSUE), based on an analysis of university teaching activities and research and innovation.

The indicators provide the basis for compiling different rankings of Spanish universities. The first of these rankings is **U-Ranking** and analyzes the performance of the University System, synthesizing the universities' achievements in teaching, research and innovation regardless of their size.

The fact that a smaller university achieves good results is relevant, but we should not ignore that their impact on their environment may be far smaller than a large university with less outstanding results. For example, a university with 100 faculty members that produces 100 patents is more productive than if one with 1,000 members produces 500 patents. However, 500 patents will have more impact on the economy than 100. For this reason we provide a second global ranking, the **U-Ranking Volume**, which considers the combined effect of both variables, results and size, and classifies the universities according to their total contribution to the universities' missions.

In addition to these two general rankings, we construct other more specific ones: **U-Ranking Dimensions**, focused on the classification of universities in the two dimensions that make up the mission of the universities (teaching and research and innovation). Also, **U-Ranking Degrees** ranks the degrees offered by the different universities, providing useful information to potential students for their decision making in the choice of a University.

All of these rankings are approximations of university results, allowing them to be compared from different perspectives. Through such comparisons, synthetic indicators assess their performance by answering to relevant questions, such as the following:

- Which Spanish universities are the most productive or efficient? Which achieve the greatest volume of results? Do the universities at the top of these rankings coincide?
- Do the positions of Spanish universities in international rankings meet the criteria in terms of volume of activity or in terms of output? Are the positions of Spanish universities in the U-Rankings in line with the best-known international rankings such as that of Shanghai, QS or THE[2]?

[2] Academic Ranking of World Universities (ARWU), QS World University Rankings and Times Higher Education World University Rankings.

- Do the universities with the best research and innovation results stand out for their teaching results? Are both results correlated?
- Do universities maintain their positions over time or do they vary?
- Are the general rankings on university activities as a whole similar to those obtained when comparing specific qualifications? Is the internal heterogeneity of universities high?

The 10th edition of U-Ranking includes an additional analysis of postgraduate education offered by the Spanish University System (SUS). The main novelty introduced by the Bologna Process was the possibility of studying a master's degrees upon obtaining a bachelor's degree, changing the structure of the courses. Thus, a follow up of postgraduate education, which include both master's and doctorate degrees, is important, as well as an evaluation of the differences in university performance. With this objective in mind, the project constructs a synthetic index based on 12 indicators that evaluate the performance of master's degrees and doctoral programs offered by universities in the SUS in the following areas: training process, quality, internationalization and labor market insertion. It offers six Postgraduate Rankings: one for each area of study and a global one that encompasses all the areas. This specific analysis included in the 10th edition answers the following questions:

- How has the importance of postgraduate education evolved in Spanish universities, do all universities follow the same pattern, is this evolution similar to that experienced in bachelor's degree studies?
- Which universities stand out regarding the quality of their postgraduate programs, and are these the same universities when all types of degree programs are considered?
- Is there heterogeneity within universities in the quality of postgraduate education in the different areas of study, do the same universities stand out in the different areas, or are they different?

The answers to these questions can be of great interest in order to offer an updated vision of the Spanish University System, identifying the strengths and weaknesses of each of the universities that form part of it, from a comparative perspective, and to classify them according to their position within the system. That is the purpose of this project and report, as noted in other studies carried out by the Ivie and the BBVA Foundation (Pérez y Serrano [Dirs.] et al. 2012; Aldás [Dir.] et al. 2016; Escribá, Iborra and Safón 2019; Pérez [Dirs.] et al. 2018; Pérez, Aldás y Peiró [dirs] et al. 2021),), the Spanish University System is far from being homogenous. Not acknowledging its heterogeneity makes its evaluation difficult. Thus, this assessment requires that the different specialization and changing characteristics of each university be taken into account, as well as their real possibility of competing in different areas.

Rankings as synthetic indicators of results

The performance of Spanish universities receives constant attention, and debates about the exploitation of the resources used and their results are increasingly frequent. This debate becomes even more common at times like now, when important changes are being considered in the legislation that regulates the university system with the proposal of Spain's new Organic Law for Universities. The driving force behind this interest is the significant amount of resources currently dedicated to these activities and the recognition of the important role universities play in generating and transmitting knowledge, two key areas in the social and economic development of countries today.

In Spain, discussions about university results frequently focus on public universities, for two main reasons: the volume of their activity accounts for most of the Spanish University System, although private universities are gaining more importance, and the origin of the majority of the resources used is public; the assessment of their results is therefore considered to be of general interest. There is also a more practical reason. In Spain, traditionally, it has been more feasible to assess the resources and results of public universities based on relatively homogeneous data, because until recently most of the numerous private universities (currently, 36 active centers) did not provide the necessary data to carry out analyses. However, the participation of private universities in public statistics and information systems is increasing, and a project such as U-Ranking, which aims to provide an overall view of the Spanish University System, took on the challenge of including these institutions. Thus, recent editions of U-Ranking have included in the ranking system private universities that provided sufficient information of adequate quality, so that the data is homogeneous with that of public universities in order to construct synthetic indicators.

The 10th edition of U-Ranking considers 24 of the 36 private Spanish universities that have been active during the 20221-22 academic year, i.e., two out of three private universities, all of those included have information on at least 18 of the 20 indicators used to calculate the synthetic index.

The published rankings include a list of private universities that are not included because of lack of comparable information. This means the reader has an enhanced overview of the system as a whole and will appreciate that if certain universities are not ranked, it is because they do not provide enough available information. If they were included, they would appear below or above other universities in the ranking, that offer more transparency by disclosing e information to the ranking system.

Assessments to measure university results in many countries, as well as in Spain, are increasingly using rankings to classify institutions from different perspectives and with different criteria. Some international university rankings have found their place in debates about the quality of these institutions, becoming widely used references to assess the position of universities and national University systems. Thus, for example, the presence of 12 Spanish universities (14% of the total 86 public and private Spanish universities with activity) among the first 500 institutions of the world according to the Shanghai Ranking, with only one in the top 200, is a fact often mentioned as proof of the limited quality and insufficient international projection of our university system, although assessing this issue has multiple facets Pérez, Aldás y Peiró [dirs.] et al. 2021).

Researchers, public and private institutions, university associations, along with companies in information and media are increasingly taking more initiatives to compile rankings. The objectives and interests of such initiatives and their scope are diverse, both in terms of university activities studied (many rankings focus on research), as well as in terms of coverage (national and international), the data used and its treatment. Some recent reports (Rauhvargers 2011, 2013) stressed the importance of carefully assessing the criteria with which the rankings are compiled when demonstrating their significance and interpreting results. Accordingly, IREG Observatory published in 2019 the *Guidelines for Stakeholders of Academic Rankings* that provides recommendations to help stakeholders (students, families, higher education institutions, policymakers, etc.) interpret and use rankings appropriately.

Indeed, the rankings are a particular way to assess university results and their appeal lies in the fact that they offer simple and concise information. This facilitates comparisons while simplifying them and making them sensitive to the criteria and procedures followed when constructing indicators. It is for this reason that the value given to the rankings should not be separated from how they are compiled or from the metric used.

These precautions are not always present when presenting the results or when using rankings. On the one hand, the reputation of a good position in a ranking turns them into an intangible asset to universities. Therefore, increasingly more universities develop strategies to convey information about themselves (signaling) by advertising their more favorable results, and also to improve their positioning in the rankings. Certainly, the expected return of a good position in a ranking is significant, given that it can affect areas as diverse as recruiting students, attracting researchers, obtaining resources and the social projection of institutions.

On the other hand, the growing interest in these classifications is because they are perceived as useful tools (despite being imprecise) for various purposes and different stakeholder groups in universities as they:

a) Provide the members of each university with external references on their strengths and weaknesses, contributing to the perception of their position.

b) Offer the users of university services easy to interpret information in terms of attractiveness or quality of institutions.

c) Provide comparative information to governments, with the possibility of being used to assign resources or for the accountability of universities to society.

d) Complement the work of university quality assurance agencies and provide information to analysts interested in having homogenized indicators available.

Approach of the project

In Spain different university rankings are being regularly presented, compiled with diverse perspectives and methodologies. What sets this project apart is that its rankings (U-Ranking, U-Ranking Volume, U-Ranking Dimensions, U-Ranking Degrees) are developed according to criteria that respond to many recent international recommendations. One of them is that indicators should be created with the objective of studying university activities from a comprehensive approach, i.e. examining teaching, research, and innovation. Another important feature, is that it offers rankings by degrees (U-Ranking Degrees), giving guidance to students when choosing what to study.

The criteria used in developing U-Ranking that should be noted are:

- Offering multiple university rankings, in which university activities are examined from a general perspective, as well as in specific fields (teaching or research and innovation), but also in terms of the performance achieved (U-Ranking) or the total output (U-Ranking Volume) of each university.

- Taking into account the perspectives and interests that potential users of the data have when using the rankings. In particular, special attention has been paid to the importance that many people give to specific areas of activity, such as degrees, when comparing universities. To deal with this concern, a web tool has been developed which enables users to create personalized rankings in terms of bachelor's degrees (U-Ranking Degrees). It has been designed to guide students, families and counselors when choosing a university in which to study. The advantage of recognizing that users have different preferences is that the following problem can be avoided when constructing synthetic indicators: their excessive dependence on experts' opinions (subjective and sometimes contentious) regarding the weights that should be attributed to teaching or research. This perspective is also taken into account in the personalized rankings,

allowing the user to give different weights to teaching and research and innovation than the general weights used to create U-Ranking.

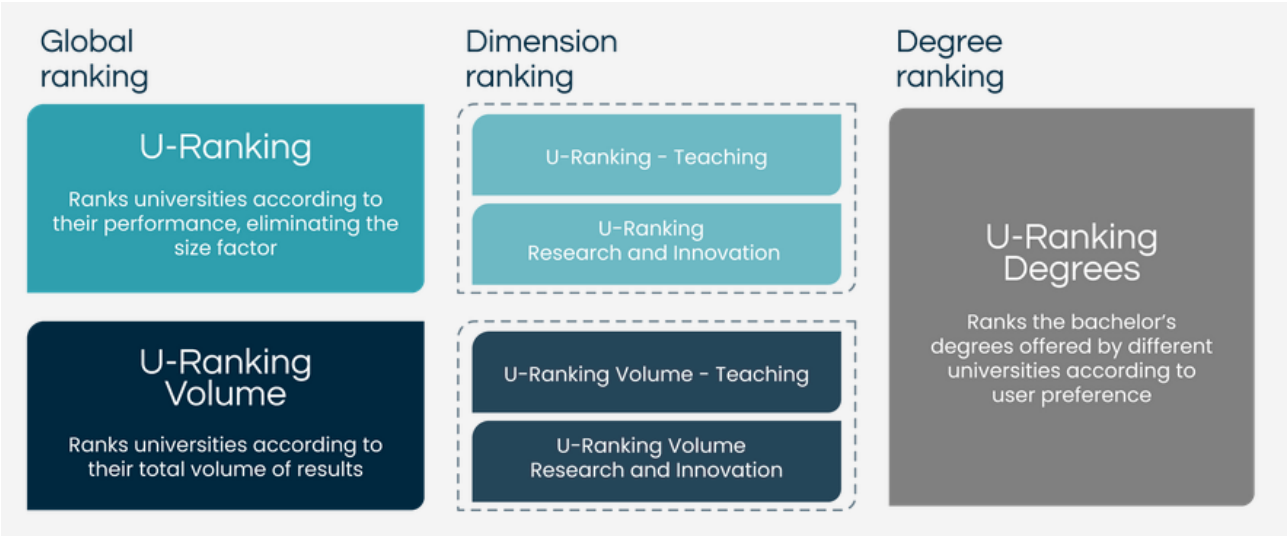
The project therefore offers two different products:

- A general collection of rankings on Spanish universities, based on the criteria of the project's team and the experts consulted, allowing each institution to be compared with others from different points of view: results (U-Ranking), volume of results (U-Ranking Volume) and areas of specialization (U-Ranking Dimensions).
- A web tool that provides personalized rankings for different bachelor's degrees, grouped according to area of study and which allows to compare the degrees offered by the universities taking into account the interests and criteria of each user (mainly students enrolling in universities, their parents or school counselors) on their choice of studies, the regions considered and the importance given to teaching and research and innovation: U-Ranking Degrees.

Figure 1.1 summarizes the different rankings offered by U-Ranking.

It is important to point out that all the rankings have a standard basis: the data correspond to the same set of variables, and the methodology followed in the treatment and aggregation of the variables is also the same. The differences between the various rankings come from the different levels of disaggregation of the variables (university, area of study, or family of degrees) and from the choices the users make to construct their personalized rankings. The adequacy of the information used is fundamental for the construction of the indicators offered.

Figure 1.1. **Rankings included in the U-Ranking Project**



The project U-Ranking relies on the collaboration with the Spanish Ministry of Universities, allowing access to the Integrated System of University Information (SIIU). The SIIU is a web-based platform that collects, processes, analyzes and disseminates data of the Spanish University System providing homogeneous and comparable statistical information of the Spanish universities. Through the SIIU, the Spanish Ministry aims to make the university system more transparent, so that citizens and researchers alike can analyze it, draw their own conclusions and generate proposals for improvement. Thus, the SIIU is a tremendously valuable project, which is a result of the necessary commitment on behalf of the majority of universities and public administrations that allows society to know the reality and performance of the university system, a system that is vital for economic and social development and in which a large amount of resources are allocated.

This platform provides information on the degrees offered by each university, in which schools they are taught, students in each degree and full-time equivalent teaching staff, students in international mobility programs, as well as detailed information by degree on success, performance and drop-out rates and percentage of foreign students in each degree. Since new information is continuously being added and updated in the SIIU, U-Ranking can rely on this source to access other indicators that can be expected to become more accurate over time.

One of U-Ranking's main objectives is to provide the most useful and detailed information as possible for the different target publics which are the potential users. Consequently, the project includes additional information to the rankings, both in the ranking of universities and in the ranking by degree:

a) Ranking of universities:

A university ranking allows to observe the relative position of one institution with respect to others, but it is not easy for university managers or researchers to analyze in depth the performance of a specific university, to assess the aspects in which it stands out or its distance from the average of the system or from a certain university, or a group of universities that are taken as a reference. For this reason, the website https://u-ranking.es, includes the section **Data by University** that allows the user to consult the data and ranking results for each university. With this dynamic tool, the user can compare different universities, both for groups of universities (Spanish university system, public or private ownership, or by region), as well as individual universities.

For each university, the U-Ranking and U-Ranking Volume (global and dimensions) indexes obtained in this edition are offered, in relation to the average of the chosen comparison group. The panel also shows a **panel of indicators** for each university, which is a file containing the values for each of the 20 indicators that make up the synthetic index and are compared with the mean value of the universities so that managers can observe the relative distance with the reference group or with other universities. The added value[3] of the indicators is presented on a scale of 0 (minimum value obtained by a university of the system) to 100 (value given to the university that scores the most). In this way, it facilitates the comparison between very different indicators and it offers a general profile of each university.

The panel of indicators also contains the position obtained in U-Ranking and U-Ranking Volume in the last six editions. Other basic data on the university is provided, such as year of foundation, type of ownership, student body, faculty and number of degrees.

[3] Without distinction by areas of study, fields of knowledge or degrees.

The information provided is completed with the results of specific analyses carried out in recent editions. Thus, for example, it includes the labor market insertion indicators recently published by the Ministry of Universities on the situation in 2020 of those graduates who obtained their bachelor's degree four years earlier. Although from a previous cohort, the indicators on enrollment rate, percentage of graduates with employment according to their educational level and their average salary for the National Insurance contribution calculation, served as the basis to prepare a ranking on the employability of universities in the 2020 edition (Pérez and Aldás [dirs.] 2020). Also included are the results on the renewal of degree offerings in the last decade, which were analyzed in the 2021 edition (Pérez and Aldás [dirs.] 2021). Finally, as a result of the specific analysis carried out in chapter 5 of this report, the panel includes the position of the university in the Postgraduate Ranking.

b) Personalized university rankings by degree:

The Choose a University tool allows to create customized rankings with more than 3,500 degrees based on the user's preferences. In addition, along with the ranking results, it offers information on tuition costs, cut-off marks and labor market insertion for each degree program.

This year the tool incorporates the most recent data published by the Ministry of Universities on the employability of each degree obtained from the Spanish Social Security system (2022a). The data refer to the employment situation in 2020 of university students who graduated during the 2015-2016 academic year. The user can consult, for more than 1,900[4] degrees, three indicators on the employment results: the rate of affiliation to the Spanish Social Security system, percentage of university graduates hired according to their educational level and their average salary for the National Insurance contribution calculation.

Structure of the document

After this introduction, the rest of this document is divided into five chapters, as follows. Chapter 2 describes the methodology used to prepare the rankings. Chapter 3 describes the approach adopted to allow users to personalize the rankings and the online tool constructed for the students. Chapter 4 presents an analysis of the main aggregate results, putting special emphasis on the comparison of the U-Rankings with the main international reference ranking (ARWU). It also provides an analysis of the sensitivity of the results to changes in any of the assumptions used. The results are compared at the level of the university systems of the different autonomous communities. Chapter 5 analyzes the postgraduate programs offered by Spanish universities, with the rankings corresponding to the five areas of study, as well as an overall ranking of universities with courses in at least three areas. Finally, chapter 6 summarizes the main characteristics and results of the project.

[4] Of which 350 have no information for 2020 and data for 2018 is offered for graduates in the 2013-2014 academic year, which is indicated with an (*).

Methodology

02

The U-Ranking project was born from the desire to closely examine the most important national and international rankings available, so as to identify possible ways of reducing their shortcomings. The most significant problems arising with rankings occur in the following areas: (1) university activities studied, (2) disaggregation by subject or type of studies, (3) data availability and use, (4) methodological rigor in the treatment of data and construction of indicators, (5) recognition of the user's perspective when creating and providing data, and (6) user-friendly tools to select their preferences in the rankings.

The project has studied the shortcomings in all these areas and this chapter describes how they have been addressed.

2.1. THE DESIGN OF RANKINGS

In the first editions of the ISSUE project, and due to its novelty, an extensive chapter was dedicated to the limitations of rankings and the improvements that a new tool like this one should include. The reader can view previous reports —found on the U-Ranking website (https://u-ranking.es)— for a detailed analysis of these aspects, which are summarized in this edition.

The development and use of rankings entails certain **risks** that should be forewarned. First of all, it is not wise to base strategies on improving the variables studied, instead of on correcting the underlining problems: the improvement of the institutions should be based on principles of efficiency and the results are reflected in the indicators. For university administrators, the goal is to generate policies that will make their institutions improve in teaching, research and knowledge transfer, trusting that if a ranking is well designed those improvements will be reflected in the indicators used to prepare the ranking. The opposite approach, i.e. to try to improve the indicators so as to improve an institution's place in the ranking, is not only misguided but doomed to failure.

The use of indicators that are not very robust, with values that are highly sensitive to the criteria of measuring the variables and aggregation procedures, and that focus on what should be measured and not only on what can be measured, must be avoided. Finally, a very common risk involving rankings is to focus only on the elite (world-class universities) and obliviate the rest. This may inadequately compare institutions that have very different specializations and resources.

Some published rankings show **limitations** that users should be aware of. In the case of universities outside the circle of the well-known universities, many rankings are exclusively centered on indicators that focus on research activity and unreliable reputation factors that are usually based on surveys. For example, the exclusive use of these indicators to rank Spanish universities is in many cases inappropriate and risky, leading to wrong conclusions.

In the first three U-Ranking reports, a detailed review of the issues to be considered in the design of a good ranking was carried out and applied to the project. In this report it is not necessary to repeat in detail the aforementioned analysis, but, we will summarize some of the aspects considered:

- The study *Berlin Principles on Ranking of Higher Education Institutions* (IREG 2006) stresses, among other recommendations, to indicate clearly what the target audience of the ranking is, to be clear when detailing what each indicator measures to be methodologically scrupulous, to focus on the outcomes rather than on the inputs and to maintain a high ethical standard, given the responsibility and impact that rankings have.

- The results of discussions held by the European University Association and the International group of Experts in Rankings (IREG 2006) highlight the importance of providing a vision of all the institutions, addressing their multidimensional nature and diversity, respecting the user's perspective and maintaining the independence and temporal sustainability of the ranking.

The U-Ranking project expressly includes all the principles which were recently discussed internationally and proposed by the EU. The following sections detail the many aspects that have been taken into account when working with these criteria.

2.2. ACTIVITIES STUDIED

One of the main shortcomings of certain rankings in providing a general assessment of universities, particularly international ones, is that the activities are examined from a very partial perspective. The problem stems from the limited data availability on the results of teaching activities, and innovation and development technology, which are far less abundant than research.

In fact, most of the important rankings focus on analyzing research, taking little account of another significant function of universities which is teaching and barely considering technological development activities, despite their increasing importance. The rankings which are biased toward research are frequently interpreted as representative of university activity as a whole and they may not be.

There are three possible reasons for this: 1) the data available is used and, without a doubt, the abundance, quality and homogeneity of data on research is much greater than in the other two areas; 2) research activity is considered the most important distinctive element of universities in the last two centuries; and 3) the hypothesis holds that the research quality of professors is a proxy variable for other areas, and therefore observing the results in this area is sufficient to predict the others.

The first reason is practical, but can induce bias by omission in indicators and rankings. The second needs some clarification in that it is a powerful argument regarding postgraduate studies but less so in relation to the degree, especially in mass university systems, such as those of most developed countries today. In fact, in many of these systems there is a significant concentration of research activity in a small number of universities, while in a large number of institutions there is fundamentally teaching activity. The third reason is a hypothesis, which validity should be tested by developing indicators for all activities and testing whether the correlation between teaching and research results is high. If the validity of this hypothesis is not tested, and given that the intensity of university teaching specialization, research and innovation and technological development varies greatly[9], overlooking the direct indicators of teaching and of innovation and technological development can bias the rankings. In this sense, the experience of U-Ranking shows a low correlation between teaching and research and knowledge transfer, the importance of including teaching and research innovation indicators becomes more relevant.

[9] See Pérez and Serrano (dirs.) (2012, ch. 1 and 4).

Therefore, it is important to take advantage of the data available on university activity in the field of teaching, and innovation and technological development, so that the rankings reflect university activity as a whole more accurately. This also allows us to recognize the different specialization profiles of universities, as some focus more on basic research (as occurs in many of those most often included in the world rankings), others on higher education and professional development, and others on applied research, innovation and technological development.

Currently, the public and homogeneous data available on the innovative activity of Spanish universities does not allow a rigorous, independent evaluation of their performance in the area of knowledge transfer. For this reason, "Research and Innovation" is considered a single dimension, which includes one of the indicators most commonly associated with innovation: patents.

Studying the different activities of the universities is a first step in the direction of addressing the different perspectives on university systems and the different interests that potential users of rankings may have. Thus, a degree student probably shows greater interest in teaching, while postgraduate students and teachers focus more on aspects related to the quality of research. If the data focuses solely on research results then these approaches cannot be carried out accurately.

The U-Ranking system specifically studies the two categories of university activities and analyzes the data available on each of them in Spain. The national dimension of the project ensures that reasonably homogeneous data is available with a set of variables representing the activity of Spanish public universities and two-thirds of private universities. In the future, it would certainly be desirable to have data available for the rest of the private universities of similar quality and homogeneity as those included in the ranking, which would improve the scope of the project.

The total amount of 72 universities included in the ranking is sufficiently high for the data available to allow a contrast of the hypothesis to which we referred earlier: if research results can predict correctly those of teaching or not. The project has examined this specific objective, with the results presented in chapter 4.

2.3. DISAGGREGATION OF ACTIVITIES

A further shortcoming noticed when analyzing current rankings is that many deal with universities in a unitary manner, not recognizing the diversity of the areas of knowledge in which these institutions can offer professional development or conduct research or innovation. This problem needs little explanation: to be more useful, a ranking has to provide the user with as much information as possible on the specific areas or scientific fields of their choice, since universities may not be homogeneous in the quality of each of their areas.

It is for this reason that ranking systems can be improved by providing disaggregated data by areas of study, fields of knowledge or specific degrees. This last level of detail could be very significant for students, given that their fundamental interest is generally linked to the quality of the specific studies that they want to pursue.

For the disaggregation, the U-Ranking project has worked in several directions. Firstly, it followed the criteria that it is important to start with the most disaggregated data available, maintaining its detail whenever possible, so as not to lose the wealth of its heterogeneity. Secondly, the disaggregated data had to be homogenized properly before adding it to the synthetic indicators. And third, the problems of combining (for the construction of some of the indicators studied) the data disaggregated according to scientific fields or degrees with other data aggregated at university or area of study level had to be solved. When there is no disaggregated data, or its disaggregation makes no sense, the aggregated data has been allocated to the various elements of the set, following the criteria considered more reasonable in each case.

Addressing the above problems is not technically considered to be trivial. For example, in the case of the rankings on specific bachelor's degrees of Spanish universities, to deal with data on areas at different levels of disaggregation, a series of matrices have been created to connect one another. In order to do this, accurate connections

had to be established between university, area of study, Web of Science category, areas of the National Evaluation and Foresight Agency (ANEP) and bachelor's degrees.

In allocating research results to each degree, the starting point was data disaggregated by the Web of Science categories (more than 250 items). Given that one classification is not perfectly nested in another, both classifications have been connected, and the two types of errors that could be made have been taken into account:

1. *Inclusion error.* That is, attributing to a given degree the research carried out by teachers from other areas. For example, attributing to the Pharmacy degree of a given university, the research in "Hematology" that has actually been conducted by teachers from the Faculty of Medicine and who only teach in Medicine.

2. *Exclusion error.* That is, excluding research by teachers in areas that are not exactly the subject of the degree courses they teach in, as a result of being too restrictive when allocating areas to degrees. For example, if in Economy we only allocate the category "Economics", then important research may be missed in the area of "Business and Finance", theoretically more related to Business Administration degrees but also carried out by professors who teach in the degree of Economy.

These problems do not have a perfect solution and one of the alternatives have to be chosen. Therefore, we have opted for a more inclusive criterion: when in doubt about whether to associate a category or scientific field to a degree we have chosen to include it, minimizing exclusion errors on the grounds that they are more serious errors.

2.4. INDICATORS, AREAS AND DIMENSIONS

The main pillar of a ranking system is the rigor of the procedure followed when dealing with existing problems so that the created classification is based on appropriate data and is treated with reasonable methodological criteria. Many of the rankings have clear shortcomings in this aspect, which international literature has analyzed in detail.

The U-Ranking system considers that a university ranking should consider all their activities and be structured according to the two following major dimensions:

- *Teaching*
- *Research and innovation*

The assessment of these two dimensions can take into account multiple areas of activity. However, many experts agree that an excessive number of indicators obscure the meaning of a ranking and complicate the construction of synthetic indices, a complex matter as it is. Following a criterion of (relative) simplicity, four **areas** have been studied in each of the dimensions aforementioned:

- *Access to financing*
- *Output obtained*
- *Quality (particularly in the results and in some cases, resources and processes)*
- *Internationalization of the activities*

The main reference to assess universities should be the results, but these can be studied from the perspective of total volume or from the perspective of their quality. If there were a market that assessed the differences in quality, then results showing a higher quality would have a higher price. However, these prices hardly exist in the area of public universities. The differences in rates, currently very diverse between regions and degrees, respond in many cases to factors that have nothing to do with quality. However, some indicators can supplement, in part, this limited information. Thus, for example, there are indicators on the quality of teaching and research and also on a very relevant feature today regarding the specialization (and quality) of universities: their internationalization.

The assessment of the quality of the output is incomplete if the impact of the university system on its environment is not taken into account. A university can generate high-quality products, but if its size is very small, its contribution to technological development or to the production of

human capital through its graduates may have a much smaller influence on the productive environment than a university with somewhat lower levels of quality in its output but a significantly larger size. This obliges us to introduce also the size factor in the rankings system which is the reason for generating the U-Ranking Volume.

Each of the four areas mentioned has been analyzed using a series of two and three indicators taking into account the dimension that is being studied for each area. Table 2.1 shows the indicators studied, after analyzing the availability of data and discussing alternatives with the group of experts working on the project. Agreements were reached by analyzing the suitability of each indicator in capturing significant data on the area and dimension it forms part of it.[10] It is important to stress that the data used is obtained from sources allowing the project database and the rankings based on it not to require universities to provide data directly to U-Ranking.

The logic underlying the selection of indicators, disclosed in summary form, is the following:

Teaching

- Teaching resources are characterized by budgetary allocations per student, and faculty and research staff per student, with special attention paid to faculty members with PhD.
- Teaching output is measured by using results obtained by students, analyzing how many students undergo evaluation, how many succeed in those evaluations and how many drop out.
- The quality of teaching is very difficult to observe, and we studied as a proxy the quality of students measured by the cut-off mark of each area and the percentage of postgraduate students.
- The internationalization of teaching is shown by the percentage of foreign students and the percentage of students participating in mobility programs.

Research and innovation

- The research process is characterized by data referring to two types of resources: competitive public funds raised and the provision of research staff, scholarships and qualified technical support.
- Output is accounted for by citable papers published in each area and the number of doctoral theses, which are an indicator of the training activity of a researcher in a given area. The number of patents is also included in this area.
- The quality of the research is reflected in the impact the publications have and the citations that these papers generate.
- Finally, a greater proportion of international publications, international co-authoring and the percentage of research funds from external sources indicate a greater international vocation in research activity.

As shown in table 2.1, U-Ranking 2022 is calculated based on 20 indicators[11], ten for the evaluation of teaching results and another ten for research and innovation activity. In the case of U-Ranking Universities, 16 of the 20 indicators are obtained by areas of study and the remaining four for the university as a whole. However, the level of detail increases in the case of the U-Ranking Degrees (see chapter 3), in which five of the ten indicators of teaching are obtained for each degree and five of the ten indicators of research and innovation are classified by degree groups, that is, an aggregation in 122 groups of the 3,575 degrees and double degrees offered by the Spanish universities analyzed.

[10] In order to ensure the transparency of the process in developing indicators, the definition of each indicator, its source and its time frame are all included in appendix 1 and in the following website of the project: https://u-ranking.es/methodology.

[11] See Annex 1 for a more detailed description of the definition, source of information and period considered.

Table 2.1. **List of indicators, areas and dimensions**

Dimension	Area	Indicator
Teaching	Resources	Faculty member per 100 students
		Budget per student
		Percentage of faculty member with PhD
	Production	Success rate
		Evaluation rate
		Drop-out rate
	Quality	Percentage of postgraduate students
		Cut-off mark[1]
	Internationalization	Percentage of foreign students
		Percentage of students in foreign exchange programs
Research and Innovation	Resources	Competitive public resources per faculty member with PhD
		Contracts with PhDs, research grants and technical support over total budget
	Production	Citable documents with ISI reference per faculty member with PhD
		Number of patents per 100 faculty members with PhD
		Number of theses defended per 100 faculty members with PhD
	Quality	Mean impact factor
		Percentage of publications in the first quartile
		Citations per document
	Internationalization	H2020 European research funds per faculty member with PhD
		Percentage of publications with international co-authorship

[1] Mark of the last student who gained admission to a degree with limited places.
Source: Own elaboration

2.5. PERIOD COVERED BY THE DATA

University rankings aspire to offer an image of the current position of each institution, though they should not be conceived of as a snapshot of a given year. Many indicators have the character of a flow, and as such, can present high variability from year to year, both in the quality of the information and in the distance between the actual reality and what the information reflects, given the delays in the information registered and available. In addition, other indicators reflect the accumulation of results over long periods of time.

The rankings referred to usually recognize this problem by taking comparison periods longer than a single year, either using moving averages and even considering the complete history of the University (as in the case of the treatment of the Nobel Prize and Fields Medal winners in the Shanghai Ranking). Considering multi-year periods when elaborating the indicators provides greater interannual stability of the rankings and permits specific random disturbances to be smoothed out by considering a longer time range.

Our approach follows this criterion, considering that one cannot reasonably expect abrupt changes in the universities' real situation. Thus, the ranking should avoid giving that impression. Therefore, as information has become available, we have converged toward a 6-year moving average for nearly all the indicators. All of the indicators on research and innovation are already calculated as a mean of six years. Furthermore, since the 6th edition of U-Ranking, teaching results are reached using data by university from six academic years, except for the two exclusions mentioned in table 2.2.

Table 2.2. **Time series used in U-Ranking 2022**

Dimension	Area	Indicator	Period
Teaching	Resources	Faculty member per 100 students	2014-15 to 2019-20
		Budget per student	2014-2019
		Percentage of faculty member with PhD	2014-15 to 2019-20
	Production	Success rate	2014-15 to 2019-20
		Evaluation rate	2014-15 to 2019-20
		Drop-out rate	2010-11 to 2015-16
	Quality	Percentage of postgraduate students	2014-15 to 2019-20
		Cut-off mark[1]	2021-22
	Internationalization	Percentage of foreign students	2014-15 to 2019-20
		Percentage of students in foreign exchange programs	2014-15 to 2019-20
Research and Innovation	Resources	Competitive public resources per faculty member with PhD	2015 to 2020
		Contracts with PhDs, research grants and technical support over total budget	2015 to 2020
	Production	Citable documents with ISI reference per faculty member with PhD	2015 to 2020
		Number of patents per 100 faculty members with PhD	2015 to 2020
		Number of theses defended per 100 faculty members with PhD	2015 to 2020
	Quality	Mean impact factor	2015 to 2020
		Percentage of publications in the first quartile	2015 to 2020
		Citations per document	2015 to 2020
	Internationalization	H2020 European research funds per faculty member with PhD	2015 to 2020
		Percentage of publications with international co-authorship	2015 to 2020

[1] Mark of the last student who gained admission to a degree with limited places.
Source: Own elaboration

Table 2.2 shows the updating in terms of years and time series registered by the indicators used in the ranking for 2022. All the indicators include an additional year compared to the previous edition, covering data for the majority of indicators up to 2020.

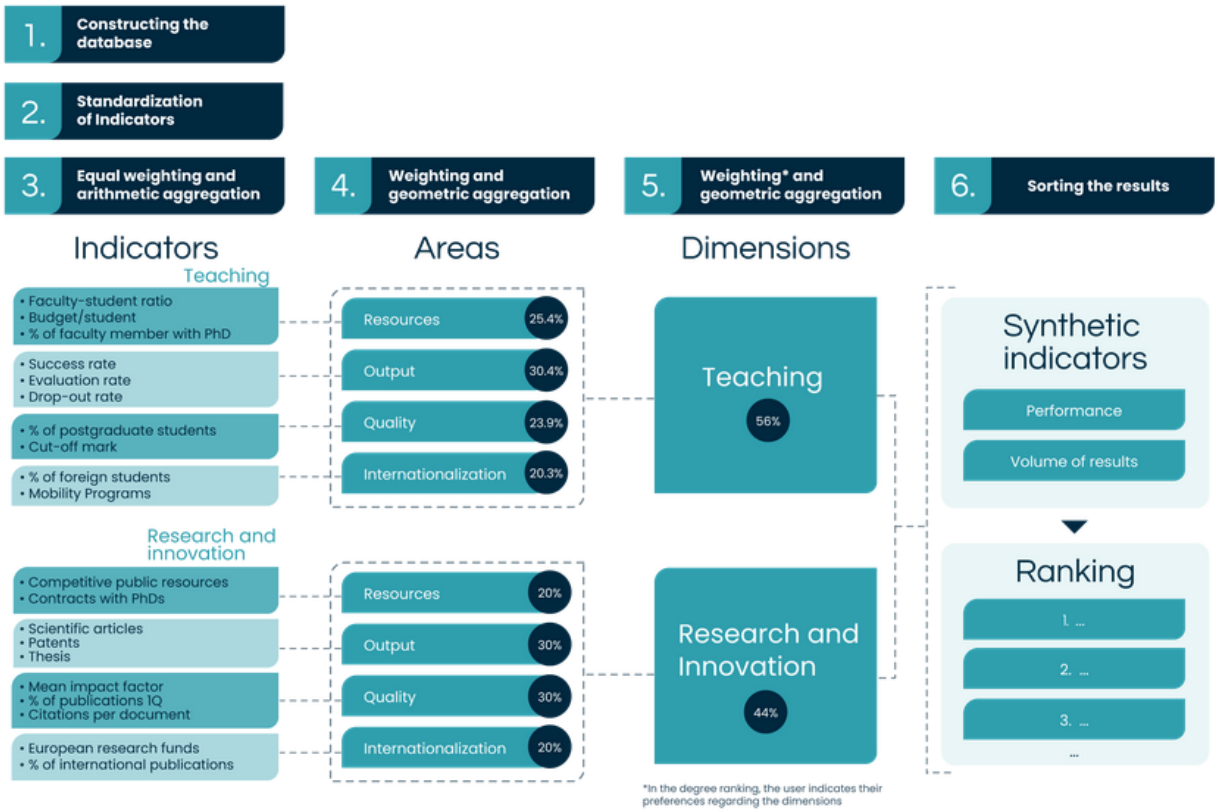
In sum, the methodology on which the calculation of the U-Ranking system is based leads one to expect that the rankings of universities will not present sudden changes from one year to another, but they contain new information that can generate changes. The existence of an inertia in the rankings seems to be a desirable attribute, since the quality of university institutions does not change radically in the short term, although some of their annual results may do so.

2.6. CRITERIA FOR THE CONSTRUCTION OF INDICATORS

A key aspect to trust the meaning of the rankings is that the processes used in its elaboration should be transparent with strong statistical foundations for the construction of indicators. In this regard, the project team contacted experts in the subject and analyzed the methodological principles established in the specialized literature, especially in the *Handbook on constructing composite indicators: Methodology and user guide* (Nardo et al. 2008).

The underlying process of drawing up any of the rankings of universities constructed is structured according to the following six steps —the fifth one being unnecessary in the case of the partial rankings of teaching and research and innovation:

Figure 2.1. **Methodology**



1. Preparation of the data bank
2. Standardization of indicators
3. Weighting and aggregation of indicators within the areas of each dimension
4. Weighting and aggregation of area indicators, within the dimensions
5. Weighting and aggregation of the dimensions
6. Obtaining of rankings

Figure 2.1 graphically illustrates the time sequence of the steps. To complete each of them it is necessary to solve technical problems, as described and indicated below.

