Received: 13 September 2021 | Accepted: 27 September 2021

DOI: 10.1111/ejed.12525

ORIGINAL ARTICLE

WILEY

The transition from higher education to first employment in Spain

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Abstract

This article explores the determinants of the transition from higher education to work, analysing the time it takes college graduates to obtain their first job in Spain. To estimate the exit rate to employment of university graduates, we use parametric and nonparametric analysis of duration models. We have incorporated unobserved heterogeneity using frailty models to account for misspecification or omitted covariates. The results show that after graduation, men are more likely to obtain employment than women. Our results also show that graduates of private universities gain their first jobs sooner than graduates of public universities. Furthermore, we found that those graduates who have previous work experience and those who start looking for a job before the end of their degree programme are likely to obtain a job sooner. In addition, Arts and Humanities graduates have the greatest difficulty in finding work. Finally, the results suggest that graduates who have international experience and those with expert knowledge of communication are more likely to obtain employment.

1 | INTRODUCTION

The employability of university graduates is one of the key indicators of education system efficiency, and it is a major policy concern in both developed and developing nations (Menon et al., 2012; Teichler, 2009). The transition from higher education to work is one of the most important steps in graduate careers, as it can determine vocational outcomes and future career success (Grosemans et al., 2017).

University graduates unemployed for a long time lose the human capital they acquired at their higher education institutions. According to De Grip (2004), the technical obsolescence of human capital involves the atrophy of skills due to unemployment. This situation represents a waste of money for individuals and for society since a university education is a time-consuming and costly investment. Therefore, it is important that policymakers understand the transition process from higher education to the labour market.

Along these lines, the present study provides new evidence regarding the factors that contribute the most to the hiring of graduates. We especially focus on the roles of gender and educational characteristics such as areas of study, educational mobility, type of university, and knowledge of information and communication technologies (ICTs) to explain the time required for graduates to obtain their first job. We highlight the most important skills for greater employability.

This analysis is relevant for several reasons. Policymakers and society must have at their disposal adequate information on the transition from university to work to improve the efficiency of resource use. Moreover, there is little information on the factors that affect the length of time from higher education graduation to employment.

Although previous empirical studies have evaluated the transition from higher education to employment, most of them performed descriptive analyses (Finnie, 2004; Teichler, 2002). Therefore, it is especially necessary to analyse the determinants of successful transitions and the time required for obtaining a first job. Nevertheless, there are few studies on the transition of university graduates to employment using duration models. The study on which this article reports is unique in that it used duration models to analyse the employability of university graduates in Spain after the economic and financial crisis. We have sought to fill this research gap by using a rich and unique dataset obtained from the National Institute of Statistics (INE) in Spain. The dataset pertains to the labour market insertion of university graduates in 2014. No other research has analysed this dataset for factors affecting the employability of university graduates.

There is no European standardisation in the field of statistics on the labour market insertion of universities graduates. Nevertheless, with this survey, Spain collects information on the employment of higher education graduates, in a similar way as has been done in other surveys for Italy, France, the UK, Sweden and Canada. In fact, the little evidence concerning transition processes of university graduates is in part due to the poor availability of adequate longitudinal and cross-sectional data.

This article is organised as follows. First, the theoretical framework of Job Search Theory is provided and the main research publications on transitions are reviewed. Next, we analyse the dataset and discuss the methodology of duration models to explain the *time-to-first-job* variable. The results of our analysis are reported and discussed. Finally, we present and summarise the primary findings of the study on which this article reports.

2 | THEORETICAL FRAMEWORK FOR TRANSITIONS FROM EDUCATION TO THE LABOUR MARKET

According to Nicholson (1990), the transition from education to the labour market is a process that starts in education and continues after graduation until the graduate obtains a job. The theoretical context used to understand the transition from unemployment to work have been based on Job Search Theory. The basic assumption of the theoretical search framework is that agents have incomplete knowledge of the labour market (Kiefer & Neumann, 1989; McCall, 1970; Mortensen, 1970, 1986; Stigler, 1962). Thus, Job Search Theory explicitly addresses uncertainty in the labour market. In this sense, Hicks (1964) noted that imperfect knowledge of job opportunities could lead to a lack of investment of time to acquire such information and hence to unemployment.[1]

In the simplest form of the job search model, an individual attempts to maximise expected wealth by accepting a job offer only if it exceeds his reservation wage (i.e., the lowest wage for which he will work; McCall, 1970; Mortensen, 1970). Thus, the conditional probability of leaving unemployment is the product of the probability of receiving a job offer times the probability of accepting it. It is influenced (among other things) by the worker's

decision variables: search intensity and reservation wage. Furthermore, the probability of receiving an offer is proportional to the intensity of the search (Becker, 1965).

