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Case Report

Transitioning from the University to the Workplace: A Duration Model with Grouped Data

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Abstract: Labor market surveys usually measure unemployment duration in time intervals. In these cases, traditional duration models such as Cox regression and parametric survival models are not suitable for studying the duration of unemployment spells. In order to deal with this above issue, we use Han and Hausman's ordered logit model for grouped durations, which has more flexibility than standard specifications. In particular, its flexibility arises from the fact that we do not need to specify any functional form for the baseline hazard function—it also circumvents problems associated with heterogeneity. The focus of interest is on the first unemployment duration of higher education graduates. The analysis is accomplished by using a large dataset from a graduate survey of Spanish university graduates. The results show that the university-to-work transition of higher education graduates is significantly associated with the graduate's age, participation in internship programs, field of study, type of university, and gender. Specifically, graduates who participated in internship programs, engineering graduates, and graduates from private universities experience a smooth transition.

Keywords: higher education; Han–Hausman ordered logit model; survival analysis; university-to-work transition

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1. Introduction

Employability can be defined as an individual's ability to obtain a job that is appropriate for his or her educational level [1]. The employability of university and college graduates has become an essential component of discussions about accountability in higher education. The main reason is related to the fact that higher education studies are a costly investment for society, bearing in mind that they are highly subsidized in many OECD countries. A college education is also a significant personal investment—in terms of both time and money—that helps young people build their skills and prepare for high-skilled jobs. Understanding the university-to-work transition is therefore vital to improving efficiency in the use of resources in higher education [2]. Among other aspects, we need to know whether graduates found their first job soon after finishing their university education. Long periods of unemployment depreciate human capital and generate unhappiness [3,4]. Similarly, we need to know if they used their university knowledge and skills to their full potential in their first job. Investments in higher education would be a waste of resources for individuals and society if university and college graduates ended up taking high school graduates' jobs. This last aspect is relevant in countries such as the U.S.A., where students end up with important debts from the loans taken to finance their university studies, which they must repay once in the labor market. However, this issue is not straightforward. We cannot blame universities if their graduates cannot find a suitable job quickly. Technological developments (including growing digitalization, automation, and AI) and the creation of highly qualified positions in the economy, along with the structure of the labor market, are essential as well. For example, the U.S. labor market is more flexible, whereas European structures are too bureaucratic and inflexible. Even cultural aspects also matter. In Europe,

in comparison with the United States, the mobility of students and graduates is much lower. Those factors may influence the optimal transition from university to employment (in terms of speed and quality).

In this context of the relationships between higher education and employment, the current study aims to investigate the factors affecting the time it took for Spanish university graduates to obtain their first job after completing their academic programs. Specifically, we address the following research questions (RQs): (RQ1): How fast did Spanish graduates of higher education acquire their first job? Are there differences between the results for the overall sample and for the sub-sample of well-matched graduates (i.e., those who work in a job for which a university degree is required)? (RQ2): What is the role of academic and socio-demographic variables in accelerating the transition into a first (and adequate) job? To answer these questions and look into some of the factors speeding up or slowing down access to the first job upon graduation, we propose an ordered logit model for grouped duration data, as suggested by Han and Hausman [5]. Its flexibility arises from the fact that we do not need to specify any functional form for the baseline hazard function. It also circumvents problems associated with heterogeneity, that is, the influence of unobserved risk factors in a duration model (such factors are typically unknown and thus cannot be explicitly included in the analysis). Moreover, a particular advantage of the specification is that the true parameters of the covariates are invariant to the length of time intervals that are chosen. Our case study is novel since, despite its popularity in applied research, applications of Han and Hausman's ordered logit model to the graduate labor market are rare (some exceptions are [6,7]).