2.6.1. Constructing the database and missing data

The starting point is to have the necessary available information on the variables to be considered in order to construct each indicator. The data used for the synthetic indices are obtained from public information systems and statistical sources. The main source of information is the Integrated System of University Information (SIIU) of the Spanish Ministry of Universities. The Bibliometric data regarding the research performance of all Spanish universities (based on information provided by Thomson-Reuters, currently Clarivate) and on patents is provided by the INAECU research team in charge of the IUNE Observatory. Information has also been collected from the State Bureau of Investigation on competitive resources and research contracts. Information on European research funds has been obtained from the European Commission's Horizon 2021 Dashboard.

For data on the revenue of private universities, public annual accounts and other information from the universities' website section on transparency or audited reports have been used.

The data has been collected with the maximum level of disaggregation available (degree, area of

study, area or field of study, ANEP areas), so that the standardizations within each field make the results more comparable.

The initial indicators of the ranking are obtained from the database, and when the information allows it, they are calculated by area of study. This disaggregation is available for 16 of the 20 indicators. In the case of the remaining four indicators, the value of the university for all the areas of study is considered.

A first technical problem to be solved is the treatment of missing data from certain universities in some variables used. Such gaps may be due to several factors, whether technical (an error in loading the data), or of availability (the university may not have generated certain information or not done so in time) and even strategic (a university may opt not to give certain information because it is not in its interests to do so).

Not facing this problem rigorously would condition the comparability of the universities, the quality of the aggregate indices, and the final results. The methodology applied and the improvements made in the sources of information used have reduced the percentage of indicators with missing values to 1.1% of the approximately 7,500 values of indicators used, thus, no further treatment is required to compensate the absence of data. The following are the criteria that have led to this methodological approach:

First, given that U-Ranking takes into account the specialization by areas of study of the different universities and operates in most indicators with this level of disaggregation, it is important to distinguish whether a possible lack of data is due to the absence of activity in that particular area —for example, a university does not register drop-out rates in Sciences because it does not offer classes for that area of study— or due to one of the reasons stated above. Therefore, the first step in identifying the missing data is to determine which areas of study are offered by a university. The following criteria are established to identify the areas of study in each university that are non-existent or of little importance for evaluating its performance:

a) The teaching dimension does not take into account those areas of study in which a university does not offer degrees during the 2021-22 academic year.

b) In the case of the research activity dimension, the areas of study with no full-time equivalent faculty members with PhD are not considered.

In the 2021-22 academic year, 84 of the 86 active universities offered bachelor's degrees. However, not all of them in all areas of study. Table 2.3 shows the number of universities that, according to the criteria indicated, do not offer bachelor's degrees or do not carry out research in each of the areas. While all the universities offer degrees related to Social and Legal Sciences, 24 of them, of which the majority are private, do not offer degrees in Sciences.

Secondly, it should be noted that the indicators are based on the calculation of moving averages, 6 years for most of the cases. If a university does not present any data for the years considered, an average is estimated with data from the available years, thus, reducing the chances of a variable with no data.

In addition, for indicators in which there are a greater number of universities without data, the information is constructed from exhaustive administrative registers, so if a university does not appear it is because it has no activity or no results in that area and therefore its value is 0. This information is based on competitive resources and research contracts from the State Bureau of Investigation, national patents granted from the INVENES database or income data from the European Commission's H2020 projects.

Table 2.3. **Number of universities with no activity in teaching or research by area of study**

		Public universities	Private universities	Total universities
Teaching *With no degree offers in 2021-22*	Arts and Humanities	1	11	12
	Social studies and Legal studies	0	0	0
	Sciences	2	22	24
	Engineering and Architecture	0	6	6
	Health Sciences	4	6	10
Research and Innovation *With no full-time equivalent faculty member with PhD (on average in the last 6 years)*		0	10	10
	Arts and Humanities	0	2	2
	Social studies and Legal studies	0	23	23
	Sciences	0	6	6
	Engineering and Architecture	1	6	7

Note: 84 off the 86 universities with teaching activity in the 2021-22 academic year offer degree programs.

Source: Spanish Ministry of Universities (2022d) y elaboración propia

Closely linked to the previous reasons is the improvement in the sources of information and their consolidation over time in the collection of university data.

Finally, the minimum requirement for a university to be evaluated in U-Ranking is that it has at least 18 of the 20 indicators used to calculate the synthetic index, as well as the three variables that measure size (student body, full-time equivalent faculty members with PhD and consolidated revenues).

After applying these criteria, the number of data missing is considerably reduced. Out of the 7,446 indicators in U-Ranking 2022, 78 values are missing, which represents 0.73% of the total. It has been verified that the results do not suffer substantial differences if the missing values are not estimated. Therefore, to not estimate the missing data proves to be the most accurate decision, since it is robust with the methodology applied previously, it simplifies the calculation method, making it easier to reproduce the ranking.

Treatment of the outliers can be done once the database from which the various indices are obtained is available. An outlier is considered to be any variable outside the interquartile range, i.e. those values not included in the interval defined by the percentile value 25 minus one and a half times the interquartile range and the percentile value 75 plus one and a half times the interquartile range of this same ratio. These values are corrected by assigning them the maximum or minimum value —depending on the case— of this interval.

2.6.2. Standardization of indicators

One of the pillars upon which the construction of synthetic indicators is based is the proper standardization of the information, that is, its transformation in order to homogenize it and make possible its comparison and aggregation. There are numerous systems of standardization, such as the Gaussian (subtracting from each variable its arithmetic mean and dividing by its standard deviation), relative order (ordering the values according to their relative value), distances from the mean or the median, and the ratio between the variable and its mean or its median.

The standardization chosen must be in consonance with the method of aggregation to be used subsequently. Because as a general rule the geometric aggregation method has been chosen, requiring the value of the standardized variables to be positive, we must exclude the Gaussian and absolute distances from the mean and from the

median, which necessarily generate negative values, as alternatives of standardization.

For this reason, the standardization method chosen is the ratio between the variable and its median. Taking into account that the median separates each distribution into two halves, the standardized results will be centered on the value 1: values below the median are bounded between 0 and 1, while those above will be greater than 1.

As previously highlighted, one of the key aspects of U-Ranking is that its methodology takes into account the different areas of study of the universities. Thus, whenever information by areas of study is available, each indicator in level I is calculated for each area of study and university. Subsequently, each one of the 5 indicators per area of study is standardized by dividing by the median of its area and finally the 5 standardized indicators of each university are aggregated by calculating the arithmetic average weighted by the weight of the student body in each area and university (if the indicator belongs to the teaching dimension) or by the weight of the faculty members with PhD (if it belongs to the research and innovation dimension).

2.6.3. Weighting and aggregation of indicators within an area

Once the 20 standardized indicators for each university is obtained, they are aggregated to obtain a synthetic indicator for each area. Thus, for example, to obtain the indicator for the *quality* area in the *Research* dimension we aggregate the standardized values of the *Mean impact factor of publications* and the *Percentage of publications in the first quartile*.

As in the case of standardization, there exist numerous aggregation procedures, such as the arithmetic, the geometric or those based on factor analysis. The choice of one or the other has implications in the substitutability of the indicators or the importance of extreme values (both large and small). The aggregation criterion chosen implies a weighting of the indicators, which is important to bear in mind.

It must be taken into account that some universities might have zeros in some indicator of a specific area (for example, they may not possess *Patents*). For this reason we have opted in this phase for an arithmetic aggregation, ruling out the geometric aggregation because the presence of a zero in the product would cause the whole area analyzed to take a nil value.

As the weighting of the indicators shows the importance assigned to each variable when aggregating it into a synthetic indicator, we also reflect on this question. This is a classic problem in the construction of synthetic indices and generally requires a judgment on the relative importance of each element. In the case of economic aggregates the weights are offered by prices —which reflect the market valuation of the goods, services or factors exchanged— but in many other cases there are no prices and the indicators have to be constructed following other criteria, frequently based on subjective opinions.

There are three possible approaches to weighting: 1) assignation of identical weights (which also implies a judgment, since the weight of one indicator is conditioned by the number of indicators included); 2) reference consultation among experts to identify the most widely held opinions (by means of surveys or methods such as the Delphi); 3) weighting according to the user's preferences. These three alternatives have been used according to the level of aggregation to be achieved.

At this first level of aggregation (changing of simple indicators into synthetic indicators for each area) we have opted for the first system, that is, equal weighting. This is because in most cases the indicators capture different aspects of the area analyzed, but there are no clear arguments for granting one of them greater or lesser importance. Also, the nature of the information that each indicator captures is fairly homogeneous and in that case there is less interest in giving greater weight to one indicator or another, because in many cases they are correlated. This occurs, for example, in the case of the mean impact of publications index and the percentage of these in the first quartile. Consequently, the different simple indicators will enter into the calculation of the arithmetic mean with the same weight.

Table 2.4. **Weights by area**

	Resources	Production	Quality	Internationalization
Teaching	25.4	30.4	23.9	20.3
Research and Innovation	20	30	30	20

Source: Elaboración propia

2.6.4. Weighting and aggregation of the area indicators within each dimension

At the second level of aggregation the indicators of the different areas are grouped into an indicator for each of the dimensions considered: teaching and research and innovation and technological development. At this stage there are reasons for following a different criterion, as after the arithmetic aggregation of the previous stage no area indicator presents zeros. A *geometric* aggregation method will be used.

Among the most interesting properties of geometric aggregation is that it limits the substitutability among the components that it aggregates. In other words, geometric aggregation penalizes the universities that have neglected any of the four transversal areas (*Resources, Output, Quality, Internationalization*) as against those that attend to them in a balanced manner.

One reason for using weights instead of an equal distribution is that if all the areas were aggregated with the same weight, this being a geometric mean the number of areas considered would influence the result. For example, if we had decided to group the indicators of quality and internationalization in a single area, their influence on the dimension would have been less than if considered separately. Another reason is that, unlike what occurred with the basic indicators, in this case there may be reasons to grant different values to each area.

Thus the decisions on the number of areas to be considered and their weights are relevant, and we have preferred to ask experts about the importance that should be given to each area. To make this valuation easier we followed the criterion that the number of areas should be small, and similar within each dimension.

A survey of former university experts was conducted by applying the Delphi method[12]. Table 2.4 shows the weights given to the different areas by the experts consulted.

2.6.5. Weighting and aggregation of the dimensions to obtain the rankings

The last phase of the methodology establishes how the different rankings of the project are drawn up. The result of the previous phase offers rankings for the two dimensions separately, so no further step beyond those described in the above sections is necessary. On the other hand, to draw up the rankings combining the two dimensions of teaching and research and innovation in U-Ranking and U-Ranking Volume, a new geometric aggregation is needed and the most reasonable criteria for doing so should be decided.

In the transition from the dimensions to the final ranking we consider that the importance attributed to each dimension can be different depending on the interests of the people contemplating the ranking, that is, of its potential users: students, researchers, managers, society. For this reason, we have concluded that the user's perspective can be the key to giving more or less importance to each of the dimensions. It could be unconvincing to impose weights from a specific standpoint —for example, that of a group of experts, who consider that research is the most important—.For individuals with another standpoint, such as students or the career guidance staff, it is more important to attend to the teaching aspects, while

[12] Two rounds of consultations were carried out, after which a 2.1 percentage point reduction was obtained in the average interquantile range.

for firms the capacity of technological transfer of the universities.

After due reflection, therefore, we have opted to consider two alternatives.

1. First, U-Ranking Degrees offers the option of the system earlier described as *personalized ranking*, based on the user's own preferences. We understand that in this case users are more likely to seek to compare the universities with fairly closely defined interests and diverse criteria, probably different from those of the experts. For this reason, with the help of a web tool, users can decide the importance of each of the two dimensions when placing the degrees in order, and the tool automatically offers them the ranking corresponding to the preferences revealed by the user.

To apply this first approach we have considered various alternatives for the choice of weights by the user. We opted for the procedure known as Budget Allocation Process, that is, for the distribution by the user of 100 points among the dimensions to be valued. This method, widely used in marketing to find out a consumer's valuation of the characteristics of a product, has the principal advantage of forcing the user to adopt a more active and reflexive position by distributing points, being therefore more aware of the opinion that he/she displays.

2. Second, for the general rankings (U-Ranking and U-Ranking Volume), corresponding to the universities' activities as a whole, the two dimensions are weighted on the basis of the experts' opinions, according to a survey such as that mentioned above when aggregating areas into dimensions, and a Delphi process to achieve convergence among the experts' opinions.

The weights to be given to teaching and research and innovation are, respectively, 56% and 44%. These weights are included as a default option for calculating the personalized.

2.7. PERFORMANCE RANKINGS VS. VOLUME RANKINGS

When comparing universities, it is relevant whether or not their size is taken into account. Making one choice or the other is not in itself a methodological advantage or failure, but implies adopting a particular perspective which affects the rankings and must be borne in mind when interpreting the results.

In the same way as when analyzing the activity of a firm or a country we can consider its volume of output or its achieved performance, and both positions are reasonable, the same occurs in the analysis of the results of universities. Neither of the two approaches is, *a priori*, more valid than the other, and the choice depends on the intended use of the results. The per capita GDP is more useful than total gross domestic product (GDP) when comparing the quality of life between countries or regions, but the volume or the growth of GDP are also important for explaining, for example, the employment generated or the importance of a country in the global economy. So, although in some cases the performance reached to obtain the results may be more important than their volume, in other cases the size may be relevant. A very productive and at the same time large university is more beneficial to society than one that offers the same level of productivity but has a small size; likewise, a very large university with a poor level of results is a much bigger problem than a small university with the same level of results.

2.7.1. Interest in both approaches

Another reason to pay attention to this aspect is that the existing rankings adopt on occasions an approach based on the performance by which the results are obtained and in other cases deal with the volume of results. For example, some widely cited international rankings —especially, the Academic Ranking of World Universities (ARWU), known as the Shanghai Ranking— are volume rankings.

The Shanghai Ranking is rather one of volume, because most of the variables from which it is built —number of Nobel prize- winners or Fields

medalists among their ex-students or staff, widely cited researchers, publications in Nature or Science, articles published in indexed journals— are not relativized by the size of the university. Such variables make up the greater part of the weight in the ranking, while only one indicator (academic performance) is expressed in *per capita* terms. So, the universities' positions in this ranking are conditioned both by their quality and by their size, both qualities being necessary for reaching good positions.

Other rankings, on the other hand, make their comparisons from the point of view of quality. It is the case of the QS World Universities Ranking, whose indicators are taken from surveys of academic reputation or are variables standardized by size. There are rankings that expressly contemplate both approaches, and make differentiated comparisons based on quality or on the total volume of results, as does the I-UGR Ranking[13] of research results.

The reason for acknowledging the interest of both approaches is that the size of institutions can be relevant for valuing the contributions of the universities, but correcting the results for size allows to compare the universities from a perspective that makes them more homogeneous. However, given that, as we said earlier, for the university system as a whole it makes a difference whether a university with high (low) productivity is large or small, we must consider whether universities would have the same position in the performance rankings as in the production volume rankings and bring out the specific significance of each ranking. To sum up:

- The rankings of volume of production are based on indicators not relativized by size, and depend on both the university's performance and its size. Thus, a university may generate a greater volume of research results than another of smaller size, even though the second is more productive.
- The performance rankings are based on indicators of results corrected by size, and seek to measure the output per unit of inputs or resources used. For example, scientific output is measured as a function of the number of faculty members with PhD and the teaching results are relativized by the number of students. This enables some smaller universities to obtain a better final result in the ranking than other much larger ones.

An interesting question is whether size influences performance positively or negatively, that is, whether performance/efficiency increases or decreases with the size of the university. In the first case, the universities' positions in the rankings of volume would be favored by two factors (size and performance). The testing of the two hypotheses is an empirical matter, which can be analyzed by drawing up both types of rankings using the same approach, as will be presented later.

2.7.2. Treatment of the size of universities

All of the simple indicators with which we started with are relativized by the most appropriate variable (students, faculty members, budget, etc.), so that size does not have a direct influence on the results. Consequently, the general scheme of the methodology leads to measuring each university's results independently of its size, so these are performance rankings. Therefore, to construct volume rankings, the size variable has to be added to the indicators. This task has been undertaken following the criteria detailed below.

The first criterion is to preserve, as far as possible, the methodological homogeneity of both rankings, calculating them on the basis of the same set of indicators and the same aggregation criteria. For this reason the ranking of volume was not drawn up simply by not relativizing those indicators that can be expressed in total terms —for example, reflecting the income from patents or the doctoral theses read without dividing them by the number of faculty members with PhD— as the Shanghai Ranking does.

It is not reasonable to proceed in that way because some variables cannot be presented in absolute terms, being rates or indices, such as the

[13] This ranking was last updated in 2014.

percentage of publications in the first quartile or the mean impact of publications factor.

If some variables are expressed in absolute terms and others are not, the relative importance of the size within the results would fall only on the variables that can be expressed in absolute terms. In that case, the importance accorded to size would depend implicitly on the proportion of variables that can be expressed in absolute terms. For example, in the variables considered in our study only 14 of the 20 indicators used could be expressed in absolute terms, which would be equivalent to the acknowledged importance of size being 70%. This percentage would be arbitrary because it would reflect the number of indicators that form part of the database expressed in absolute terms.

This solution is unsatisfactory, and we have explored other alternatives for introducing size. The option chosen consists of calculating the volume of results of each university by multiplying the performance index by a measure of size. We have considered three indicators of the size of a university: the number of faculty members, the number of students, and the budget. Each one has its specificities and can be a better proxy of different aspects of the university's activity that do not have the same importance in each of them. To avoid skewing the size proxy in one or other direction in the most general indices —which could favor some institutions by giving greater weight to one of the aspects— we have taken as indicator of size the arithmetic mean of the three variables, previously standardized by its mean value.

2.8. PRIVATE UNIVERSITIES

U-Ranking 2022 analyzes 48 public and 24 private universities. Private universities are an important part of the Spanish University System.

As shown in figure 2.1, they have experienced a large growth in the last twenty years, quadrupling in number to 41 institutions out of the 91 that make up the Spanish University System today (see panel a). In the past 4 years, 8 universities have been created, of which 5 are in Madrid, 1 in Galicia, 1 in the Basque Country and 1 in the Canary Islands. In 2019, ESIC and CUNEF, previously considered centers attached to public universities, , were recognized as universities. In addition, two universities were created this year, Universidad Internacional de Villanueva and Universidad de les Hespérides, and Universidad Internacional de la Empresa in 2020. In 2021, Universidad Euniz and la Universidad Intercontinental de la Empresa were established, and Universidad de Diseño, Innovación y Tecnología in 2022. Of these 41 private universities, 36 carried out their teaching activity during the 2021-22 academic course[14].

Likewise, the number of bachelor's and master's degree students has multiplied sixfold, from 52,000 to more than 345,000 students in the 2021-2022[15] academic year, which represents 20% of university students studying in Spain, compared to 4% 25 years ago.

An important characteristic of private universities, apart from their relative young age of existence, is their smaller size. If we compare the number of private universities as a percentage of the total (45%) and the number of private university students as a percentage of the total (20%), it becomes clear that private universities are generally smaller.

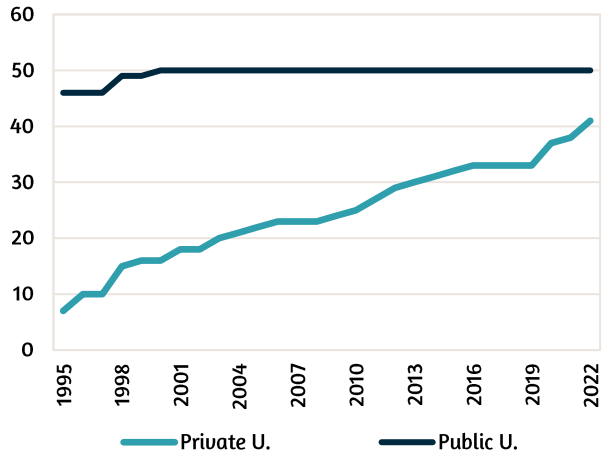
Another distinctive feature is their greater degree of specialization in postgraduate studies, especially master's degrees. Private universities have placed great emphasis on these type of degrees, as the makeup of their students shows. Whereas the proportion of master's degree students in public universities is 11.1%, in private universities it is 32.4%. Indeed, four in every ten master's degree students in Spain study at a private university.

[14] The five universities with no teaching activity are: University of the Hesperides, International Business University, Euniz University, Intercontinental Business University and University of Design, Innovation and Technology.

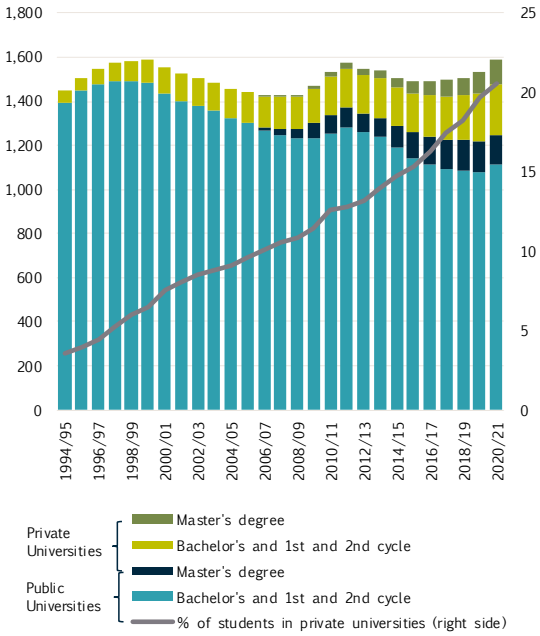
[15] Data on students in the last academic year does not include students from the universities created in 2019 and 2020, since information on these universities has not yet been provided by the Ministry.

Figure 2.1. **Evolution of the number of universities and students. 1994/95 to 2021/22 academic years**

a) Number of public and private universities



b) University students by level of studies and type of university. 1994/95 to 2020/21 academic years (number and percentage)



Note: Student data for the 2020/21 academic course are provisional.

Source: Spanish Ministry of Universities (2022c, 2022f).

Due to the idiosyncrasies of private universities, one of the indicators defined in the methodology, Cut-off marks"[16] (Teaching), is not applicable to these institutions. Students must pass a university admissions test (PAU) and upper secondary education tests in order to study a degree regardless of whether it is offered by a public or private university. However, for private universities, the mark obtained does not always constitute a criterion of admission, since they have their own procedures, based on specific tests, personal interviews and academic record.

As a result, private universities do not publish cut-off marks for their degrees.[17] Therefore, for private universities this variable will be set at 5.

It is more frequent for private universities to present information gaps in certain variables than public universities, limiting, in some cases, their comparability. The U-Ranking 2022 edition has reviewed all the information available for private universities following the criteria to include those institutions that provide at least 18 out of the 20 indicators considered for the public system[18], as well as the three variables that measure for size (student body, full-time equivalent faculty members with PhD and consolidated revenues). As a result, in the 10th edition of U-Ranking the following 24 private universities are analyzed:

- IE Universidad
- Mondragon Unibertsitatea
- Universidad a Distancia de Madrid
- Universidad Alfonso X el Sabio
- Universidad Camilo José Cela
- Universidad Cardenal Herrera-CEU
- Universidad Católica de Valencia San Vicente Mártir
- Universidad Católica San Antonio
- Universidad de Deusto
- Universidad de Navarra
- Universidad Europea de Canarias
- Universidad Europea de Madrid

[16] The cut-off mark is the mark of the last student who gained admission to a degree with limited places. This mark is only a guideline and varies from one year to the next, depending on the number of available places and the marks of the students registered.

[17] For private universities, the cut-off mark for each degree is 5 since the prerequisite is to pass the university admissions test.

[18] Since the indicators are based on moving averages, the requirement has been for each of the chosen indicators to have information on the years that are necessary to calculate them.

- Universidad Europea de Valencia
- Universidad Internacional de La Rioja
- Universidad Internacional de Valencia
- Universidad Internacional Isabel I de Castilla
- Universidad Nebrija
- Universidad Pontificia Comillas
- Universidad San Pablo CEU
- Universitat Abat Oliba CEU
- Universitat de Vic-Universitat Central de Catalunya
- Universitat Internacional de Catalunya
- Universitat Oberta de Catalunya
- Universitat Ramon Llull

The list of universities considered remains the same as in the U-Ranking 2021 edition.

User personalized rankings

03

There are different dimensions in universities in their performance, but also different profiles of users interested in them: undergraduate or postgraduate students, teachers, managers, members of a governing body or Board of Directors, heads of university policy in the Public Administration, journalists, citizens, etc. The importance granted by each to the different activities of the universities may be different and their interest may focus on one or more of their activities. For example, students are likely to focus on aspects of the university related with the degree that they wish to study and teachers may focus more on research. Therefore, aggregating the information on each of the aspects is not only a complex problem, but the criteria may depend on the user.

Given the high number of users that might value the universities' activity from a particular viewpoint, it makes sense to consider the possibility of drawing up personalized rankings, established taking into account the interest of the user. The U-Ranking project considers this question and in the case of bachelor's degrees, it offers a tool that provides information on the ranking of degrees to students, their families and careers advisers, personalized according to their specific interests.

3.1. EXAMPLES OF PERSONALIZED RANKINGS

Constructing synthetic indicators by acknowledging the preferences of users has been available thanks to the interactivity permitted by web tools. Through them, the user can value personally each one of the dimensions considered, indicating which areas they want to consider and which are the most important for them. Web technology allows these preferences identified by the users themselves to be incorporated and combined with other elements contributed by the experts, such as the selection of variables and aggregating them in intermediate indicators according to criteria as described in chapter 2.

Two interesting examples of this approach, referring to very distinct areas, are those corresponding to the "Talent Attractiveness" Index, developed by the OECD (2022), and the CHE Ranking, a ranking of university degrees drawn up by the German Center for Higher Education.

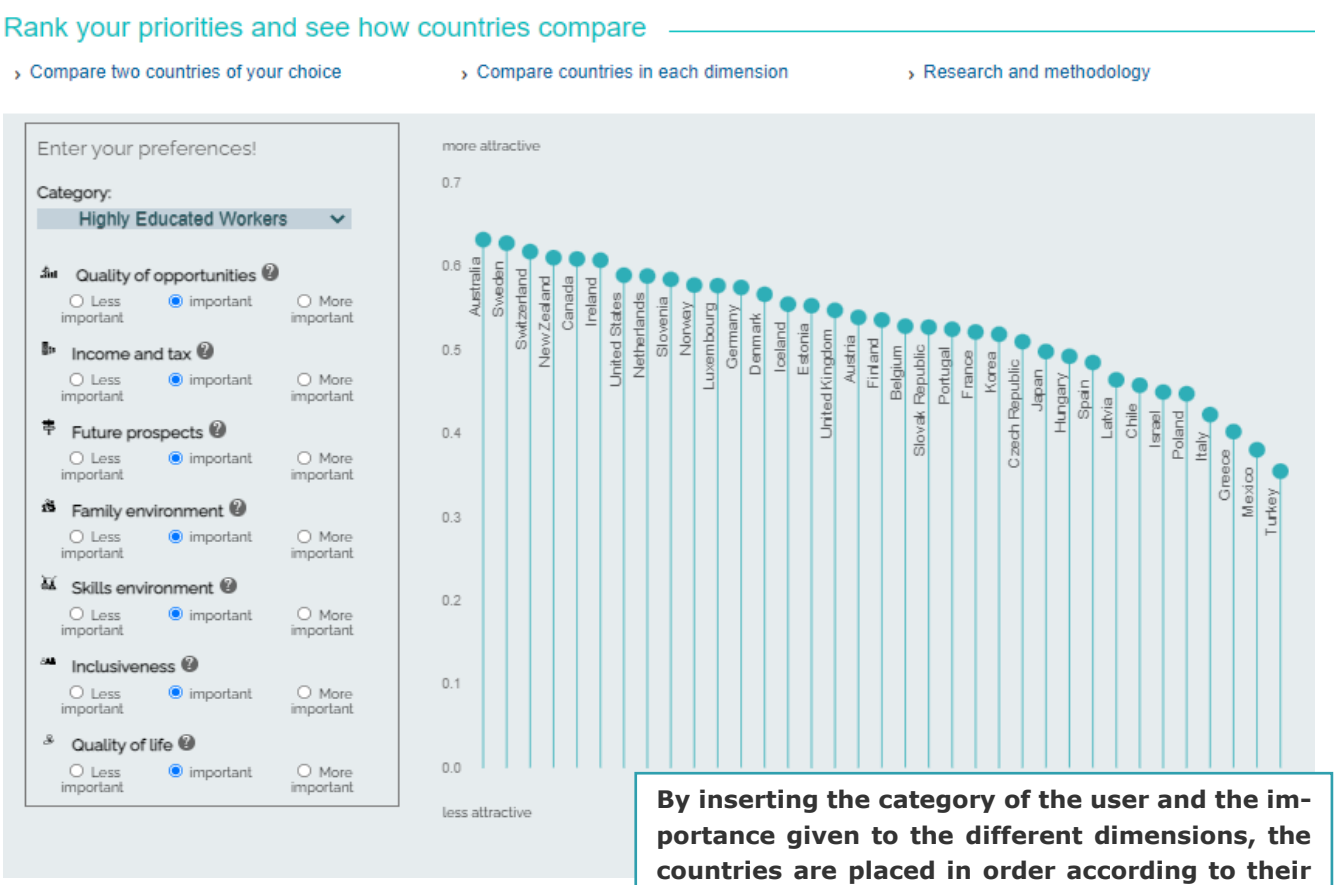
The OECD (2022) draws up a synthetic index that ranks countries according to their ability to attract and retain talent based on three types of migrants: university students, entrepreneurs and workers with higher education. The index rates country performance based on different dimensions: quality of opportunities, income and taxes, future

prospects, family environment, skills, inclusion and quality of life. In order to calculate the index, the user must specify the importance given to each of the dimensions considered.

Experts justify and prepare the set of relevant dimensions and variables and, once the user has introduced their valuation of each area, the web tool shows a synthetic index of talent attraction that takes into account the importance given by the user, as well as the category it belongs to.

A similar approach is used by one of the university rankings analyzed, the CHE Ranking, drawn up by Germany's Center for Higher Education for the journal *Zeit*. In this case, the student who wishes to choose a degree needs to select the subject they wish to study, the type of course of their interests and the aspects they consider to be most important (teaching, subsequent employment opportunities, research, etc.). A personalized university ranking is created based on their preferences.

Figure 3.1. **Talent Attraction Index**



By inserting the category of the user and the importance given to the different dimensions, the countries are placed in order according to their attractiveness.
Their position indicates their place in the ranking.

Figure 3.2. **CHE Ranking**

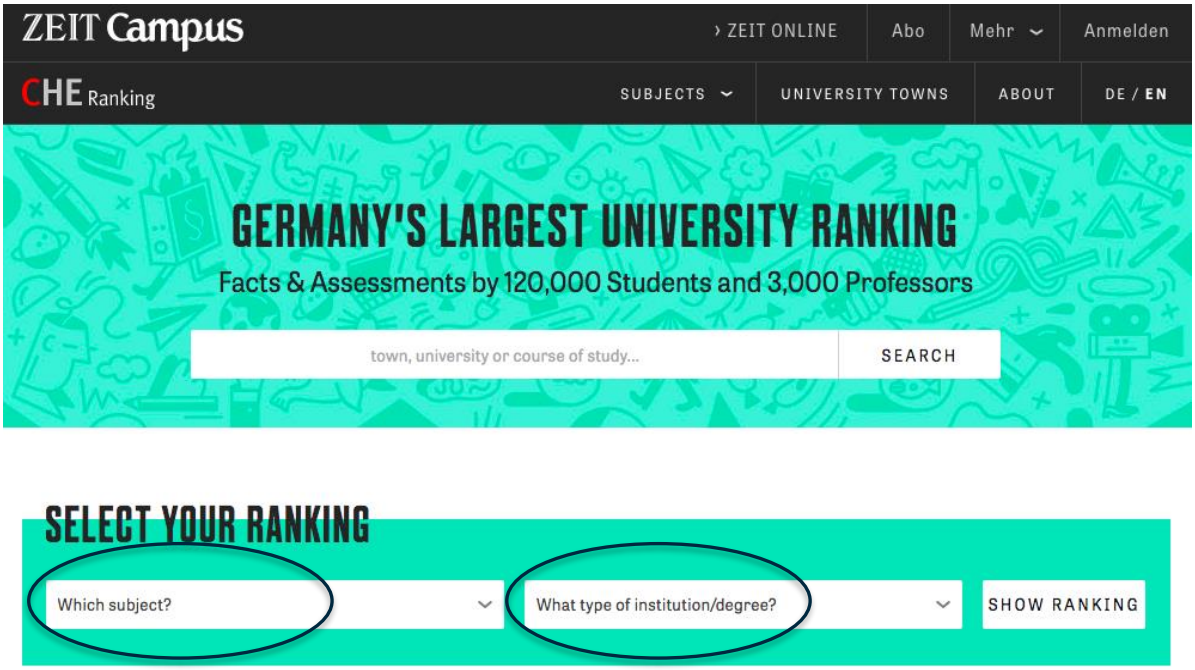
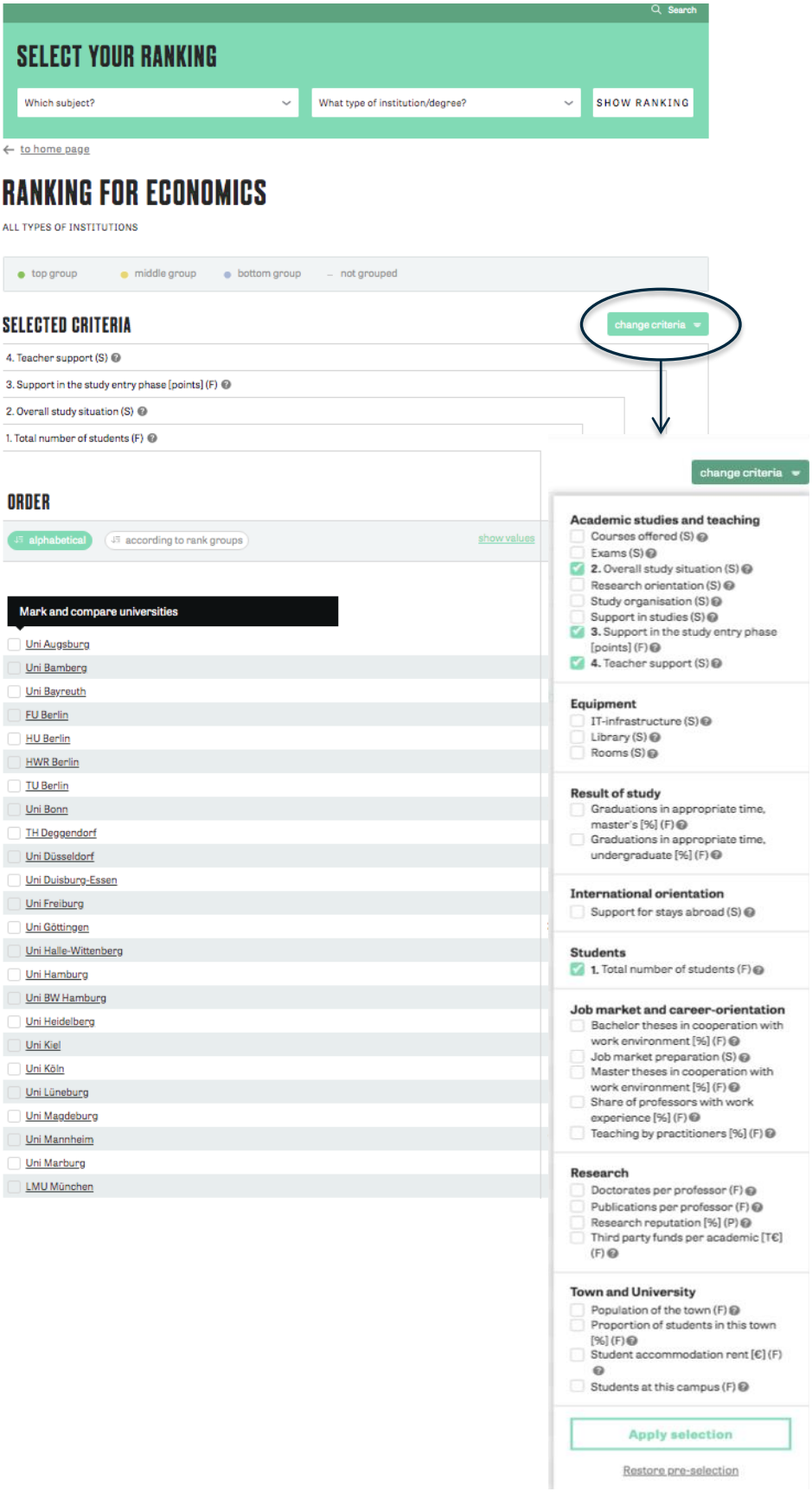


Figure 3.2. (Cont.) **CHE Ranking**



3.2. DESCRIPTION OF THE WEB TOOL FOR GENERATING PERSONALIZED RANKINGS OF DEGREES

This personalized ranking approach has been used in U-Ranking to classify degrees in order, constructing rankings of universities for the different bachelor's degrees. In the future it is intended to extend this approach to other university activities, for example, to master's degrees, when the necessary databases are available. The first step in this direction is the analysis carried out in chapter 5 of this report on postgraduate education.

The value of a web tool like this depends much on the effort made to facilitate its use. The objective of U-Ranking is to present a simple, easy-to-use tool to minimize the number of clicks needed to obtain the relevant information, which is above all the corresponding ranking. This simple approach must be present both when limiting the degrees to be compared and when permitting the user to declare their preferences in order to draw up the personalized rankings. In order to make the procedure more user-friendly, the website has been redesigned, as well as the Choose a University tool, which can be accessed by clicking on the icon that appears at the top of the website (Figure 3.3). Next, three questions are displayed that must be answered by the user to obtain a personalized ranking by degree, according to the student's interests in three aspects (Figure 3.4):

- *What to study*
- *Where to study*
- *Study and research*

In order to harmonize the tool with the most frequent potential users we performed trials among students ages 17 to 18 years old, who are less familiar with the concepts used in the university world than the experts participating in the project. Based on these trials, the necessary corrections were made to better adapt the tool to the students and to make the results easier to understand. The tool is presented on the screen of the project's website via the *Select University* tab.

Figure 3.3. **Choose a university**

In the first step, the user must choose the bachelor's degree or degrees they wish to study. Nearly 3,600 degrees offered by 72 universities analyzed are classified into 122 *groups of degrees* to simplify the selection process. To make the user's decision even easier, the degree groups are clustered into 26 families of degrees.