In this respect, Burdett and Mortensen (1978) present a search model in which an increase in the time spent on the search increases the average number of job offers arriving within a given time interval. However, it also causes lost utility due to a decrease in leisure time and inflicts opportunity costs in the form of foregone wage. On the other hand, firms do not know the talents of applicants. Thus, employers must forecast prospective employees' performance based on their experience, training, and other observable characteristics such as age or education level, among others (Spence, 1973). According to Warner et al. (1980), to leave unemployment, a person seeking employment must (1) locate a firm with a job vacancy, (2) get the firm to extend a job offer, and (3) accept that offer. Furthermore, they provide a unified model that integrates employer and employee search procedures to explain the determinants of the time required to obtain a first job.

3 | DATA

The data come from the first survey on the labour market insertion of university graduates that the National Institute of Statistics (INE) has conducted since 2014, the scope of which includes all universities in Spain.[2]

The information was collected between September 2014 and February 2015 using a method that combined direct interviews and administrative data. University graduates who finished their degrees in the 2009–2010 academic year were surveyed about the four years after graduation. The survey collects information on the different aspects of the labour insertion process, such as gender, age group, areas of study, educational mobility, type of university and knowledge of ICTs, among others. Graduates already employed at the end of their university studies were eliminated from the sample. As a result, of 30,379 graduates who finished their degrees in the 2009–2010 academic year, a total of 22,560 were selected for the study. To analyse missing survey responses, the INE obtained information on basic characteristics of the units that do not collaborate in the survey, either directly from the informant unit or from administrative records.

The variable of interest is the duration (in months) until the first transition to employment after graduation. This event is measured in an interval since the exact time is unknown. Table 1 provides a description of the variables involved in this study. We analyse socio-demographic characteristics such as gender, nationality, disability and age group and education variables such as area of study and type of university, among others.

There were significantly fewer men compared to women among the higher education graduates, men represented only 38.75% of the sample. As expected, men were more likely to study sciences, engineering, and business, while women were more likely to study humanities, education, and some social sciences. The age variables (*AGE1* and *AGE2*) represent the age at which the graduates completed their university studies. Age is classified into the three categories of under 30 years, 30 to 34 years and over 35 years, which represent 68%, 24% and 9% of the sample, respectively. These variables are included because it is assumed that mature graduates are disadvantaged compared with younger ones since leaving the higher education system at an older age may be due to some students needing extra years to finish their degrees. Thus, employers may see this situation as a negative signal of productivity or effort if they associate educational success with success in the workplace (Salas-Velasco, 2007).

Regarding the subjects of study (*SUBJ1*, *SUBJ2*, *SUBJECT3* and *SUBJ4*), a higher percentage of graduates had studied Social and Legal Sciences (41.91%) followed by Engineering and Architecture (22.06%), Health Sciences (15.59%), Sciences (10.35%) and Arts and Humanities (10.09%). According to human capital theory, the demand for education depends on employment and income expectations by education level (Albert, 2000).

In terms of gender balance, there were comparatively more men in Engineering and Architecture (70.74%). In contrast, in Arts and Humanities, Health Sciences, Sciences and Social and Legal Sciences, the percentages of men were 32.04%, 20.41%, 31.84% and 28.65%, respectively. The empirical evidence shows that in many countries women are underrepresented in the fields of science, technology, engineering and mathematics, whereas they are