Our empirical application relies on graduate surveys, which are required to answer the above research questions. Despite their scarcity, Spain joined other countries that have studied the entry of young higher education graduates into working life (e.g., Italy, France, the United Kingdom, Sweden, and Canada). Nevertheless, the information available from those graduate surveys suffers from a lack of comparability. Therefore, comparative international studies are difficult to undertake in this area. In this article, we used the first survey of university graduates' labor insertion in Spain (hereafter EILU2014). The Spanish National Institute of Statistics (INE) carried out the survey between September 2014 and February 2015. Approximately 30,000 university graduates from the 2009–2010 academic year were interviewed using a combination of methods, including direct interviews (via the Web and telephone) and administrative data. We must clarify that the respondents finished their degrees before the university reform in 2010 (called the Bologna reform). Then, in Spain, there were short-cycle degrees such as nursing, quantity surveyors, etc. (equivalent to undergraduate studies) and long-cycle degrees such as law, medicine, etc. (equal to graduate programs). Thus, the EILU2014 sample included ISCED-97 5A level (bachelor's and master's or equivalent) graduates. In this article, we use the terms higher education graduates and university graduates interchangeably to refer to the Spanish (under)graduates. Specifically, 30,379 university graduates from Spanish universities were interviewed: 86% attended public universities and 14% attended private universities. By gender, 40.3% of the graduates were male, while 59.7% were female. The EILU2014 survey has already been used to provide interesting insights about the role of internships and international student mobility programs on the labor market outcomes of recent higher education graduates in Spain (e.g., [8,9]), and the mismatches and job mobility in their early careers (e.g., [10,11]). However, the transition duration from the university to the workplace remains a topic that needs further attention.

2. Background

The transition from education to work has generally become more difficult for young people in recent years, but university graduates have remained in a better position than their counterparts with lower or intermediate education [12]. Even though having a university degree provides some protection against unemployment, the economic downturn in many developed nations, combined with the increased graduation rate over the past ten years,

has resulted in the greatest challenges for recent university graduates seeking jobs in OECD nations. Moreover, graduates who manage to find a job often fail to match their degree qualifications. Research on the labor market outcomes of new university graduates has, thus far, mostly examined the time it took them to find their first job and the (mis)match between education and employment (e.g., [7,11,13–15]).

For the past few decades, a recurrent feature among many OECD countries has been the significant rise in higher education enrolments. There has been widespread credential, or degree, inflation. The annual influx of higher education graduates into the workforce has led to an increased likelihood of part-time, temporary, or informal employment for younger individuals. In some countries, such as Poland, increased involvement in higher education resulted in faster transitions to the labor market, but with a poor job–education match, despite initial job stability [15]. Poland experienced a crowding-out effect among higher education graduates, resulting in overqualification [16].

Labor market mismatches can be caused by either overeducation or overskilling [17] (overeducated or overqualified: a person has more formal education than the current employment demands; overskilled: an individual is unable to fully utilize their talents and abilities in their current position). The mismatch between educational requirements for various occupations and the quantity of education obtained by workers is big and expanding over time [11,13,18]. In 2010, for example, just 62 percent of U.S. college graduates held a job that required a college degree [19]. Countries with a relative oversupply of highly qualified people have greater levels of graduate overeducation [20]. There is also evidence that many college graduates are working in professions that do not require a degree and do not fully utilize the abilities they obtained in college [17]. This phenomenon is known as "occupational filtering down". This refers to the shift of educated people into lower-level jobs as education expands [21]. The most basic explanation of this phenomenon is that higher education serves as a filter to select the most capable individuals. The economic theory of "market signaling" conceded that education did not produce job skills and was simply used by employers as a signal that may be associated with attractive personnel [22]. Insisting on a college degree for traditional non-degree jobs looks to be an un-needed and harmful screening technique. However, situations of educational and skill mismatch may also originate on the demand side of the labor market. Employment growth is "polarizing" into relatively high-skill, high-wage occupations and low-skill, low-wage jobs—to the detriment of "middle-skill" jobs [23]. Higher education graduates will choose the first option only if an economy can provide highly qualified positions in fields such as biomedicine, telecommunications, and so on. Otherwise, university graduates will outcompete high school graduates for jobs. The argument that "college is worth it" because of the strong economic benefits associated with having a college degree frequently misses the importance of this phenomenon in deciding employment and salaries. With high college tuition costs and substantial debt from graduates who took out loans to pay for their education, this is a severe issue in nations like the United States.