When choosing a family of degrees, as for example "Humanities, History and Philosophy", the bachelor's degrees included in this family of degrees are displayed. This list of degrees is not extensive or literal, since "Humanities" and "Humanities and social studies" have been grouped under the name "Humanities Degrees". The grouping of the degrees is intended to facilitate the user's selection process but does not reduce the results of the ranking. Thus, regardless of this initial simplification, the final results show all the degrees included in the complete selection, as well as the center where they are taught whenever there are several options.

The user can choose either one or several groups of degrees, whether they belong to the same family or not. For example, he/she could select "Degree in Art History" (from the Humanities, History and Philosophy family) and "Degree in Conservation and Restoration" (from the Art Studies family).

The following step is to choose the autonomous community or regions considered as places in which to study (figure 3.6). Thus, the user must mark those chosen in the corresponding list. If the user does not want to geographically limit their choice, they can "Select all". The option of restricting the search to specific autonomous communities is a response to the fact that many students do not contemplate the idea of moving

as an alternative or a restriction. In this case, their interest will be to know which of the studies offered are valued best in the territories considered. In any way, complementary information is offered to position their options in relation to the remaining offers in the Spanish University System.

Thirdly, the user must declare their preference regarding the importance they give to study and research when valuing the universities' profiles (figure 3.7), by distributing the 100 points available to the importance they grant to teaching and to research. The resulting ranking will order the degrees and universities taking into account these weights. By default, 56 points are given to teaching and 44 to research and innovation, which are the weights used for the U-Ranking calculation.

Once these three steps are completed, the personalized ranking corresponding to the criteria introduced is displayed (figure 3.8). The ranking places in order the universities that offer the bachelor's degrees chosen in the pre-selected territories according to their preference.

Figure 3.4. **Steps to create a personalized ranking**

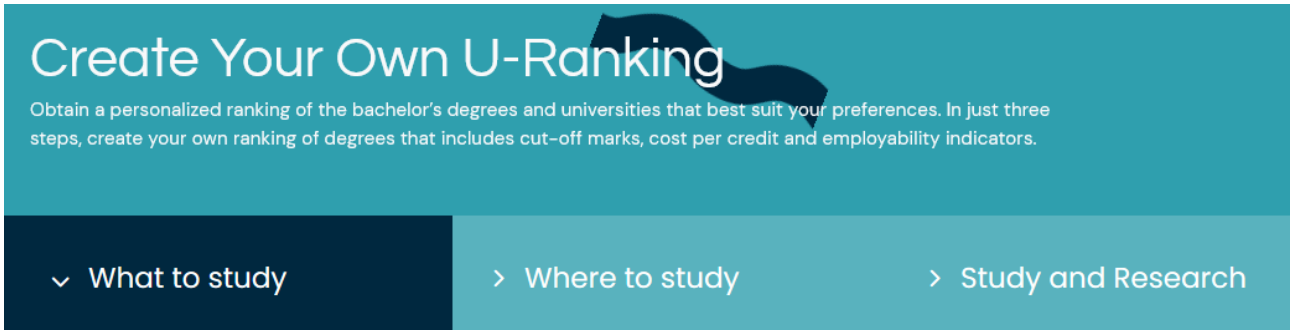


Figure 3.5. **Step 1. Choose a bachelor's degree**

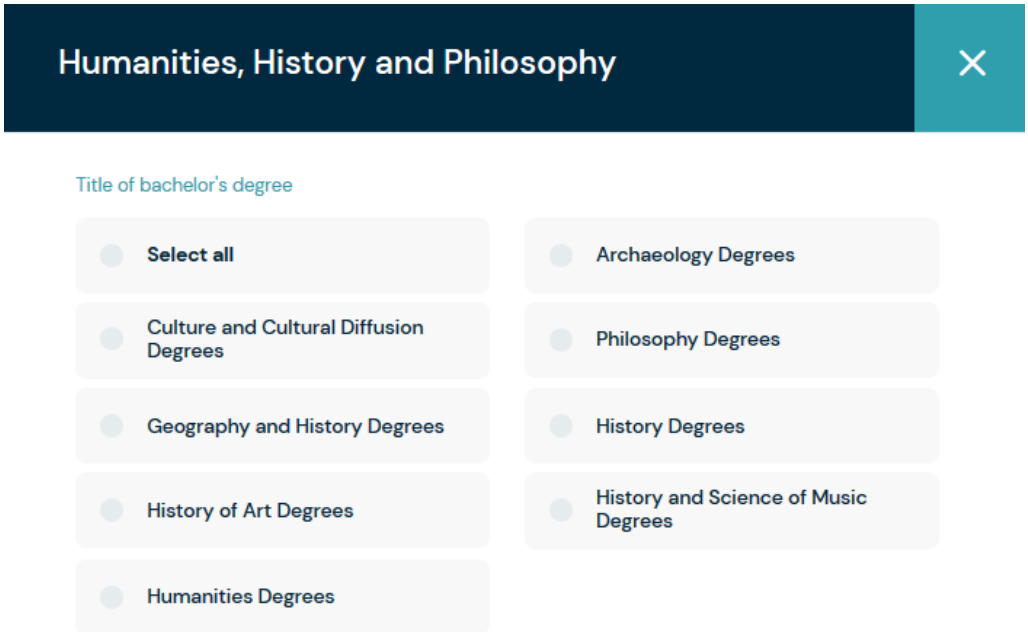


Figure 3.6. **Step 2. Choose a Spanish region**

Figure 3.7. **Step 3. Indicate percentage of importance given to Teaching and Research and Innovation**

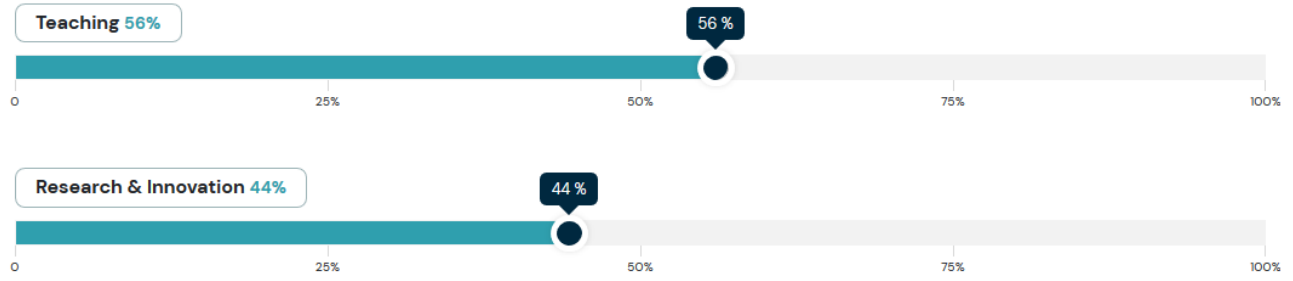
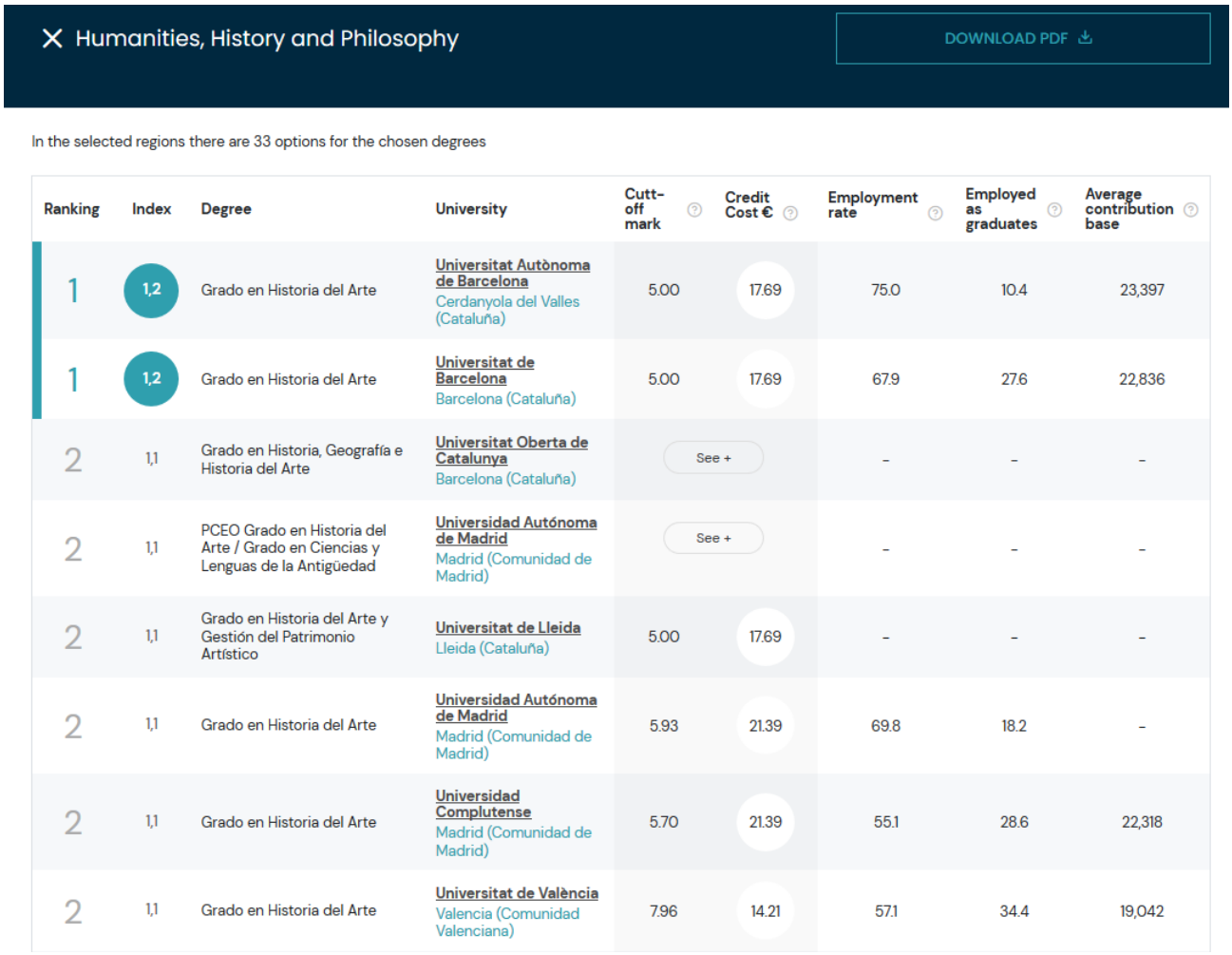


Figure 3.8. **Personalized ranking of degrees**



Ranking	Index	Degree	University	Cutt-off mark	Credit Cost €	Employment rate	Employed as graduates	Average contribution base
1	1,2	Grado en Historia del Arte	Universitat Autònoma de Barcelona Cerdanyola del Valles (Cataluña)	5.00	17.69	75.0	10.4	23,397
1	1,2	Grado en Historia del Arte	Universitat de Barcelona Barcelona (Cataluña)	5.00	17.69	67.9	27.6	22,836
2	1,1	Grado en Historia, Geografía e Historia del Arte	Universitat Oberta de Catalunya Barcelona (Cataluña)	See +		-	-	-
2	1,1	PCEO Grado en Historia del Arte / Grado en Ciencias y Lenguas de la Antigüedad	Universidad Autónoma de Madrid Madrid (Comunidad de Madrid)	See +		-	-	-
2	1,1	Grado en Historia del Arte y Gestión del Patrimonio Artístico	Universitat de Lleida Lleida (Cataluña)	5.00	17.69	-	-	-
2	1,1	Grado en Historia del Arte	Universidad Autónoma de Madrid Madrid (Comunidad de Madrid)	5.93	21.39	69.8	18.2	-
2	1,1	Grado en Historia del Arte	Universidad Complutense Madrid (Comunidad de Madrid)	5.70	21.39	55.1	28.6	22,318
2	1,1	Grado en Historia del Arte	Universitat de València Valencia (Comunidad Valenciana)	7.96	14.21	57.1	34.4	19,042

The first column shows the position of each degree considered in the personalized ranking. The second shows the value of the index reached for each specific degree. The official name of the degree appears in the third column. As we observe in the example, various bachelor's degrees can occupy the same position in the ranking, since the indices are rounded to one decimal point because greater precision is not considered to reflect, more accurately, differences among the degrees. In these cases, the degrees are ordered according to the value of the index, considering all the decimals. In the fourth column, in addition to the name of the university, the campus where the degree is taught appears. Clicking on the name of the university takes you to its website.

The last five columns contain complementary information which is useful in the decision process. The cut-off mark of the last year, the price per credit on first registration and information on graduate employability which will be described in the next section.

Table 3.1. **Indicators and level of disaggregation of the information used for the ranking by degree**

Dimension	Area	Indicator	Level
Teaching	Resources	Faculty member per 100 students	Area of study
		Budget per student	University
		Percentage of faculty member with PhD	Area of study
	Production	Success rate	Bachelor's Degree
		Evaluation rate	Bachelor's Degree
		Drop-out rate	Bachelor's Degree
	Quality	Percentage of postgraduate students	Area of study
		Cut-off mark	Bachelor's Degree
	Internationalization	Percentage of foreign students	Bachelor's Degree
		Percentage of students in foreign exchange programs	University
Research and Innovation	Resources	Competitive public resources per faculty member with PhD	Area of study
		Contracts with PhDs, research grants and technical support over total budget	Area of study
	Production	Citable documents with ISI reference per faculty member with PhD	Area of study
		Number of patents per 100 faculty members with PhD	University
		Number of thesis defended per 100 faculty members with PhD	Area of study
	Quality	Mean impact factor	Group of degrees
		Percentage of publications in the first quartile	Group of degrees
		Citations per document	Group of degrees
	Internationalization	H2020 European research funds per faculty member with PhD	University
		Percentage of publications with international co-authorship	Group of degrees

Source: Own elaboration

Table 3.1 shows the level of disaggregation of each of the indicators included in the calculation of the personalized ranking of degrees[29]. These indicators are the twenty that are used to calculate the rankings by institutions. The sources and the years used are also the same; however, the level of disaggregation varies. While the indicators in the general ranking are collected at area of study or university level, more disaggregated information is used for the personalized ranking when available. Thus, 9 of the 20 indicators involved in the calculation of the synthetic index of each degree correspond to a degree or group of degrees. It should be noted that the only difference with regards to the methodology of the general ranking is that the standardization of the indicators of the personalized ranking of degrees is done by groups of degrees, not by area of study. In other words, the reference group for each degree would be the one that belongs to the same family of degrees and therefore, it is the median value of this family used for the standardization.

To sum up, the web tool for constructing personalized rankings is easy to use, very flexible, and is underpinned by a rigorous methodology identical to the one described in previous sections on how general rankings are constructed. Therefore, it is a complement to the latter with a high potential for students, families and careers counselors, as well as for universities themselves. The more than 200,000 personalized rankings that have been calculated testify to the level of interest in the tool. For this interest in the tool to be effective, it is essential to keep all the supporting information up-to-date and to constantly improve

[29] The dimensions, areas, and indicators used, as well as the definition of the indicators, sources, and period coincide with what is described in Annex 1 (overall ranking). As shown in the table, the only variation is in the column of level of disaggregation.

the data offered, taking the users' experience into account. Along this line, last year's edition included information on the labor market insertion by degrees. In addition to an update of this data, this year's edition has improved the usability of the tool.

3.3. COMPLEMENTARY INFORMATION ON GRADUATE EMPLOYABILITY

Graduate employability according to the degrees offered by a university influences the users' valuations of its services. The demand can be reinforced if a university offers degrees with a favorable employability outlook, especially if a certain degree has better employability results than those of the same degree in another university. Consequently, since the 8th edition of U-Ranking, employability indicators are offered instead of environmental data as in previous editions.

An analysis of graduate employability is carried out with data from the report "Inserción laboral de los egresados universitarios" (Ministry of Universities 2019) on the Spanish Social Security system affiliation rates of bachelor's degree students four years after their graduation. In 2015, the Ministry of Universities published its first report with employability data along with the corresponding indicators on graduates from the 2009-10 academic course, focusing on 1st and 2nd cycle students. The 8th edition published the labor market results of the second wave of indicators corresponding to the situation from 2015 to 2018 of students who graduated in 2013-2014.

This edition updates the information, with the latest data published by the Ministry of Universities in May 2022 on the situation from 2017 to 2020 of bachelor's degree students who graduated in 2015-2016.

The data analyzed in U-Ranking 2021 focuses on the employment situation of university graduates four years after obtaining their degree, taking into account three indicators of degree employability:

a) Percentage of university graduates affiliated to the Spanish Social Security system four years after graduating

b) Percentage of graduates in 2020 affiliated to the Spanish Social Security system in contribution categories compatible with a university degree four years after graduating.

c) Average annual salary for the National Insurance contribution calculation base in 2020 for graduates who work full-time 4 years after obtaining the degree.

Data on employability is presented as a supplementary to the ranking of degrees. The web tool offers the value of the degree for each one considered, with information for over1,900[30] degrees.

As in previous editions, 2022 also includes the price per credit for over 3,575 bachelor's degrees analyzed by U-Ranking, based on university statistics provided by the Spanish Ministry of Universities (2022b). These prices, despite the maximum limit set by the Spanish Ministry, can vary depending on the region, the university, the level of degree —bachelor, master, doctorate— the level of experimentality of the degree and the type of ownership of the center[31] offering that degree. As can be seen in table 3.2, the current range of fees by regions is considerable, even more if differences of experimentality and level of degree are considered.

For this reason, it is relevant that the U-Ranking user will be able to easily know the price per credit at first registration for each bachelor's degree. The prices included in U-Ranking correspond to those established for the 2021-2022 academic year. Also, the cost was included by degree course or by credit offered by private universities when available on their webpage.

[30] Of these, there are 350 degrees with no information in 2020 and the 2018 data is provided for graduates in the 2013-2014 academic year, which is indicated with an asterisk (*).

[31] U-Ranking also includes bachelor's degrees imparted by private centers affiliated to public universities. In general, the price of these degrees includes an extra cost added on to the public prices.

Table 3.2. **Public price per credit at the time of first enrollment by region. 2021-2022 academic year (€/credit)**

Region	Average price	Min. price	Max. price
Andalusia	12.62	12.62	12.62
Aragon	18.2	13.5	21.3
Asturias	12.34	8.63	15.7
The Balearic Islands	15.97	11.59	20.82
The Canary Islands	12.45	9.47	14.59
Cantabria	13.48	10.06	15.73
Castile-La Mancha	16.54	12.59	22.32
Castile and Leon	15.92	12.13	18.87
Catalonia	23.05	17.69	27.67
The Valencian Community	16.96	13.16	20
Extremadura	14.53	10.1	18.13
Galicia	11.93	9.85	13.93
Madrid	23.37	21.39	26.14
Murcia	15.7	14.38	16.78
Navarre	19.62	15.48	21.95
Basque Country	16.95	14.08	19.84
La Rioja	16.89	14.08	22.68
UNED	16.03	13.2	21.6
Total Public universities	17.32	8.63	27.67

Note: In Catalonia, the Generalitat de Catalunya, the public universities and the Universitat Oberta de Catalunya (UOC), through the Agency for Management of University and Research Grants (AGAUR), have applied the "Equidad" (Equity) grants, which involve a reduction in the price paid per credit of enrollment by bachelor's and master's degree students of these universities, based on the level of family income, so the resulting prices, after deducting the grant, are those set out in Annex 6 of the Price Decree.

Source: Spanish Ministry of Universities (2022b).

Main results

04

This chapter reviews the principal results obtained in the 10th edition of U-Ranking, corresponding to 2022, in which the rankings by university and the personalized rankings of bachelor's degrees have been updated. All the rankings are available at the project's new website www.u-ranking.es.

The 2022 rankings will be analyzed in this section from four different perspectives in order to emphasize the contribution made by the project and its methodology: a) comparing them with existing rankings to evaluate their similarities and differences; b) assessing the sensitivity of the results to changes in some of the hypotheses set forth, specifically the relative weights assigned to teaching and research activities, and the importance of considering or not the size of the university; c) comparing this year's results with the 2021 edition; d) and examining the differences in the performance of the various regional university systems.

4.1. U-RANKING

Table 4.1 offers the ranking of 72 Spanish universities classified according to their indices of performance (U-Ranking). Keeping in mind that performance is the relationship between the volume of university results in the areas analyzed and the resources used to accomplish them. Thus, if two universities generate the same results, the one that makes use of less resources to achieve them will have a higher performance.

The order is based on the value of the synthetic indicator obtained for each university which is offered in the second column. The universities are ordered according to the value of this indicator, rounded to one decimal as a greater detail of the index would not reflect the differences among universities more accurately, given the set of decisions adopted in the process of construction of indicators already described.

As shown in the table, various universities obtain the same index and therefore present the same position in the ranking. As a result of this criterion, the 72 universities are grouped into 12 levels of performance. Within each group of universities with similar results, the universities are ordered according to the complete value of the index, however, the differences in second place are not necessarily important.

Universities that are 15 years or younger are marked with an asterisk (*), so the reader can put into context the results in the following sense. Universities must be able to show their teaching potential from the start, because graduates must acquire all the competences associated to a degree. However, most results in research and innovation require a longer amount of time in order to create research teams and obtain equipment and infrastructures, as well as the needed organizational requirements to develop their full potential. Pointing out the universities with 15 years or less of existence allows to keep in mind the reason why the results for these younger universities in research and transfer are often lower

and this should also be considered when interpreting the results.

Table 4.1 shows a list of the universities that have not been grouped due to lack of sufficient information to construct the indices. The purpose of including this group is to highlight the transparency of the universities that are included in the rankings, as they generate and disclose the information required in order to be included, regardless of their final position. Nine universities that have existed for less than 15 years are marked with an asterisk.

When interpreting the results of a university included in the ranking, it is important to bear in mind, therefore, that a large part of the private university system is not included due to lack of information. Any university in the ranking could conceivably have an indeterminate number of universities behind it, even though it is included in the lowest level (12) in the current rankings because of insufficient information to construct the indices.

Table 4.1. U-Ranking of Spanish universities 2022

University	Ranking	Index	University	Ranking	Index	University	Ranking	Index
Universitat Politècnica de Catalunya	1	1.5	Universidad de Alicante	5	1.1	Universidad Católica San Antonio	9	0.7
Universitat Pompeu Fabra	1	1.5	Universidad Pública de Navarra	5	1.1	U. Internacional de La Rioja*	9	0.7
Universidad Carlos III de Madrid	1	1.5	Universidad de Córdoba	5	1.1	Universidad Cardenal Herrera- CEU	9	0.7
Universitat Politècnica de València	2	1.4	Universidad de Zaragoza	5	1.1	Universidad Católica de Valencia	10	0.6
Universitat Autònoma de Barcelona	2	1.4	Universidad de Almería	5	1.1	Universidad Abat Oliba CEU	10	0.6
Universidad Autónoma de Madrid	3	1.3	Universidad del País Vasco	5	1.1	U.Internacional Valenciana*	11	0.5
Universitat de Barcelona	3	1.3	Universidad de Salamanca	5	1.1	Universidad A Distancia de Madrid*	11	0.5
Universitat Rovira i Virgili	3	1.3	Universidade da Coruña	6	1.0	Universidad Europea de Canarias*	11	0.5
Universidad Politécnica de Madrid	3	1.3	Universidad Rey Juan Carlos	6	1.0	Universidad Camilo José Cela	11	0.5
Universidad de Navarra	3	1.3	Universidad de Málaga	6	1.0	Universidad Alfonso X El Sabio	11	0.5
Universidad de Cantabria	3	1.3	Universidad Nebrija	6	1.0	Universidad Europea de Valencia*	11	0.5
Universitat de València	4	1.2	Universidad de Sevilla	6	1.0	U. Internacional Isabel I de Castilla*	12	0.4
Universidad de Deusto	4	1.2	Universidad de Oviedo	6	1.0			
Universidad de Alcalá	4	1.2	Universidad de León	6	1.0	CUNEF Universidad*		
IE Universidad	4	1.2	Universitat Oberta de Catalunya	6	1.0	ESIC Universidad*		
Universitat Ramon Llull	4	1.2	Universidad de Cádiz	6	1.0	Universidad Católica de Ávila		
Universitat de Girona	4	1.2	U. Internacional de Catalunya	6	1.0	Universidad del Atlántico Medio*		
Universidade de Vigo	4	1.2	Universidad de Jaén	6	1.0	Universidad Europea del Atlántico*		
U. Miguel Hernández de Elche	4	1.2	Universidad de Valladolid	6	1.0	Universidad Europea Miguel de Cervantes		
U. de Santiago de Compostela	4	1.2	Universidad de Murcia	6	1.0	Universidad Fernando Pessoa- Canarias*		
Universidad de Burgos	5	1.1	Universidad San Pablo- CEU	7	0.9	Universidad Francisco de Vitoria		
Universidad Pablo de Olavide	5	1.1	Universidad de Huelva	7	0.9	Universidad Internacional de Andalucía		
Universidad de Granada	5	1.1	U. de Las Palmas de Gran Canaria	7	0.9	Universidad Internacional Menéndez Pelayo		
U.Politécnica de Cartagena	5	1.1	Universidad de La Laguna	7	0.9	Universidad Internacional Villanueva*		
Universidad de La Rioja	5	1.1	Universidad Pontificia Comillas	7	0.9	Universidad Loyola de Andalucía*		
Universidad Complutense de Madrid	5	1.1	Universidad de Extremadura	7	0.9	Universidad Pontificia de Salamanca		
Universitat de Lleida	5	1.1	Universidad de Castilla- La Mancha	7	0.9	Universidad San Jorge		
Universitat Jaume I de Castellón	5	1.1	Universidad Europea de Madrid	8	0.8			
Vic- Universitat Central de Catalunya	5	1.1	Mondragón Unibertsitatea	8	0.8			
Universitat de les Illes Balears	5	1.1	UNED	8	0.8			

Note: Universities are ordered from the highest to the lowest index value. Universities with the same index value are ordered alphabetically. The 14 universities listed in the last column have not been analyzed due to lack of data..

* Universities 15 years or younger.

Source: BBVA-Ivie Foundation.

The cardinal and ordinal aspects of the universities that constitute notable differences are discussed below.

A first aspect worth mentioning is that the range of the index from which this ranking is derived continues to show, as in previous editions, significant differences in performance among Spanish universities, with the most productive ones having results that are three times higher than those in end positions.

The leading group in U-Ranking is made up of 20 universities occupying from the first to the fourth positions (various universities share the same position), increasing their results to 20% above the national average. These universities are the following: Universitat Politècnica de Catalunya, Pompeu Fabra and Universidad Carlos III de Madrid share the first place, as in the previous edition. They are followed in second place by Universitat Politècnica de València and Universitat Autònoma de Barcelona. In third place appears the first private university, Universidad de Navarra, along with five other public universities: Autonomous and Polytechnic Universities of Madrid, Universitat Rovira i Virgili, Universitat de Barcelona and Universidad de Cantabria. Nine universities are in fourth position, three of them private: Pablo Olavide, Universitat de València, Universidad de Deusto, Universidad de Alcalá, IE Universidad, Universitat Ramon Llull, Universitat de Girona, Universidade de Vigo, Universidade de Santiago de Compostela and Universidad Miguel Hernández de Elche.

In fifth place, still above the average, are seventeen universities. Other groups of universities with similar levels of performance are: thirteen that share sixth place (equivalent to the average of the system), seven in seventh position, three others are found in eighth place, three in ninth and two in tenth place. Six universities occupy the eleventh place, and one, the twelfth place.

The twenty universities in the top four places are basically the same universities as in the 2021 edition[20]. The main changes are the drop of one position of Universidad de Deusto, which moves to fourth place, and Universidad Pablo Olavide and Universitat Jaume I of Castellón, which move to the fifth position. On the other hand, Universidad Miguel Hernández de Elche, Universidad de Santiago de Compostela and Universidade de Vigo move up one position from fifth to fourth.

4.2. U-RANKING VOLUME

Table 4.2 shows the index and the ranking of the 72 Spanish public universities analyzed according to their volume of results (U-Ranking Volume). It differs from that of the previously discussed performance ranking because it calculates the size of each university. The volume index is justified because a small university can also have a great performance (i.e., its researchers can publish almost all of their articles in first quartile [Q1] journals), but if its size is very small, its impact on the environment and university system as a whole will be limited. In turn, a very large university may have a high or low performance rate (i.e., the percentage of articles published in Q1 journals is small), but if its size makes the total output bigger (the total number of published Q1 articles is higher), its total impact can be significantly relevant, in a positive sense, as well as negative.

In the volume ranking there are many more different positions in the ranking because there are less universities that share the same position with others as a group. Unlike the performance ranking, in which universities are grouped in 12 levels, in U-Ranking Volume, the 72 universities analyzed are ordered in 35 different positions, indicating the greater heterogeneity in the university system in terms of the size-performance binomial, adding variability to the ranking.

As can be seen in table 4.2, Universidad Complutense de Madrid leads by a large margin, with an index of 5.7, almost one point higher than Universitat de Barcelona in second place, (4.9). Universitat de Barcelona itself has a half a point higher index than Universidad de Granada, which is in third place. Following in fourth and fifth place by one decimal point are Universitat

[20] In the 2021 ranking, 19 universities were placed between the first and fourth positions.

de València (4.3) and Universidad de Sevilla (4.2). In sixth place is Universidad del País Vasco, and the seventh place is shared by the Polytechnics of Madrid and Valencia. Next Universitat Autònoma de Barcelona and Politécnica de Catalunya occupy eighth and ninth place, respectively. Finally, Universidad Autónoma de Madrid completes the list of the 10 top universities of the ranking. These eleven universities that occupy the first ten positions are the same ones that headed the first eight positions in the 2021 edition, showing the great stability of the results.

Between the eleventh and twenty-first place are 18 public universities. The rest are shown below, most of them grouped in levels shared by at least three or more universities.

The ranking by volume shows the smaller size of private universities compared to public ones. Due to their size, they rank lower in the ranking by volume of results than in the ranking by performance. Thus, in table 4.2, it can be observed that all the private universities are located in the lower half of the list. The highest-ranking private universities in terms of volume of results when combining better results and larger size are Universidad de Navarra and Universitat Ramon Llull in twenty-second place.

Table 4.2. U-Ranking Volume of Spanish universities 2022

University	Ranking	Index	University	Ranking	Index	University	Ranking	Index
Universidad Complutense de Madrid	1	5.7	Universidad de Extremadura	22	1.3	Universidad de La Rioja	31	0.4
Universitat de Barcelona	2	4.9	Universidade da Coruña	22	1.3	Universidad Católica de Valencia	31	0.4
Universidad de Granada	3	4.4	Universidad de Navarra	22	1.3	Universidad Cardenal Herrera-CEU	31	0.4
Universitat de València	4	4.3	Universitat Rovira i Virgili	22	1.3	Vic-Universitat Central de Catalunya	31	0.4
Universidad de Sevilla	5	4.2	Universitat Ramon Llull	22	1.3	Universidad Nebrija	32	0.3
Universidad del País Vasco	6	3.9	U. de Las Palmas de Gran Canaria	23	1.2	Mondragón Unibertsitatea	32	0.3
Universidad Politécnica de Madrid	7	3.6	Universitat Oberta de Catalunya	23	1.2	U. Internacional de Catalunya	32	0.3
Universitat Politècnica de València	7	3.6	Universidad de Cantabria	24	1.1	Universidad Alfonso X El Sabio	32	0.3
Universitat Autònoma de Barcelona	8	3.5	Universitat Jaume I de Castellón	24	1.1	Universidad Camilo José Cela	33	0.2
Universitat Politècnica de Catalunya	9	3.4	U. Miguel Hernández de Elche	25	1.0	Universidad A Distancia de Madrid*	34	0.1
Universidad Autónoma de Madrid	10	3.1	Universitat de Girona	25	1.0	U. Internacional Valenciana*	34	0.1
Universidad de Zaragoza	11	2.8	Universidad de Jaén	25	1.0	IE Universidad	34	0.1
UNED	12	2.6	Universitat de les Illes Balears	25	1.0	U. Internacional Isabel I de Castilla*	34	0.1
Universidad de Málaga	13	2.4	Universidad de Almería	25	1.0	Universidad Europea de Valencia*	34	0.1
U. de Santiago de Compostela	13	2.4	Universidad Pablo de Olavide	26	0.9	Universidad Abat Oliba CEU	34	0.1
Universidad Carlos III de Madrid	14	2.2	Universidad de León	27	0.8	Universidad Europea de Canarias*	35	<0,1
Universidad Rey Juan Carlos	15	2.1	Universidad Europea de Madrid	27	0.8	CUNEF Universidad*		
Universidad de Murcia	15	2.1	Universitat de Lleida	27	0.8	ESIC Universidad*		
Universidad de Salamanca	16	2.0	Universidad de Deusto	27	0.8	Universidad Católica de Ávila		
Universidad de Alicante	16	2.0	Universidad Pública de Navarra	27	0.8	Universidad del Atlántico Medio*		
Universidad de Oviedo	17	1.8	Universidad de Huelva	28	0.7	Universidad Europea del Atlántico*		
Universidad de Valladolid	18	1.7	Universidad San Pablo-CEU	28	0.7	Universidad Europea Miguel de Cervantes		
Universidad de Castilla-La Mancha	18	1.7	U. Internacional de La Rioja*	29	0.6	Universidad Fernando Pessoa-Canarias*		
Universidade de Vigo	19	1.6	Universidad de Burgos	29	0.6	Universidad Francisco de Vitoria		
Universidad de Alcalá	19	1.6	Universidad Pontificia Comillas	29	0.6	Universidad Internacional de Andalucía		
Universidad de Córdoba	20	1.5	U. Politécnica de Cartagena	30	0.5	Universidad Internacional Menéndez Pelayo		
Universidad de Cádiz	21	1.4	Universidad Católica San Antonio	30	0.5	Universidad Internacional Villanueva*		
Universidad de La Laguna	21	1.4				Universidad Loyola de Andalucía*		
Universitat Pompeu Fabra	21	1.4				Universidad Pontificia de Salamanca		
						Universidad San Jorge		

Note: Universities are ordered from the highest to the lowest index value. Universities with the same index value are ordered alphabetically. The 14 universities listed in the last column have not been analyzed due to lack of data..

* Universities 15 years or younger.

Source: BBVA-Ivie Foundation.

4.3. U-RANKING VOLUME VS. U-RANKING PERFORMANCE

The comparison of the above two tables indicates that the differences are substantial between U-Ranking Volume and U-Ranking, which measures performance. But both approaches can be useful, depending on the question to be answered.

The differences in the values of the indicators are much greater in the volume ranking due to the importance of size. The indicator of total results ranges from 5.7 to less than 0.1, very much wider than for the indicator of performance, which goes from 1.5 to 0.4.

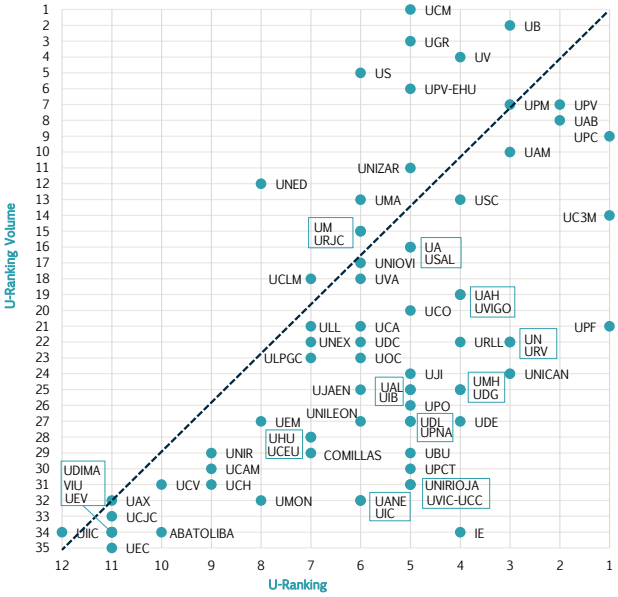
Figure 4.1 combines the two types of rankings and facilitates the comparison of the position of each university in both. The results of U-Ranking Volume, which depend on the size, are shown on the vertical axis, while on the horizontal axis the results of U-Ranking, which measures the performance and corrects the effects of size, are seen.

The universities are ordered from top to bottom on the first axis and from right to left on the second. In each case the scale is different, to reflect that each ranking establishes a different number of groups of universities with the same index. As can be observed, the dispersion of points in the figure is significant and reflects that there is no definite correlation between the two rankings. Therefore, size does not seem, in general, to have any defined positive or negative influence on performance.

The universities with the highest output are located in the upper part of the figure: Universidad Complutense, Universitat de Barcelona, Universidad de Granada, Universitat de València, Universidad de Sevilla, Universidad del País Vasco, Universitat Politècnica de València, Universidad Politécnica de Madrid, Universitat Autònoma de Barcelona, Universitat Politècnica de Catalunya, Universidad Autónoma de Madrid, Universidad de Zaragoza and UNED.

Figure 4.1. **U-Ranking vs. U-Ranking Volume of the Spanish public universities**

Position in each ranking

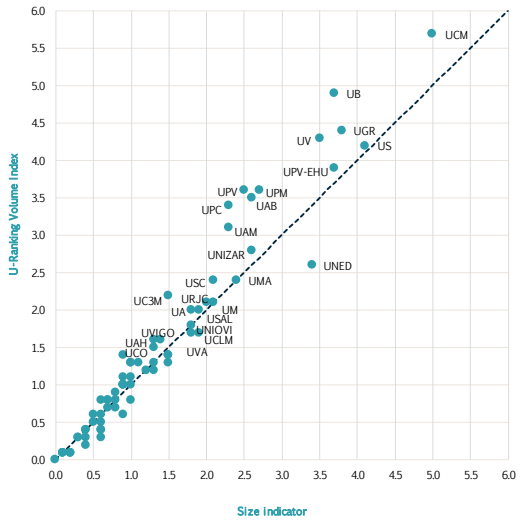


Note: See appendix 2 for a list of abbreviations.
Source: BBVA-Ivie Foundation.