TABLE 1 Description of the variables

Variable	Description
ABRO	=1 if the graduate spent part of their studies abroad; =0 otherwise
ACSE	=1 if the graduate was actively looking for an employment through a temporary employment agency; =0 otherwise
AGE1	=1 if the graduate is 30–34 years old; =0 otherwise
AGE2	=1 if the graduate is 35 years old or older; =0 otherwise
DUR	Duration (in months) until the first transition to employment after graduation
EXCE	=1 if the graduate received a scholarship of excellence by the Ministry of Education and Science of Spain; =0 otherwise
ICT1	=1 if the graduate has advanced knowledge of ICTs; =0 otherwise
ICT2	=1 if the graduate has expert knowledge of ICTs; =0 otherwise
LANG	=1 if the graduate speaks a second language; =0 otherwise
LOC1	=1 if the University is located in Aragon; =0 otherwise
LOC2	=1 if the University is located in Asturias; =0 otherwise
LOC3	=1 if the University is located in the Balearic Islands; =0 otherwise
LOC4	=1 if the University is located in the Canary Islands; =0 otherwise
LOC5	=1 if the University is located in Cantabria; =0 otherwise
LOC6	=1 if the University is located in Castile and Leon; =0 otherwise
LOC7	=1 if the University is located in Castile-La Mancha; =0 otherwise
LOC8	=1 if the University is located in Catalonia; =0 otherwise
LOC9	=1 if the University is located in Valencia; =0 otherwise
LOC10	=1 if the University is located in Extremadura; =0 otherwise
LOC11	=1 if the University is located in Galicia; =0 otherwise
LOC12	=1 if the University is located in the Community of Madrid; =0 otherwise
LOC13	=1 if the University is located in Murcia; =0 otherwise
LOC14	=1 if the University is located in Navarra; =0 otherwise
LOC15	=1 if the University is located in the Basque Country; =0 otherwise
LOC16	=1 if the University is located in La Rioja; =0 otherwise
MAST	=1 if the graduate did not obtain a Masters; =0 otherwise
PRACT	=1 if the graduate participated in curricular or extracurricular activities; =0 otherwise
SEAR	=1 if the graduate started looking for a job after completing the degree; =0 otherwise
SEX	=1 if the graduate is a man; =0 if the graduate is a woman
SUBJ1	=1 if the graduate studied Sciences; =0 otherwise
SUBJ2	=1 if the graduate studied Social and Legal Sciences; =0 otherwise
SUBJ3	=1 if the graduate studied Engineering and Architecture; =0 otherwise
SUBJ4	=1 if the graduate studied Health Sciences; =0 otherwise
UNIV	=1 if the university is private; =0 if it is public

Source: Authors.

over-represented in humanities, education, health and the arts. The proportion of students across fields of study with overrepresentation of one gender has been called horizontal gender segregation in education. This phenomenon can explain gender segregation in the labour market (Bordón et al., 2020).

An additional variable is the type of higher education institution (*UNIV*). This variable is included to analyse the potential relationship of this characteristic due to the scarcity of empirical literature on the association to types of higher education institutions. It allows for the analysis of the employability of university graduates based on the costs associated with each type of university, since student fees significantly vary between public and private institutions. In Spain, 62% of universities are public and 38% private.

The explanatory variable related to student mobility decisions during university studies (*ABRO*) is used to show any differences in the unemployment durations between the graduates who spent part of their studies abroad and those who did not. Educational mobility is thought of as an investment in human capital because it promotes skills acquisition in additional languages and social, intercultural, and mobility skills. In this sense, previous studies revealed that these skills are thought to produce economic returns on globalised, national and international labour markets, resulting in better jobs, higher incomes and brighter career prospects (Waibel et al., 2017; Wiers-Jenssen & Try, 2005).

It is worth noting that one way that graduates can increase their competitiveness in the job market is through investment in knowledge. Approximately 37% of graduates analysed obtained a master's degree (*MAST*) to ensure future competitiveness, and 93% of the graduates had foreign language knowledge (*LANG*). Moreover, the *EXCE* variable (Excellence scholarships for academically high-performing) was used in the study as a proxy variable for the ability of the graduate.

Knowledge of ICTs (*ICT1* and *ICT2*) was initially included in the models to determine whether these competences and abilities were valued by employers. ICT expertise was reported by the university graduates as follows: *basic-level user* (surfing the internet, sending emails, copying or moving files or folders, writing text using a word processor, using simple formulas in spreadsheets), *advanced-level user* (formatting text, using more advanced formulas and creating graphics in spreadsheets, installing devices and/or programs, using databases) and *expert user* (writing macros, programming, solving software and hardware problems when the computer does not work properly).

