The Fading Path to Academia: A Data-Driven Analysis of Gender Disparities in Spanish Universities

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Abstract

Gender parity in academia remains a pressing global challenge, with notable disparities as women advance through the academic ladder. This paper presents the first study on gender parity in Spanish public universities broken down by institution, analyzing the most recent official data to measure the representation of women at key career stages: graduates, doctorates, temporary workers and civil servants. Our findings show that women's representation falls by an average of 22% in higher positions, with severe imbalances in engineering-focused institutions, highlighting the need for reforms and improved data transparency to promote gender equity.

1 Introduction

Gender equality is a pending challenge of our time, promoted in Goal 5 of the 2030 Agenda for Sustainable Development [9]. When it comes to academia, reports from the United Nations Educational, Scientific and Cultural Organization (UNESCO) find that the proportion of women decreases as they move up the ranks. Yet, women outnumber men at 52% in terms of undergraduate students worldwide [1, 2].

Despite the growing importance of this issue, comprehensive analysis focusing at the country or institutional level remains scarce. Previous reports by the Spanish Ministry of Science have focused on measuring gender parity in national institutions and characterizing the impact of state policies [3]. While this series has examined the presence of women researchers in higher education, no further analysis is made at the institutional level.

To fill this knowledge gap, we present the first study on gender parity in Spanish public universities, broken down by institution. Specifically, we sought to answer the question of how the representation of women evolves across key stages of the academic career, depending on the institution. We find that women are systematically less represented in higher academic positions across all observations, whilst on average they make up the majority of bachelor graduates. Moreover, we also find the institutions with the most severe gender disparities are predominantly those specializing in engineering.

2 Methodology

We use the official historical data provided by the Spanish Ministry of Universities, which offers several aggregated datasets covering both public and private Spanish universities. We focus on the academic year 2020/2021, as this is the most recent data available for the series. We exclude private universities because, unlike public universities, they do not have permanent positions for civil servants. Specifically, we employ the following datasets:

Graduates by gender and university. Students who graduated with a bachelor's degree from a Spanish university, stratified by year, gender and university [4].

Doctorates by gender and university. Same information as the previous dataset, but for students who graduated with a doctoral degree instead [5].

Research personnel. Researchers working at Spanish universities in 2020/2021, stratified by type of personnel, gender and university [6]. Due to the limitations of publicly available data, we focus exclusively on researchers without a permanent position and civil servants.

2.1 Data Processing

All the datasets we use are provided by the Spanish Ministry of Science and contain aggregated data on the different variables we study. The data collection, processing methodology and indicator definitions are publicly available on the website of this entity [8].

Of the various data formats in which these datasets are offered, we use the spreadsheet files (in XLSX format) because they contain rich tabular information that is missing in the other formats.

2.2 Dataset Overview

Ultimately, we end up with four sequential key academic career stages: (*i*) graduates, (*ii*) doctorates, (*iii*) temporary workers, and (*iv*) civil servants. We acknowledge that PhD students generally fall into the temporary workers stage. However, we place this stage chronologically after doctorates because it is predominantly composed of postdoctoral researchers and due to the lack of more granular data. The final dataset is comprised of 48 Spanish public universities, with no missing values for any of the stages. We consider this to be the most complete dataset on gender parity in Spanish academia to date, as only 2 of the country's 50 public universities are absent[1] and no more recent official numbers are available [7].

3 Results

Figure 1 shows the ratio of women at each of the four major career stages in the 2020/2021 academic year, grouped by university. Looking at the average of all Spanish public universities, we see

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[1]Namely Universidad Internacional Menéndez Pelayo (UIMP) and Universidad Internacional de Andalucía (UNIA).