Another important topic in the analysis of the job market for university graduates, which is the focus of this article, is the duration between graduation and employment. Graduate surveys have been the best tool to study university-to-work transitions. They are widely used to measure higher education outcomes because they provide concrete information that is useful for a wide variety of stakeholders, including policymakers, higher education institutions, and prospective students. Statistics Canada, for example, developed the National Graduate Survey (NGS), which allows for studying graduates' labor market. Using the first waves of the NGS, ref. [24] focused on the time it took Canadian graduates to start a full-time job that lasted six months or more. They analyzed the duration of the first job using the Cox proportional hazards model: Ph.D. graduates experienced shorter durations relative to other graduates, and married graduates had quicker transitions than non-married ones, but those with children had somewhat longer transitions than those without children. In 1999, for the first time in Europe, a large representative survey was conducted to compare the position of graduates from higher education institutions in a

significant number of European nations. About four years after graduation, university graduates from eleven nations who completed their degrees in the 1994–1995 academic year were surveyed. The study was titled CHEERS (Careers after Higher Education: A European Research Survey). Based on this dataset, ref. [25] analyzed the factors that explained the duration of the first unemployment spell using the Cox proportional hazards model and the log–normal parametric model. Among other results, his analysis showed that university degrees in health, computing, architecture, and business reduced the first period of unemployment considerably. Other recent studies have also confirmed that certain university degrees are more marketable than others, in the sense that they guarantee a faster entry into employment (e.g., [15]).

When explaining this transition, some studies have also focused on the role that the quality of the university and grades obtained in the university degree play in illustrating the university-to-employment transition. Ref. [26] adopted a multilevel approach to the analysis of the time to get the first job. Using a large dataset from a survey on job opportunities for 1992 Italian graduates (Italian National Statistical Institute), they demonstrated that information related to academic ability (final marks) had a positive effect on the probability of obtaining the first job after graduation. Next, using a large-scale European survey among higher education graduates (the Reflex graduate survey), ref. [7] studied the transition from university to work in Europe. Han and Hausman's ordered logit model estimation results for duration data for 17,327 individuals revealed that, when they finished their university degrees, European graduates with higher average grades—compared to other students (classmates) who graduated from the same study program—had a higher probability of finding their first job sooner, ceteris paribus. Employers may perceive strong grades (or marks) as a favorable indicator of productivity or effort if they correlate school success with workplace success.

Finally, it is also important to explore how gender differences and socioeconomic status (SES) influence graduates' employability. Applied research in the university-to-employment transition has shown interest in knowing if there are statistically significant differences in the time necessary to obtain the first job after graduation between male and female graduates. Ref. [24] for Canadian graduates (National Graduate Survey) and [7,25] (2007, 2011) for European graduates (CHEERS and REFLEX surveys, respectively) found a first unemployment length longer for female graduates than for their male counterparts after controlling for other variables. More recently, a systematic review has demonstrated that higher education graduates from lower SES backgrounds have more difficulty finding suitable employment and often experience lower success rates (e.g., longer unemployment) when transitioning to work [27]. SES is usually operationalized by parental education, parental occupation, and parental income.

3. Length of Time to the First Job: An Exploratory Analysis

The current study aims to characterize the factors that shape the transition from university to work in Spain, considering the graduates' characteristics and the effects pertaining to degree programs and universities. For this, we used microdata included in the EILU2014, a nationally representative random sample of Spanish universities and graduates. Specifically, a total of 30,379 university graduates of the class of 2010 were surveyed four years after graduation: 94.1% had already found a first job (28,580 cases); 4.6% had never worked but had sought employment sometime after completing the degree (1393 cases); and 1.3% had never looked for a job after leaving university (406 cases). Table 1 shows, in seven intervals, the time elapsed since the completion of higher education studies and the achievement of the first job (variable labeled as TIME). (We must emphasize that around 65% of these graduates obtained a full-time job, although a significant percentage of them were employed on a temporary contract or as trainees). In general, the entry into employment of Spanish graduates was relatively rapid: 52% of university graduates needed less than three months to find their first job, including a notable percentage of them who continued with a job they already had during their studies.

Table 1. Time elapsed since receiving a university degree and finding first employment *.