Job experience during university studies (*PRACT*) is included in the model to evaluate whether graduates who had had jobs during their university studies obtained jobs faster than inexperienced ones. As Salas-Velasco (2007) concluded, previous job experience considerably reduces the job search period.

The *NATI* and *DISA* variables are not included in the model since only 1% of the graduates had a different nationality and 0.85% had a disability. Although these variables could be significant, they affected only a very small percentage of the individuals in the sample. Moreover, to promote the integration of disabled workers into the labour market, several measures have been introduced, such as employment quotas, subsidies and antidiscrimination regulations.

The Autonomous Community (*LOC1-LOC16*) variables were taken into account in the study to evaluate differences in the unemployment durations of the graduates identified in the database as located in Autonomous Communities, as determined by the geographical location of the management of public universities and the main office of private universities. Finally, the relationship between job search intensity and the probability of receiving and accepting a job offer is a common finding in the literature (Gregg & Wadsworth, 1996). Thus, we analysed the *ACSE* variable to evaluate whether graduates actively looking for an employment obtain jobs faster, as expected. Table 2 shows the employment rate in the six months preceding the survey for some of the previous variables in which some group specific differences are shown.

4 | METHODOLOGY

In this study, we used duration models with interval-censored failure time data (Li & Pu, 2003; Sun, 2006; Tian & Cai, 2006). Interval censoring is encountered in many situations where the only information available for each individual is that their event is measured in a known interval $(L_i, R_i]$, but the exact time is unknown.[3]

TABLE 2 Employment rate after six months for some of the main variables

Graduates' characteristics	Percentage
Abro	
Yes	48
No	45
ICT	
Basic knowledge	40
Advanced knowledge	43
Expert knowledge	57
Sex	
Women	44
Men	48
Subj	
Sciences	36
Social and Legal Sciences	41
Engineering and Architecture	54
Health Sciences	58
Arts and Humanities	31
Univ	
Private	44
Public	56

Source: Prepared by the authors based on the INE survey on the labour market insertion of university graduates.

The nonparametric procedure is an initial tool to describe survival times. Peto (1973) and Turnbull (1976) developed a nonparametric estimator of the survival function for interval-censored data, which is similar to the Kaplan–Meier (1958) estimator for right-censored data. The survival function $S(t)$ provides the probability of being unemployed just before duration t, or, more generally, the probability that the event of interest has not occurred by time t.[4]

Model 1

$$S(t) = P(T \geq t)$$

To evaluate the influence of several covariates on the survival time T, parametric accelerated failure time (AFT) models were used. Lindsey and Ryan (1998) review the use of parametric models for the analysis of interval-censored data. The AFT model allows the covariates to directly accelerate time in a baseline survivor function, which is the survivor function when all covariates are zero. The AFT assumption allows for the estimation of an acceleration factor that can capture the direct association of an exposure with survival times. Thus, the estimated parameters quantify the corresponding association of a covariate with the mean survival time in unemployment.

In the AFT model, the natural logarithm of the survival time $\ln(T)$ is expressed as a linear function of the covariates:

Model 2

$$\ln(T) = \beta_0 + X\beta + \sigma\varepsilon$$

where β_0 is the intercept, β is a vector of parameters, X is a vector of explanatory variables, σ is an unknown scale parameter, and ε is the random error term assumed to come from a known distribution.

Exponential, Weibull, log-normal, log-logistic and generalised gamma are implemented as AFT models. The parameters are estimated by maximum likelihood (Klein & Moeschberger, 2003). We compare parametric models in the usual way. If they are nested, the likelihood-ratio test can be used to verify a significant deviation from the more parsimonious model. If they are not, the Akaike information criterion (AIC) can be used to select the best fit.

For considering the possible presence of unobserved heterogeneity due to omission of relevant variables and/or measurement errors, we incorporated in the model a random factor α uncorrelated with the rest of explanatory variables, as follows

Model 3

$$h(t / \alpha) = \alpha h(t)$$

where the frailty component (α) is a random positive quantity and $h(t)$ is a nonfrailty hazard function.