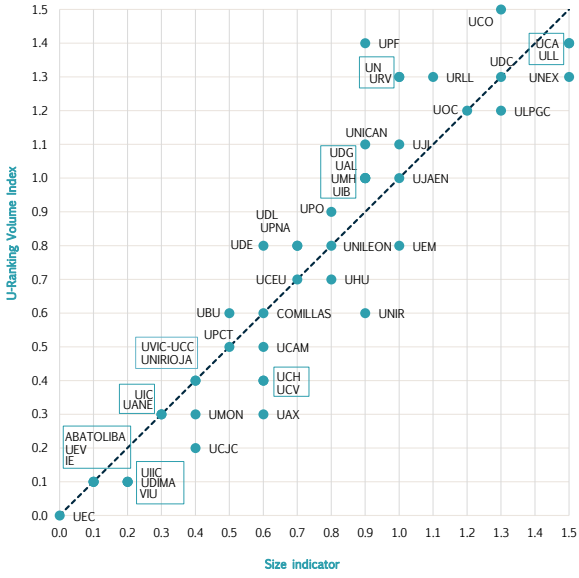
However, not all of these large universities show a good performance (not all are on the right side of the figure), while other smaller ones stand out in this regard and do appear on the right side. An example of the former case is UNED, a large university with a great volume of results that is placed among the top 12 universities in U-Ranking Volume. An example of the latter is Universitat Pompeu Fabra, which obtains the highest performance in U-Ranking, in addition to other very productive medium- or small-sized universities such as Universitat Rovira i Virgili, Universidad de Cantabria, Universidad Carlos III and Universidad de Navarra, whose output places them around the middle of U-Ranking Volume.

Figure 4.2. **U-Ranking Volume vs. Size indicator**

a) Total



b) Universities with a U-Ranking Volume Index below 1.5



Note: The size indicator is a standard arithmetic mean of the teachers, students and budget of each university. See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

In fact, examples of higher or lower performance can be found among universities of very different sizes.[21] Figure 4.2 shows the relationship in panel a (all the universities) and b (universities with a U-Ranking Volume index inferior to or same as 1.5) between size on the horizontal axis and the index of U-Ranking Volume for each university on the vertical axis. Those situated above the diagonal achieve results higher than the average performance, the gradient of the vector radius joining each position to the origin being the measure of their performance.

4.4. U-RANKING VS. SHANGHAI RANKING

Many universities are interested in being compared with the best in the world, thus explaining the increasing popularity attained by some international rankings. In view of the importance given to these popular references, the question arises whether U-Ranking offers different or similar results as international ones. As an external reference for comparison, we will consider the Academic Ranking of World Universities (ARWU), also known as the Shanghai Ranking, which without a doubt has become the most widely known.

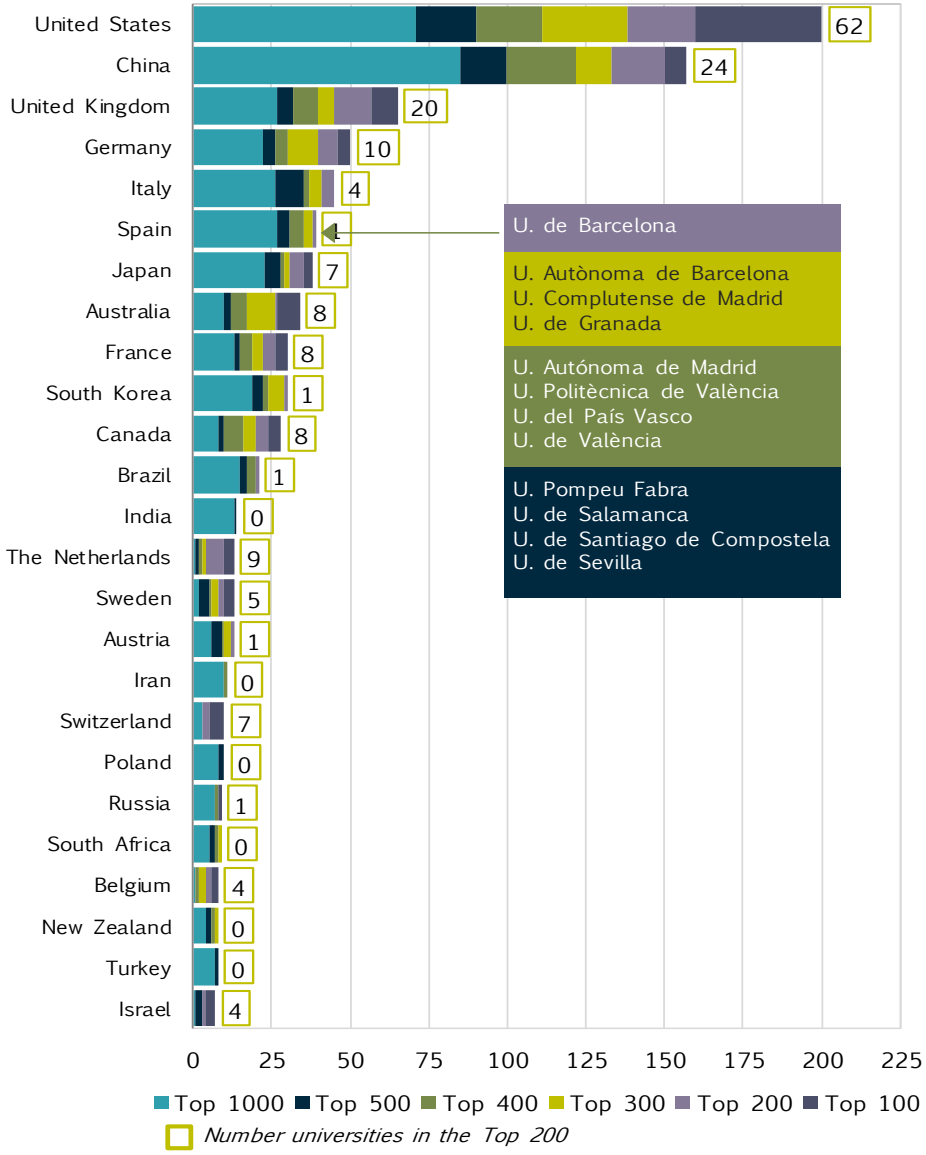
Since the 2017 edition the Shanghai Ranking offers a list of the top 1,000 universities from among the more than 20,000 that exist in the world. In the last edition of ARWU, 39 Spanish universities (38 public and 1 private) have been included among these 1,000. ARWU presents an individual positioning system for the first 100 universities, the next 100 appear in groups shared by 50 universities (101 to 150 and 151 to 200), and from position 201 onwards the universities are grouped in sections of 100.

[21] As mentioned previously, the indicator of size is the result of calculating the standardized arithmetic mean of the number of students, faculty members and budget of each university.

In the latest edition, as can be seen in figure 4.3, 12 Spanish universities appear in the top 500. All except one, Universitat de Barcelona, are located below the 200th place. Spain appears in the seventh position in the figure when considering the 1,000 universities of the ranking. When only the first 500 universities are considered, Spain's position improves from that perspective since, despite the fact that only 14% of Spanish universities are in the Top 500, 45% appear in the complete ranking, that includes a total of 1,000.

The positioning system by groups published in the ranking makes it impossible to compare with U-Ranking, but it is possible to obtain an individual ranking of the 39 universities which are among the top 1,000 in the world on the basis of six standardized indicators disseminated by ARWU. Once the Spanish universities have been sorted by means of this calculation, a comparison between U-Ranking and the international ranking can be made (see figures 4.4 and 4.5). However, a recent study (Docampo 2017) offers a version of the 2016 Shanghai Ranking adapted to the Spanish universities that includes the majority of the private and public universities, allowing a better comparison.

Figure 4.3. **Spanish universities in the 2021 Shanghai Ranking**



Note: Ordered from the countries' highest to lowest number of universities in the Top 1,000.

Source: CWCU (ARWU 2021).

The results of U-Ranking Volume and Shanghai Ranking are much more similar than if we compare our two U-Rankings (performance and volume) with each other, as shown in the following figures. The reason is that ARWU uses indicators that, in general, do not minimize because of size. Only one of the six indicators it uses, with a weight of 10%, takes into account size, that is measured by the number of full-time equivalent faculty members it has. Figure 4.4 represents on the horizontal axis the position of the Spanish universities in U-Ranking Volume and in the vertical axis, their place in the Shanghai Ranking. Regardless of the different number of levels that each ranking sets, both offer a similar order, and therefore the universities are mostly grouped around areas I and III of the figure.

The universities located in area IV of the figure have comparatively a better position in our ranking. The case of Universidad Carlos III de Madrid stands out, occupying a clearly better position in U-Ranking Volume than in the Shanghai Ranking. The universities in area II, on the contrary, are comparatively better placed in the Shanghai Ranking. The common denominator in many cases is that these are small but more productive universities, such as Pompeu Fabra, whose greater efficiency already became apparent in the U-Ranking's measurement of performance.

In figure 4.4, the universities that are among the Top 500 of the 2021 Shanghai Ranking are highlighted with dark blue colored squares. Almost all are among the top universities in U-Ranking Volume: Universidad Complutense de Madrid, Universitat de Barcelona, Universidad de Granada, Universitat de València, Universidad del País Vasco, Universidad de Sevilla, Universitat Politècnica de València, Universidad Autónoma de Madrid and Barcelona and Santiago de Compostela. Two universities, Universidad de Salamanca and Universitat Pompeu Fabra are located in more discrete positions of U-Ranking Volume, the first because its performance is within average and the second because of its smaller size.

The differences with ARWU are much more substantial in the case of the U-Ranking of performance (figure 4.5) since the Shanghai Ranking scarcely corrects the indicators used to take into account size and, therefore, it is more a ranking of volume of results than of performance.[22]

To view the position of universities that stand out in both of the U-Rankings classifications (performance and volume) and their position in the Shanghai Ranking, the shaded area in figure 4.6 shows the fifteen universities that stand out in U-Ranking, both for their high performance and their great volume of results. The universities listed in the 2021 Shanghai Ranking are highlighted in red.

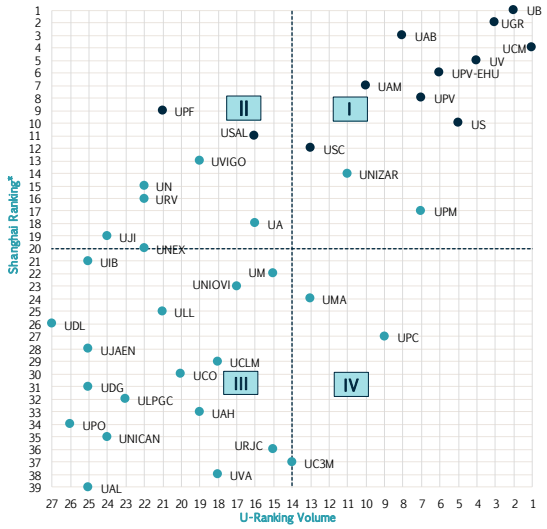
The shaded area contains all the universities also highlighted by the Shanghai Ranking. Both have been included this year in the Top 500 of the 2021 Shanghai Ranking and are located in intermediate positions in U-Ranking. On the other hand, three universities appear in prominent positions in U-Ranking (shaded area) but not in the Shanghai Top 500 of the 2019 Ranking: Universidad Carlos III and Politécnica de Madrid, which have not yet been included in the Top 500 of the international ranking, and Universidad de Zaragoza that appears between positions 501-600 in this year's edition.

To illustrate at the same time the extent to which the three rankings compared generate different groupings of the universities a Venn diagram can be used that represents the ones that form part of the first quartile in each of the classifications and the intersections among the three.

[22] As an example, the Shanghai Ranking uses as an indicator of teachers' quality the number of teachers who have received a Nobel Prize or a Fields Medal, not this number divided by the number of professors of the university.

Figure 4.4. **U-Ranking Volume vs. Shanghai Ranking**

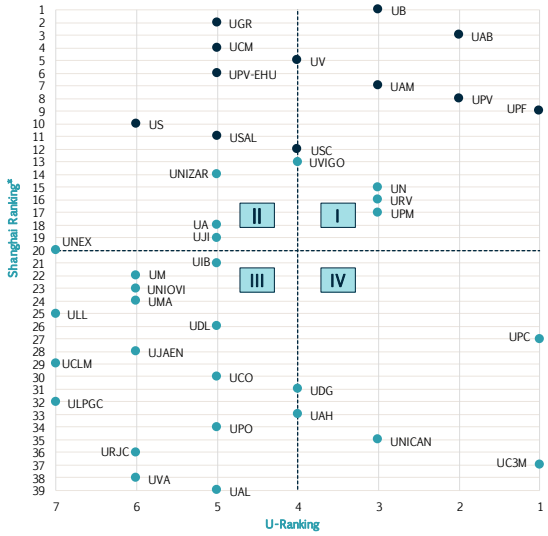
Position in each ranking



Note: Results correspond to an adaptation for 39 Spanish universities that appear in the ranking based on their score in the 5 indicators used and their relative position with respect to the university with the highest score. See appendix 2 for a list of abbreviations.
● Universities in the Shanghai Ranking Top 500 2021.
Source: BBVA-Ivie Foundation and CWCU (ARWU 2021).

Figure 4.5. **U-Ranking vs. Shanghai Ranking**

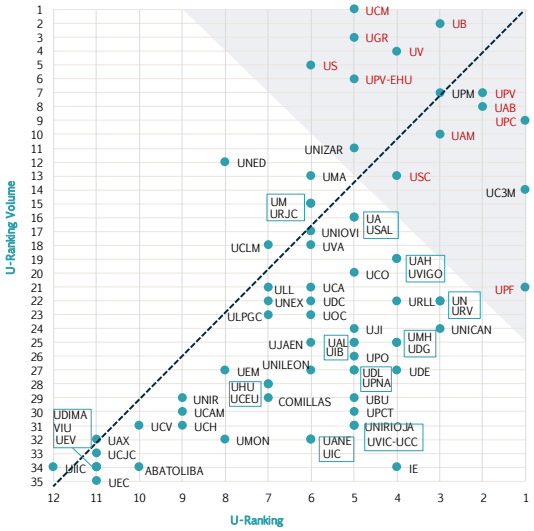
Position in each ranking



Note: Results correspond to an adaptation for 39 Spanish universities that appear in the ranking based on their score in the 5 indicators used and their relative position with respect to the university with the highest score.
● Universities in the Shanghai Ranking Top 500 2021.
Source: BBVA-Ivie Foundation and CWCU (ARWU 2021).

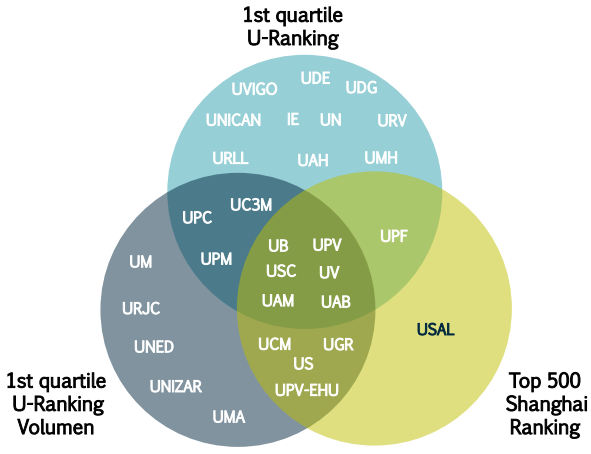
Figure 4.6. **U-Ranking and the Spanish universities in the Top 500 of Shanghai Ranking**

Position in each ranking



Note: Universities in the Shanghai Ranking Top 500 are marked in red.
See appendix 2 for a list of abbreviations.
Source: BBVA-Ivie Foundation and CWCU (ARWU 2021).

Figure 4.7. **U-Ranking vs. Shanghai Ranking**



Note: The 12 Spanish universities in the Top 500 of the Shanghai Ranking 2021 and the first 18 and 20 universities in U-Ranking Volume and U-Ranking are included
See appendix 2 for a list of abbreviations.
Source: BBVA-Ivie Foundation and CWCU (ARWU 2021).

In the middle area of the diagram (figure 4.7) appear the six universities situated in the first quartile of the three rankings, namely, Universitat de Barcelona, Universitat de València, Universitat Politècnica de València, Universidad Autónoma de Barcelona and Madrid and Universidade de San-tiago de Compostela.. Ten other universities are in the first quartile in two of the rankings: Universitat Pompeu Fabra, in Shanghai and U-Ranking; Universidad Complutense de Madrid, Universidad de Santiago de Compostela, Universidad de Granada, Universidad de Sevilla and Universidad del País Vasco-EHU, in Shanghai and U-Ranking Volume; Universidad del País Vasco-EHU, and, in Shanghai and U-Ranking Volume; and the Polytechnics of Cataluña and Madrid, along with Universidad Carlos III, in U-Ranking (performance) and U-Ranking Volume. Finally, sixteen universities stand out by only one of the three criteria considered.

In sum, these results show important coincidences between the rankings when identifying the universities that stand out, but also significant differences that reflect the different approach of each ranking. It is especially interesting to observe that of the twelve Spanish universities that the Shanghai Ranking places in its Top 500, six also appear in the first quartile of our two rankings, in the intersection of the three circles of the diagram; five other ones are found in the two top positions in the ranking of performance (Universitat Pompeu Fabra, Universitat Autònoma de Barcelona and Universitat Politècnica de València) and volume (Universidad Complutense de Madrid and Universitat de Barcelona).

Therefore, it can be said that, of the twelve Spanish universities included in the Top 500 of the Shanghai Ranking, ten are found in our first quartile because of their greater volume of results according to U-Ranking Volume and seven among our most productive universities according to U-Ranking of performance. Consequently, our classifications, especially of volume, present a substantial harmony with those of the Shanghai Ranking, which strengthens their interest as instruments for identifying best practice and greatest impact. They also allow us to see that there may be differences in the rankings according to the perspective with which they are drawn up, but indicate that some universities are well positioned from any perspective.

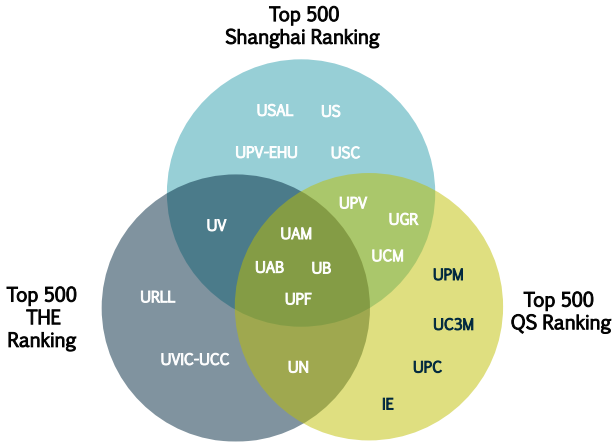
4.5. COMPARISON OF RESULTS WITH OTHER INTERNATIONAL RANKINGS

Although the Shanghai Ranking is consolidating its influence as the most cited international indicator, there exist other initiatives of high international repute, such as the Times Higher Education (THE) or the QS Ranking. The principal differences between these two and the Shanghai Ranking are that they (i) try to measure the role of teaching and (ii) incorporate subjective valuations based on surveys of international employers and experts. The results for the Spanish universities in the three initiatives present similarities but also some differences, as shown in figure 4.8.

In the intersection of the three rankings we find four universities (Universidad Autónoma de Madrid, Universitat Autònoma de Barcelona, Universitat de Barcelona and Universitat Pompeu Fabra) which appear systematically in the top positions of our rankings and belong to the group of universities at the *frontier* of figure 4.6 —that is, those universities that are not dominated by hardly any other university—. If we compare the universities that appear in the international rankings mentioned in figure 4.8 with the efficient frontier of figure 4.6 for U-Ranking, we see that only one, Universidad de Navarra, appears in more than one of the rankings, namely, QS and THE, but is not in our efficient frontier. The rest of the universities that are not part of it appear, at most, in one of the three rankings.

These results again confirm the presence of a group of Spanish universities in the top positions within our university system, regardless of the prism with which they are analyzed and that the discrepancies between our ranking and any of the well-known international rankings are not any greater than those among them.

Figure 4.8. **Comparison of the results of three international rankings. 2021-2022**



Note: See appendix 2 for a list of abbreviations.

Source: CWCU (ARWU 2021), THE (2022) and QS (2022).

4.6. RESEARCH VS. TEACHING: SENSITIVITY ANALYSIS

One of the biggest problems inherent to any composite indicator is the effect of the relative weight of the elements composing it. The U-Ranking methodology expressly considers that teaching and research and innovation can be regarded differently important to each user of university services. Therefore, the web tool allows to draw up personalized rankings that take into account each user's preferences in this sense.

The question posed in this section is how much the general rankings of the universities would change if the weights allocated to teaching and to research were to change. In the results presented above the weights used to calculate the rankings were those obtained by applying the Delphi method that captures the opinions of the experts who collaborated in the design of the project as well as other available information.[23]

Given that other experts or users of rankings may have different valuations about the weights that should be assigned to different activities, we should analyze whether the results are sensitive or not —in the latter case we will say that they are *robust*— to changes in the weights.

Would the results differ much if a greater weight was granted to research, as in other well-known rankings? Can a university occupy a high place in a ranking if the weights of teaching and research and innovation change to better suit its strengths? The answers to these questions are important in assessing whether the results of a ranking are reliable, in other words, if they are oversensitive to the arbitrary nature of the weight assigned to research or any other university activity. As we shall see, the answer to each question is very different.

Most rankings place great emphasis on research because the information on the results of this activity is abundant and seems more precise and reliable. This bias tendency, based on the "use of what can be measured", is attempted to be minimized by arguing that teaching and research are highly correlated, but this hypothesis has barely been tested due to a lack of indicators of teaching results or lack of consensus on which most appropriately reflect an institution's quality of life. Thus, studying the sensitivity of the rankings to changes in the weight of teaching and research and innovation is not an easy task, but allows us to analyze whether the results of universities in both activities are indeed correlated or whether these one-dimensional rankings would be offering a partial view that should be recognized.

The fact that research dimension is easier to measure should not be an excuse to not measure quality of teaching. Likewise, the existence of a positive correlation between the quality of teaching and that of research should not hide the fact that disparity is also possible: if for the same level of research quality there are different teaching results between two universities, ignoring this information

[23] The weights used are 56% for teaching, 34% for research and 10% for innovation and technological development. The weights were established on the basis of the opinion of the experts consulted and agree practically with the distribution of resources among the teaching and research activities in the universities' budgets. It also reflects an intensity of research activity in accordance with the results of the Spanish universities: if we consider that in the top universities of the world by their research results these activities had a weight of 85-90%, the corresponding figure for the Spanish universities would be 35%.

biases the results in favor of one and against the other. This fact becomes more evident since there is a strong disparity in the importance attributed to research by universities in the Spanish University System depending on whether they are public or private.

To value the effect of the selection of the weights given to teaching and to research and innovation we performed an analysis of sensitivity to their variations on the ranking of performance. We calculated three rankings that are differentiated by the very different relative weights of research and of teaching and innovation:

- Option 1: Teaching 30% / Research and innovation 70%
- Option 2: Teaching 70% / Research and innovation 30%
- U-Ranking 2022: Teaching 56% / Research and innovation 44%

Figure 4.9 shows the effect on the position in the ranking of each of Spain's 72 universities analyzed when the weight of research and innovation varies, according to the three weightings chosen.

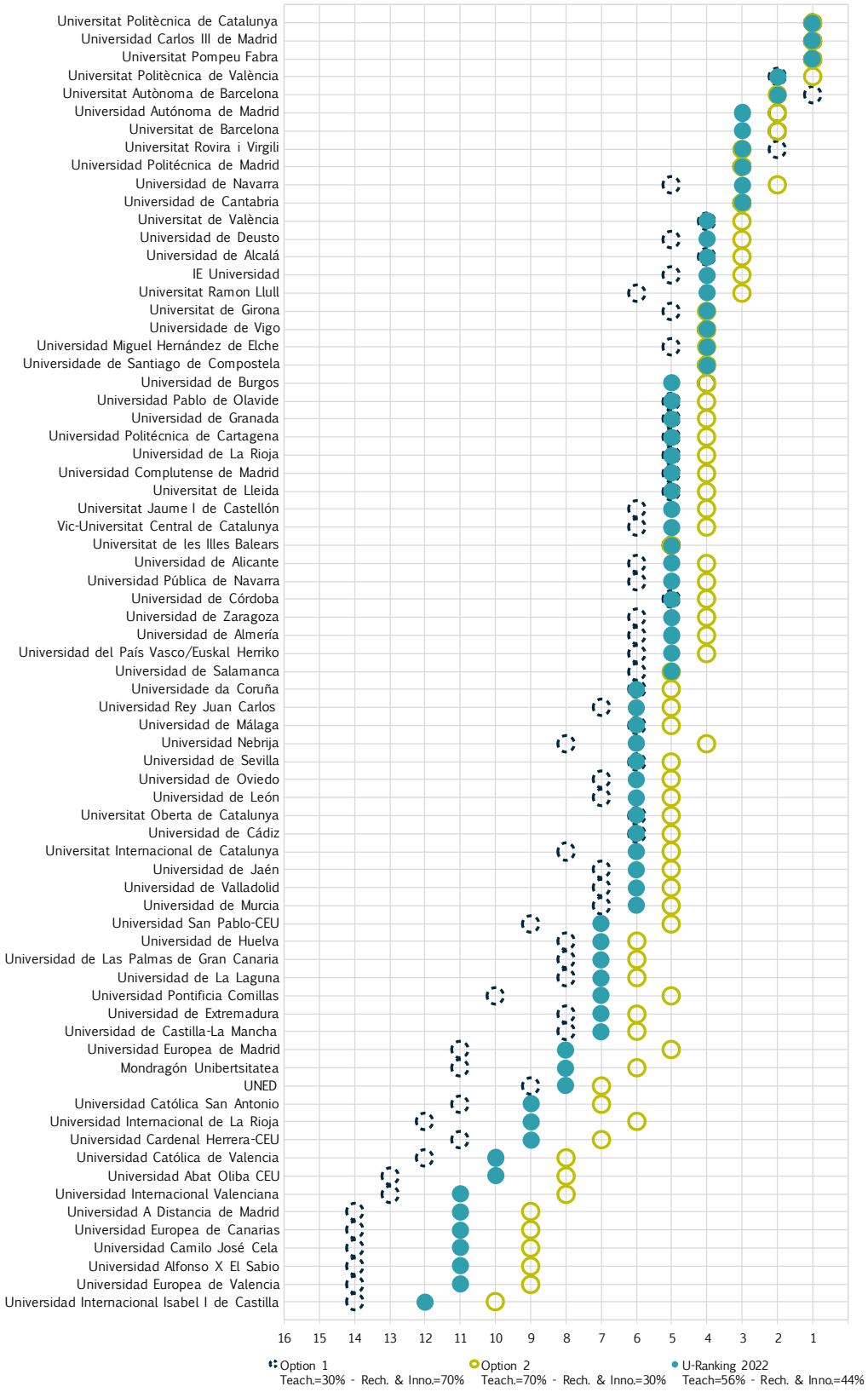
The changes in position in the ranking are visible by right to left movements of the solid-colored circle that represents the position with the weights of U-Ranking 2022 which are characterized by:

- If the weight of research and innovation were to increase to 70% (option 1), the gaps in the results would widen, generating 14 levels in the ranking instead of the current 12, but the maximum variations would be in general 3 places. The main pattern of these changes is that the worsening in the ranking is more intense among private universities, since they are institutions with less research activity. From the 24 private universities, 10 would fall 3 places and another 10 would fall 2 places. In the case of public universities, the variations would be much more moderate, since 23 universities maintain their position and 21 go down one place. The increase in the weight of research imply improvements in one position for 5 universities..
- On the other hand, if the weight given to research and innovation were reduced to 30% (option 2), there would be only a few improvements in position. Note that the ranking generates 12 levels, instead of 11, because, as will be explained in section 4.7, the differences in teaching performance are less than the differences in research performance. As the weight given to teaching increases, the number of groups decreases. Thus, 59 of the 72 universities would improve at least one position, including all the private ones given their higher degree of teaching specialization. Three private universities —Universidad Europea de Madrid, Universidad Europea de Valencia and Universidad Internacional Valenciana (VIU)— would improve 3 places, limiting the majority of the rest of to an improvement of 2 places. Public universities that improve their position would rise 1 place at the most.

These result reveals a pattern of sensitivity of the ranking to changes in weights: because of their high degree of specialization in teaching, private universities are much more sensitive than public universities to increases in the weight of research and innovation.

Thus, the rankings are sensitive to changes in the weights given to teaching and to research and innovation, if we compare weightings as different as those corresponding to our options 1 and 2. However, a university does not pass from the top places to the bottom ones no matter how substantial the changes in the weights may be, although, it is true that some can improve in the ranking if greater importance is accorded to teaching or research.

Figure 4.9. **Evolution of U-Ranking according to variations in the weight of research and innovation**



Note: Universities are ordered by their position in the global performance ranking with the following weights: 56/44

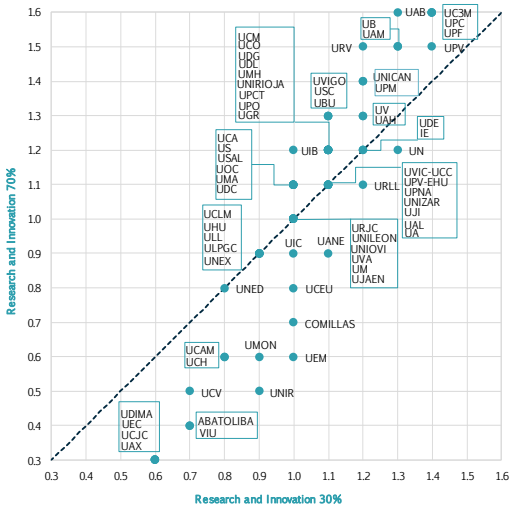
Source: BBVA-Ivie Foundation.

We must consider that, as with any type of measuring instrument, the sensitivity to changes is desirable. If the instrument is insensitive to very significant changes in the weights that reflect a different attribution of importance to different factors, it would not be useful if it does not react to changes, it cannot be expected to react to changes in indicator levels, which is what makes a university better or worse in the ranking. In this sense, U-Ranking proves to be tolerant to moderate changes in the weights, but reacts to significant changes.

If instead of focusing on the analysis of sensitivity of the ranking, in other words, in the positions of the universities, we consider the values of the index by which U-Ranking is obtained, we observe that their stability when changing the weights of teaching and research and innovation is notable. Figure 4.10 presents the synthetic indicator from which U-Ranking is derived for research and innovation weights of 30% (horizonal axis) and 70% (vertical axis). It shows that a drastic change in the weights would cause an increase of only three decimal points for Universitat Autònoma de Barcelona and Universitat Rovira I Virgili, improving their index. In the opposite direction, if the index were to worsen, several universities would fall by four decimal points: Universidad Europea de Madrid and Universidad Internacional de la Rioja, and nine universities by three decimal points: Universidad Europea de Valencia and Canarias, UDIMA, Universidad Camilo José Cela, Universidad Alfonso X El Sabio, Internacional de Valencia, Abat Oliba CEU, Mondragón and Pontificia de Comillas.

Figure 4.10. **U-Ranking for two different weights in research**

Weights of Teaching / Research and Innovation: 70/30 vs. 30/70. Index



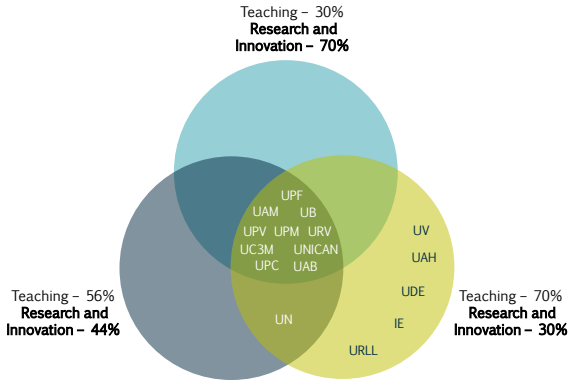
Note: See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

To offer another sample of the stability of the groups of universities, the Venn diagram in figure 4.11 presents the results of the U-Ranking for the three weights described above. Based upon the value of the index, each circle contains the dominant universities. Looking at the diagram we see that changing the weights does not alter the index so much as to cause the appearance or disappearance of universities in those top positions. In fact, once again there is a group of leading universities in Spain that have maintained these positions regardless of the approach adopted in the analysis. In the extreme case where a small value is given to research and innovation (30%) one university, Universidad de Navarra, would drop from the top positions. On the other end, in which more weight is given to research, along with this university, Universitat de València, Universidad de Alcalá, Deusto, IE Universidad and Ramon Llull would then appear among the top places.

Figure 4.11. **Effects of the change in the weight given to research in U-Ranking on the top-ranking universities**

Top universities according to different weights given



Note: The universities that occupy the first 3 positions in each option are included (10 first universities when the weight of Research and Innovation is 70%, 16 when it is 30% and 11 when the weight is 44%).

See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

4.7. TEACHING AND RESEARCH AND INNOVATION RANKINGS

The methodology used constructs indicators with the results of the universities in teaching and research and innovation, which are then aggregated to draw up the two global rankings presented (U-Ranking and U-Ranking Volume). The partial results for each university in each of the two dimensions can be arranged in order to obtain a *teaching ranking and* a *research and innovation ranking*. Each of them can be calculated according to both variants: volume of results and performance. This is a different way to consider whether universities are different in their teaching and research and innovative performance, without entering a debate on the importance of both types of activities.

Figure 4.12 shows by means of *box plots* the distribution corresponding to the indices of the different dimensions and the global index of a university in the case of performance (panel a) and volume of results (panel b). It shows the distributions for the university system as a whole and for public vs. private universities. The extremes of the green lines represent the maximum and minimum values reached by the indices in each dimension and define the range of variation of the index; the top of the central box indicates the 75% percentile and the 25% percentile is marked by the bottom of the box, so that between them is situated 50% of the distribution (interquartile range). The border between the two parts of the box defines the median value. From the comparative analysis of the panels, four essential features stand out:

- The comparison of panels *a* and *b* permits us to observe that the differences between public universities are much greater if their volume of results is analyzed instead of their performance. This feature is observed in both dimensions, but is greater in research and innovation activities than in teaching. Given the total weight of public universities in the university system, this pattern applies to the average of the system.

- In private universities, since they all have a smaller size, the situation is the opposite, and the volume index has much greater homogeneity than the performance index.

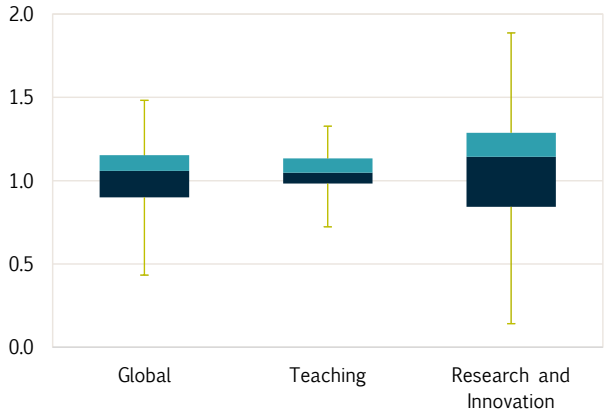
- Differences in performance are greater in research than in teaching for both public and private universities. The range of the teaching index is 0.6 points and 1.7 for research. This result is important because it makes research the main discriminating factor in U-Ranking positions.

- The median for the total number of universities in the distribution of the indices is 1 (see figure 4.12, panels a1 and b1). However, when we analyze private universities (figure 4.12, panels a3 and b3), we clearly observe the difference that exists in specialization to which we have been making reference. Fixing our attention on the indices of performance, we observe that the median is higher than the average of the system in teaching and, meanwhile, it is half in research and innovation.

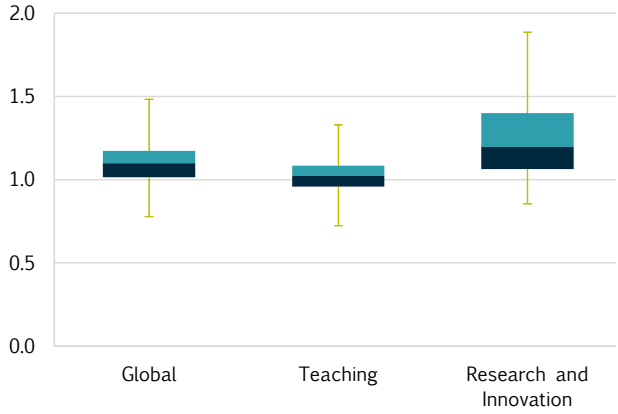
Figure 4.12. **U-Ranking. Distribution of the indices obtained in each dimension**

a) U-Ranking (performance)

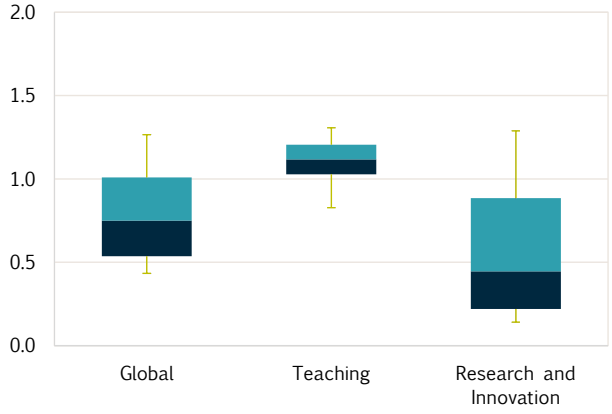
a1. Total universities



a2. Public universities

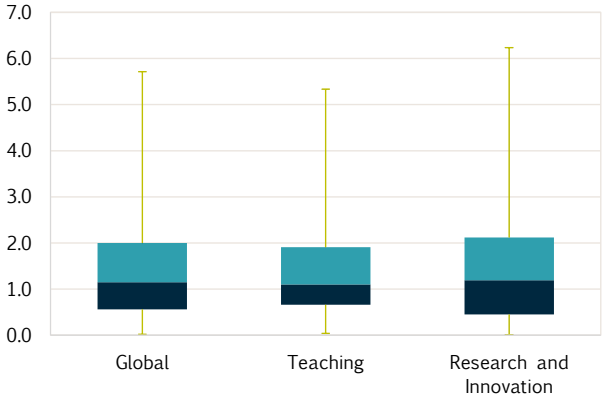


a3. Private universities

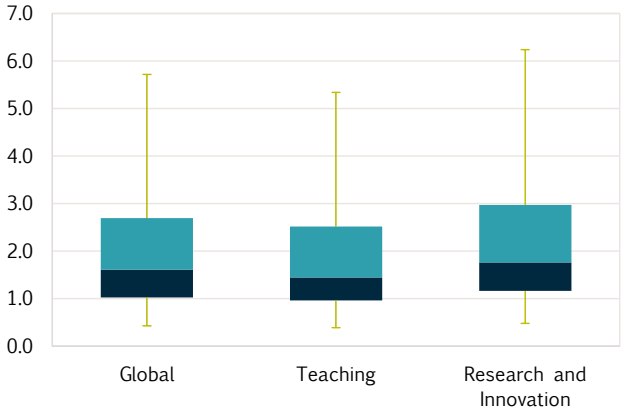


b) U-Ranking Volume

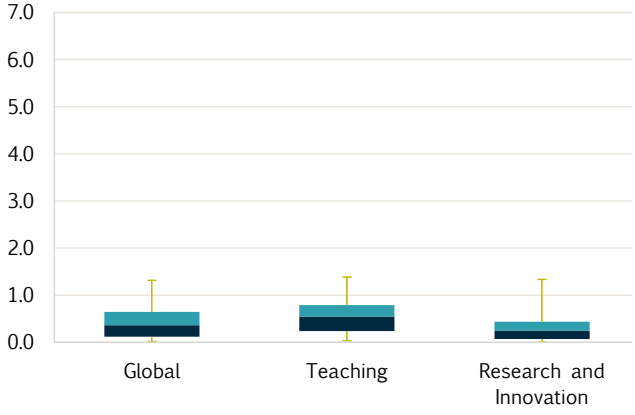
b1. Total universities



b2. Public universities



b3. Private universities



Source: BBVA-Ivie Foundation.