TIME	* Intervals as They Appeared in the Survey	Full Sample		Subsample	
		Observations	Percentage	Observations	Percentage
0	S/he continued for at least 6 months in the work s/he had while studying	7819	27.36	4396	26.04
1	Less than 3 months	6916	24.20	4714	27.92
2	From 3 to 6 months	3290	11.51	1891	11.20
3	From 6 months to 1 year	3538	12.38	2189	12.97
4	From 1 year to a year and a half	2466	8.63	1388	8.22
5	For 1 year and a half to 2 years	1506	5.27	821	4.86
6	More than two years	3045	10.65	1484	8.79
	Total	28,580	100.00	16,883	100.00

To get a clearer picture of the transition to employment that occurs upon graduation, we also consider the extent to which college graduates are working in college jobs. Rapid transitions might be attributed to graduates accepting positions that do not require a college education. On the contrary, a longer job search period may be seen as an investment in achieving a better job match. A qualification mismatch occurs when a worker's educational attainment is higher or lower than that required for their position. Workers are classified as overqualified if their qualification level exceeds that required by their job and underqualified if the converse is true [28]. In the context of the graduate labor market, a graduate in a job requiring sub-degree-level qualifications (or no qualifications at all) is also defined as overeducated [29]. There are a variety of ways to actually measure the education needed to do a particular job. EILU2014 used a "self-assessment" technique whereby survey respondents were asked directly about the minimum education level needed to do their jobs. In this regard, we see in Table 1 that 16,883 respondents had an adequate insertion into employment, which represented around 60% of the population of university graduates. By adequate insertion, we refer to the fact that the most appropriate level of formal education to perform the first job was a university education. Considering the employment match, 54% of respondents needed less than three months to find their first job, including immediate insertion (TIME = 0). In this subsample, around 73% of graduates obtained a full-time job (a significant percentage of them were employed on a temporary contract or as trainees).

Finally, we highlight the fact that some university qualifications are more marketable than others. In general, the university-to-work transition was relatively quick; however, we see differences in degree subjects. As can be seen in Table 2, the fastest transition was for graduates in engineering and architecture; around 60% found their first job in less than three months. Conversely, the transition period was more extended among graduates in hard sciences (biology, chemistry, etc.) Nevertheless, the information in Table 2 was only descriptive and insufficient to know in depth the university-to-work transition patterns. A more in-depth analysis should take into account, simultaneously, other factors such as gender, age, etc. In the following section, we will explain the econometric methodology necessary to study which factors accelerated or slowed down the process of insertion of graduates into employment.

Table 2. How long did it take graduates to find their first job? An analysis by field of study.

TIME	Intervals as They Appeared in the Survey	Arts and Humanities		Hard Sciences		Social and Legal Sciences		Engineering and Architecture		Health Sciences	
		Percentage	Accumulated Percentage	Percentage	Accumulated Percentage	Percentage	Accumulated Percentage	Percentage	Accumulated Percentage	Percentage	Accumulated Percentage
0	S/he continued for at least 6 months in the work s/he had while studying	33.19	33.19	22.57	22.57	31.77	31.77	28.01	28.01	10.99	10.99
1	Less than 3 months	16.04	49.23	18.93	41.50	19.83	51.60	29.24	57.25	39.76	50.75
2	From 3 to 6 months	8.46	57.69	11.79	53.29	11.20	62.80	12.29	69.54	13.29	64.04
3	From 6 months to 1 year	9.19	66.88	12.63	65.93	11.65	74.45	9.33	78.87	22.03	86.07
4	From 1 year to a year and a half	11.10	77.97	12.92	78.85	8.79	83.24	6.45	85.32	6.86	92.93
5	For a year and a half to 2 years	7.52	85.49	7.79	86.64	5.38	88.63	4.43	89.74	2.86	95.79
6	More than 2 years	14.51	100.00	13.36	100.00	11.37	100.00	10.26	100.00	4.21	100.00
	Total	100.00		100.00		100.00		100.00		100.00	
	Observations (**full sample**)	2874		2747		12,599		6484		3876	
0	S/he continued for at least 6 months in the work s/he had while studying	37.74	37.74	20.50	20.50	31.37	31.37	29.86	29.86	7.56	7.56
1	Less than 3 months	15.66	53.40	22.25	42.74	22.51	53.88	31.44	61.30	43.01	50.57
2	From 3 to 6 months	8.15	61.55	11.12	53.87	10.63	64.51	11.74	73.03	13.16	63.73
3	From 6 months to 1 year	9.11	70.67	13.36	67.23	11.45	75.97	8.22	81.26	23.90	87.63
4	From 1 year to a year and a half	10.27	80.94	12.64	79.87	8.97	84.93	5.86	87.11	6.55	94.18
5	For a year and a half to 2 years	6.87	87.80	7.68	87.55	5.28	90.21	4.16	91.27	2.52	96.69
6	More than 2 years	12.20	100.00	12.45	100.00	9.79	100.00	8.73	100.00	3.31	100.00
	Total	100.00		100.00		100.00		100.00		100.00	
	Observations (**subsample**)	1558		1654		6312		4183		3176	