The hazard function, denoted by $h(t)$, is expressed as

Model 4

$$h(t) = \lim_{\Delta t \to 0} \frac{P(t \leq T < t + \Delta t | T \geq t)}{\Delta t}$$

The commonly used two types of distributions for the factor α are: (1) Gamma distribution and (2) Inverse Gaussian distribution, with unit mean and finite variance θ.

5 | RESULTS

We present the results from the nonparametric and iterative procedures suggested by Turnbull (1976) to estimate the survival function for interval-censored data, and we also use parametric regression models that take into account the covariate-association. Specifically, we present analysis on the determinants that influence the time that it takes higher education graduates to obtain their first job in Spain.

The dataset surveyed 22,560 university graduates who finished their degrees in the 2009–2010 academic year and were surveyed approximately four years after graduation. The information was collected using a combined method of gathering information through a web questionnaire, individual telephone interviews and the use of administrative data. Respondents were asked to fill out the questionnaire online, and if they did not return the questionnaire within a set time, they were then contacted by phone. The administrative information sources used were the Integrated University Information System, Affiliations and Contribution Bases from the Social Security Revenue Office, Contracts and Jobseekers from the State Public Employment Service and the State Disability Database. The variable of interest is the duration until the first transition to employment for the graduates. Table 3 presents the descriptive statistics of the sample.

Using Turnbull's algorithm, we obtained the estimated survival function. Approximately 25%, 50% and 75% of degree graduates found their first job after finishing their studies within three, nine and 21 months, respectively. This result highlights the association of the economic and financial crisis with the length of the transition process to first employment. Before the crisis, approximately only 50% of graduates in Spain obtained their first job in six months or less (Salas-Velasco, 2007). It confirms the previous results established in the literature on the transition from university to work, in which individuals increase their search efforts as job competition falls and the probability of receiving a job offer rises. Thus, job search intensity is inversely related to the unemployment rate (Wadsworth, 1991).

TABLE 3 Descriptive statistics of the sample (university graduates)

Graduate characteristics	Percentage
Abro	
Yes	14.30
No	85.70
Acse	
Yes	11.19
No	88.81
Age	
<30 years	63.99
30–34 years	25.69
>35 years	10.32
Exce	
Yes	2.64
No	97.36
ICT	
Basic knowledge	22.35
Advanced knowledge	62.72
Expert knowledge	14.93
Lang (second language)	
Yes	90.86
No	9.14
Loc	
Andalusia	12.81
Aragon	4.47
Asturias	3.68
Balearic Islands	2.02
Canary Islands	3.95
Cantabria	2.13
Castile and Leon	8.48
Castile—La Mancha	3.11
Catalonia	9.67
Valencia	8.62
Extremadura	3.96
Galicia	7.11
Community of Madrid	14.63
Murcia	4.94
Navarra	3.07
Basque Country	6.17
La Rioja	1.19

TABLE 3 (Continued)

Graduate characteristics	Percentage
Mast	
Yes	33
No	67
Pract (participated in curricular or extracurricular activities)	
Yes	79.21
No	20.79
Sex	
Women	62.26
Men	37.74
Subj	
Sciences	6.11
Social and Legal Sciences	45.81
Engineering and Architecture	24.25
Health Sciences	18.31
Arts and Humanities	5.52
Univ	
Private	12.96
Public	87.04

Source: Prepared by the authors based on the INE survey on the labour market insertion of university graduates.

TABLE 4 Model comparison statistics (non-frailty models)

	Exponential	Weibull	Log-normal	Log-logistic
Variable	30	30	30	30
Number of parameters		1	1	1
Log-likelihood	−29,068.737	−29,068.641	−27,908.824	−28,517.066
AIC	58,199.474	58,201.282	55,881.648	57,098.132

Source: Authors.

The duration of time-to-first-job models were separately estimated using the exponential, Weibull, log-normal, and log-logistic models. The models' comparison statistics are presented in Table 4. When models were nested, we used the likelihood-ratio test or the Wald test to discriminate between them (Weibull versus exponential, or gamma versus Weibull or log-normal). When the models were not nested, we used the Akaike Information Criterion (AIC) (Akaike, 1974). Based on both the Wald test and AIC, the Log-normal model was finally selected.