Table 4.3. **Correlation coefficients of the indices and rankings for each dimension**

	Index	Ranking
Total universities	0.12	0.20
Public universities	0.75	0,.71
Private universities	0.29	0.33

Note: The ranking values are calculated by means of a Spearman correlation coefficient and the index values by means of a Pearson correlation coefficient..

Source: BBVA-Ivie Foundation.

Table 4.3 shows the coefficients of correlation between teaching and research and innovation in the different rankings and corresponding performance indices. Once again, we can observe that the behavior is different depending on whether a university is private or public. While the correlation is high and fairly homogeneous among dimensions in public universities, in private universities it is found at 0.3.

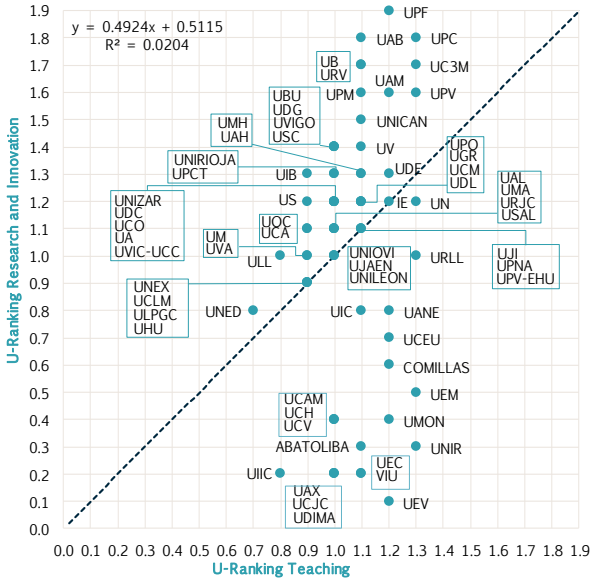
These results suggest that complementarity exists among teaching and research activities, but it is much higher in public universities than in private ones. If the university system as a whole is analyzed, the existence of groups of institutions with different characteristics that result from the coexistence of private and public institutions cannot be ignored, as analyzed by Aldás (dir.) (2016). If we did, it could lead to biases in the analysis of the reality of the university system.

A validation of these differences can be obtained by checking if the hypothesis that research results can predict correctly those of teaching is true or not, this being the assumption of many rankings that concentrate exclusively on the research dimension. Therefore, the rates of performance in research and innovation are represented against the rates of performance in teaching (figure 4.13, panel a). We can see that the observations are grouped vertically and the relationship is practically insignificant as confirmed by the coefficient of determination of the regression line that is around 2%.

Figure 4.13. **U-Ranking. Teaching vs. Research**

Index

a) Public and private universities



b) Public universities

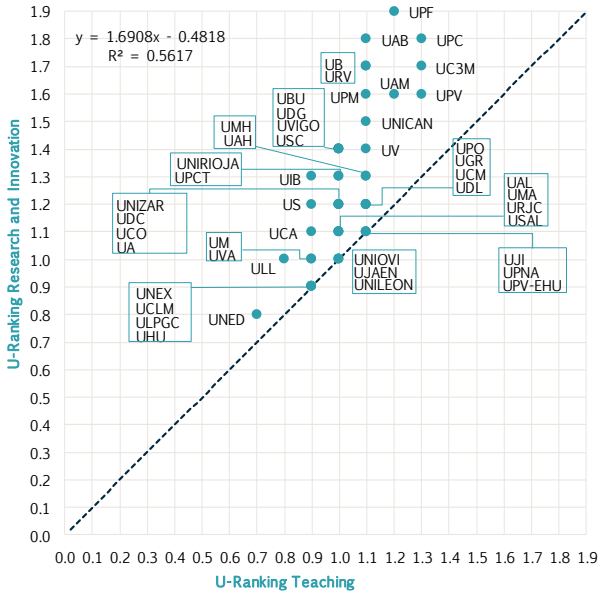
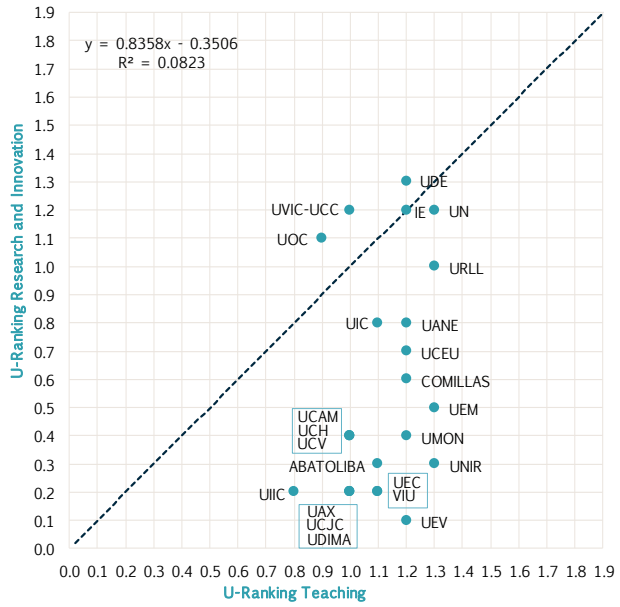


Figure 4.13. (Cont.) **U-Ranking. Teaching vs. Research**

Index

c) Private universities



Note: See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

This result is important because many rankings exclusively analyze the research work carried out by the institutions, assuming that good results in the latter imply good results in the former, when this is not the case. Hence the importance of using a multidimensional configuration for rankings, as in the case of U-Ranking.

If we examine the universities by type of ownership and focus the analysis mainly on the public system (figure 4.13, panel b), the adjustment between the synthetic indices of teaching and research and innovation improves and reaches a coefficient of determination of 0.56, giving evidence of stronger relationship than in the private system but, in any case, limited. In the subset of private universities, the relationship is even smaller than for the overall system (figure 4.13, panel c).

Finally, after describing the results of the rankings of teaching and research and innovation, tables 4.4 to 4.7 present in detail the results of the rankings for each of the dimensions drawn up for all Spanish universities (U-Ranking of teaching and research and innovation and U-Ranking Volume for each of the aforesaid dimensions). In the performance ranking a well-defined pattern of teaching specialization of private universities can be seen: all improve when comparing their position in teaching ranking with the global ranking and worsen when considering the research ranking. That pattern is also shown in panel c of figure 4.13: almost all the private universities are located below the diagonal because their research rate is lower than their teaching rate (the only exceptions being Universitat Oberta de Catalunya, Universidad de Deusto and Universitat de Vic-Universitat Central de Catalunya, which have a research index that is higher than the teaching index). On the other hand, the opposite happens among public universities in all of the cases.

Table 4.4. U-Ranking of Spanish universities 2022. Teaching

University	Ranking	Index	University	Ranking	Index	University	Ranking	Index
Universitat Politècnica de València	1	1.3	Universidad del País Vasco	3	1.1	Universitat de les Illes Balears	5	0.9
Universidad Europea de Madrid	1	1.3	Universidad de Cantabria	3	1.1	Universidad de Valladolid	5	0.9
Universidad Carlos III de Madrid	1	1.3	Universidad Complutense de Madrid	3	1.1	Universidad de Murcia	5	0.9
Universidad de Navarra	1	1.3	Universitat de Lleida	3	1.1	U. de Las Palmas de Gran Canaria	5	0.9
Universitat Ramon Llull	1	1.3	U. Miguel Hernández de Elche	3	1.1	Universidad de Huelva	5	0.9
U. Internacional de La Rioja*	1	1.3	Universidad A Distancia de Madrid*	4	1.0	Universidad de Sevilla	5	0.9
Universitat Politècnica de Catalunya	1	1.3	Universidad Politécnica de Cartagena	4	1.0	Universitat Oberta de Catalunya	5	0.9
Universidad Pontificia Comillas	2	1.2	Universidad Católica San Antonio	4	1.0	Universidad de Cádiz	5	0.9
Mondragón Unibertsitatea	2	1.2	Universidad de La Rioja	4	1.0	Universidad de Extremadura	5	0.9
Universitat Pompeu Fabra	2	1.2	Universidad de Zaragoza	4	1.0	Universidad de Castilla-La Mancha	5	0.9
IE Universidad	2	1.2	Vic-Universitat Central de Catalunya	4	1.0	Universidad de La Laguna	6	0.8
Universidad Europea de Valencia*	2	1.2	Universidad de Alicante	4	1.0	U. Internacional Isabel I de Castilla*	6	0.8
Universidad Nebrija	2	1.2	Universidad Cardenal Herrera-CEU	4	1.0	UNED	7	0.7
Universidad San Pablo-CEU	2	1.2	Universitat de Girona	4	1.0	CUNEF Universidad*		
Universidad de Deusto	2	1.2	Universidad de Almería	4	1.0	ESIC Universidad*		
Universidad Autónoma de Madrid	2	1.2	Universidad de Salamanca	4	1.0	Universidad Católica de Ávila		
Universitat de València	3	1.1	Universidad Camilo José Cela	4	1.0	Universidad del Atlántico Medio*		
Universidad de Alcalá	3	1.1	Universidad de León	4	1.0	Universidad Europea del Atlántico*		
U.Internacional de Catalunya	3	1.1	Universidad de Oviedo	4	1.0	Universidad Europea Miguel de Cervantes		
Universitat de Barcelona	3	1.1	Universidad Alfonso X El Sabio	4	1.0	Universidad Fernando Pessoa-Canarias*		
Universitat Autònoma de Barcelona	3	1.1	Universidad Rey Juan Carlos	4	1.0	Universidad Francisco de Vitoria		
Universidad Pablo de Olavide	3	1.1	Universidade de Vigo	4	1.0	Universidad Internacional de Andalucía		
Universidad Politécnica de Madrid	3	1.1	Universidad Católica de Valencia	4	1.0	Universidad Internacional Menéndez Pelayo		
U. Internacional Valenciana*	3	1.1	Universidad de Córdoba	4	1.0	Universidad Internacional Villanueva*		
Universidad Abat Oliba CEU	3	1.1	U. de Santiago de Compostela	4	1.0	Universidad Loyola de Andalucía*		
Universidad Pública de Navarra	3	1.1	Universidad de Burgos	4	1.0	Universidad Pontificia de Salamanca		
Universidad de Granada	3	1.1	Universidad de Málaga	4	1.0	Universidad San Jorge		
Universitat Rovira i Virgili	3	1.1	Universidade da Coruña	4	1.0			
Universitat Jaume I de Castellón	3	1.1	Universidad de Jaén	4	1.0			
Universidad Europea de Canarias*	3	1.1						

Table 4.5. U-Ranking of Spanish universities 2022. Research and Innovation

University	Ranking	Index	University	Ranking	Index	University	Ranking	Index
Universitat Pompeu Fabra	1	1.9	Universitat Jaume I de Castellón	9	1.1	U. Internacional Valenciana*	18	0.2
Universitat Autònoma de Barcelona	2	1.8	Universitat Oberta de Catalunya	9	1.1	Universidad Camilo José Cela	18	0.2
Universitat Politècnica de Catalunya	2	1.8	Universidad de Cádiz	9	1.1	Universidad A Distancia de Madrid*	18	0.2
Universitat Rovira i Virgili	3	1.7	Universidad de Almería	9	1.1	Universidad Europea de Canarias*	18	0.2
Universidad Carlos III de Madrid	3	1.7	Universidad de Salamanca	9	1.1	Universidad Alfonso X El Sabio	18	0.2
Universitat de Barcelona	3	1.7	Universidad de Málaga	9	1.1	U. Internacional Isabel I de Castilla*	18	0.2
Universidad Autónoma de Madrid	4	1.6	Universidad Pública de Navarra	9	1.1	Universidad Europea de Valencia*	19	0.1
Universidad Politécnica de Madrid	4	1.6	Universidad Rey Juan Carlos	9	1.1			
Universitat Politècnica de València	4	1.6	Universidad del País Vasco	9	1.1	CUNEF Universidad*		
Universidad de Cantabria	5	1.5	Universitat Ramon Llull	10	1.0	ESIC Universidad*		
Universidad de Burgos	6	1.4	Universidad de Murcia	10	1.0	Universidad Católica de Ávila		
U. de Santiago de Compostela	6	1.4	Universidad de Valladolid	10	1.0	Universidad del Atlántico Medio*		
Universidade de Vigo	6	1.4	Universidad de Oviedo	10	1.0	Universidad Europea del Atlántico*		
Universitat de València	6	1.4	Universidad de Jaén	10	1.0	Universidad Europea Miguel de Cervantes		
Universitat de Girona	6	1.4	Universidad de León	10	1.0	Universidad Fernando Pessoa-Canarias*		
Universidad de Alcalá	7	1.3	Universidad de La Laguna	10	1.0	Universidad Francisco de Vitoria		
Universitat de les Illes Balears	7	1.3	Universidad de Castilla-La Mancha	11	0.9	Universidad Internacional de Andalucía		
Universidad de La Rioja	7	1.3	Universidad de Extremadura	11	0.9	Universidad Internacional Menéndez Pelayo		
Universidad de Deusto	7	1.3	Universidad de Huelva	11	0.9	Universidad Internacional Villanueva*		
U. Miguel Hernández de Elche	7	1.3	U. de Las Palmas de Gran Canaria	11	0.9	Universidad Loyola de Andalucía*		
U. Politécnica de Cartagena	7	1.3	UNED	12	0.8	Universidad Pontificia de Salamanca		
Universidad Complutense de Madrid	8	1.2	Universidad Nebrija	12	0.8	Universidad San Jorge		
Universidad de Córdoba	8	1.2	U. Internacional de Catalunya	12	0.8			
Universidad de Navarra	8	1.2	Universidad San Pablo-CEU	13	0.7			
Universidad de Granada	8	1.2	Universidad Pontificia Comillas	14	0.6			
Universitat de Lleida	8	1.2	Universidad Europea de Madrid	15	0.5			
Vic-Universitat Central de Catalunya	8	1.2	Universidad Católica San Antonio	16	0.4			
Universidad Pablo de Olavide	8	1.2	Mondragón Unibertsitatea	16	0.4			
IE Universidad	8	1.2	Universidad Cardenal Herrera-CEU	16	0.4			
Universidad de Alicante	8	1.2	Universidad Católica de Valencia	16	0.4			
Universidade da Coruña	8	1.2	U. Internacional de La Rioja*	17	0.3			
Universidad de Sevilla	8	1.2	Universidad Abat Oliba CEU	17	0.3			
Universidad de Zaragoza	8	1.2						

Note: Universities are ordered from the highest to the lowest index value. Universities with the same index value are ordered alphabetically. The 14 universities listed in the last column have not been analyzed due to lack of data.
*Universities 15 years or younger.
Source: BBVA-Ivie Foundation.

Table 4.6. U-Ranking Volume of Spanish universities 2022. Teaching

University	Ranking	Index
Universidad Complutense de Madrid	1	5.3
Universidad de Granada	2	4.1
Universitat de Barcelona	2	4.1
Universitat de València	3	4.0
Universidad del País Vasco	3	4.0
Universidad de Sevilla	4	3.8
Universitat Politècnica de València	5	3.3
Universidad Politécnica de Madrid	6	3.0
Universitat Politècnica de Catalunya	7	2.9
Universitat Autònoma de Barcelona	7	2.9
Universidad Autónoma de Madrid	8	2.7
Universidad de Zaragoza	8	2.7
UNED	9	2.5
Universidad de Málaga	10	2.3
U. de Santiago de Compostela	11	2.0
Universidad Rey Juan Carlos	11	2.0
Universidad de Murcia	11	2.0
Universidad Carlos III de Madrid	12	1.9
Universidad de Salamanca	12	1.9
Universidad de Alicante	12	1.9
Universidad de Oviedo	13	1.8
Universidad de Valladolid	14	1.7
Universidad de Castilla-La Mancha	15	1.6
Universidad de Alcalá	16	1.5
Universidade de Vigo	17	1.4
Universitat Ramon Llull	17	1.4
Universidad de Navarra	17	1.4
Universidad de Córdoba	18	1.3
Universidad de Extremadura	18	1.3
Universidad de Cádiz	18	1.3
Universidad de La Laguna	18	1.3
Universidad Europea de Madrid	18	1.3
Universidade da Coruña	19	1.2
U. de Las Palmas de Gran Canaria	19	1.2
U. Internacional de La Rioja*	20	1.1
Universitat Pompeu Fabra	20	1.1
Universitat Jaume I de Castellón	20	1.1
Universitat Oberta de Catalunya	21	1.0
Universitat Rovira i Virgili	21	1.0
Universidad de Jaén	21	1.0
Universidad de Cantabria	21	1.0
U. Miguel Hernández de Elche	22	0.9
Universidad de Almería	22	0.9
Universitat de Girona	22	0.9
Universidad Pablo de Olavide	22	0.9
Universitat de les Illes Balears	22	0.9
Universidad San Pablo-CEU	23	0.8
Universidad de León	23	0.8
Universidad Pontificia Comillas	23	0.8
Universidad Pública de Navarra	23	0.8
Universitat de Lleida	23	0.8
Universidad de Deusto	24	0.7
Universidad de Huelva	24	0.7
Universidad Católica San Antonio	24	0.7
Universidad Católica de Valencia	25	0.6
Universidad Cardenal Herrera-CEU	25	0.6
Universidad Alfonso X El Sabio	25	0.6
Universidad de Burgos	26	0.5
Mondragón Unibertsitatea	26	0.5
U. Politécnica de Cartagena	26	0.5
Universidad Nebrija	27	0.4
Universidad de La Rioja	27	0.4
Universidad Camilo José Cela	27	0.4
Vic-Universitat Central de Catalunya	27	0.4
U. Internacional de Catalunya	27	0.4
Universidad A Distancia de Madrid*	28	0.2
U. Internacional Valenciana*	28	0.2
Universidad Europea de Valencia*	28	0.2
U. Internacional Isabel I de Castilla*	29	0.1
IE Universidad	29	0.1
Universidad Abat Oliba CEU	29	0.1
Universidad Europea de Canarias*	30	0.0
CUNEF Universidad*		
ESIC Universidad*		
Universidad Católica de Ávila		
Universidad del Atlántico Medio*		
Universidad Europea del Atlántico*		
Universidad Europea Miguel de Cervantes		
Universidad Fernando Pessoa-Canarias*		
Universidad Francisco de Vitoria		
Universidad Internacional de Andalucía		
Universidad Internacional Menéndez Pelayo		
Universidad Internacional Villanueva*		
Universidad Loyola de Andalucía*		
Universidad Pontificia de Salamanca		
Universidad San Jorge		

Table 4.7. U-Ranking Volume of Spanish universities 2022. Research and Innovation

University	Ranking	Index
Universidad Complutense de Madrid	1	6.2
Universitat de Barcelona	2	6.0
Universidad de Sevilla	3	4.7
Universitat de València	3	4.7
Universitat Autònoma de Barcelona	3	4.7
Universidad de Granada	4	4.6
Universidad Politécnica de Madrid	5	4.4
Universitat Politècnica de Catalunya	6	4.2
Universitat Politècnica de València	7	4.0
Universidad del País Vasco	8	3.9
Universidad Autónoma de Madrid	9	3.7
Universidad de Zaragoza	10	3.0
U. de Santiago de Compostela	10	3.0
UNED	11	2.9
Universidad de Málaga	12	2.6
Universidad Carlos III de Madrid	13	2.5
Universidad de Murcia	14	2.2
Universidad Rey Juan Carlos	14	2.2
Universidad de Alicante	15	2.1
Universidad de Salamanca	15	2.1
Universidade de Vigo	16	2.0
Universidad de Oviedo	17	1.8
Universidad de Valladolid	17	1.8
Universidad de Castilla-La Mancha	17	1.8
Universitat Pompeu Fabra	18	1.7
Universidad de Alcalá	18	1.7
Universidad de Cádiz	18	1.7
Universitat Rovira i Virgili	18	1.7
Universidad de Córdoba	19	1.6
Universidad de La Laguna	20	1.5
Universidade da Coruña	20	1.5
Universidad de Cantabria	21	1.4
Universidad de Extremadura	21	1.4
Universitat Oberta de Catalunya	22	1.3
Universidad de Navarra	22	1.3
Universitat de les Illes Balears	23	1.2
Universitat de Girona	23	1.2
U. de Las Palmas de Gran Canaria	23	1.2
Universitat Jaume I de Castellón	23	1.2
U. Miguel Hernández de Elche	24	1.1
Universitat Ramon Llull	24	1.1
Universidad de Almería	25	1.0
Universidad de Jaén	25	1.0
Universidad Pablo de Olavide	26	0.9
Universitat de Lleida	26	0.9
Universidad de Deusto	27	0.8
Universidad de León	27	0.8
Universidad de Burgos	27	0.8
Universidad Pública de Navarra	27	0.8
Universidad de Huelva	28	0.7
U.Politécnica de Cartagena	29	0.6
Universidad San Pablo-CEU	30	0.5
Universidad de La Rioja	30	0.5
Universidad Europea de Madrid	30	0.5
Vic-Universitat Central de Catalunya	31	0.4
Universidad Pontificia Comillas	31	0.4
U. Internacional de La Rioja*	32	0.3
Universidad Católica San Antonio	32	0.3
Universidad Nebrija	32	0.3
U. Internacional de Catalunya	32	0.3
Universidad Cardenal Herrera-CEU	33	0.2
Universidad Católica de Valencia	33	0.2
Mondragón Unibertsitatea	33	0.2
Universidad Alfonso X El Sabio	34	0.1
IE Universidad	34	0.1
Universidad Camilo José Cela	34	0.1
Universidad A Distancia de Madrid*	35	<0,1
U. Internacional Valenciana*	35	<0,1
U. Internacional Isabel I de Castilla*	35	<0,1
Universidad Abat Oliba CEU	35	<0,1
Universidad Europea de Valencia*	35	<0,1
Universidad Europea de Canarias*	35	<0,1
CUNEF Universidad*		
ESIC Universidad*		
Universidad Católica de Ávila		
Universidad del Atlántico Medio*		
Universidad Europea del Atlántico*		
Universidad Europea Miguel de Cervantes		
Universidad Fernando Pessoa-Canarias*		
Universidad Francisco de Vitoria		
Universidad Internacional de Andalucía		
Universidad Internacional Menéndez Pelayo		
Universidad Internacional Villanueva*		
Universidad Loyola de Andalucía*		
Universidad Pontificia de Salamanca		
Universidad San Jorge		

Note: Universities are ordered from the highest to the lowest index value. Universities with the same index value are ordered alphabetically. The 14 universities listed in the last column have not been analyzed due to lack of data.
*Universities 15 years or younger.
Source: BBVA-Ivie Foundation.

4.8. PUBLIC AND PRIVATE UNIVERSITIES' RESULTS COMPARED

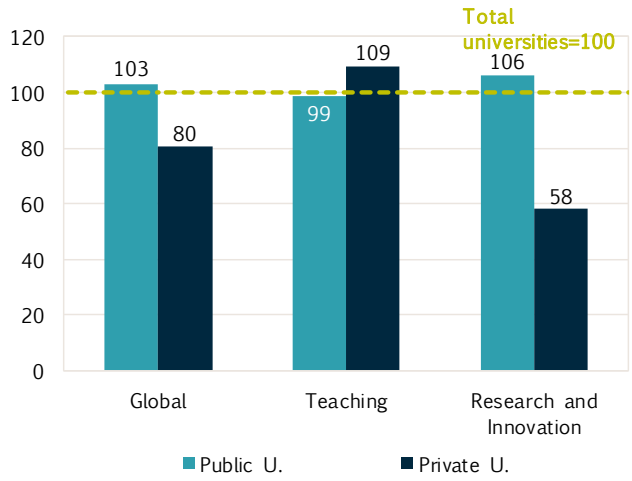
The increased weight of private universities in the Spanish University System is making the comparison of the results depending on the ownership of the universities –public or private- much more relevant. It is undeniable that many variables may cause non-equivalent results: private universities are much younger on average, many are located in geographic areas with higher per capita income, a less diversified range of courses than the public system, to the extent that their age of existence has allowed them to decide which degrees to specialize in, and also a smaller size. But to determine the differences in the results its necessary to find first evidence that these differences do exist. The indices of the U-Ranking system allow us to address this issue with accurate data.

Figure 4.14 shows the average results for U-Ranking indices for teaching and research and innovation, as well as in the global index of results.

If we take the average of the system as basis 100, built as an average weighted by the weight of the individual indices of universities, the performance of the private universities is 23 points less than the public system. This result is due, primarily, to a specialization in these universities, that is much more focused on the teaching dimension, in which they achieve a greater performance than public universities (10 points). This teaching specialization goes in hand with research results that are well below those of public universities (their performance being 48 points lower).

Figure 4.14. **Average performance of the Spanish public and private universities**

Total universities=100



Source: BBVA-Ivie Foundation.

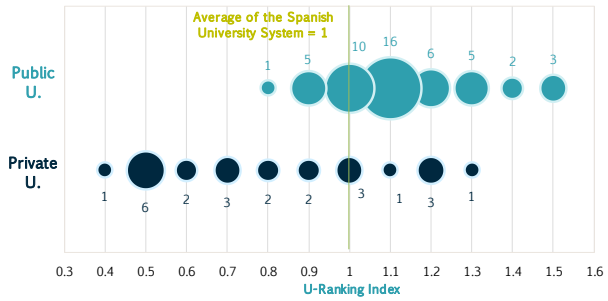
Averages may hide a more complex reality characterized by a great heterogeneity of results. The heterogeneity shared by private and public university systems, is clearly visible in figure 4.15. In all the panels (global, teaching and research and innovation) we observe how the distribution of both types of universities along the range that represents the index indicates diversity in the results.

In short, public and private university systems are both heterogeneous with respect to the performance of the institutions that comprise them, there being a great diversity in the global, teaching and research and innovation results. However, the public university system stands out with respect to private universities in their research achievements and innovation results. On the other hand, the teaching specialization of the private system achieves better results in this dimension.

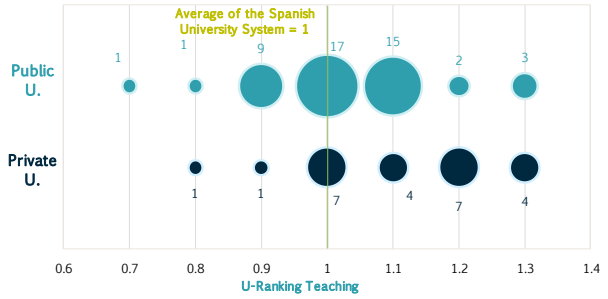
Figure 4.15. **Index and number of universities with the same index. 2022**

Index and number of universities with the same index

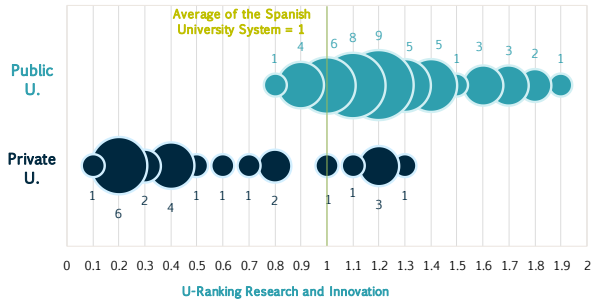
a) Global



b) Teaching



c) Research and Innovation



Source: BBVA-Ivie Foundation.

4.9. U-RANKING 2021 AND 2022

The aim of this section is to evaluate the stability of results of the different editions of U-Ranking. For this purpose, two types of comparisons are offered between the results of this edition and the one carried out in 2021. First, the correlation between the results of both editions is calculated (table 4.8) and then the dispersion of the indices in both editions is presented (table 4.9)..

The results obtained by U-Ranking 2022 are highly correlated with those presented in 2021. As table 4.8 shows, the coefficients of correlation between the indices and the rankings corresponding to the two editions are very high. All the correlations, both those referring to the positions in the ranking (Spearman) and to the values of the synthetic indicator (Pearson), are significant to 1% and, for the global index, present coefficients higher than 0.95 in all cases. This result is important because it means that the small changes introduced and data updates have not significantly altered the results confirming the reliability of the methodology used.

The close fit between the indexes of both editions of the rankings can also be appreciated in the figures which show on the horizontal axis the synthetic indicator of each university in 2021 and on the vertical axis the results for 2022, both for U-Ranking (figure 4.16) and for U-Ranking Volume (figure 4.17). In both cases, the vast majority of universities are concentrated in the 45-degree diagonal, reflecting the fact that the index obtained in this edition is the same as in the previous one.

Table 4.8. **Correlation coefficients of 2021 and 2022 U-Rankings**

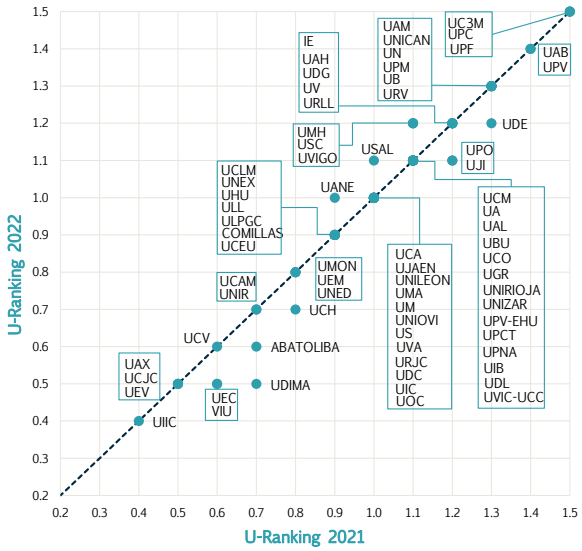
	Performance		Volume	
	Index	Ran-king	Index	Ran-king
Global	0.99	0.98	1.00	1.00
Teaching	0.99	0.97	1.00	1.00
Research and Innovation	0.99	0.98	1.00	1.00

Note: The ranking values are calculated by means of a Spearman correlation coefficient and the index values by means of a Pearson correlation coefficient.

Source: BBVA-Ivie Foundation.

Figure 4.16. **U-Ranking (performance) of the Spanish public universities. 2021 and 2022**

Index



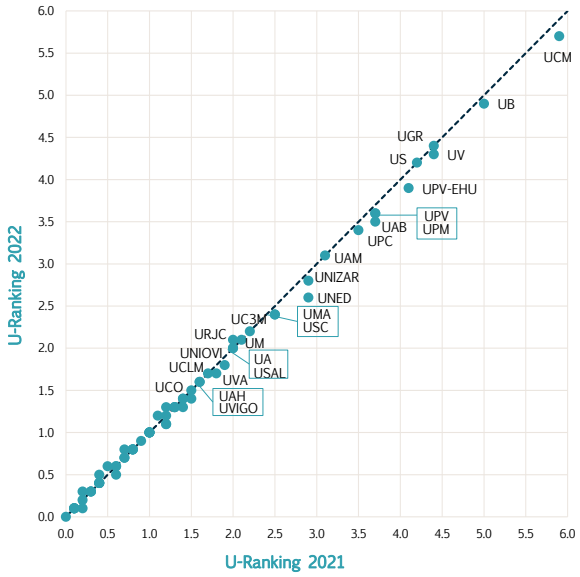
Note: See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

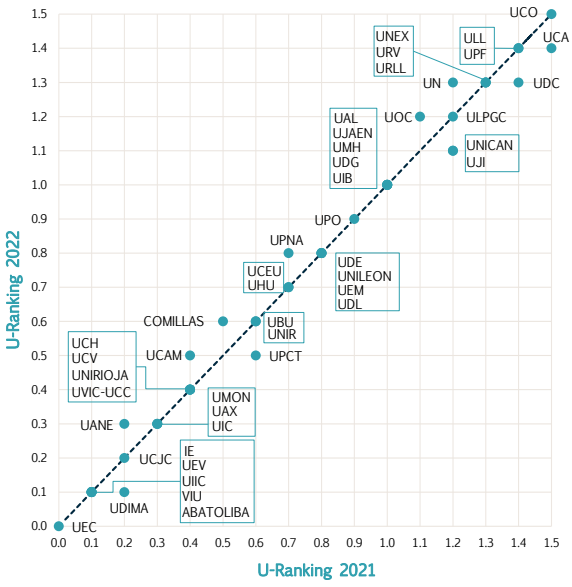
Figure 4.17. **U-Ranking Volume of the Spanish public universities. 2021 and 2022**

Index

a) Total universities



b) Universities with a less than 1.5 index in U-Ranking 2022



Note: See appendix 2 for a list of abbreviations.

Source: BBVA-Ivie Foundation.

4.10. REGIONAL UNIVERSITY SYSTEMS

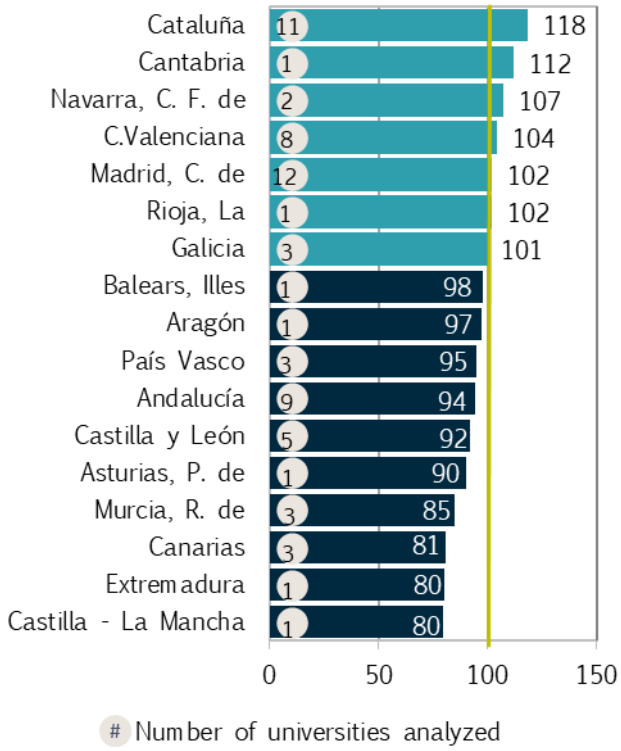
Universities undertake their teaching and research activities in a certain geographic context that influences them. On the one hand, if they are public, investment efforts as well as incentive policies, fees, quality assurance and plans to boost internationalization vary greatly from one region to another. On the other hand, the socio-economic environments of each region are different: there are differences in the levels of income, the population's educational levels, type of industries, labor market, urbanization, etc.

Many of these circumstances influence the location of private universities, which are clearly concentrated in the most prosperous regions of Spain, so that the number of regional public and private universities is also uneven. For all these reasons, it is interesting to analyze the performance of the so-called *regional university systems*. To the extent that the variables used to calculate the rankings reflect these regional differences, the synthetic indicators will show that the performances of the university systems are not the same.

Figure 4.18 shows the averages of the 2022 U-Ranking index of all universities, both public and private, of each autonomous community. The six distance-learning universities have been removed from this analysis because, given their teaching method, it would be difficult to assign their scope of action to a particular region.

The results show, in fact, large differences regarding performance among the regional university systems: the autonomous community with the highest performance exceeds by 38 percentage points the region with the lowest performance.

Figure 4.18. **Performance of the regional university systems in U-Ranking. 2022. Spain=100**



Note: On-line universities not included.

Source: BBVA-Ivie Foundation.

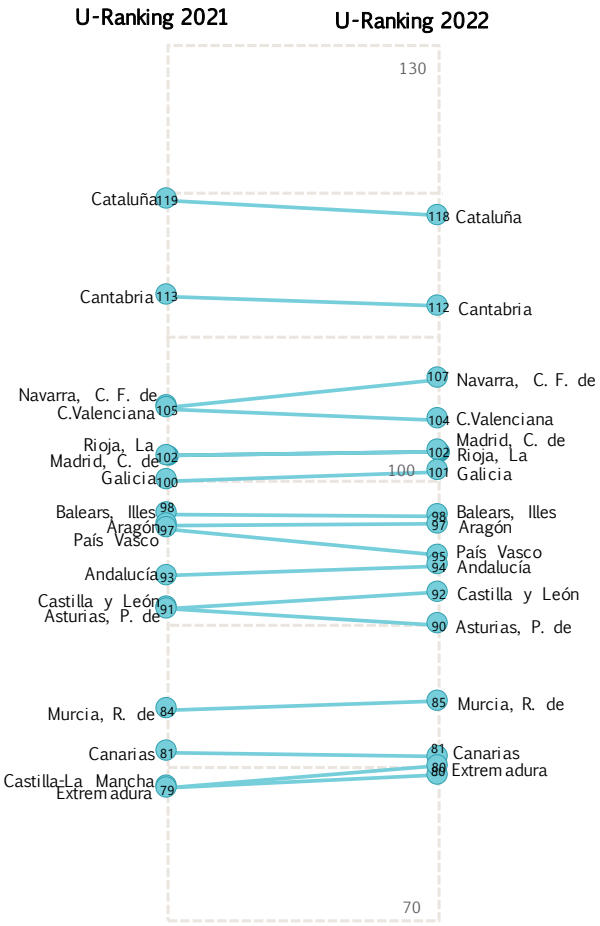
The best-performing university systems are those of Catalonia (11 of the universities analyzed in U-Ranking), and Cantabria (with just one university), which have performance indices of 18% and 12%, respectively. They are followed by Navarra (+7%), the Valencian Community (+4%), La Rioja (+2%), Madrid (+2%) and Galicia (+1%) all of which are above average.