4. Methodology

4.1. Duration Models

An event is a transition from one state to another, that is, from an origin state to a destination state. The modeling of event times—the dependent variable is the duration until event occurrence—is also known as hazard modeling, survival analysis, or duration analysis. It has its roots in biometrics and industrial engineering and has been increasingly used to model duration time in labor economics since Lancaster's paper on unemployment [30]. In this section, we provide an overview of duration models and propose a model for explaining the university-to-work transition of Spanish (under)graduates. We assume the survival time T to be a non-negative random variable that describes the time it takes for an event to occur. In the current study, the survival time is defined as the time elapsed between the end of the university ($T = 0$) and starting the first job after the degree was obtained (failure time $T = t$). The hazard function (or hazard rate) indicates the instantaneous rate of failure at $T = t$, assuming survival until time t. In our scenario, the hazard function indicates the likelihood of obtaining a job at $T = t$, given that he or she has survived until t. The hazard function, $h(t \mid X)$, is dependent on the covariates X (under the assumption that the explanatory variables are not time-dependent). An estimation of the hazard function can be carried out using semiparametric and parametric duration models. Among the first, Cox's model of proportional hazards is widely used in survival analysis [31].

The Cox proportional hazards regression model states the hazard function as a function of two components following a multiplicative specification. This is indicated as follows:

$$h(t|\mathrm{X}) = h_0(t)\exp(X\beta) \tag{1}$$

where the baseline hazard h_0 ($\bullet$) involves t but not X; the second component involves X but not t. The nice thing about this model is that the baseline hazard is given no specific parametrization and is left un-estimated.

Alternatively, we can estimate parametric duration models (accelerated failure time models) with assumptions about the form of the baseline hazard. This is indicated as follows:

$$h(t|\mathrm{X}) = h_0(t\,\phi(X,\beta))\phi(X,\beta) \tag{2}$$

However, these models have two major issues: (i) unobserved heterogeneity, which is primarily caused by an insufficient specification, and (ii) the shape of the hazard function (exponential, Weibull, log–normal, etc.). (Economic theory is not very informative on the precise form of the hazard function). To avoid these problems, especially the second one, Cox's model is widespread in survival studies. In practice, however, we must test if the assumption of proportional hazards is satisfied by our data.

In any case, the parametric models and Cox's model include density function terms in their likelihood functions, which are only suitable for estimation from continuous duration data. If they were employed to model grouped (or interval-level) duration data, the results would be inconsistent [32]. Indeed, the literature on survival analysis mostly deals with cases where time is measured as a continuous variable (e.g., [33–36]). On the contrary, Han and Hausman's approach is an appropriate method when duration models are to be estimated from interval-level data arising from the grouping of underlying continuous duration times [37]. In the EILU2014, the dependent variable was grouped into seven time intervals (Table 1), which makes Han and Hausman's ordered logit model for duration data an attractive econometric instrument for the present estimation problem.

4.2. Grouped or Discrete-Time Duration Data

Grouped duration data arises when each duration is only known to fall into a certain time interval, such as a month or even a year: $[0, t_1)$, $[t_1, t_2), \ldots,$ $\left[t_j, t_{j+1}\right), \ldots$ Under interval censoring, none of the event times are observed exactly. For example, in the second column in Table 1, the time to the first job after graduation is measured using grouped survival time

in months. As previously stated, when time is discrete, classical survival and competing-risks models for continuous time become inappropriate [38,39], necessitating the use of discrete-time-specific techniques. Han and Hausman demonstrated that the ordered logit model might also be utilized to describe duration data [5].