Table 5 shows the parameter estimates of the Log-normal model for the duration times of the graduates without unobserved heterogeneity (we have used a Gamma distribution for unobserved heterogeneity). The coefficients are interpreted as the direction of the influence of a variable on the survival and probability of exit. Thus, a positive coefficient means that the time-to-first-job is decelerated by a unit-increase in the covariate.

The estimate of the frailty variance component θ is near zero, and the p-value of the test of H_0: $\theta = 0$ equals one, indicating negligible heterogeneity as a consequence of omission of relevant variables and/or measurement errors. In fact, the empirical results remain robust, so the parameter estimates are the same in the Log-normal model with and without unobserved heterogeneity.

TABLE 5 Lognormal AFT model estimates of the duration time of the graduates

	Non-frailty model	
Variable	**Estimate**	**Standard error**
ABRO	−0.119***	0.021
ACSE	−0.184***	0.019
EXCE	−0.093*	0.047
ICT1	−0.007	0.021
ICT2	−0.229***	0.030
LOC1	−0.251***	0.042
LOC2	0.033	0.046
LOC3	−0.277***	0.058
LOC4	−0.043	0.045
LOC5	−0.132**	0.057
LOC6	−0.079**	0.035
LOC7	−0.009	0.051
LOC8	−0.455***	0.033
LOC9	−0.138***	0.034
LOC10	−0.009	0.045
LOC11	0.034	0.036
LOC12	−0.320***	0.031
LOC13	−0.111***	0.042
LOC14	−0.367***	0.050
LOC15	−0.265***	0.038
LOC16	−0.380***	0.074
MAST	−0.167***	0.017
PRACT	−0.066***	0.020
SEAR	0.758***	0.014
SEX	−0.041**	0.017
SUBJ1	−0.070*	0.036
SUBJ2	−0.151***	0.030
SUBJ3	−0.253***	0.033
SUBJ4	−0.762***	0.034
UNIV	−0.085***	0.025
Intercept	2.093***	0.057
σ (scale)	1.060	0.005

Note: Likelihood-ratio test of $\theta = 0$: $\chi^2(01) = 0.00$ Prob >= chibar2 = 1.000.

Source: Authors.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

The criterion for inclusion of a variable in the model was stepwise selection. The age (*AGE1* and *AGE2*) and foreign language knowledge (*LANG*) variables were not selected. This indicates that these variables were not the most crucial factors influencing the time that it took higher education graduates to find their first job in the analysed economic and financial crisis period. We observed that the gender of the graduate (*SEX*) is related to the time-to-first-job. The exponent of the estimated coefficient indicates that the average time-to-first-job was

approximately 4.1% shorter for men than women. Also noteworthy, while 26.81% of men who graduated in 2010 were hired as employees on temporary contracts, the percentage for women was 37.17%.

With respect to the variables related to the subjects of study (*SUBJ1*, *SUBJ2*, *SUBJ3* and *SUBJ4*), we observed that the time-to-first-job was approximately 6.77%, 14.04%, 22.37% and 53.35% shorter for graduates whose areas of study were Sciences, Social and Legal Sciences, Engineering and Architecture, and Health Sciences, respectively, when compared to those in Art and Humanities. We note that according to human capital theory, students choose their subject of study based on its profitability.

The results for the type of higher education institution (*UNIV*) at which graduates obtained the university degree indicated that graduates of private institutions had an unemployment time 8.13% shorter on average than those who studied at public institutions, but the graduates of private institutions also bore higher costs. Of degree graduates from public institutions, approximately 25%, 50% and 75% went into the labour market within three, nine and 21 months, respectively. Degree graduates from private institutions exited unemployment within three, four and a half, and fifteen months, respectively. Nevertheless, the INE Survey on the Expenditures of Households in Education (2011–2012 academic year) calculated that the average annual expenditures per student were 1,339 € in public institutions and 5,664 € in private institutions. This result could reflect the socioeconomic status of families. Also, previous studies show that parental education level influences graduates' access to a first job. The higher the level of education the shorter the transition because these graduates have more and better personal contacts. This often occurs in Spain where there are mainly small and medium-sized firms and recruitment is done through recommendations. In the literature on the job search process, it has been observed that good jobs are usually found through informal referrals from friends and relatives. Additionally, private universities primarily offer marketable university degrees such as Computer Science, Engineering, or Business Administration/Management.