Among the regional university systems with performance levels below the average, we can distinguish several levels: some do not reach 5% —Balearic Islands, Aragon and Basque Country—, others are less than 10% —Andalusia, Castile and Leon and Asturias—. While other communities are over 10%, as is the cases of Murcia, Canary Islands, Extremadura and Castile-La Mancha.

When comparing the regional university systems, we must take into account that private universities, which on average have a lower performance, tend to be concentrated, as we already have seen, in regions with high levels of income and large potential markets. This is not to say, however, that the autonomous communities with more private universities rank lower, as those with the highest concentration of private universities (especially Madrid and Catalonia) also have a large number of strong public universities.

Figure 4.19 compares the results obtained by the autonomous communities in the 2021 edition with the results from the present edition. In general, we can highlight their stability, but some changes should be noted. Specifically, the gap between the community with the highest and lowest performance indexes has narrowed from 40 to 38 points.. Thus, a return to the convergence process experienced in recent years can be seen, with the exception of what occurred in the previous edition.

Figure 4.19. **Evolution of the regional university systems. 2021 and 2022. Spain =100**



Note: On-line universities not included.

Source: BBVA-Ivie Foundation.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Postgraduate rankings

05

5.1. INTRODUCTION

The Bologna reform, which paved the way for the European Higher Education Area, brought major changes in the way teaching is organized in the Spanish university system. One of the biggest changes was undoubtedly the replacement of a system based essentially on three-year generalist degrees (*diplomaturas* and *ingenierías técnicas*) and five or six-year specialist degrees (*licenciaturas* and *ingenierías superiores*) by a system of four-year bachelor's degrees leading to one or two-year master's degrees.

The introduction of the master's degree and the growth in demand for these degrees deserve special attention for a number of reasons. First, because the option of advancing in one's education by stages was not available in the previous system, unless one wished to pursue a doctorate. Second, because a prospective master's student, having already completed a bachelor's, has a mature knowledge of the system and so is better equipped to choose a university for the master's (either stay at the same university or change to a different one), thus fostering mobility, which is very limited at the bachelor's level. Third, master's degrees have been introduced at a time of growth in the number of private universities, which see master's Programs as a speciality that aligns with their competitive advantages, including the focus on entry to work. Fourth, as will be seen in the following pages, master's degrees deserve attention because the number of master's students in the Spanish university system has been growing steadily and significantly, so it is just as important to offer a guide to making the right choice for prospective master's students as it is for undergraduates.

This chapter is intended to achieve two things. On the one hand, to give a timely overview of how postgraduate education (master's and doctoral Programs) has evolved and expanded, the types of Programs offered and the differential impact they have had on public and private universities. On the other hand, against this background, to present the results of a ranking of Spanish universities based specifically on their teaching performance at postgraduate level (master's and doctorate). Before presenting these results, we will explain the methodology, paying particular attention to the indicators on which the assessment of each university's postgraduate teaching performance is based.

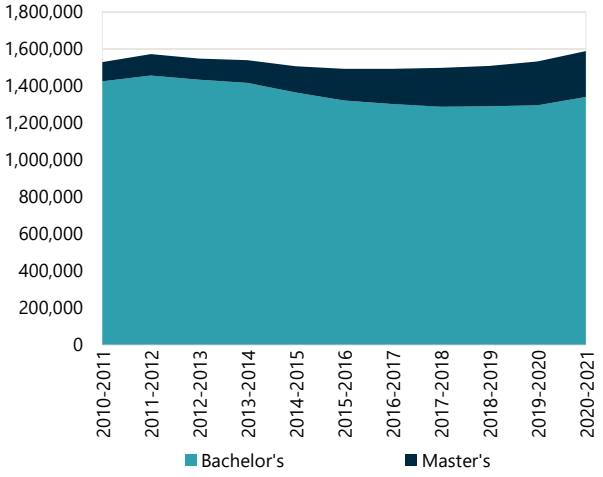
5.2. TRENDS IN POSTGRADUATE EDUCATION

After a period in which the new system of bachelor's and master's degrees coexisted with the old system of generalist and specialist degrees, since 2010 the total number of students enrolled in the Spanish university system (SUS) has been flat (figure 5.1, panel *a*). However, the composition of the student body has changed significantly. Whereas, in the 2010-2011 academic year, master's Programs accounted for less than 7% of total enrolments in the SUS, by the 2020-2021 academic year the figure had doubled to 15.6% (figure 5.1, panel *c*).

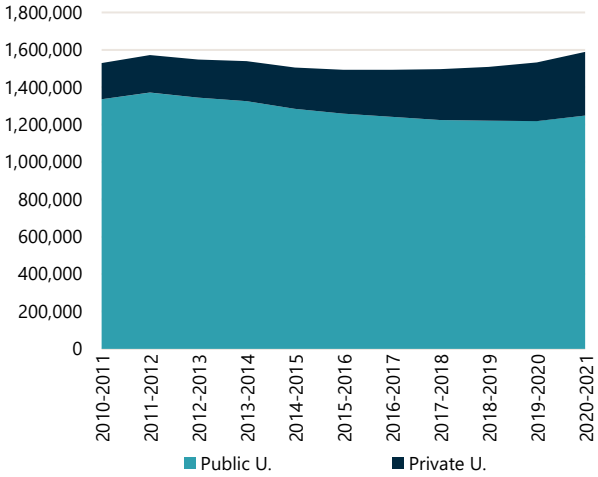
Yet the trend in the growth of demand for master's Programs has differed between public and private universities. While master's students currently account for 11.1% of the students enrolled in the public universities, less than five percentage points more than in the 2010-2011 academic year, in the private universities they account for almost one-third of the total, a five-fold increase in just 10 years (figure 5.1, panel *d*).

Figure 5.1 **Student enrolment in the SUS. Academic years 2010-2011 to 2020-2021**

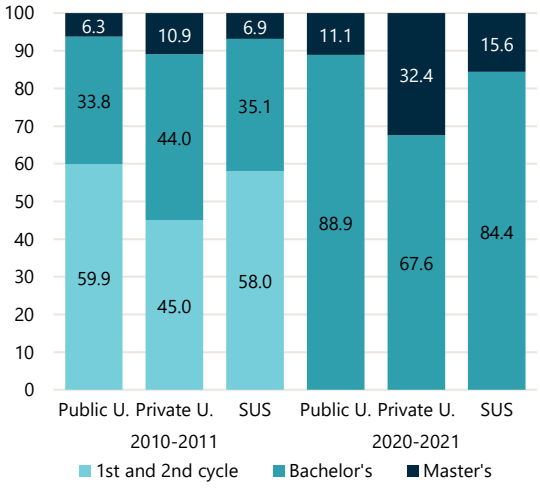
a) No. of students by level of study



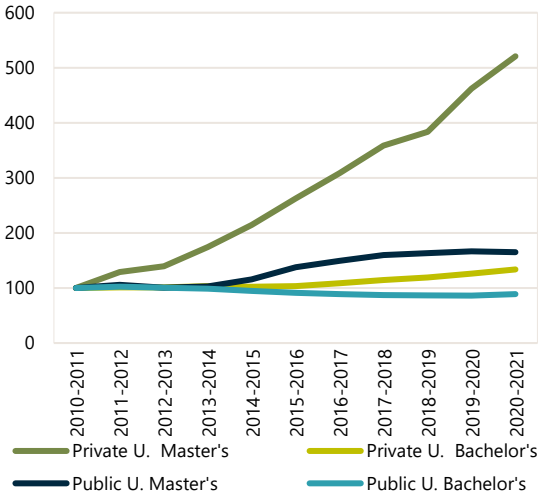
b) No. of students by type of university



c) Composition of student body by level of study and type of university (percentage)



d) Growth in enrolments by level of study and type of university. Academic year 2010-2011=100



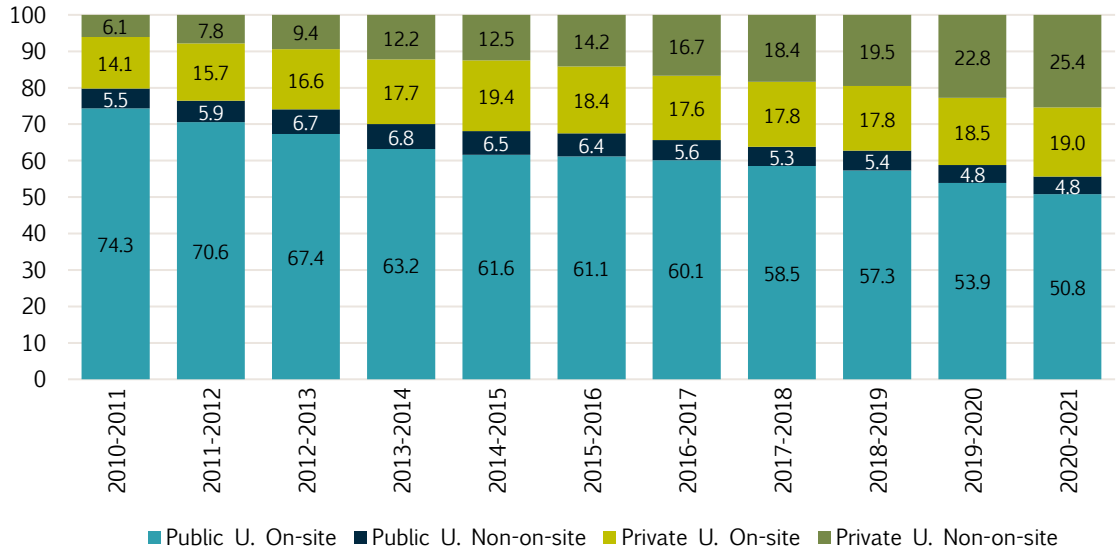
Note: The data for the 2020-2021 academic year are provisional.
Source: Authors, based on data from the Ministry of Universities (2022f).

There are several reasons for this difference between public and private universities, not least the creation of more than 10 new private universities during the reference period. The duration of master's Programs also plays a role, since the vast majority are one-year Programs attracting higher fees, which makes them potentially more profitable from a strictly business point of view. The absence of certain organizational constraints (e.g. foreign students are not required to pass a university entrance exam, as they are for bachelor's Programs) is another reason for the expansion of master's Programs in the private universities. Later on we will consider whether the growth in demand is also partly attributable to the quality of the education provided or the outcomes achieved, such as increased employability for graduates of the private universities.

The difference in enrolment between public and private universities is also attributable to the private universities' clear predilection for distance education, to the point where universities have been created that operate exclusively in distance mode, so that their Programs can be completed more easily by people living in different places or who want to combine university study with other activities. As figure 5.2 shows, non-on-site teaching is now more common (i.e. accounts for a larger proportion of students) than on-site teaching in master's Programs at private universities.

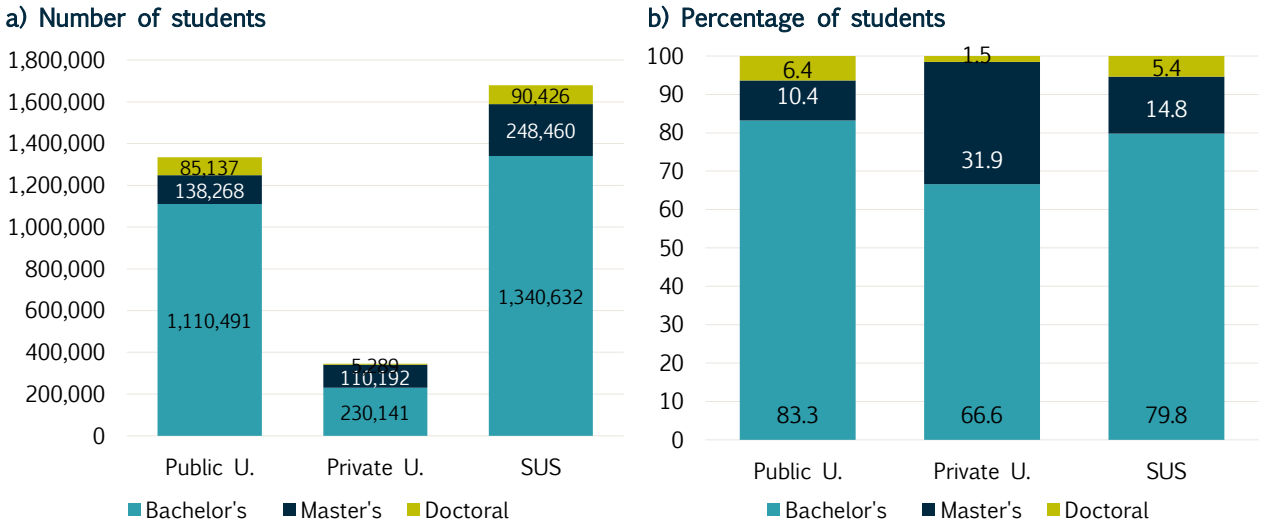
Postgraduate education includes not only master's Programs but also doctoral Programs. Another feature of the private universities is that although the proportion of students enrolled in master's Programs is high, the proportion enrolled in doctoral Programs (and thus progressing into research) is relatively low, as can be seen in figure 5.3. At the private universities, doctoral students account for just 1.5% of the total, compared to 6.4% in the public universities.

Figure 5.2 **Share of master's students by type of university and mode of teaching (on-site or non-on-site) (percentage)**



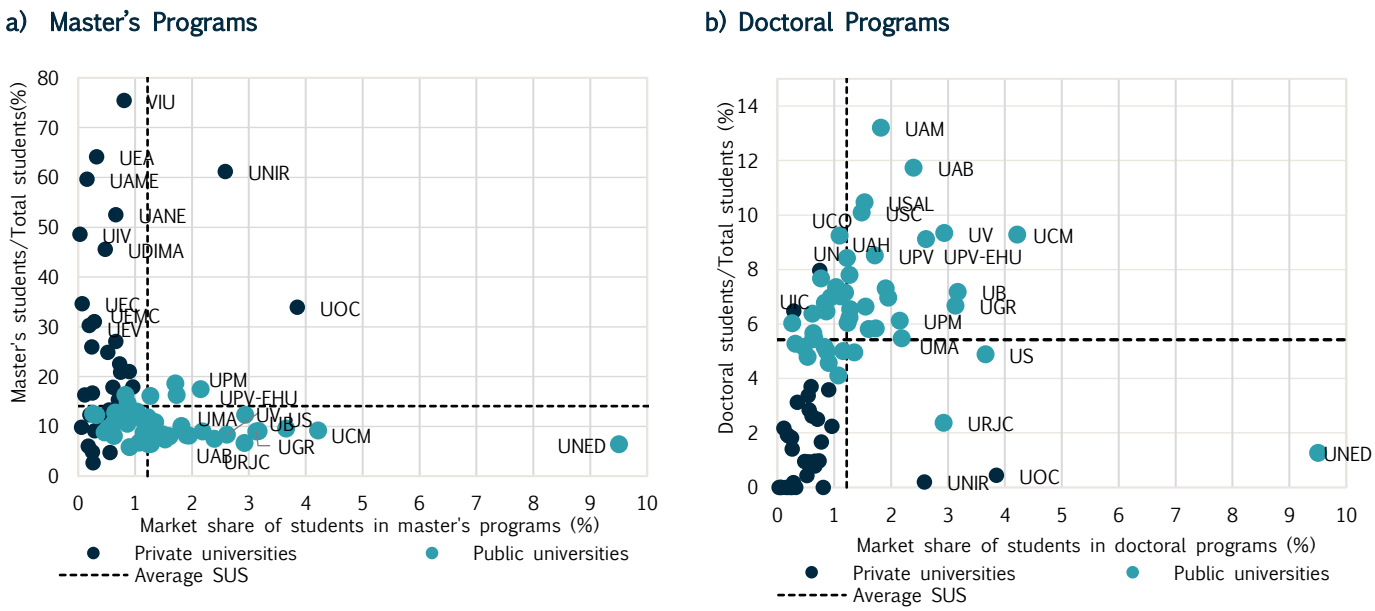
Note: The data for the 2020-2021 academic year are provisional.
Source: Authors, based on data from the Ministry of Universities (2022f).

Figure 5.3 **Student enrolments by level of degree and type of university. SUS. University totals. Academic year 2020-2021**



Note: The data for the 2020-2021 academic year are provisional.
Source: Authors, based on data from the Ministry of Universities (2022f).

Figure 5.4 **Market share of postgraduate enrolments. Academic year 2020-21. Universities and associated centers (percentage)**



Note: The data for the 2020-2021 academic year are provisional.
Source: Authors, based on data from the Ministry of Universities (2022f).

Figure 5.4 panel *a* shows clearly the structure of the market for master's Programs. On the one hand, most of the private universities are small (small market share of total bachelor's, master's and doctoral students), yet the proportion of master's students in these universities is very high (in a dozen of them more than 25%). The public universities, in contrast, have varying though often much larger market shares but a much smaller proportion of master's students. This contrasts with the structure of the market for doctoral Programs, as shown in panel *b* of

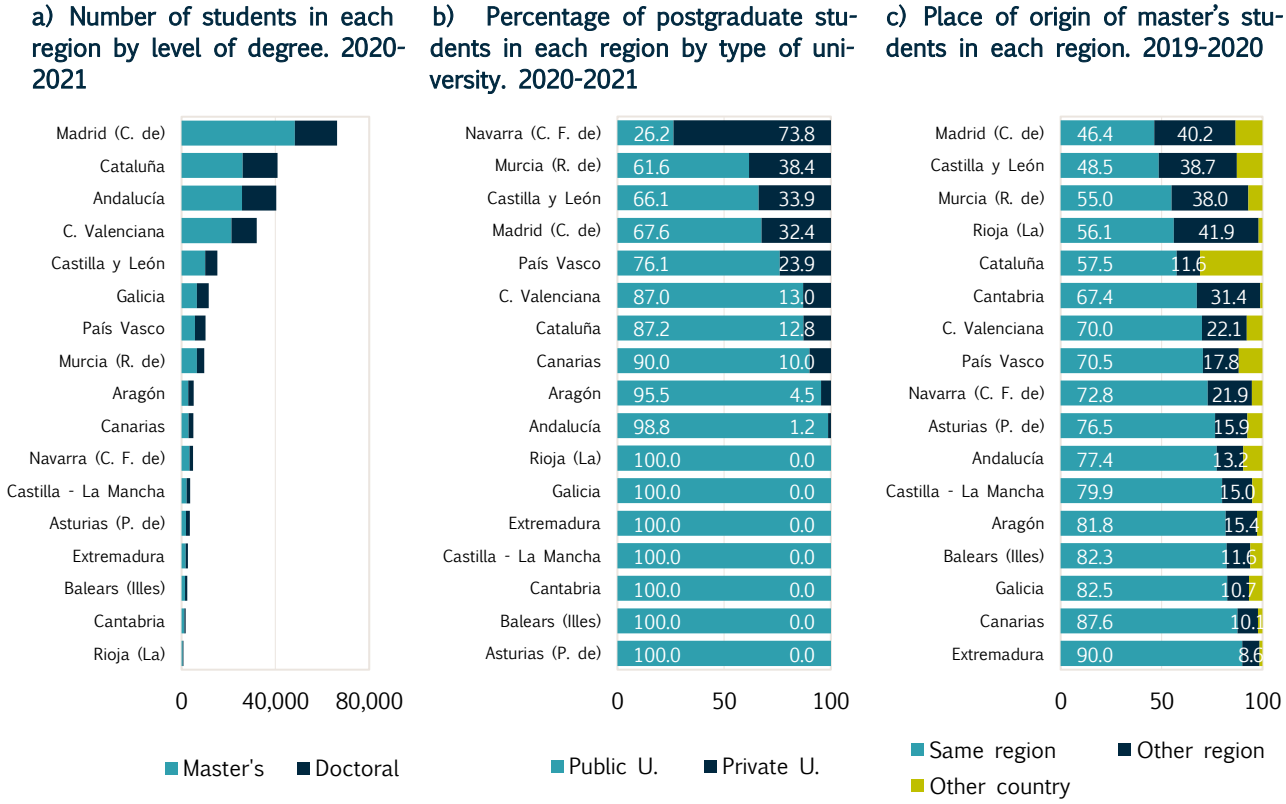
figure 5.4. Doctoral students account for no more than 4% of total enrolment in the private universities, as against up to 14% in the public universities.

As already mentioned, students who decide to start a postgraduate degree have already completed a first degree and so are more mature, more aware of the strengths and weaknesses of the university from which they graduated and closer to entering the world of work. They therefore tend to be more mobile. Is this greater mobility reflected in a preference for universities located in particular regions ("autonomous communities")? In other words, are certain regions more attractive than others for students wishing to embark on a course of postgraduate study?

To help answer this question, figure 5.5 shows the differences in the intensity and composition of the demand for postgraduate Programs in the different regions of Spain.

Panel *a* shows the number of postgraduate (master's and doctoral) students enrolled in on-site universities in each region. At first glance, the regions would seem to be ordered more or less by population, i.e. the more populous regions have more postgraduate students. However, panel *c* qualifies this impression in an important respect. More than half the master's students enrolled at universities in the region of Madrid come from other regions of Spain or from outside Spain. Much the same applies to Catalonia, where international students account for a large proportion of the total. In contrast, the postgraduate Programs in Extremadura, the Canary Islands, the Balearic Islands, Galicia and Aragon are filled mainly by students from the same region. In other words, the regions are not equally attractive.

Figure 5.5. **Postgraduate students by region. On-site universities**



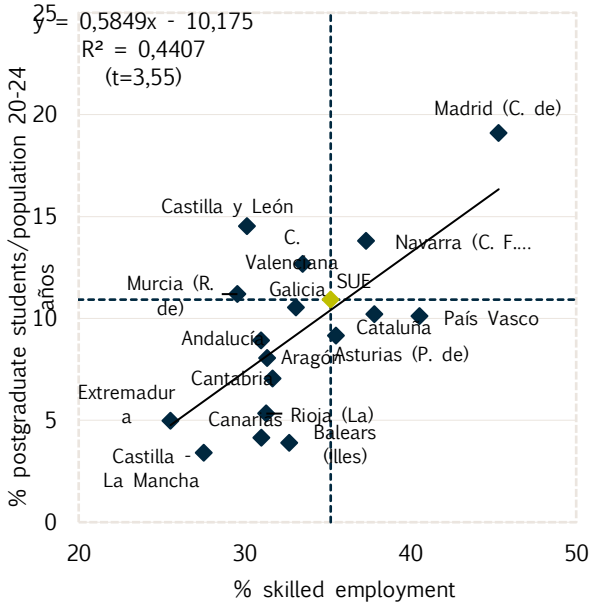
Note: The figures for Cantabria do not include the master's students enrolled at the European University of the Atlantic because 80% (12 out of 15) of this university's Programs are non-on-site. Similarly, the figures for the Canary Islands do not include the students at Mid Atlantic University because 74% (5 out of 7) of the Programs are non-on-site. In panel *c*, the data are such that non-on-site students at Mid Atlantic University cannot be excluded. The data for the 2020-2021 academic year are provisional.
Source: Authors, based on data from the Ministry of Universities (2022f) and INE (2022a).

Panel *b* shows the distribution of postgraduate students by type of university in each region (on-site universities only). Many regions (Galicia, Castilla-La Mancha, Asturias, Extremadura, Balearic Islands, Cantabria and La Rioja) have no on-site private universities, while others, such as Navarra, have more postgraduate students in private universities than in public universities

Overall, there is no clear relationship between a region's attractiveness to postgraduate students and its proportion of private universities. Madrid appears to show a link between the two variables, but not so Catalonia, which attracts large numbers of students from other regions and from outside Spain despite having a fairly small proportion of private universities. Castilla y León and Murcia seem more like Madrid, with a large proportion of private universities and high attractiveness (large proportion of students from outside the region). Lastly, Cantabria and La Rioja[24] attract percentages of master's students from other regions comparable to Catalonia, but this is probably also attributable to their small size and geographical location.

The fact that the regional university systems that rank high in U-Ranking attract significantly more postgraduate students seems to confirm that the perceived quality of a university system attracts students who are more mobile and more mature. But are there any other reasons? One reason could be the job opportunities available in the region of the university. Figure 5.6 compares the number of postgraduate students in each region as a percentage of the region's young population (age 20-24) to the number of skilled jobs in each region as a percentage of total jobs. A very clear and direct relationship emerges[25]. Madrid, where more than 45% of the jobs offered are skilled, has one postgraduate student for every five young people of an age to enroll in a postgraduate Program, whereas, at the opposite extreme, Castilla-La Mancha, with only 27% of skilled jobs, has one postgraduate student for every 20 young people in that age group. A student who is willing to move is therefore likely to move not only to a region with a high quality university system but also to one that has a high demand for skilled professionals.

Figure 5.6. **Percentage of postgraduate students and percentage of skilled employment in each region. On-site universities. 2021 (percentage)**



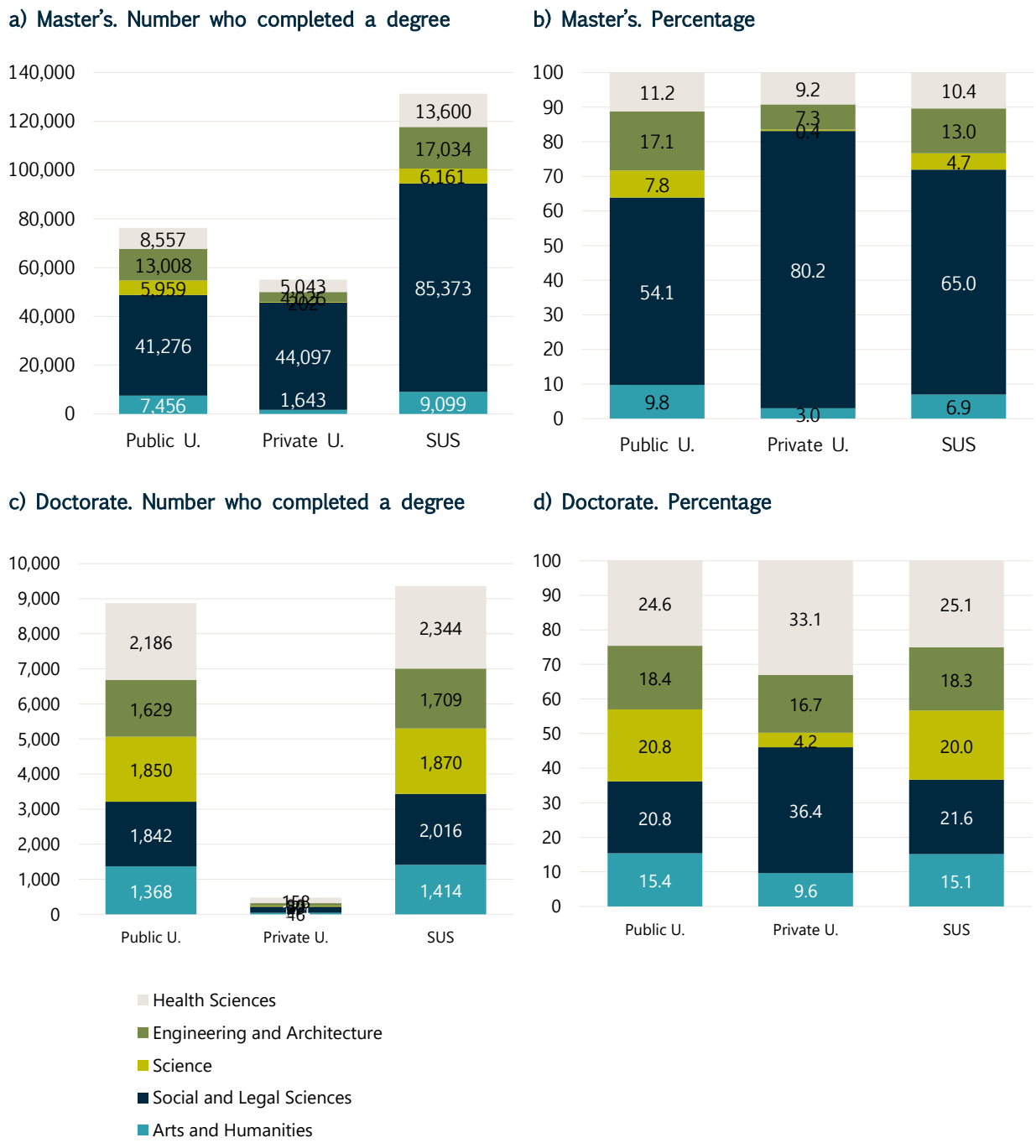
Note: The figures for Cantabria do not include the master's students at the European University of the Atlantic because 80% of the Programs at this university are not on-site. Similarly, the figures for the Canary Islands do not include the students at Mid Atlantic University because 74% of the Programs are not on-site. The data for the 2020-2021 academic year are provisional.

Source: Authors, based on data from the Ministry of Universities (2022f) and INE (2022a, 2022b).

[24] In each of these two regions there is both a public and a private university, although the figures for the two regions do not include the private universities because the master's degree courses they offer are mostly non-on-site.

[25] The relationship between these two variables is statistically significant, with an R^2 of 0.44.

Figure 5.7 **Students who completed a postgraduate degree by level of degree and type of university. University totals. Academic year 2019-2020**



Source: Ministry of Universities (2022f).

So far our analyses have focused on the numbers of master's and doctoral students as a whole, not on the mix of graduates in terms of their area of study. The mix is especially relevant because it reflects the way the university system, both public and private, responds to the needs of business for skilled human resources. Panel *b* of figure 5.7 provides a breakdown of the students completing a master's degree at each type of university by area of study. The fields of Social and Legal Sciences account for a majority of the master's graduates, and also for a much larger proportion of the total in the private universities (80.2%) than in the public universities (54.1%). The private universities, by contrast, have hardly any master's graduates in Science (0.4%) or Arts and Humanities (3.0%). The proportion of master's graduates in Engineering and Architecture is also much smaller in the private universities (7.3%) than in the public ones (17.1%). One reason why the private universities specialize so intensely in Social and Legal Sciences may be that although Programs in these fields require specialized teaching resources, they do not require major investment in equipment, laboratories, etc. and so are more likely to be profitable.

When we look at the progression from master's Programs to doctoral Programs (panel *c*), we find that practically all the doctoral graduates come from the public universities. The distribution of doctoral graduates by area of study is also very balanced, with substantial proportions of students in fields other than Social Sciences, which is the field that tends to predominate at the bachelor's and master's level. Health Sciences, Science and Engineering account for a majority of doctoral graduates in the Spanish university system as a whole, which is relevant in assessing the system's ability to meet present and future needs arising from changes in the specialization of industry that demand a sharper focus on research and innovation.

5.3. METHODOLOGY FOR PREPARING THE POSTGRADUATE RANKING

The postgraduate ranking places universities in order of their performance in the delivery of master's and doctoral Programs, so it is important to clarify how university performance is defined and measured. The ranking takes account of four areas of performance: process, quality, internationalization and employment outcomes. Table 5.1 lists and defines the indicators for each area. Note that the indicators have been selected based on the available information; other indicators that would undoubtedly be of interest have not been used because of lack of data.

In the **process** area we analyze a university's teaching and learning process to determine the extent to which Program design and skill assessment mechanisms allow students to complete their degree within the set time, and whether the non-continuation rate casts doubt on the effectiveness of the process. The indicators are the timely completion rate for master's and doctoral Programs (the percentage of students who complete their degree on time) and the first-year non-continuation rate for master's Programs.

In the **quality** area we analyze mainly a university's ability to retain its undergraduate students. As already mentioned, a student looking to do a master's degree already knows the university at which he or she completed the bachelor's degree and will be more or less satisfied with it. When a relatively mature student (compared to an undergraduate), having completed a bachelor's degree at a given university, chooses to enroll in a master's Program at the same university, rather than going elsewhere, that choice can be taken as an indicator of trust in the quality of the university in question. We thus define two indicators for the quality of master's Programs: the transition rate, which is the percentage of bachelor's graduates who enroll in a master's Program at the same university in the year immediately after graduation; the loyalty rate, which is the number of

Table 5.1. **Structure and description of postgraduate performance indicators**

Area	Indicator	Source	Level	Academic course
PROCESS	**Timely graduation rate:** percentage of master's degree students who complete their degree within or before the set time	SIIU	Area of study	Cohorts 2016-17 to 2018-19
	Doctoral completion rate: doctoral students in academic course T over the average number of doctoral students in courses T-3 y T-4	SIIU	Area of study	2019-20
	First year drop-out rate for master's degree programs: percentage of new students entering a master's degree program who have not obtained the degree and do not enroll in the same program the following year or in the subsequent year	SIIU	Area of study	Cohorts 2015-16 to 2017-18
QUALITY	**Transition rate from bachelor's to master's degree within the same university:** percentage of bachelor's graduates who enroll in a master's program at the same university in the year immediately after graduation	SIIU	Area of study	2017-18 to 2019-20
	Loyalty rate: number of bachelor's graduates from a given university who enroll in a master's Program at the same university as a percentage of the total number of bachelor's graduates from that university who enroll in a master's Program at any university in the SUS	SIIU	Area of study	2017-18 to 2019-20
	Percentage of graduates in doctoral programs: graduates in doctoral programs over the total number of postgraduates.	SIIU	Area of study	2017-18 to 2019-20
INTERNACIONALIZATION	**Percentage of foreign master's degree students:** non-Spanish students enrolled in an official master's degree out of the total number of official master's degree students.	Spanish Ministry of Universities	Area of study	2017-18 to 2019-20
	Percentage of foreign doctoral students: non-Spanish students enrolled in a doctoral program over the total number of doctoral students.	Spanish Ministry of Universities	Area of study	2017-18 to 2019-20
	Percentage of foreign full-time equivalent professors: foreign full-time equivalent research teaching staff over the total number of full-time equivalent research teaching staff.	Spanish Ministry of Universities	University	2017-18 to 2019-20
IEMPLOYMENT OUTCOME	**Affiliation rate:** percentage of master's degree graduates in the 2015-2016 academic year affiliated to the Spanish Social Security system and employed with respect to the total number of graduates. Average situation in the first (2017) and fourth year after graduation (2020)	Spanish Ministry of Universities	Area of study	2017 and 2020
	Average contribution base of master's degree graduates in the 2015-2016 academic year who are employed with a full-time contract. Average situation at the first (2017) and fourth year after graduation (2020)	Spanish Ministry of Universities	Area of study	2017 and 2020
	percentage of social security tax payers in the 'university graduate' category: percentage of master's degree graduates in the 2015-2016 academic year affiliated to the Spanish Social Security system in a contribution group that matches their educational level. Average situation at the first (2017) and fourth year after graduation (2020)	Spanish Ministry of Universities	Area of study	2017 and 2020

bachelor's graduates from a given university who enroll in a master's Program at the same university as a percentage of the total number of bachelor's graduates from that university who enroll in a master's Program at any university. As an indicator of the quality of doctoral Programs we use the number of students graduating from a given university with a doctorate as a percentage of the total number of students graduating from that university with a postgraduate degree. The higher this percentage, the larger the proportion of Programs that attract students from elsewhere based on the reputation of the university's research teams, such as doctoral Programs.

In the **internationalization** area we use two indicators. One is the percentage of foreign students as an indicator of the attractiveness of the Programs offered at both master's and doctoral level. The more attractive the Programs, the higher the percentage of foreign students who will want to enroll in them. Otherwise, there would be no international demand for these Programs. The second indicator is the percentage of foreign faculty, on the basis that a university's efforts to make itself attractive to international students will also attract teachers from other countries.

The fourth area, **employment outcomes**, acknowledges that the ultimate goal of postgraduate education is appropriate employment. Employment outcomes can be considered appropriate not only when a significant percentage of graduates are working on completion of their degree or some time later (indicator: average number in employment, i.e. registered as employed with the social security system, one year and four years after graduation), but also when graduates' income is commensurate with their qualifications (indicator: average taxable income one year and four years after graduation) and their jobs also match their qualifications (indicator: percentage of social security tax payers in the 'graduate' category one year and four years after graduation).

Figure 5.1 lays out the method used to construct an index for ranking the universities according to their performance in each field of postgraduate study and a final aggregate index that ranks the universities according to their performance in postgraduate education as a whole. The 12 indicators described in table 5.1 are obtained for each of the five fields of study (Arts and Humanities, Social and Legal Sciences, Science, Engineering and Architecture, and Health Sciences) and are normalized to the median in each field[26]. The arithmetic means of these normalized indicators are then used to construct an indicator for each area of performance (process, quality, internationalization and employment outcomes) and each area of study. The resulting four indices for each area of study (one per area) are combined on a geometric scale that gives equal weight to each area, so as to create a single index for each area of study[27]. The index for each area of study is used to rank the universities' performance in that field. To rank overall performance, the five area of study indices are combined into an overall index for each university[28] using an arithmetic average weighted by the number of postgraduate students at that university in each area of study.

Before discussing the results of the overall ranking and the rankings by area of study, we shall look at the performance of the Spanish universities in each of the areas and indicators used to construct the ranking. The results are summarized below.

[26] Universities with fewer than 50 postgraduate students in a given area of study or no bachelor's Programs in that field are excluded from the area of study analysis.

[27] Each area is given a weight of 25%.