Han and Hausman's ordered logit model is a semiparametric hazard model in which the baseline hazard is nonparametric while the function of variables takes a particular functional form, which is typically linear. The focus of the model is on the probability that an event ends after different periods of time T. The data to estimate this model are assumed to be generated as observations of failure times over discrete periods $t = 0, 1, 2, 3, \ldots, J$ for individuals $i = 1, 2, 3, \ldots, n$. This is indicated as follows:

$$t = \begin{matrix} 0 & T_1 & T_2 & T_3 & \cdots & T_J \\ 0 & 1 & 2 & 3 & \cdots & J \end{matrix} \tag{3}$$

The lower line shows the values taken by the dependent variable in the model. The model is based on the following specification:

$$\begin{aligned} y &= \beta X_i + \varepsilon_i \\ y_i = 0 \quad & if \quad y \le \mu_0 \\ 1 \quad & if \quad \mu_0 < y \le \mu_1 \\ 2 \quad & if \quad \mu_1 < y \le \mu_2 \\ \cdots \quad & \cdots \quad \cdots \\ J \quad & if \quad y > \mu_{j-1} \end{aligned} \tag{4}$$

where the dependent variable y_i is the observed time period from graduation to employment for individual i (variable labeled as TIME in Table 1). The risk of experiencing an event within a time interval is regressed on a set of covariates. The explanatory variables X include degree characteristics and graduates' personal features, and *beta* represents the parameter values of these variables. It is assumed that the explanatory variables for each individual do not vary over time. The error component accounts for several elements that the researcher cannot observe, such as measurement errors, ambient circumstances, and omitted explanatory variables. The ordered logit model assumes that the error component follows a conventional logistic distribution. The *mu*'s are unknown parameters that have to be estimated for each time period.

In addition to allowing us to treat grouped durations, Han and Hausman cited other virtues [5]. On the one hand, one advantage of this model is that the variables' parameters remain constant regardless of the duration of the observed time periods. On the other hand, it also avoids issues associated with heterogeneity (sometimes known as "frailty"). Unobserved variables, such as underlying ability, can be significant predictors of unemployment duration. This is especially troublesome for estimation results in which unobserved factors are linked with covariates of interest.

5. Factors Influencing the University-to-Work Transition Duration

In survival analysis, one aims at quantifying the effects of explanatory variables on the duration time [40]. In our study, the time to obtain the first job (in months) was grouped into seven time intervals in the EILU2014 (dependent variable TIME defined in Table 1). To explain the time-to-first job, all the explanatory variables were time-invariant for an individual (they did not change while graduates were looking for a job). These non-time-varying covariates are shown in Table 3, along with their sample means. In particular, we have taken into account those variables that the reviewed relevant literature has identified as essential in relation to the employment of fresh graduates, such as gender, age, internships, type of university, and university degrees (field of study). The EILU2014 did not provide some covariates that changed after graduation, such as a region of residence or marital status. We also did not have information about the effort and intensity of the job search. In survival analysis, one talks about unobserved heterogeneity to denote

variation not explained by covariates. Nonetheless, as we stated before, the survival model just discussed circumvents problems associated with heterogeneity (i.e., the influence of unobserved risk factors).

Table 3. Explanatory variables and descriptive statistics.

Explanatory Variable §	**Full Sample**	**Subsample**
	Mean	**Mean**
GENDER (=1 male)	0.403	0.409
AGE 1 (under 30 years old)	0.588	0.588
AGE 2 (from 30 to 34 years old)	0.254	0.241
AGE 3 (35 years old or older)	0.157	0.171
INTERNSHIP (=1 yes)	0.613	0.638
UNIVERSITY (=1 private)	0.143	0.164
FIELD OF STUDY 1 (Arts and Humanities)	0.101	0.092
FIELD OF STUDY 2 (Hard Sciences)	0.096	0.098
FIELD OF STUDY 3 (Social and Legal Sciences)	0.441	0.374
FIELD OF STUDY 4 (Engineering and Architecture)	0.227	0.248
FIELD OF STUDY 5 (Health Sciences)	0.136	0.188
Observations	28,580	16,883

§ For a group of dummy variables, the mean represents the percentage of cases in each category. For the dichotomous variables, the mean includes the percentage of cases in the category equal to 1.