It is also important to note that the time required for initial employment was significantly influenced by whether the graduates had spent part of their studies abroad (*ABRO*). The unemployment periods were 11.19% shorter on average for those who had done so. As previously mentioned, students who become internationally mobile are considered to have innate abilities, ambitions, and preparedness to be mobile, which are features highly valued by employers. In addition, graduates with international experiences during their studies consider a wider geographical range of job offers (Teichler & Janson, 2007).

As expected, the graduates that obtained a master's degree (*MAST*) remained unemployed longer. We assumed that their job search intensity is lower since they continue studying. Nevertheless, it is expected that this group of individuals will increase its competitiveness in the job market through their investments in knowledge. The unemployment durations were 15.36% shorter for graduates who did not obtain a master's degree.

The result of the relationship between knowledge of ICTs (*ITC1* and *ITC2*) and the probability of remaining unemployed suggests that graduates with expert knowledge were more likely to exit unemployment. The time-to-first-job was 20.46% shorter for graduates with expert knowledge than for those with basic knowledge. This result indicates that ICT expert knowledge is a competence and ability valued by employers. According to Pineda-Herrero et al. (2016), a key variable in obtaining high-quality employment is the mastery of ICTs.

Furthermore, the results for job experience during university studies (*PRACT*) indicated that graduates with such experience (curricular or extracurricular practices) started jobs sooner than others. In fact, the time-to-first job was 6.35% shorter for those with such experience than for those without it. This is an important result because it confirms that employers use trial periods or previous individual employment records as sources of information about job seekers. In fact, employers' hiring decisions are made under uncertain conditions because the match between job applicants' capabilities and the skills required for jobs cannot be readily determined. Nevertheless, this screening problem is solved by the previous information about job seekers.

Regarding the *EXCE* variable, which is used in the study as a proxy variable for the ability of the graduate, the analysis shows that graduates who received a scholarship for excellence were more likely to exit unemployment. The time-to-first-job was 8.91% shorter on average for those who received an excellence scholarship for academically high performance.

It is also important to note that the time required for initial employment was approximately 36.55%, 31.63%, 30.72%, 27.38%, 24.17%, 23.24% and 22.22% shorter for graduates from the Autonomous Communities of Catalonia, La Rioja, Navarra, Community of Madrid, Balearic Islands, Basque Country and Aragon, respectively, than those from Andalusia.

Finally, regarding the *SEAR* and *ACSE* variables, the results confirm the relationship between job search intensity and the probability of receiving and accepting a job offer. Graduates who waited until degree attainment to start looking for a job remained unemployed longer. In fact, they had unemployment durations two times longer than those who started looking for a job before the end of their studies. Moreover, the time-to-first-job was 16.77% shorter on average for those who actively looked for an employment.

6 | CONCLUSION

The employability of higher education graduates is a complex issue and currently constitutes one of the key measures for the quality and efficiency of education systems. For this reason, this study improves the understanding of the determinants that influence the time it takes higher education graduates to find their first job.

The empirical analysis presented in this article was performed using a dataset of university graduates who finished their degrees in the 2009–2010 academic year and were surveyed four years after graduation. This analysis is the first to study the employability of university graduates in Spain after the economic and financial crisis using the framework of parametric and nonparametric techniques of duration models and Job Search Theory.

This research reveals that 50% of degree graduates found their first job after finishing their studies within nine months. This result is worse than before the crisis, when 50% of the graduates in Spain obtained their first job in six months or less; in the case of Norway, the Netherlands, the United Kingdom, and Finland this percentage of graduates was 80% (Salas-Velasco, 2007).

Moreover, this study shows gender inequities in education and employment in terms of preferences for subjects of study and the transition to first employment. As expected, the results indicate that the gender of graduates is related to the time required for initial employment. This highlights the fact that recent graduates who are men had a higher probability of exiting unemployment than women. This result is in accordance with findings from Salas-Velasco (2007) which show that in comparison to men, women are less likely to find their first job in less than eighteen months. Examples of efforts to address this issue include the promotion of gender equality in the EU Horizon 2020 agenda, through new methods to achieve greater gender equality in science, and by the Strategic Engagement for Gender Equality 2016–2019 to increase the labour market participation of women.