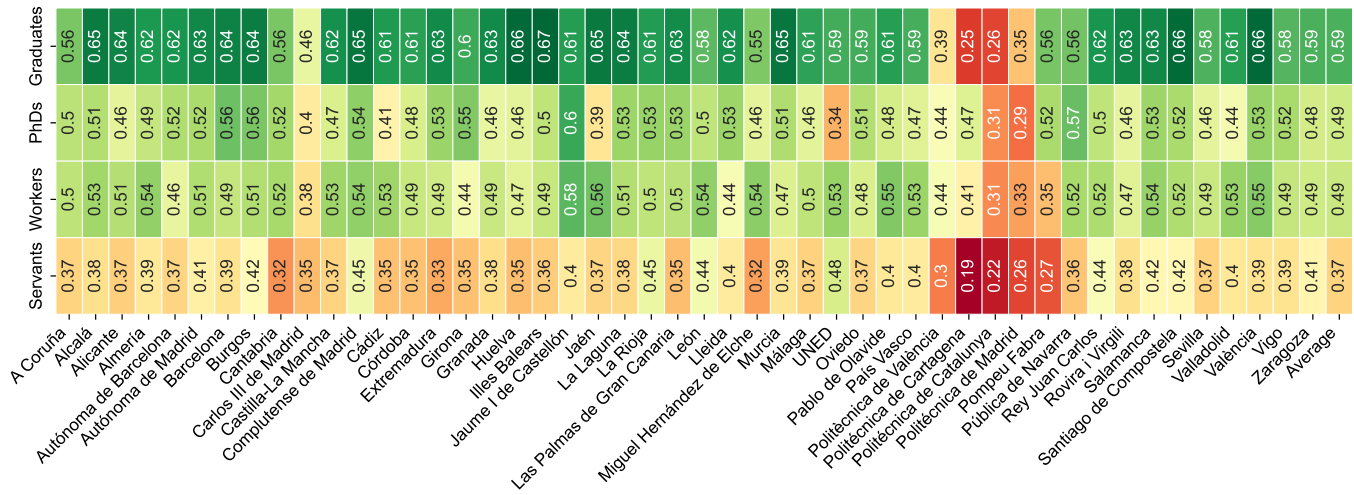|	A Coruña	Alcalá	Alicante	Almería	Autónoma de Barcelona	Autónoma de Madrid	Barcelona	Burgos	Cantabria	Carlos III de Madrid	Castilla-La Mancha	Complutense de Madrid	Cádiz	Córdoba	Extremadura	Girona	Granada	Huelva	Illes Balears	Jaume I de Castellón	Jaén	La Laguna	La Rioja	Las Palmas de Gran Canaria	León	Lleida	Miguel Hernández de Elche	Murcia	Málaga	UNED	Oviedo	Pablo de Olavide	País Vasco	Politècnica de València	Politécnica de Cartagena	Politècnica de Catalunya	Politécnica de Madrid	Pompeu Fabra	Pública de Navarra	Rey Juan Carlos	Rovira i Virgili	Salamanca	Santiago de Compostela	Sevilla	Valladolid	València	Vigo	Zaragoza	Average
Graduates	0.56	0.65	0.64	0.62	0.62	0.63	0.64	0.64	0.56	0.46	0.62	0.65	0.61	0.61	0.63	0.6	0.63	0.66	0.67	0.61	0.65	0.64	0.61	0.63	0.58	0.62	0.55	0.65	0.61	0.59	0.59	0.61	0.59	0.39	0.25	0.26	0.35	0.56	0.56	0.62	0.63	0.63	0.66	0.58	0.61	0.66	0.58	0.59	0.59
PhDs	0.5	0.51	0.46	0.49	0.52	0.52	0.56	0.56	0.52	0.4	0.47	0.54	0.41	0.48	0.53	0.55	0.46	0.46	0.5	0.6	0.39	0.53	0.53	0.53	0.5	0.53	0.46	0.51	0.46	0.34	0.51	0.48	0.47	0.44	0.47	0.31	0.29	0.52	0.57	0.5	0.46	0.53	0.52	0.46	0.44	0.53	0.52	0.48	0.49
Workers	0.5	0.53	0.51	0.54	0.46	0.51	0.49	0.51	0.52	0.38	0.53	0.54	0.53	0.49	0.49	0.44	0.49	0.47	0.49	0.58	0.56	0.51	0.5	0.5	0.54	0.44	0.54	0.47	0.5	0.53	0.48	0.55	0.53	0.44	0.41	0.31	0.33	0.35	0.52	0.52	0.47	0.54	0.52	0.49	0.53	0.55	0.49	0.49	0.49
Servants	0.37	0.38	0.37	0.39	0.37	0.41	0.39	0.42	0.32	0.35	0.37	0.45	0.35	0.35	0.33	0.35	0.38	0.35	0.36	0.4	0.37	0.38	0.45	0.35	0.44	0.4	0.32	0.39	0.37	0.48	0.37	0.4	0.4	0.3	0.19	0.22	0.26	0.27	0.36	0.44	0.38	0.42	0.42	0.37	0.4	0.39	0.39	0.41	0.37

Figure 1: Ratio of women by career stage in Spanish public universities, stratified by institution.

that women make up the majority of graduates, accounting for 59%. Yet, for all the universities studied, there are systematically fewer women at public worker and civil servant positions, dropping to 49% and 37%, respectively.

The institution with the highest gender parity ratio is Universidad Nacional de Educación a Distancia (UNED) at a respectable 48%, followed by Universidad de La Rioja (UR) and Universidad Complutense de Madrid (UCM), both at 45%. On the other end of the spectrum, Universidad Politécnica de Cartagena (UPCT) has the worst ratio at 19%, followed by Universitat Politècnica de Catalunya (UPC), Universidad Politécnica de Madrid (UPM), Universitat Pompeu Fabra (UPF) and Universitat Politècnica de València (UPV), ranging between 20% and 30%. With the exception of UPF, all of the latter institutions exclusively offer engineering studies.[2]

Given that all of the former universities have declining gender parity across career stages, we now focus on finding those with the steepest drops. That is, which universities have the highest difference in the ratio of women between graduates and civil servants. Universidad de Huelva (UHU) has the highest decline at -31%, closely followed by Universitat de les Illes Balears (UIB) and Universidad de Extremadura (UEx) at -30%. While these drops may look like outliers, we find that Spanish universities have, on average, 22% fewer women in higher academic positions than in early career stages.

4 Discussion

The fading representation of women in higher academic positions suggests enduring structural barriers within Spanish public universities. We find it concerning that the sharp drops in gender parity from graduates to civil servants are not isolated cases, but affect all the institutions studied. Institutes of Technology (where science, technology, and engineering are the only programs offered), show an even greater gap. This broader gender imbalance may be related to the choice of academic discipline, as evidence from UNESCO

indicates that women are underrepresented in science, technology, engineering and mathematics (STEM) [1].

Based on our findings, we suggest that initiatives to achieve gender equity in STEM go beyond undergraduate education and extend to the whole academic career. This would require institutional reforms and support instruments designed to retain and incentivize women in these fields. Regardless, the first step towards tackling gender disparities in academia is for institutions (both universities and the State) to publish current and accessible data.

5 Conclusion

We have presented the first study on gender parity in Spanish public universities. Using the most recent publicly available data, we provide empirical evidence showing that women are less represented than men in higher academic positions across all institutions studied. This is especially worrisome as women make up the majority of bachelor's graduates.

5.1 Future Work

During our research, we find evidence that Institutes of Technology in Spain have the worst gender parity compared to their peer universities. Therefore, we suggest taking a closer look at the prevalence of women across fields (e.g., engineering, education, health) rather than per institution to assess the cause of this phenomenon.

References

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[2] We note that *Universidad Politécnica* translates to *Institute of Technology* in English.

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