Which factors accelerated and which decelerated the transition duration from higher education to employment for the graduates in our survey? Table 4 shows the estimation results of Han and Hausman's ordered logit model. All observations are taken as uncensored (all graduates had transitioned from university to the workplace four years after graduation). The effects of covariates on the transition duration are difficult to interpret in terms of the hazard ratios. However, the signs of the coefficients can be interpreted. For example, a negative coefficient increases the failure rate and therefore lowers the time-to-first job. The first columns refer to parameter estimation for the full sample (Model 1). The last columns report estimation results for the subsample considering the education–job match (Model 2). The signs of the coefficients do not vary significantly.

First, the internship variable presents a negative sign: Graduates who participated in internship programs during their university studies increase the failure rate and therefore reduce the time to obtain the first job; that is, they increase the probability of finding the first job sooner, ceteris paribus (in Models 1 and 2). This is a stimulating result when studying the employability of recent higher education graduates, even though this variable is possibly endogenous. Nevertheless, explanations of how internships can influence labor market outcomes are diverse. This effect can be due to the market value of acquired experience (internships are believed to help students build work-relevant skills), but possibly also to the contacts that graduates establish with the companies. Internships in higher education are popular not only because of individual preferences but also because colleges value internships as part of the overall educational experience. Internships require students to apply classroom learning, theories, and experiences to professional settings. Universities have been asked to better prepare their graduates for the transition to the workplace by focusing on relevant job-market competencies [41]. Internships have been highlighted as an excellent method for developing these skills [42].

Second, our estimates show that the type of university also explains the time to first employment of higher education graduates. All things equal, graduates from private universities have a faster insertion into the world of employment than those from public universities (in Models 1 and 2). However, this result should be interpreted with caution because it is an endogenous variable due to the self-selection of the graduates into the two types of universities. The choice of a private university is associated with the higher socioeconomic status and parental education of the students (e.g., [43]), and research proves that these variables accelerate the labor insertion process of graduates (e.g., [6,25,26]).

Well-educated parents pass on to their children information about the conditions of the labor market (they also have more personal contacts), as well as skills appreciated in the workplace (communication, negotiation, etc.).

Table 4. The transition from university to work: factors that speed up and slow down the labor insertion of graduates.

Variable	Model 1			Model 2		
	Coefficient		Standard Error	Coefficient		Standard Error
Index function for probability						
Constant	0.2460	**	2.29×10^{-2}	0.2363	**	3.02×10^{-2}
GENDER (=1 male)	−0.0412	**	1.56×10^{-2}	−0.0490	**	2.04×10^{-2}
AGE 1 (under 30 years old)	0.4405	**	1.69×10^{-2}	0.4772	**	2.24×10^{-2}
AGE 2 (from 30 to 34 years old)	reference			reference		
AGE 3 (35 years old or older)	−0.9576	**	2.91×10^{-2}	−0.9915	**	3.73×10^{-2}
INTERNSHIP (=1 yes)	−0.0722	**	1.61×10^{-2}	−0.0507	**	2.18×10^{-2}
UNIVERSITY (=1 private)	−0.1692	**	2.07×10^{-2}	−0.2104	**	2.58×10^{-2}
FIELD OF STUDY 1 (Arts and Humanities)	0.0301		2.83×10^{-2}	−0.0098		3.88×10^{-2}
FIELD OF STUDY 2 (Hard Sciences)	0.1732	**	2.71×10^{-2}	0.2593	**	3.47×10^{-2}
FIELD OF STUDY 3 (Social and Legal Sciences)	−0.0853	**	2.01×10^{-2}	−0.0215		2.64×10^{-2}
FIELD OF STUDY 4 (Engineering and Architecture)	reference			reference		
FIELD OF STUDY 5 (Health Sciences)	0.1363	**	2.51×10^{-2}	0.2298	**	3.03×10^{-2}
Threshold parameters for index						
Mu (1)	0.7399	**	7.47×10^{-3}	0.8832	**	1.05×10^{-2}
Mu (2)	1.1197	**	9.00×10^{-3}	1.2683	**	1.24×10^{-2}
Mu (3)	1.6258	**	1.15×10^{-2}	1.8365	**	1.61×10^{-2}
Mu (4)	2.1179	**	1.45×10^{-2}	2.3631	**	2.05×10^{-2}
Mu (5)	2.5531	**	1.79×10^{-2}	2.8336	**	2.58×10^{-2}
Ordered probability model						
Maximum likelihood estimates						
Dependent variable	TIME			TIME		
Number of observations	28,580			16,883		
Log-likelihood function	−49,567.73			−28,466.79		
Restricted log-likelihood	−51,744.17			−30,099.51		
Chi-squared	4352.888			3265.438		
Degrees of freedom	9			9		
Prob[ChiSqd > value]	0.0000			0.0000		
Underlying probabilities based on Gompertz						
Both models were run using LIMDEP (econometric software by William H. Greene)						
** Level of significance at 5%						