No overall index is calculated for universities that do not have Programs in at least three fields of study, so although those universities appear in the ranking by area of study, they do not appear in the overall ranking.[28]

Figure 5.1. **Method for calculating the overall index of university performance in post-graduate education**

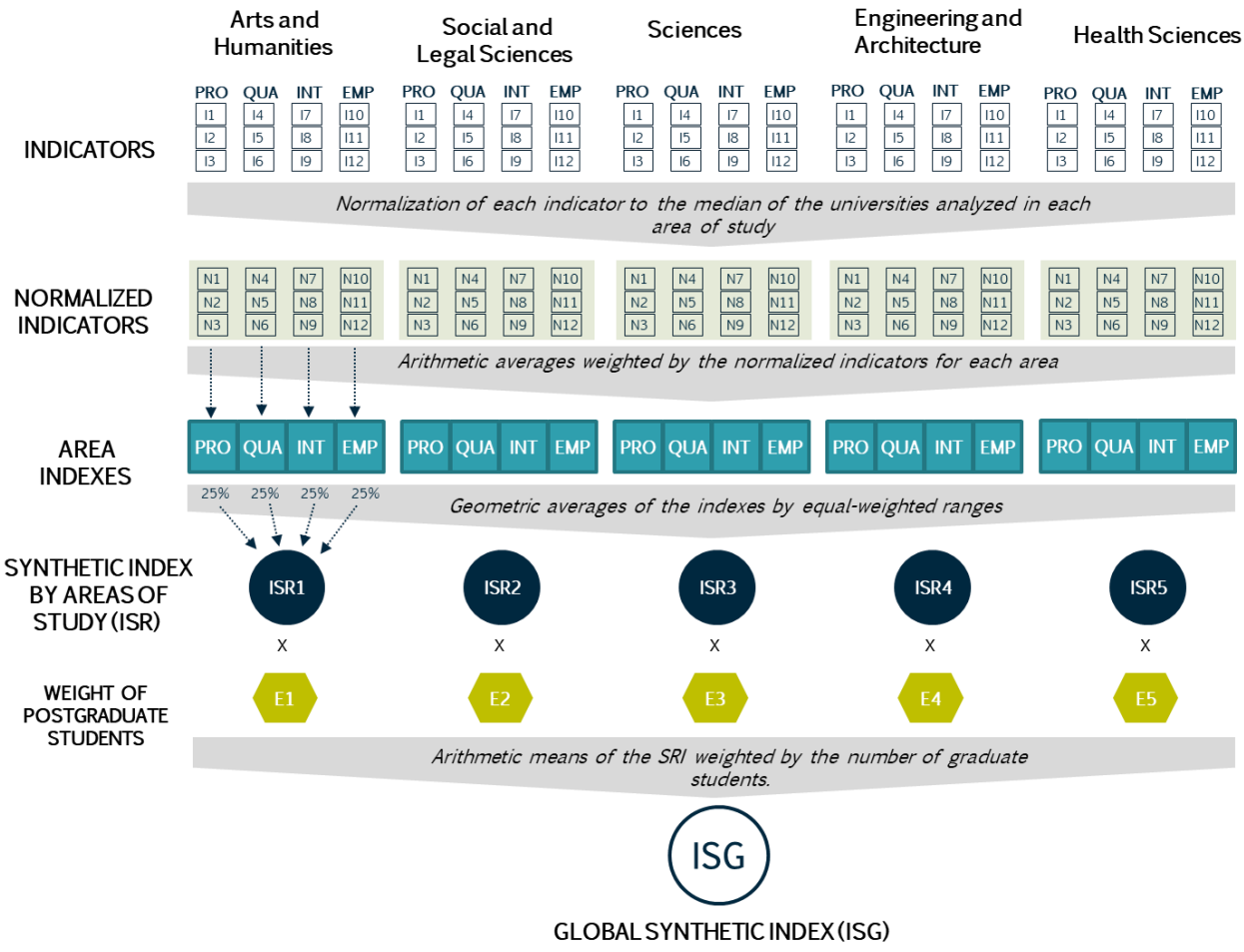
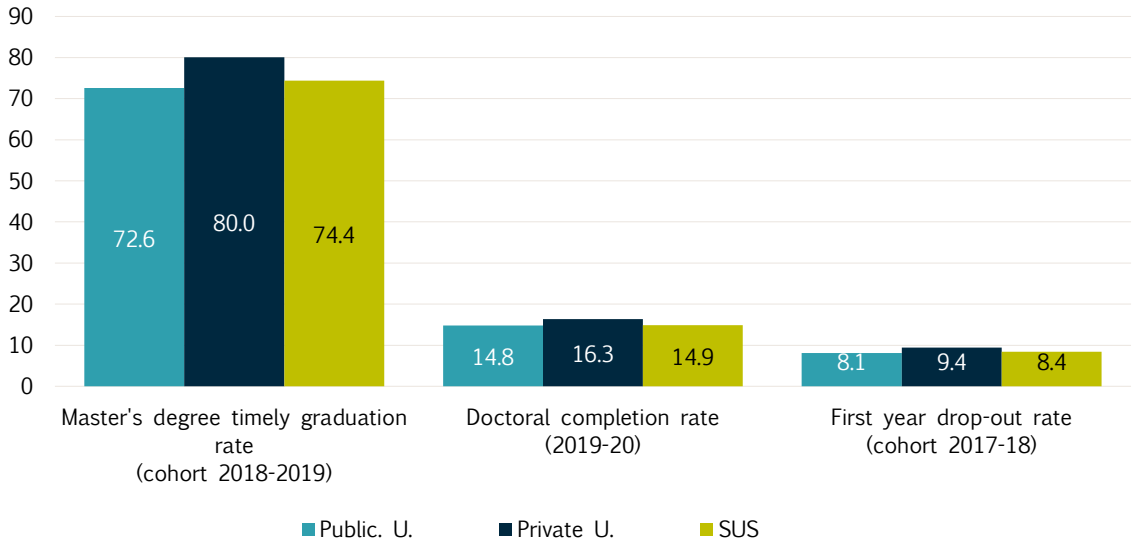


Figure 5.8 shows the averages of the process area indicators for on-site public and private universities and for the Spanish university system as a whole. Table 5.2 gives the same information broken down by area of study. In general, for the Spanish university system as a whole, we see that for master's degrees the average rate of non-continuation in the first year is only 8.4%. This is well below the average for bachelor's degrees (16.5%), confirming that the enrolment decision is more mature and is supported by the experience gained in the bachelor's degree. The non-continuation rate is slightly higher in the private universities (9.4%) than in the public ones (8.1%), and also in the fields of Arts and Humanities (11.1%) and Engineering and Architecture (10.6%).

Overall, almost three-quarters of master's students complete their degree on time (timely completion rate), with the rate being slightly higher in the private universities (80%) than in the public ones (72.6%). The pattern is the same as for non-continuation by area of study, i.e., the rate is highest in Arts and Humanities, and Engineering and Architecture. In doctoral education, despite reforms aimed at establishing realistic completion times for doctorates by introducing part-time Programs and setting deadlines for the oral examination, the rate of timely completion (thesis reading) of doctoral degrees is very low (14.9%). In Science, where research master's Programs that lead on to a doctoral thesis are more common, the rate is slightly higher (21.0%) but still low.

Figure 5.8. **Process indicators. On-site universities (percentage)**



Note: The timely completion rate for doctoral degrees is defined as the number of doctoral students graduating in the 2019-20 academic year as a percentage of the average number of doctoral students enrolled in the 2015-16 and 2016-17 academic years.

Source: Authors, based on data from the Ministry of Universities (2022d).

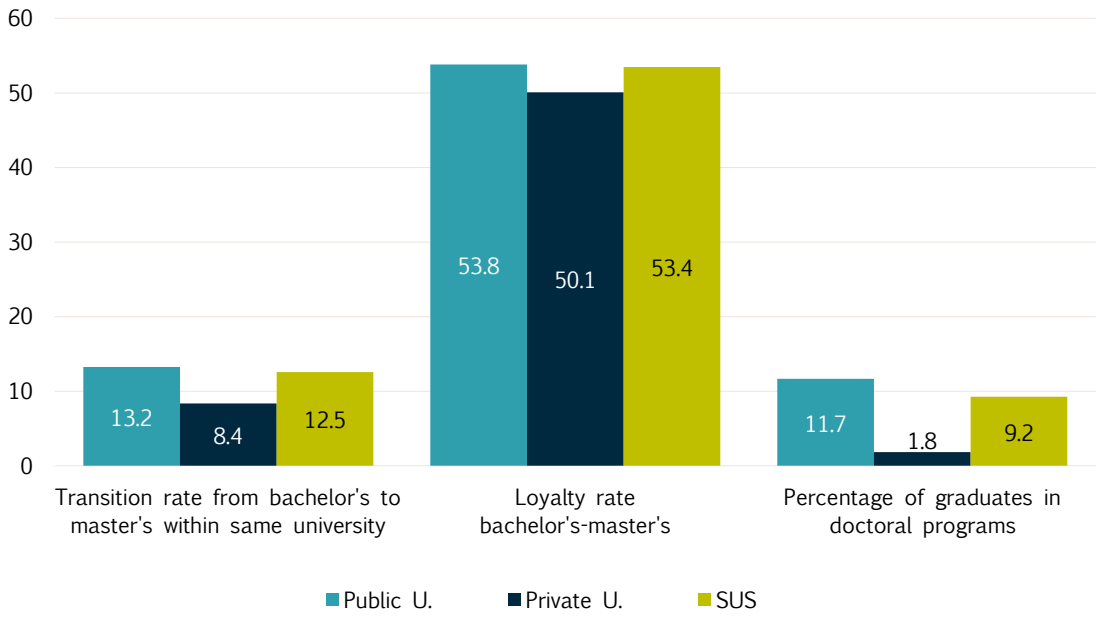
Table 5.2. **Process indicators by area of study. On-site universities**

		Arts and Humanities	Social and Legal Sciences	Sciences	Engi-neering and Architec-ture	Health Sciences	Total
Master's degree timely gradua-tion rate (cohort 2018-2019)	Public U.	62.2	75.8	80.9	58.4	82.9	72.6
	Private U.	59.6	81.4	87.4	72.8	80.9	80.0
	SUS	**62.0**	**77.5**	**81.0**	**60.4**	**82.3**	**74.4**
Doctoral comple-tion rate (2019-20)	Public U.	12.6	19.0	13.9	21.5	23.6	69.8
	Private U.	17.6	1.2	0.1	0.8	1.3	2.7
	SUS	**12.8**	**12.0**	**21.0**	**15.6**	**15.2**	**14.9**
First year drop-out rate (cohort 2017-18)	Public U.	11.0	7.2	7.7	10.0	6.9	8.1
	Private U.	12.2	8.5	4.8	14.6	11.0	9.4
	SUS	**11.1**	**7.6**	**7.7**	**10.6**	**8.0**	**8.4**

Note: The timely completion rate for doctoral degrees is defined as the number of doctoral students graduating in the 2019-20 academic year as a percentage of the average number of doctoral students enrolled in the 2015-16 and 2016-17 academic years.

Source: Authors, based on data from the Ministry of Universities (2022d).

Figure 5.9. **Quality indicators. On-site universities. Academic year 2019-2020 (percentage)**



Source: Authors, based on data from the Ministry of Universities (2022d).

Table 5.3. **Quality indicators. On-site universities. Academic year 2019-2020. On-site universities**

		Arts and Humanities	Social and Legal Sciences	Sciences	Engineering and Architecture	Health Sciences	Total
Transition rate from bachelor's to master's within same university	Public U.	23.3	9.1	24.9	22.3	5.8	13.2
	Private U.	4.9	6.3	16.1	24.6	7.0	8.4
	SUS	**22.1**	**8.6**	**24.6**	**22.5**	**6.0**	**12.5**
Loyalty rate bachelor's-master's	Public U.	58.0	46.5	50.4	32.9	12.6	53.8
	Private U.	36.6	40.5	35.7	33.8	12.6	50.1
	SUS	**57.5**	**45.7**	**50.0**	**32.9**	**12.6**	**53.4**
Percentage of graduates in doctoral programs	Public U.	16.5	5.0	24.6	11.2	22.0	11.7
	Private U.	6.6	0.8	16.9	3.6	5.1	1.8
	SUS	**15.7**	**3.6**	**24.5**	**10.2**	**18.0**	**9.2**

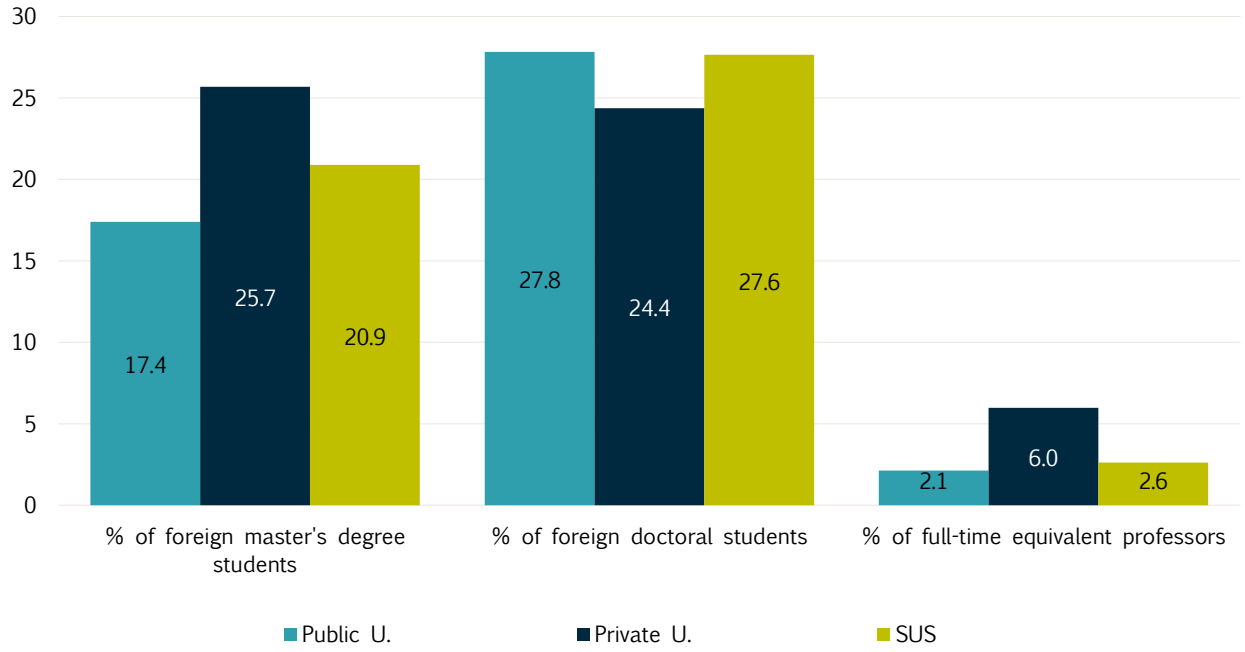
Source: Authors, based on data from the Ministry of Universities (2022d).

In figure 5.9 and table 5.3, which show the quality indicators, it can be observed that of the total number of graduates who go on to do a master's degree, more than half (53.4%) do so at the same university at which they did their bachelor's degree (loyalty rate). The fact that only 12.5% of bachelor's degree graduates enroll in a master's Program at the same university (transition rate) indicates that a master's degree is not seen as a necessary follow-up to a

bachelor's degree. However, more than half of those who do enroll in a master's Program do so at the same university, indicating that, although graduates will take other options into consideration, the loyalty rate is high and the majority of graduates do not in fact change university. Both the transition rate and the loyalty rate are higher in the public universities. The significantly lower transition and loyalty rates in Health Sciences can be traced to the fact that graduates of medicine and pharmacy receive a degree equivalent to level 3 in the Spanish Qualifications Framework, which allows them to proceed directly to a doctorate[29]. Overall, only 9.2% of postgraduate graduates are doctoral graduates, but the proportion is much higher in the public universities (11.7%) than in the private ones (2%).

Figure 5.10 and table 5.4 show the level of internationalization of master's and doctoral students and teachers. Because the admission requirements for graduates are more flexible than for undergraduates (no need for a university entrance exam), the percentage of foreign students is much higher, both in master's Programs (20.9%) and, above all, in doctoral Programs (27.5%). In master's Programs the percentage is higher in the private universities, whereas in doctoral Programs it is higher in the public universities. There are no major differences by area of study, except for the smaller percentage of foreign students in Health Sciences, where the rules for the recognition of qualifications are probably stricter. Only 2.6% of faculty at Spanish universities are foreign. The percentage of foreign teaching staff is almost three times higher in the private universities (6%), which have greater flexibility in recruitment, than in the public ones (2.1%).

Figure 5.10. **Internationalization indicators by type of university. Academic year 2019-2020 (percentage)**



Source: Authors, based on data from the Ministry of Universities (2022f).

[29] Spanish Higher Education Qualifications Framework (MECES) level 3: degrees containing at least 60 ECTS credits at the master's level (Spain 2014).

Table 5.4. **Internationalization indicators by area of study and type of university. SUS. Academic year 2019-2020**

		Arts and Humanities	Social and Legal Sciences	Sciences	Engineering and Architecture	Health Sciences	Total
% foreign master's degree students	Public U.	23.6	17.4	19.8	15.7	13.5	17.4
	Private U.	30.8	27.2	40.5	27.3	12.2	25.7
	SUS	25.2	22.6	20.9	18.5	12.9	20.9
% foreign doctoral students	Public U.	28.5	39.6	23.8	31.8	14.8	27.8
	Private U.	35.2	32.9	22.8	24.2	11.4	24.4
	SUS	28.7	39.0	23.8	31.5	14.6	27.6

Note: The information on the percentage of foreign full-time equivalent teachers is not available by area of study
Source: Authors, based on data from the Ministry of Universities (2022d).

Finally, panels *a* to *c* of figure 5.11 provide an overview of employment outcomes for master's degree graduates. The bars show the outcome one year after completing the master's degree (2017) and the dot above each bar, the outcome after four years (2020). A first conclusion is that the outcomes, in terms of employment rate, average income (average social security contribution base) and job-skills match (percentage of social security tax payers in the 'graduate' category), improve with time. This conclusion holds across both types of university and all fields of study.

One year after graduation, 56.3% of master's graduates are working[30], while after four years the figure has risen to 65.9%, although there are differences between public and private universities and between fields of study. Overall, the employment rates are higher for the private universities one year after graduation, but after four years the rates for public and private universities tend to converge. Class advantages among graduates of private universities combined with the continuing importance of networking and recommendations in obtaining a first job may help explain these differences, but the closer, more personalized attention the generally smaller private universities give to employment outcomes as a vital reputational asset probably also plays a role. By area of study, Health Sciences and Engineering and Architecture have the best employment outcomes, Arts and Humanities the worst. Engineers who graduated from public universities have a slightly higher employment rate after four years than those from private universities.

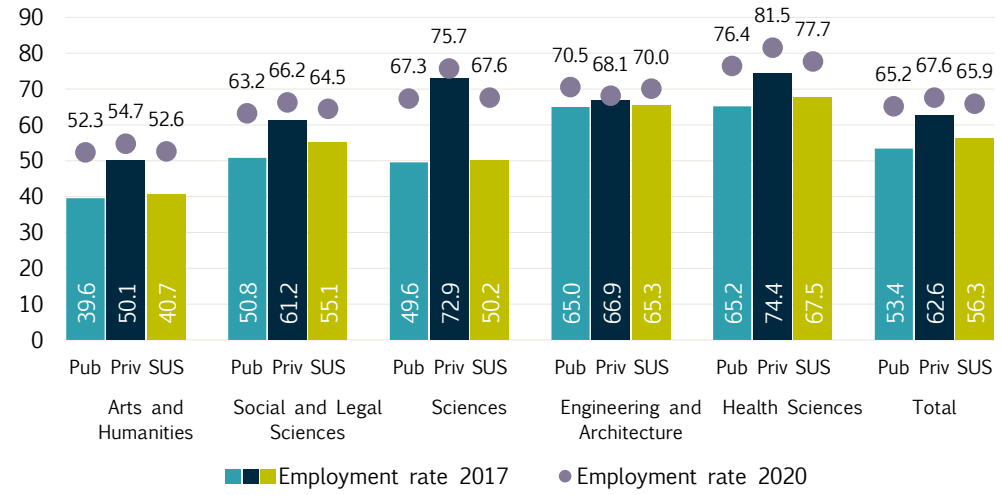
The findings for the fit between the degree and job level, as approximated by the social security tax payer category, are very similar, both overall (61.9% fit one year after graduation and 74.5% after four years) and for the different types of university and fields of study, with the exception of Engineering and Architecture, where the percentage of graduates whose job matches their qualifications is slightly higher among those from public universities.

Looking at income (as approximated by the social security contribution base), the overall average increases by 8,000 euros between the year after graduation (22,728 euros) and four years later, probably because of the gain in experience over that period and mobility in search of better jobs. Once again the private universities perform better, probably for reasons similar to those proposed for the difference in employment rates. By area of study, for the Spanish university system as a whole, average income is higher in Engineering and Architecture and similar in Health Sciences, and Social and Legal Sciences.

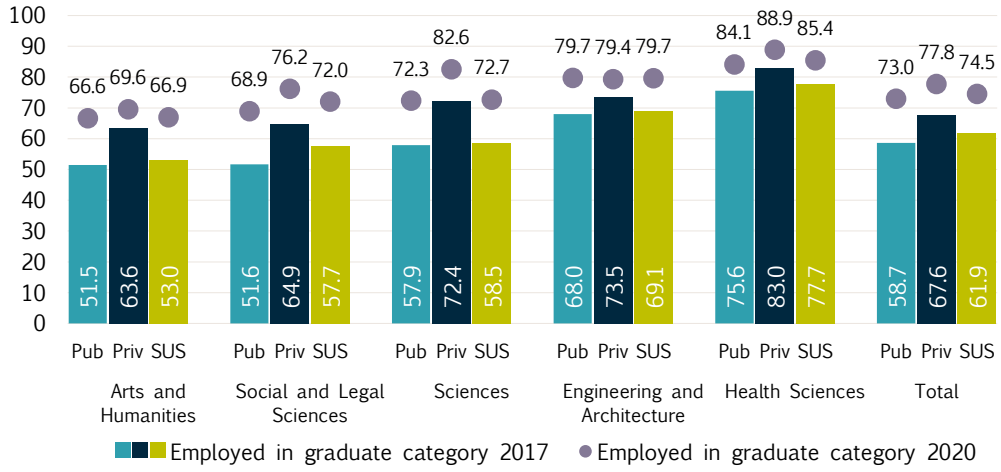
[30] Strictly speaking, this is the percentage registered as employed with the social security system in Spain. The true percentage may be higher, as some may be working but not registered with social security (e.g. those registered with civil service mutual benefit associations) or working abroad.

Figure 5.11. **Employment outcome indicators. Students enrolled in a master's Program in academic year 2015-2016**

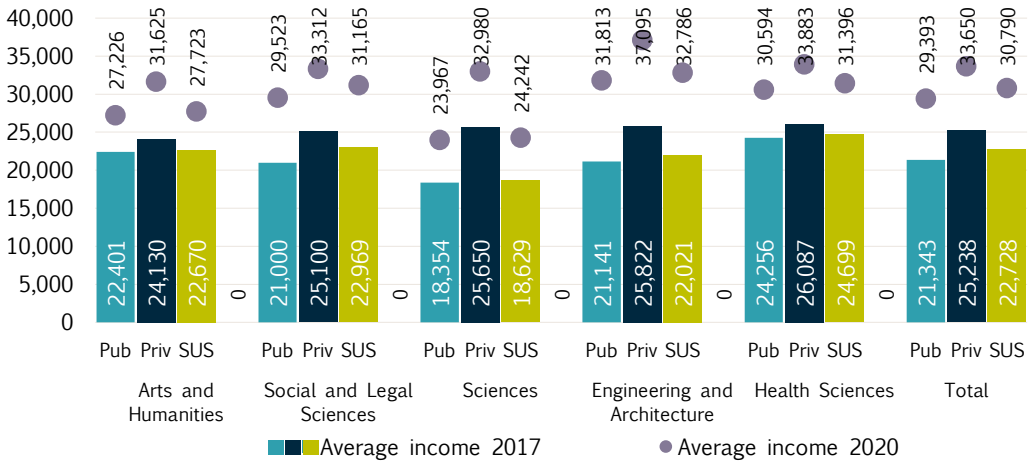
a) Employment rate (registration with social security). Average by type of university and area of study (percentage)



b) Percentage of registered employed in the 'graduate' category. Average by type of university and area of study (percentage)



c) Average income (social security contribution base). Average by type of university and area of study (percentage)



Source: Authors, based on data from the Ministry of Universities (2022a).

5.3.1. Results of the postgraduate ranking

Now that we have assessed each university's performance in postgraduate education based on the indicators used to construct the index, we move on to discuss the aggregate results and associated rankings.

We start with the overall ranking, which, as mentioned, includes only the universities that have a ranking in at least three of the fields of study, as shown in table 5.5. The overall ranking has nine steps or levels[31]. In first place is Universitat Pompeu Fabra, which also ranks first in **U-Ranking Performance**. Occupying the second level are two private universities, Universidad de Navarra and Universitat Ramon Llull, and one public one, Universitat Autònoma de Barcelona. The third level features six universities: Universitat Rovira i Virgili, Universidad Carlos III de Madrid, Universidad de Salamanca, Universitat de Barcelona, Universidad Pontificia de Comillas (the third private university in the ranking) and Universitat Politècnica de Catalunya. The reason for the small number (14) of private universities in the overall ranking (besides the three already mentioned, we find, elsewhere in the ranking, Deusto, Internacional de la Rioja, Oberta de Catalunya, Católica San Antonio, Europea de Madrid, Católica de Valencia, UDIMA San Pablo-CEU, Cardenal Herrera-CEU, Alfonso X el Sabio and VIU) is that a university is only included in the overall ranking if it offers a broad range of Programs in at least three fields of study, whereas, as pointed out at the beginning of the chapter, the private universities, especially the newer ones, tend to concentrate on or specialize in a small number of fields. A private university may therefore appear in one or two of the rankings by area of study but not in the overall ranking. Tables 5.6 to 5.10 show the results of the rankings by area of study. To appear in the rankings for a given area of study a university must have at least 50 postgraduate students as well as undergraduate students in that field.

In Arts and Humanities, the ranking has 10 levels, based on the aggregate indices. The first level is occupied by Universitat Rovira i Virgili and the second level, by Universitat Pompeu Fabra. Universitat Autònoma de Barcelona, Universidad de Navarra, Universidad de Salamanca, Universidad de Almería, Universidad de Castilla-La Mancha and Universidad Carlos III all share the third level. As noted at the beginning of the chapter, the private universities have very little presence in this area of study. Besides Universidad de Navarra, the only private universities in the Arts and Humanities ranking are Pontificia de Comillas (level 4), Nebrija (6), Internacional de la Rioja (7), Oberta de Catalunya (7), San Pablo-CEU (9), Internacional de Valencia (10) and Católica de Valencia (10).

Social and Legal Sciences is a field in which most universities are well represented, including the private ones. Universitat Pompeu Fabra ranks at the first level (out of a total of 12), IE University at the second, Universitat Autònoma de Barcelona and Universidad de Navarra at the third, and Universidad de Salamanca and Universitat Ramon Llull at the fourth level. The private universities clearly have a much stronger presence in this field, with one or more representatives at every level except the first, which is occupied by a single public university.

[31] Following the principles applied in the U-Ranking project, the index is rounded to one decimal place and all the universities with the same index are ranked at the same level.

Table 5.5. **Overall ranking of postgraduate education**

University	Ranking	Index
Universitat Pompeu Fabra	1	1.5
Universidad de Navarra	2	1.4
Universitat Autònoma de Barcelona	2	1.4
Universitat Ramon Llull	2	1.4
Universitat Rovira i Virgili	3	1.3
Universidad Carlos III	3	1.3
Universidad de Salamanca	3	1.3
Universitat de Barcelona	3	1.3
Universidad Pontificia Comillas	3	1.3
Universitat Politècnica de Catalunya	3	1.3
Universidad Autónoma de Madrid	4	1.2
Universitat de Girona	4	1.2
Universitat de València	5	1.1
Universidad de Alicante	5	1.1
Universidad de Deusto	5	1.1
Universidad de Almería	5	1.1
Universidad de Granada	5	1.1
Universidad Internacional de La Rioja	5	1.1
Universidad Complutense	5	1.1
Universitat de les Illes Balears	5	1.1
Universitat de Lleida	5	1.1
Universidad del País Vasco	5	1.1
Universitat Politècnica de València	5	1.1
Universidad de Alcalá	5	1.1
Universidad Pública de Navarra	5	1.1
Universidad de Oviedo	5	1.1
Universidad de Castilla-La Mancha	6	1.0
Universidad Rey Juan Carlos	6	1.0
Universidad de Córdoba	6	1.0
Universidade de Santiago de Compostela	6	1.0
Universitat Oberta de Catalunya	6	1.0
Universidad Católica San Antonio	6	1.0
Universitat Jaume I	6	1.0
Universidad Europea de Madrid	6	1.0
Universidad de Zaragoza	6	1.0
Universidad de Sevilla	6	1.0
Universidad de Valladolid	6	1.0
Universidad Pablo de Olavide	6	1.0
Universidad de Murcia	6	1.0
Universidad de Cantabria	6	1.0
Universidad de Jaén	6	1.0
Universidad de Huelva	6	1.0
Universidade de Vigo	6	1.0
Universidad de León	6	1.0
Universidade da Coruña	7	0.9
Universidad de Cádiz	7	0.9
Universidad de Extremadura	7	0.9
Universidad Católica de Valencia	7	0.9
Universidad a Distancia de Madrid	7	0.9
Universidad Miguel Hernández de Elche	7	0.9
Universidad de Málaga	7	0.9
Universidad de Burgos	8	0.8
Universidad de Las Palmas de Gran Canaria	8	0.8
Universidad Nacional de Educación a Distancia	8	0.8
Universidad de La Laguna	8	0.8
Universidad San Pablo - CEU	8	0.8
Universidad Cardenal Herrera - CEU	9	0.7
Universidad Alfonso X el Sabio	9	0.7
Universidad Internacional Valenciana	9	0.7

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

Table 5.6. **Postgraduate ranking - Arts and Humanities**

University	Ranking	Index
Universitat Rovira i Virgili	1	1.4
Universitat Pompeu Fabra	2	1.3
Universitat Autònoma de Barcelona	3	1.2
Universidad de Navarra	3	1.2
Universidad de Salamanca	3	1.2
Universidad de Almería	3	1.2
Universidad de Castilla-La Mancha	3	1.2
Universidad Carlos III	3	1.2
Universidad Pontificia Comillas	4	1.1
Universitat de les Illes Balears	4	1.1
Universitat de Girona	4	1.1
Universitat de Barcelona	4	1.1
Universidad Autónoma de Madrid	4	1.1
Universitat Jaume I	4	1.1
Universidad de Jaén	4	1.1
Universidad de Alcalá	4	1.1
Universidad de Valladolid	4	1.1
Universidad de Granada	4	1.1
Universidad de Extremadura	4	1.1
Universidad de Alicante	4	1.1
Universidad Complutense	5	1.0
Universitat de València	5	1.0
Universidad de Huelva	5	1.0
Universitat Politècnica de València	5	1.0
Universidad de Zaragoza	5	1.0
Universidad Rey Juan Carlos	5	1.0
Universidad de Oviedo	5	1.0
Universidad de Cantabria	5	1.0
Universidad del País Vasco	5	1.0
Universidad de Murcia	5	1.0
Universidad de Córdoba	5	1.0
Universidade de Santiago de Compostela	5	1.0
Universidad Pablo de Olavide	6	0.9
Universidad de Sevilla	6	0.9
Universidad Nebrija	6	0.9
Universidade de Vigo	6	0.9
Universitat de Lleida	6	0.9
Universidad de Cádiz	6	0.9
Universidad de Málaga	6	0.9
Universidad de Las Palmas de Gran Canaria	6	0.9
Universidade da Coruña	7	0.8
Universidad Internacional de La Rioja	7	0.8
Universidad Nacional de Educación a Distancia	7	0.8
Universitat Oberta de Catalunya	7	0.8
Universidad de La Laguna	8	0.7
Universidad San Pablo - CEU	9	0.6
Universidad Internacional Valenciana	10	0.2
Universidad Católica de Valencia	10	0.2

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

Table 5.7. **Postgraduate ranking - Social and Legal Sciences**

University	Ranking	Index
Universitat Pompeu Fabra	1	1.7
IE Universidad	2	1.6
Universitat Autònoma de Barcelona	3	1.5
Universidad de Navarra	3	1.5
Universidad de Salamanca	4	1.4
Universitat Ramon Llull	4	1.4
Universitat Rovira i Virgili	5	1.3
Universidad Carlos III	5	1.3
Universidad Politécnica de Cartagena	5	1.3
Universidad Pontificia Comillas	5	1.3
Universidad Autónoma de Madrid	5	1.3
Universitat de Barcelona	5	1.3
Universitat de Girona	6	1.2
Universitat Abat Oliba CEU	6	1.2
Universidad Complutense	6	1.2
Universitat de València	6	1.2
Universidad del País Vasco	6	1.2
Universidad de Alicante	6	1.2
Universidad Internacional de La Rioja	6	1.2
Universidad de Granada	7	1.1
Universidad Politécnica de Madrid	7	1.1
Universidad de Deusto	7	1.1
Universidad de Córdoba	7	1.1
Universitat de les Illes Balears	7	1.1
Universitat Politècnica de Catalunya	7	1.1
Universitat Politècnica de València	7	1.1
Universidad de Almería	7	1.1
Universitat de Lleida	7	1.1
Universitat Oberta de Catalunya	7	1.1
Universidade de Santiago de Compostela	7	1.1
Universidad de Alcalá	7	1.1
Universidad Rey Juan Carlos	8	1.0
Universidad Pablo de Olavide	8	1.0
Universidad de León	8	1.0
Universidad de Sevilla	8	1.0
Universidad de Castilla-La Mancha	8	1.0
Universidade de Vigo	8	1.0
Universidad de Zaragoza	8	1.0
Universidad Católica San Antonio	8	1.0
Universidad de Oviedo	8	1.0
Universidade da Coruña	8	1.0
Mondragon Unibertsitatea	8	1.0
Universidad de Huelva	8	1.0
Universidad Pontificia de Salamanca	8	1.0
Universitat Jaume I	8	1.0
Universidad de Murcia	8	1.0
Universidad de Cantabria	8	1.0
Universidad de Cádiz	9	0.9
Universidad de Extremadura	9	0.9
Universidad Nebrija	9	0.9
Universidad a Distancia de Madrid	9	0.9
Universidad de Valladolid	9	0.9
Universidad Pública de Navarra	9	0.9
Universidad de Jaén	9	0.9
Universidad Europea de Madrid	9	0.9
Universidad de Burgos	9	0.9
Universitat de Vic - Universitat Central de Catalunya	9	0.9
Universidad de Málaga	9	0.9
Universidad Católica de Valencia	9	0.9

Table 5.7. (Cont.) **Postgraduate ranking - Social and Legal Sciences**

University	Ranking	Index
Universidad Loyola Andalucía	10	0.8
Universidad Nacional de Educación a Distancia	10	0.8
Universidad de Las Palmas de Gran Canaria	10	0.8
Universidad Internacional Valenciana	10	0.8
Universidad de La Laguna	10	0.8
Universidad de La Rioja	10	0.8
Universidad San Pablo - CEU	10	0.8
Universidad Miguel Hernández de Elche	11	0.7
Universidad Camilo José Cela	11	0.7
Universidad Internacional Isabel I de Castilla	11	0.7
Universidad Cardenal Herrera - CEU	11	0.7
Universidad Alfonso X el Sabio	12	0.6
Universidad Católica Santa Teresa de Jesús de Ávila	12	0.6

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

Table 5.8. **Postgraduate ranking - Science**

University	Ranking	Index
Universitat Politècnica de Catalunya	1	1.6
Universitat Rovira i Virgili	2	1.3
Universitat Autònoma de Barcelona	2	1.3
Universidad Pública de Navarra	3	1.2
Universidad Autónoma de Madrid	3	1.2
Universitat de Barcelona	3	1.2
Universidad del País Vasco	3	1.2
Universidad de Almería	3	1.2
Universidad de Alicante	4	1.1
Universitat Jaume I	4	1.1
Universidad de Granada	4	1.1
Universidad de Jaén	4	1.1
Universidad de Salamanca	4	1.1
Universidad de Cádiz	4	1.1
Universitat de les Illes Balears	4	1.1
Universitat Ramon Llull	5	1.0
Universidade de Santiago de Compostela	5	1.0
Universitat Politècnica de València	5	1.0
Universidad de Alcalá	5	1.0
Universitat de València	5	1.0
Universidad de Oviedo	5	1.0
Universidad de Sevilla	5	1.0
Universidad de Zaragoza	5	1.0
Universidad de Córdoba	5	1.0
Universidade da Coruña	5	1.0
Universidade de Vigo	5	1.0
Universitat de Girona	5	1.0
Universidad Complutense	5	1.0
Universidad de Extremadura	6	0.9
Universidad de La Laguna	6	0.9
Universidad de Las Palmas de Gran Canaria	6	0.9
Universidad de Castilla-La Mancha	6	0.9
Universidad Miguel Hernández de Elche	6	0.9
Universidad de Murcia	6	0.9
Universidad de Málaga	6	0.9
Universidad de Burgos	6	0.9
Universidad Pablo de Olavide	6	0.9
Universidad Nacional de Educación a Distancia	7	0.8

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

Table 5.9. **Postgraduate ranking - Engineering and Architecture**

University	Ranking	Index
Universitat Ramon Llull	1	1.4
Universitat Rovira i Virgili	1	1.4
Universidad Carlos III	1	1.4
Universidad de Navarra	1	1.4
Universitat de Girona	1	1.4
Universidad Pontificia Comillas	1	1.4
Universidad Autónoma de Madrid	2	1.3
Universitat Autònoma de Barcelona	2	1.3
Universitat Politècnica de Catalunya	3	1.2
Universidad de Almería	3	1.2
Universitat Pompeu Fabra	3	1.2
Universidad de Salamanca	3	1.2
Mondragon Unibertsitatea	3	1.2
Universitat de Lleida	4	1.1
Universitat de València	4	1.1
Universitat de Barcelona	4	1.1
Universidad de Deusto	4	1.1
Universitat Politècnica de València	4	1.1
Universidad de Granada	4	1.1
Universidad de Alicante	4	1.1
Universidad de Oviedo	4	1.1
Universidad del País Vasco	4	1.1
Universidad Pública de Navarra	4	1.1
Universidad de Castilla-La Mancha	4	1.1
Universidad Complutense	4	1.1
Universidad de Córdoba	4	1.1
Universidad Politécnica de Madrid	5	1.0
Universidad Politécnica de Cartagena	5	1.0
Universidad de Alcalá	5	1.0
Universidad de Zaragoza	5	1.0
Universidade de Santiago de Compostela	5	1.0
Universidad Rey Juan Carlos	5	1.0
Universitat Oberta de Catalunya	5	1.0
Universitat Jaume I	5	1.0
Universidad de Huelva	5	1.0
Universidad de Cantabria	5	1.0
Universidad de Sevilla	5	1.0
Universidad de Valladolid	5	1.0
Universidad de Jaén	6	0.9
Universidade da Coruña	6	0.9
Universidad Europea de Madrid	6	0.9
Universidad de Málaga	6	0.9
Universidade de Vigo	6	0.9
Universidad de León	6	0.9
Universidad de Cádiz	6	0.9
Universidad Miguel Hernández de Elche	7	0.8
Universidad Católica San Antonio	7	0.8
Universidad Alfonso X el Sabio	7	0.8
Universidad Internacional de La Rioja	7	0.8
Universidad Nacional de Educación a Distancia	7	0.8
Universidad de La Laguna	7	0.8
Universidad de Burgos	8	0.7
Universidad Cardenal Herrera - CEU	8	0.7
Universidad de Las Palmas de Gran Canaria	8	0.7
Universidad de Extremadura	8	0.7
Universidad a Distancia de Madrid	9	0.6
Universidad de La Rioja	9	0.6
Universidad Europea de Canarias	10	0.2

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

Table 5.10. **Postgraduate ranking - Health Sciences**

University	Ranking	Index
Universitat Pompeu Fabra	1	1.5
Universitat Autònoma de Barcelona	1	1.5
Universitat de Barcelona	2	1.4
Universidad de Navarra	2	1.4
Universidad Europea de Madrid	3	1.3
Universidad Pública de Navarra	3	1.3
Universidad de Salamanca	3	1.3
Universitat Rovira i Virgili	4	1.2
Universidad Autónoma de Madrid	4	1.2
Universidad de Deusto	4	1.2
Universitat de les Illes Balears	4	1.2
Universidad Complutense	4	1.2
Universidad de Granada	4	1.2
Universidad de Almería	4	1.2
Universidad de Valladolid	5	1.1
Universidad de Oviedo	5	1.1
Universidad de Alcalá	5	1.1
Universitat de València	5	1.1
Universidad Rey Juan Carlos	5	1.1
Universitat de Lleida	5	1.1
Universitat de Girona	5	1.1
Universitat Ramon Llull	5	1.1
Universidad de Alicante	5	1.1
Universidad Católica San Antonio	5	1.1
Universidad Católica de Valencia	5	1.1
Universidad de Sevilla	5	1.1
Universidade de Santiago de Compostela	5	1.1
Universidad Camilo José Cela	6	1.0
Universitat Jaume I	6	1.0
Universitat Internacional de Catalunya	6	1.0
Universidad de Castilla-La Mancha	6	1.0
Universidad Miguel Hernández de Elche	6	1.0
Universidade da Coruña	6	1.0
Universidad de Murcia	6	1.0
Universidad de Zaragoza	6	1.0
Universidad Pontificia Comillas	6	1.0
Universidad de Jaén	6	1.0
Universidad de Las Palmas de Gran Canaria	6	1.0
Universidad de Cantabria	7	0.9
Universitat de Vic - Universitat Central de Catalunya	7	0.9
Universidad del País Vasco	7	0.9
Universidad de León	7	0.9
Universidad de Extremadura	7	0.9
Universitat Oberta de Catalunya	7	0.9
Universidad de Córdoba	7	0.9
Universidad a Distancia de Madrid	7	0.9
Universidad San Pablo - CEU	7	0.9
Universidad Alfonso X el Sabio	7	0.9
Universidad Pablo de Olavide	8	0.8
Universidade de Vigo	8	0.8
Universidad de Málaga	8	0.8
Universidad de La Laguna	8	0.8
Universidad Cardenal Herrera - CEU	8	0.8
Universidad de Cádiz	8	0.8
Universidad de Huelva	8	0.8
Universidad Nacional de Educación a Distancia	8	0.8
Universidad de Burgos	9	0.7
Universidad Europea de Canarias	10	0.2
Universidad Internacional Valenciana	10	0.2

Note: The universities are grouped by index rounded to one decimal place. The universities within each group are ordered from highest to lowest index value. Private universities appear in bold.