We can conclude that graduates whose areas of study were Social and Legal Sciences, Engineering and Architecture and Health Sciences had a shorter unemployment period than those who studied Art and Humanities. This is an important result because it confirms that students have realistic perceptions of their employability prospects in the labour market since Art and Humanities had the smallest percentage of graduates with only 10.9%.

Furthermore, we find that graduates who studied at private higher education institutions had a shorter unemployment period but also bore higher costs than those who studied at public institutions. Thus, approximately 75% of degree graduates exited unemployment within 21 and fifteen months for public and private universities, respectively. In the case of private institutions, the annual average expenditure per student was 323% higher than for those from public institutions.

The results suggest that graduates who had international experiences during their studies were more likely to exit unemployment, which may be caused by the fact that employers consider them more mobile workers. In fact, such international experiences offer graduates the potential to develop communication skills and abilities related to cultural intelligence, which allow them to adapt to new cultural contexts (Crossman & Clarke, 2010). Therefore, mobility contributes to combating youth unemployment, which is an objective that is prominently featured in the Europe 2020 strategy for growth and jobs. For this reason, the European Commission encourages institutions

to more systematically incorporate learning mobility into curricula, eliminate unnecessary barriers to switching institutions between the bachelor's and master's levels, and to engage in cross-border cooperation and exchange.

Moreover, graduates with expert or advanced knowledge of ICTs were more likely to exit unemployment. This result proves that these competences and abilities are valued by employers. For this reason, the European Commission will develop a digital readiness model to help higher education institutions, their staff and their students implement digital learning strategies and harness the potential of state-of-the-art technology, including learning analytics.

In addition, we demonstrated that graduates who obtained job experience during their university studies took less time to find a job than inexperienced ones. This is an important result because it confirms that employers use probationary periods or previous individual employment records as sources of information about job seekers. In fact, employers' hiring decisions are made under conditions of uncertainty since the match between job applicant capabilities and the skills required by the job cannot be readily determined. Nevertheless, this screening problem is solved by previous information about job seekers. The results confirm the relationship between job search intensity and the probability of receiving and accepting a job offer. Thus, graduates who started looking for a job after completing their degree remained unemployed longer.

Higher education students (regardless of their discipline) need to acquire advanced transversal skills and key competences that will allow them to thrive. High-level digital competences, autonomy, critical thinking and capacity for problem solving are increasingly crucial attributes.

Higher education has a duty to ensure that content is up to date, provide relevant study programmes in fields where skills shortages exist and develop methods of teaching and learning that allow students to acquire the breadth and depth of skills they need.

Furthermore, in this study, we demonstrated the usefulness of duration models for understanding the employment of higher education graduates in Spain, to improve knowledge of this complex process of employability. Thus, to develop effective policies, we highlight the need for more research on the labour market insertion of university graduates. In this sense, higher education institutions have a key role in delivering on the EU strategy to propel and maintain growth and jobs by contributing to effective and efficient higher education systems. Moreover, although the main measures enacted during the economic crisis to support the employment of young people have focused on reducing unemployment, it is important that more measures are established to foster stable employment.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ENDNOTES

[1] An excellent introduction to Job Search Theory is provided in Devine and Kiefer (1991).

[2] The National Institute of Statistics (INE) in Spain is a legally independent administrative autonomous institution assigned to the Ministry of Economic Affairs and Digital Transformation.

[3] Duration models are also known as event history analysis in sociology, survival analysis in health sciences, hazard models in biostatistics or epidemiology and failure-time models in engineering. They are a statistical method for studying the occurrence and timing of events.

[4] Exact right-censored and left-censored failure time data are special cases of interval-censored data. The exact failure time data occur when the censoring interval is reduced to a single point and the interval-censored data become right-censored data or left-censored data when the right boundary of the interval is infinity, or the left boundary is zero (Lindsey & Ryan, 1998).

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How to cite this article: Cordón-Lagares, E., García-Ordaz, F., & García-del-Hoyo, J. J. (2022). The transition from higher education to first employment in Spain. *European Journal of Education*, *00*, 1–15. https://doi.org/10.1111/ejed.12525