Third, with respect to the field-of-study variable, transition durations are longer among graduates in hard sciences, whereas health sciences degrees reflect similar effects. In particular, according to Models 1 and 2, individuals who obtained degrees such as biology, medicine, etc., extend the time to obtain the first job compared with graduates in engineering and architecture (reference category). In this regard, graduates in the hard sciences are in a worse situation than those in the health sciences. On the contrary, graduates in social and legal sciences (e.g., business, law, etc.) reduce the period of unemployment compared with graduates in engineering and architecture (only in Model 1). However, the higher speed of incorporation into the first job of graduates in social and legal sciences disappears when considering only graduates who experienced adequate insertion into employment (Model 2). In other words, the educational mismatch may give the appearance of an aggregate decline in hazard rates, simply because the high-risk observations have already experienced the event and thus exited. In the EILU2014, many graduates in social

and legal sciences took their first job quickly, but they perceived that they were overqualified or overeducated. In particular, around 35% of Spanish graduates entered non-graduate jobs when they left higher education in 2010; more than 56% of them had studied for a degree in social and legal sciences.

Fourth, compared to the reference group (30 to 34 years of age), mature graduates (over-34-year-olds) have a faster insertion than the younger ones (under-30-year-olds) in Models 1 and 2. This is because mature graduates combined work and studies, and many of them continued for at least six months in that job after finishing their studies (immediate insertion: TIME = 0). Specifically, in the EILU2014, 65.5% of graduates employed aged 35 (and over) worked while they studied and remained in that job for at least six months after graduation. The percentage dropped to 17.8% for those under 30 years of age.

Finally, differences in access to first employment are observed by gender. The estimated coefficient associated with this explanatory variable is negative and statistically significant. Thus, the university-to-work transition is faster for men than for women, ceteris paribus. According to the labor economics literature, an explanation for this finding would be that men are generally expected to receive more job offers than women, mainly due to the female labor market behavior that is (or is perceived to be) characterized by frequent interruptions. However, we must be cautious when talking about discrimination in the Spanish graduate labor market because the graduates with the quickest insertion in our survey are those in engineering and architecture, and these are typically male-dominated degrees. Concerns about the gender gap in higher education have indeed been growing for some time (e.g., [44]).

6. Conclusions

Based on a nationally representative graduate survey conducted in 2014, we analyze in this article the entry into employment of people who graduated from Spanish universities in 2010. To determine the factors that explain the time to obtain the first job after graduation, we specify and estimate a discrete-time semiparametric Han–Hausman ordered logit model. Some conclusions can be drawn from our study. First, graduates who participated in internship programs during their university studies increase the probability of finding their first job sooner, ceteris paribus. Second, all things equal, graduates from private universities have a faster insertion into the world of employment than those from public universities. Third, the university degree also explains the transition. Studies in engineering and architecture reduce the time to obtain the first job considerably. Graduates in social and legal sciences also take their first job quickly, but they perceive that they are overqualified or overeducated in their first employment. Around 35% of Spanish graduates entered non-graduate jobs when they left higher education in 2010. Finally, there is a significant gender difference in favor of males, and mature graduates have an advantage compared with the younger ones.

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