Source: Fundación BBVA-Ivie.

The fact, noted earlier, that Science is a field in which private universities are scarcely represented is reflected in the ranking, which features only one non-public university. Universitat Politècnica de Catalunya occupies the first of the total of seven levels, followed by Universitat Rovira i Virgili and Universitat Autònoma de Barcelona at the second level and Universidad Pública de Navarra, Universidad Autònoma de Madrid, Universitat de Barcelona, Universidad del País Vasco and Universidad de Almería at the third level.

The ranking for Engineering and Architecture has a total of 10 levels. The top level is shared by three private and three public universities: Universitat Ramón Llull, Universitat Rovira i Virgili, Universidad Carlos III, Universidad de Navarra, Universidad de Girona and Pontificia Comillas. The second level is occupied by two public universities: Universidad Autónoma de Madrid and Universitat Autònoma de Barcelona. They are followed at the third level by Universitat Politècnica de Catalunya, Universitat de Almería, Universitat Pompeu Fabra, Universitat de Salamanca and the private university Mondragon Unibertsitatea.

Lastly, the Health Sciences ranking has 10 levels, with Universitat Pompeu Fabra and Universidad Autònoma de Barcelona at the top, Universitat de Barcelona and Universidad de Navarra at the second level and Universidad Europea de Madrid sharing the third level with Universidad Pública de Navarra and Universidad de Salamanca.

To provide an overview, panel *a* of table 5.11 shows each university's level in the overall ranking and in each area of study ranking, with the universities listed in the order of the overall ranking. The universities that do not appear in the overall ranking because they do not appear in at least three area of study rankings are shown in panel *b* of table 5.11. As a general conclusion, we note in panel *a* that the universities that place well in the overall ranking (shaded green and yellow) also place well in most area of study rankings, which suggests that good performance in postgraduate education is a general feature of certain universities' overall concern for and investment in postgraduate education, which in many cases extends across all fields of study. Similarly, some universities' weak overall postgraduate performance extends to most or all fields of study.

Panel *b* confirms that the postgraduate Programs of many private universities are concentrated in the field of Social and Legal Sciences but shows that few of them perform particularly well in that field. However, it also reveals the possibility of a niche positioning that consists of concentrating on a single area of study with the aim of achieving leadership in that field, as in the case of IE University.

Table 5.11. **Summary of postgraduate rankings**

a) Universities included in the Global Ranking

University	Global	Arts and Humanities	Social and Legal Sciences	Sciences	Engineering and Architecture	Health Sciences	No. of rankings in which it appears
Number of groups	**9**	**10**	**12**	**7**	**10**	**10**	**6**
Number of universities	**59**	**48**	**72**	**38**	**58**	**59**	**74**
Universitat Pompeu Fabra	1	2	1		3	1	5
Universidad de Navarra	2	3	3		1	2	5
Universitat Autònoma de Barcelona	2	3	3	2	2	1	6
Universitat Ramon Llull	2		4	5	1	5	5
Universitat Rovira i Virgili	3	1	5	2	1	4	6
Universidad Carlos III	3	3	5		1		4
Universidad de Salamanca	3	3	4	4	3	3	6
Universitat de Barcelona	3	4	5	3	4	2	6
Universidad Pontificia Comillas	3	4	5		1	6	5
Universitat Politècnica de Catalunya	3		7	1	3		4
Universidad Autónoma de Madrid	4	4	5	3	2	4	6
Universitat de Girona	4	4	6	5	1	5	6
Universitat de València	5	5	6	5	4	5	6
Universidad de Alicante	5	4	6	4	4	5	6
Universidad de Deusto	5		7		4	4	4
Universidad de Almería	5	3	7	3	3	4	6
Universidad de Granada	5	4	7	4	4	4	6
Universidad Internacional de La Rioja	5	7	6		7		4
Universidad Complutense	5	5	6	5	4	4	6
Universitat de les Illes Balears	5	4	7	4		4	5
Universitat de Lleida	5	6	7		4	5	5
Universidad del País Vasco	5	5	6	3	4	7	6
Universitat Politècnica de València	5	5	7	5	4		5
Universidad de Alcalá	5	4	7	5	5	5	6
Universidad Pública de Navarra	5		9	3	4	3	5
Universidad de Oviedo	5	5	8	5	4	5	6
Universidad de Castilla-La Mancha	6	3	8	6	4	6	6
Universidad Rey Juan Carlos	6	5	8		5	5	5
Universidad de Córdoba	6	5	7	5	4	7	6
Universidade de Santiago de Compostela	6	5	7	5	5	5	6
Universitat Oberta de Catalunya	6	7	7		5	7	5
Universidad Católica San Antonio	6		8		7	5	4
Universitat Jaume I	6	4	8	4	5	6	6
Universidad Europea de Madrid	6		9		6	3	4
Universidad de Zaragoza	6	5	8	5	5	6	6
Universidad de Sevilla	6	6	8	5	5	5	6
Universidad de Valladolid	6	4	9		5	5	5
Universidad Pablo de Olavide	6	6	8	6		8	5
Universidad de Murcia	6	5	8	6		6	5
Universidad de Cantabria	6	5	8		5	7	5
Universidad de Jaén	6	4	9	4	6	6	6
Universidad de Huelva	6	5	8		5	8	5
Universidade de Vigo	6	6	8	5	6	8	6
Universidad de León	6		8		6	7	4
Universidade da Coruña	7	7	8	5	6	6	6
Universidad de Cádiz	7	6	9	4	6	8	6
Universidad de Extremadura	7	4	9	6	8	7	6
Universidad Católica de Valencia	7	10	9			5	4
Universidad a Distancia de Madrid	7		9		9	7	4
Universidad Miguel Hernández de Elche	7		11	6	7	6	5
Universidad de Málaga	7	6	9	6	6	8	6
Universidad de Burgos	8		9	6	8	9	5
Universidad de Las Palmas de Gran Canaria	8	6	10	6	8	6	6
Universidad Nacional de Educación a Distancia	8	7	10	7	7	8	6
Universidad de La Laguna	8	8	10	6	7	8	6
Universidad San Pablo - CEU	8	9	10			7	4
Universidad Cardenal Herrera - CEU	9		11		8	8	4
Universidad Alfonso X el Sabio	9		12		7	7	4
Universidad Internacional Valenciana	9	10	10			10	4

Note: Universities ordered by their position in the overall ranking

Source: Fundación BBVA-Ivie.

Table 5.11. (Cont.) **Summary of postgraduate rankings**

b) Universities not included in the Global Ranking but appearing in 1 or 2 Rankings per area of study

Universidad	Glo-bal	Arts and Humani-ties	Social and Legal Sciencies	Scien-ces	Engi-neering and Architec-ture	Health Sciences	No. of rankings in which it appears
Number of groups	**9**	**10**	**12**	**7**	**10**	**10**	**6**
Number of universities	**59**	**48**	**72**	**38**	**58**	**59**	**74**
IE Universidad			2				1
Universidad Politécnica de Cartagena			5		5		2
Universitat Abat Oliba CEU			6				1
Universidad Politécnica de Madrid			7		5		2
Mondragon Unibertsitatea			8		3		2
Universidad Pontificia de Salamanca			8				1
Universidad Nebrija		6	9				2
Universitat de Vic - Universitat Central de Catalunya			9			7	2
Universidad Loyola Andalucía			10				1
Universidad de La Rioja			10		9		2
Universidad Camilo José Cela			11			6	2
Universidad Internacional Isabel I de Castilla			11				1
Universidad Católica Santa Teresa de Jesús de Ávila			12				1
Universitat Internacional de Catalunya						6	1
Universidad Europea de Canarias					10	10	2

Note: Universities ordered by their position in the Social and Legal Sciences ranking.

Source: Fundación BBVA-Ivie.

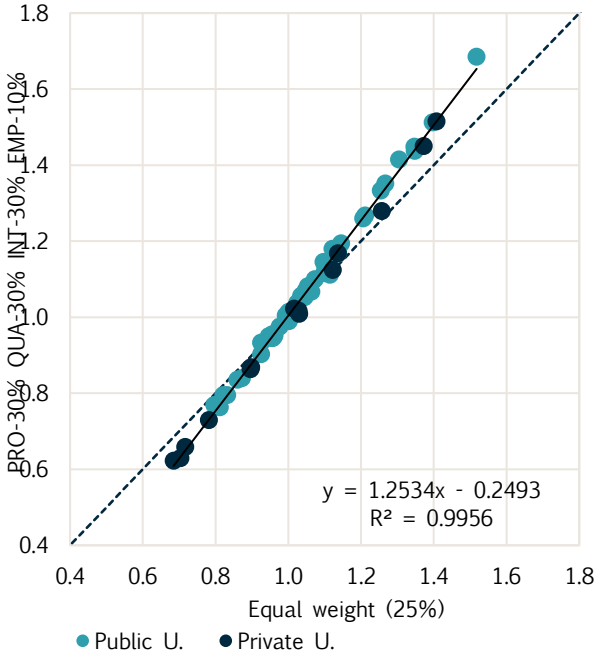
5.4. CONSISTENCY OF THE POSTGRADUATE RANKING AND RELATIONSHIP WITH U-RANKING

To conclude the analysis, we conducted two exercises that we consider necessary to verify the consistency of our analyses. As explained when describing the methodology, the indices for each area of study were obtained by combining the geometric averages of the indices for each area of performance (process, quality, internationalization and employment outcomes), giving equal weight (25%) to each area. The logic behind this is that there is no objective criterion for giving more weight to one area than another.

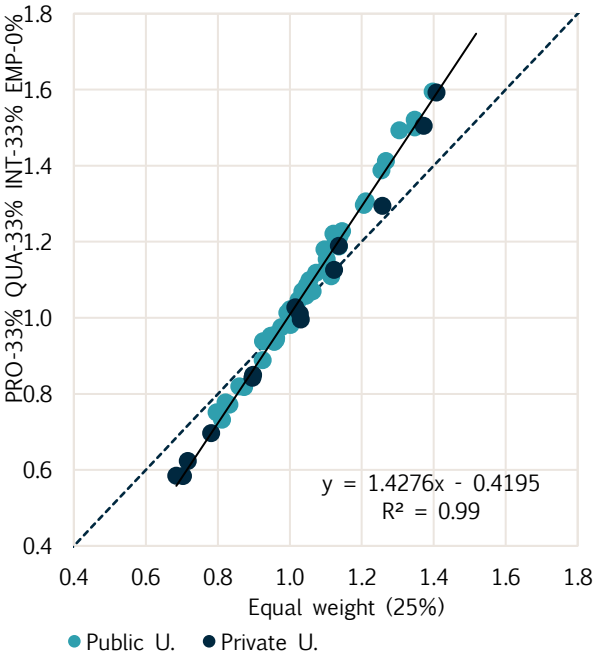
Given that the decision to weight the areas equally may raise doubts in those who have a different a priori criterion regarding the weight each area should have, it is worth calibrating the sensitivity of the ranking to changes in the weights. The index has therefore been recalculated with different combinations of weights, as reflected in panels *a* and *b* of figure 5.13, which show the results of these exercises. Panel *a* compares the index obtained with equal weighting to the index obtained when the employment outcomes indicator, which often does not appear in this type of ranking, is given a lower weight (30% process, 30% quality, 30% internationalization, 10% employment outcomes). Panel *b* shows the effect of zero-weighting employment outcomes (33% process, 33% quality, 33% internationalization, 0% employment outcomes). The results show that the ranking would be practically identical, with an R^2 of 0.99 in both cases, showing that the result is very stable to changes in the weights. The results are identical when the analysis is broken down by area of study, although for reasons of space they are not shown in this report. In no case is the coefficient of determination less than 0.91.

Figure 5.13. **Comparison of overall postgraduate indices. Different weights**

a) Equal weight vs. PRO-30% CAL-30% INT-30% ILAB-10%



b) Equal weight vs. PRO-33% QUA-30% INT-33% EMP-0%

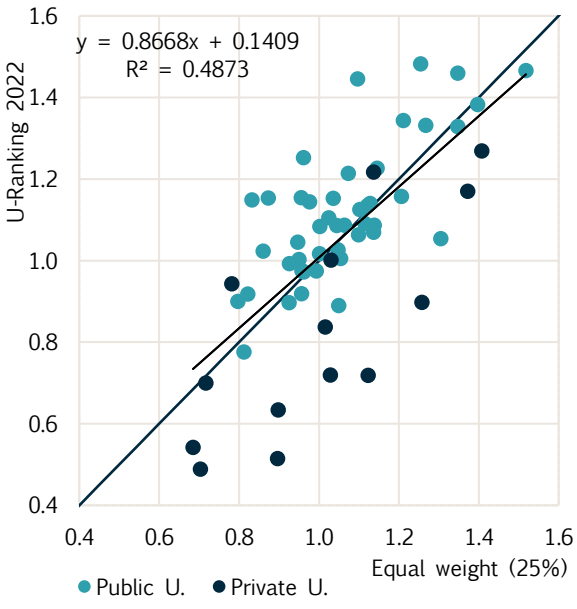


Note: 59 universities in the overall ranking

Source: Fundación BBVA-Ivie.

We already pointed out when discussing table 5.11 that where the quality of postgraduate education is consistently high across the different fields of study, this appears to reflect a university's commitment to quality in education in general, including at the postgraduate level. This preliminary conclusion prompts the question of whether the results of the postgraduate ranking bear any relation to the index constructed to measure a university's overall performance, not only in teaching but in all its usual activities (teaching, research and innovation). To confirm this hypothesis, figure 5.15 shows the result of regressing the 2022 U-Ranking performance index on the overall postgraduate performance index presented in this report. The result confirms the correlation between the two indices (coefficient of determination of 0.49), suggesting that a university's good performance in postgraduate education is the result of good overall performance, albeit leaving room for other factors to play a role in good postgraduate performance.

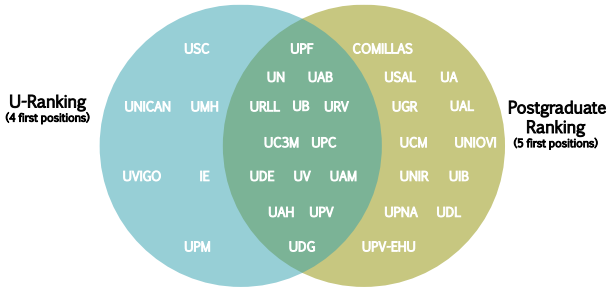
Figure 5.14. **Comparison of postgraduate indices and U-Ranking performance index**



Source: Fundación BBVA-Ivie.

Figure 5.15 shows another way of looking at this same result, with a very large overlap between U-Ranking and the postgraduate ranking, supporting the hypothesis of an overall quality that underlies all of a universities' activities.

Figure 5.15 **U-Ranking vs. Postgraduate ranking**



Note: The chart includes the top 20 universities from U-Ranking and the top 26 from the postgraduate ranking

Source: Fundación BBVA-Ivie.

Conclusiones

06

The aim of U-Ranking is to generate classifications that allow to analyze the Spanish universities with broad datasets that consider the main dimensions of their activities: teaching, research and innovation. Two main rankings are obtained with this project: U-Ranking, which correcting for size, measures the performance of Spanish universities and ranks them according to their level, and U-Ranking Volume, which measures the results taking into account their size. The methodology used in U-Ranking is rigorous and in harmony with the recommendations of recent international studies on this subject.

Adding the information on the results of the universities in different areas has its challenges. Not considering them and examining the numerous indicators that can be contemplated separately is not a practical solution, since most of the people interested in comparing universities want information presented in a simple manner, not large and complex volumes of information. Therefore, students, faculty members, researchers, university managers or politicians, and communications media appreciate having synthetic indicators available. Rankings, if constructed with suitable criteria and clear metrics, can be useful in this sense, because they condense the results of universities in several areas, reducing the effort that users have to make to obtain and analyze the information, which in many cases, the user has to do personally.

U-Ranking indices allow to analyze the results in teaching, research and innovation of all the public universities in Spain (48) and 24 private universities that offer the information needed to make the comparison. Data for the rest of the private universities that are currently not included will be in the future when information on their activities becomes available and can be compared with the data offered by the 72 universities that are now included.

The rankings were constructed from 20 variables that take into account the following aspects: (i) the universities' different missions (teaching, research and innovation); (ii) the existence of differences in the results of a university in the different areas of study; and (iii) the importance of considering the preferences of the users of university services when constructing some rankings.

The project generates two general university rankings —volume of results (U-Ranking Volume) and performance (U-Ranking)— and four partial rankings: teaching, research and innovation, in terms both of volume and of performance. These six university profiles can be of interest for assessing them from different perspectives, since the images projected of a university by each ranking are not the same for all of them. It corresponds to the users of the information — university or political leaders, researchers, students, analysts, etc.— to consider which images are the most relevant for their needs or interests.

The main results of the 2022 edition of U-Ranking are:

1. The synthetic indicators from which the rankings are obtained show that the differences in performance among universities

are relevant: the level of the indicator of those with better results triples that of the universities with lower performance levels.

2. The differences among universities in terms of volume of results are much greater, since they are influenced by performance and the different sizes of the universities.

3. Public universities dominate the Spanish University System. The Universities Pompeu Fabra, Carlos III, Autónoma de Barcelona and Polytechnic Universities of Catalonia and Valencia, take the lead in U-Ranking 2021. For the first time, Pompeu Fabra shares first place, which it previously held alone, with Universidad Carlos III de Madrid and Universidad Politécnica de Catalunya. They are followed by U. Autónoma de Barcelona and U. Politécnica de Valencia. The first private universities, Navarra and Deusto, appear in third place, which they share with U. Autónoma de Madrid, U. de Cantabria, U. de Barcelona, U. Politécnica de Madrid and U. Rovira i Virgili.

4. The leadership of some of these universities is especially outstanding in the research and innovation. More specifically, the Universitat Pompeu Fabra leads the research and innovation ranking, followed by U. Autònoma de Barcelona, U. Politècnica de Catalunya, U. Carlos III de Madrid, U. de Barcelona and U. Rovira y Virgili. While a group of eight universities, of which five private stand out taking the lead in the teaching ranking: U. Carlos III, U. de Navarra, U. Europea de Madrid, U. Internacional de La Rioja, U. Nebrija, U. Politécnica de Catalunya, U. Politécnica de Valencia and U. Ramon Llull.

5. There is a group of universities, made up of institutions with varied profiles among which predominate those of larger dimension that occupy the prominent places regarding volume of results and also performance. Most of them appear among the top 500 universities in well-known international rankings, such as Shanghai, THE and QS. U-Ranking confirms that Spanish universities that appear in the international rankings with greater volume of results are more productive. The repeated signals of quality sent by these institutions allow us to identify them as excellent universities, a conclusion that is repeated with different classification criteria. Consequently, efforts to improve the positioning of Spanish universities at international level should focus on these institutions.

6. With regard to private universities, the ranking confirms their high specialization and remarkable performance in teaching which exceeds by 10% the average of public universities. Four out of the seven universities with a high level of performance in teaching are private. To evaluate this result in perspective, it is important to note that the private universities that have been included in the ranking have higher indicators than the majority of private ones that are not included due to lack of information, in view of the values which are available. Thus, the average level of the teaching results of private universities could be lower if U-Ranking included all the private universities.

7. The specialization in teaching of private universities has its counterpart in a worse relative position with respect to the public system in terms of research performance which is 48 percentage points lower than that of public universities, with the first private university (Deusto) appearing in seventh place in the research and innovation ranking. None of the 19 universities with best performance in research is private. Public universities present higher levels of performance in research, and innovation.

8. Some well-known international initiatives —such as the Shanghai Ranking or THE— have increased the visibility of the classifications of universities and the social demand for such rankings. But these rankings emphasize the indicators of research and training of high international prestige, often at graduate level, leaving out most of the activity of our university system, which focuses on the teaching of bachelor's degrees and does not compete in the world leagues. The orientation towards research indicators

is also characteristic of other national rankings, drawn up with guarantees of quality but are based on indicators of the activities of universities that are too partial. Our results highlight the key importance of combining research performance with teaching performance measurements. Using the former as a proxy for the latter offers a very biased view of reality because the correlation between the two measures is low. The incorporation of private universities blurs the relationship between the two dimensions because they combine strong teaching performance and (in many cases) weak research performance, confirming the need to acknowledge the heterogeneity of the Spanish University System.

9. Differences in the results of the universities are also seen at regional level. Catalonia, whose university system is clearly the leader, Cantabria, Navarre, Valencian Community, Madrid, La Rioja and Galicia have the most productive university systems, with average performance levels above the Spanish average. Differences in performance among the regional university systems are great: 38 percentage points between the best-performing region and the worst-performing region.

Besides updating the U-Ranking results presented each year, this edition provides a specific analysis of postgraduate education, i.e. master's and doctoral Programs. One of the main consequences of the Bologna reform was the introduction of the master's degree as a new level of university education. This amounted to a major structural change in the Spanish university system, so it is important to analyze Spanish universities' performance in the delivery of postgraduate education. This chapter is intended to achieve two objectives: first, to give an overview of how postgraduate education has evolved and expanded, the types of Program offered and the differential impact they have had on public and private universities; and second, to prepare a ranking of universities' performance specifically at postgraduate level.

To achieve the first objective, we analyze the changes in postgraduate education over the last decade and how the structure of postgraduate education differs between public and private universities and different fields of study. To achieve the second objective, we construct an overall index based on 12 indicators of Spanish universities' performance at postgraduate level in the areas of process, quality, internationalization and employment outcomes. This index ranks Spanish universities according to their postgraduate performance, providing six separate rankings: one for each field of study and an overall ranking that combines all the information.

The following are some of the relevant findings of this analysis included in the tenth edition of U-Ranking:

10. Although the number of students enrolled in the Spanish university system has been stable since 2010, the composition of the student body has changed significantly, with the proportion of students enrolled in master's Programs having doubled, from 7% in 2010 to 15.6% in the 2020-2021 academic year.

11. The number of master's Programs has grown in both public and private universities but more markedly in the latter. In the private universities, master's students account for almost one-third of the total, compared to 11.1% in the public universities, indicating a strong specialization in master's Programs in the private sector.

12. Much of the growth in postgraduate education in private universities is attributable to a firm commitment to non-on-site delivery. The private universities have more students studying remotely (25.4% of the total number of postgraduate students in Spain) than on-site (19.0%). The public universities operate predominantly on-site (50.8% of total postgraduate students in Spain), accounting for only 4.8% of the Spanish postgraduate students studying remotely.

13. Postgraduate education includes doctoral Programs, which are concentrated very

largely in the public universities (85,137 students in the 2020-2021 academic year), while the private universities had only 5,289 postgraduate students.

14. The composition of the postgraduate education offered by the public and the private universities differs greatly by field of study. While the field of Social and Legal Sciences accounts for a majority of the master's graduates of both types of university, the proportion is much larger in the private universities (80.2% vs. 65%). The private universities have only a token offering in the field of Science (0.4% of private university graduates vs. 4.7% of public university graduates) and also a much smaller offering in Arts and Humanities (3.0% vs. 6.9%) and Engineering and Architecture (7.3% vs.13.0%), while the proportion of master's graduates in the field of Health Sciences is more balanced (9.2% vs. 10.4%).

15. This pattern of specialization in private universities, avoiding STEM subjects (Science, Technology, Engineering and Mathematics), may in some cases be attributable to the relative profitability of degree Programs in the different fields of study, given that the level of capital investment required is considerably lower in the less experimental fields.

16. The region of Madrid accounts for 26% of the total number of master's students in Spain, displaying a great capacity to attract students from other parts of the country. More than half of these students come from outside the region. The high percentage of highly skilled jobs in Madrid (45.3%) is clearly one of the incentives for this mobility.

17. The postgraduate ranking uses 12 indicators of a university's performance in the areas of process (timely completion and non-continuation), quality (loyalty and percentage of doctoral students), internationalization (international students and teachers) and employment outcomes (employment, income and job-skills match).

18. Generally speaking, the private universities perform slightly better in the process indicators, worse in the quality indicators (especially at the doctoral level), higher in internationalization, and better in employment outcomes one year after graduation, although the outcomes tend to be more equal four years after graduation.

19. We evaluate a total of 74 universities (48 public and 26 private), which together account for 96% of all postgraduate students in Spain. Universities with fewer than 50 postgraduate students in a given field of study or no bachelor's Programs in that field are not included in the analysis by field of study. Similarly, universities that do not appear in at least three of the rankings by field of study are not included in the overall ranking, which thus comprises a total of 59 universities (45 public and 14 private), accounting for 88% of postgraduate students.

20. The overall postgraduate ranking is headed by Universitat Pompeu Fabra, followed at the second level of the scale by Universidad de Navarra, Autònoma de Barcelona and Ramon Llull.

21. Of the 10 universities ranked in the first three levels, six are in Catalonia, two in Madrid, one in Navarra and one in Salamanca. Seven are public and three are private.

22. Universitat Rovira i Virgili heads the ranking in the field of Arts and Humanities, followed by Pompeu Fabra. Of the eight universities occupying the first three levels only one, Universidad de Navarra, is private.

23. In Social and Legal Sciences, at the top of the ranking is Pompeu Fabra, followed by IE University and, in joint third place, Universidad de Navarra and Autònoma de Barcelona. This is the field in which private universities tend to specialize, with four private universities (Ramon Llull and Pontificia de Comillas in addition to the two already mentioned) among the top 12.

24. Universitat Politècnica de Catalunya leads the postgraduate ranking in Science, followed Rovira i Virgili and Autònoma de Barcelona in joint second place. As seen earlier, the private universities, led by Ramon Llull at the fifth level, are only poorly represented in this ranking.

25. The ranking in Engineering and Architecture is led by three public and three private universities: Ramón Llull, Rovira i Virgili, Carlos III, Navarra, Girona and Pontificia de Comillas.

26. At the top of the Health Sciences ranking are Pompeu Fabra and Autònoma de Barcelona, followed at the second level by Universidad de Barcelona and Universidad de Navarra.

27. If we compare the overall ranking with the ranking by field of study, the order turns out to be quite similar, prompting the conclusion that quality in education is a general attribute of a university, one that manifests across all fields of study. The same conclusion emerges if we compare the overall postgraduate ranking with the overall U-Ranking. This conclusion is compatible with the strategy adopted by some universities, such as IE University, of concentrating on only one or two fields of study with a view to excelling in those fields.

Appendices

Appendix 1: Glossary of Indicators

Appendix 1. **Glossary of indicators and statistical sources of U-Ranking 2022**

Dimension	Area	Indicator and definition	Source	Period	Level
Teaching	Resources	**Faculty member per 100 students:** Full-time equivalent faculty and research staff in centers belonging to the University per 100 full-time equivalent students in studies of 1st and 2nd cycle, bachelor's and master's degrees and students in doctoral degrees (all of these students registered in centers belonging to the University)	SIIU	2014-15 to 2019-20	Area of study
		Budget per student: Effective income of the University by number of full-time equivalent students in stud-ies of 1st and 2nd cycle, bachelor's and master's degrees and of students in doctoral degrees (all of these students registered in centers belonging to the University)	SIIU SABI WEB	2015-2020	Universidad
		Percentage of faculty member with PhD: Full-time equivalent faculty members with PhD in centers belong-ing to the University over total full-time equivalent faculty and research staff in centers belonging to the University	SIIU	2014-15 to 2019-20	Area of study
	Production	**Success rate in bachelor's degree studies:** Number of credits passed by grade students registered in an academic year over total credits evaluated within the same course (excluding transfer and recog-nized credits)	SIIU	2014-15 to 2019-20	Area of study
		Evaluation rate in bachelor's degree studies: Number of credits evaluated by grade students registered in an academic year over total credits registered within the same course (excluding transfer and recognized credits)	SIIU	2014-15 to 2019-20	Area of study
		Overall dropout rate in undergraduate studies: sum of the dropout rates in the first, second and third years of undergraduate studies	SIIU	Cohorte 2010-11 to 2015-16	Area of study
	Quality	**Percentage of postgraduate students:** Full-time equivalent students registered in master's degrees over the total number of full-time equivalent students registered in studies of 1st and 2nd cycle, bachelor's and master's degrees (all of these students registered in centers belonging to the University)	SIIU	2014-15 to 2019-20	Area of study
		Cut-off mark: Mark of the last general group1 student that gained admission to a degree with limited places	SIIU	2021-22	Area of study
	Internacionalization	**Percentage of foreign students:** Non-Spanish students of 1st and 2nd cycle, bachelor's and master's degrees over the total number of students of 1st and 2nd cycle, bachelor's and master's degrees	SIIU	2014-15 to 2019-20	Area of study
		Percentage of students in international mobility programs: Number of bachelor's and master's degree students who study abroad through a mobility program over total number of bachelor's and master's degree students	SIIU	2015-16 to 2019-20	Universidad

Appendix 1. Glossary of indicators and statistical sources of U-Ranking 2022 (cont)

Dimension	Area	Indicator and definition	Source	Period	Level
Research and innovation	Resources	**Competitive public resources per faculty member with PhD:** Competitive public resources for undirected research projects, including both projects and complementary actions and ERDF funds, over the total number of faculty members with full-time equivalent PhD	Agencia Estatal de Investigación SIIU	2015 to 2020	Area of study
		Contracts with PhDs, research grants and technical support over total budget: Competitive resources obtained for research staff training, Juan de la Cierva, Ramón and Cajal and support technicians over total effective income	Agencia Estatal de Investigación SIIU SABI WEB	2015 to 2020	Area of study
	Production	**Citable documents with ISI reference per faculty member with PhD:** Documents with ISI reference published per faculty members with full-time equivalent PhD	IUNE (Thomson Reuters) SIIU	2015 to 2020	Area of study
		Number of patents per 100 faculty members with PhD: Number of national patents granted to each Spanish university by the Spanish Patents and Trade Marks Office per 100 faculty members with PhD	IUNE (INVENES) SIIU	2015 to 2020	University
		Doctoral theses read per 100 faculty members with PhD: Doctoral theses read per 100 faculty members with full-time equivalent PhD	SIIU	2015 to 2020	Area of study
	Quality	**Mean impact factor:** Mean impact factor of the publications with at least one author affiliated to the University	IUNE (Thomson Reuters)	2015 to 2020	Area of study
		Percentage of publications in the first quartile: Publications corresponding to journals in the first quartile of relevance within the Thomson Reuters classification by areas, over the total number of publications belonging to that area	IUNE (Thomson Reuters)	2015 to 2020	Area of study
		Citations per document: Citations received per document from the date of publication to the date of data gathering	IUNE (Thomson Reuters)	2015 to 2020	Area of study
	Internacionalization	**Horizon 2020 European research funds per faculty members with PhD:** Funding received by the university from EU research funds (H2020 Program) per every 100 full-time equivalent faculty members with PhD	European Commission (H2020 Dashboard)	2015 to 2020	University
		Percentage of publications with international co-authorship: Publications with at least one co-author affiliated to a foreign institution over the total number of publications	IUNE (Thomson Reuters)	2015 to 2020	Area of study

Appendix 2: List of University Abbreviations

Abbreviation	University	Type of ownership
ABATOLIBA	Universitat Abat Oliba CEU	Private
COMILLAS	Universidad Pontificia Comillas	Private
IE	IE Universidad	Private
UA	Universidad de Alicante	Public
UAB	Universitat Autònoma de Barcelona	Public
UAH	Universidad de Alcalá	Public
UAL	Universidad de Almería	Public
UAM	Universidad Autónoma de Madrid	Public
UANE	Universidad Nebrija	Private
UAX	Universidad Alfonso X El Sabio	Private
UB	Universitat de Barcelona	Public
UBU	Universidad de Burgos	Public
UC3M	Universidad Carlos III de Madrid	Public
UCA	Universidad de Cádiz	Public
UCAM	Universidad Católica San Antonio	Private
UCEU	Universidad San Pablo-CEU	Private
UCH	Universidad Cardenal Herrera-CEU	Private
UCJC	Universidad Camilo José Cela	Private
UCLM	Universidad de Castilla-La Mancha	Public
UCM	Universidad Complutense de Madrid	Public
UCO	Universidad de Córdoba	Public
UCV	Universidad Católica de Valencia San Vicente Mártir	Private
UDC	Universidade da Coruña	Public
UDE	Universidad de Deusto	Private
UDG	Universitat de Girona	Public
UDIMA	Universidad A Distancia de Madrid	Private
UDL	Universitat de Lleida	Public
UEC	Universidad Europea de Canarias	Private
UEM	Universidad Europea de Madrid	Private
UEV	Universidad Europea de Valencia	Private
UGR	Universidad de Granada	Public
UHU	Universidad de Huelva	Public
UIB	Universitat de les Illes Balears	Public
UIC	Universitat Internacional de Catalunya	Private
UIIC	Universidad Internacional Isabel I de Castilla	Private
UJAEN	Universidad de Jaén	Public
UJI	Universitat Jaume I de Castellón	Public
ULL	Universidad de La Laguna	Public
ULPGC	Universidad de Las Palmas de Gran Canaria	Public
UM	Universidad de Murcia	Public
UMA	Universidad de Málaga	Public
UMH	Universidad Miguel Hernández de Elche	Public
UMON	Mondragon Unibertsitatea	Private
UN	Universidad de Navarra	Private
UNED	Universidad Nacional de Educación a Distancia	Public
UNEX	Universidad de Extremadura	Public
UNICAN	Universidad de Cantabria	Public
UNILEON	Universidad de León	Public
UNIOVI	Universidad de Oviedo	Public
UNIRIOJA	Universidad de La Rioja	Public
UNIR	Universidad Internacional de La Rioja	Private
UNIZAR	Universidad de Zaragoza	Public
UOC	Universitat Oberta de Catalunya	Private
UPC	Universitat Politècnica de Catalunya	Public
UPCT	Universidad Politécnica de Cartagena	Public
UPF	Universitat Pompeu Fabra	Public
UPM	Universidad Politécnica de Madrid	Public
UPNA	Universidad Public de Navarra	Public
UPO	Universidad Pablo de Olavide	Public
UPV	Universitat Politècnica de València	Public
UPV-EHU	Universidad del País Vasco/Euskal Herriko Unibertsitatea	Public
URJC	Universidad Rey Juan Carlos	Public
URLL	Universitat Ramon Llull	Private
URV	Universitat Rovira i Virgili	Public
US	Universidad de Sevilla	Public
USAL	Universidad de Salamanca	Public
USC	Universidade de Santiago de Compostela	Public
UV	Universitat de València	Public
UVA	Universidad de Valladolid	Public
UVIC-UCC	Vic-Universitat Central de Catalunya	Private
UVIGO	Universidade de Vigo	Public
VIU	Universidad Internacional Valenciana	Private


PHILPOT

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