working papers

UNIVERSIDAD CARLOS III DE MADRID

YOUTH LABOUR MARKET INTEGRATION IN SPAIN: THE CONNECTION BETWEEN SEARCH TIME, JOB DURATION AND SKILL-MISMATCH *

Maite Blázquez [(1)]

Abstract

In the last years, young workers in Spain have faced great difficulties to find and maintain a job. Using the *ad hoc module* of the Labour Force Survey (2nd quarter, 2000), this paper analyses the transition process from school to work for a sample of Spanish youngsters who left education, for the first time, after 1990. We allow the search period after completing education, the duration at *first significant job*, and the probability of being under-educated at that job, to be connected in a system of simultaneous equations which is estimated by maximum likelihood. The results suggest that employment duration is negatively correlated with the length of the search period. Furthermore, we observe unobserved factors affecting, at the same time, search duration, the probability of being under-educated and employment duration.

Key Words: search time, job duration, skill-mismatch

[1]   Universidad Carlos III de Madrid y Fundación Centro de Estudios Andaluces (CENTRA) C/Bailén 50 (41001) Sevilla. SPAIN E-mail: maiteblazquez@fundacion-centra.org

1 Introduction

Labour markets in Europe have been in continual decline in the eighties and the beginning of nineties. Among all of them, the Spanish youth labor market has probably experienced the most pronounced deterioration. In spite of the rapid educational upgrading, which has mostly affected young workers, Spain has faced one of the highest unemployment rates in the OECD since the mid-eighties, with youth unemployment rates about 20 percentage points higher than the average. Most of this rise in the unemployment rate consists in the substantial lengthening of average unemployment spell, rather than in increased inflows into unemployment. This fact makes it interesting to analyze the factors affecting the length of joblessness periods, specially for those individuals who have just completed the educational system. Moreover, young people not only face problems to get the first job, but they also find it difficult to maintain it.

Starting in the 1960s from one of the lowest stocks of human capital in the OECD, Spain has experienced a remarkable improvement in the relative supply of educated workers (see Dolado et.al, 2000). Nonetheless, this educational drive has been accompanied with high and persistent unemployment rates. In 1995, the unemployment rate in Spain was around 23 percent, about twice that in other European countries (OECD, 1999). Furthermore, looking at the unemployment rates by age group for the aforementioned year, more than 50 percent of the 16-19-year-old population and more than 40 percent of the 20-24-year-old population were unemployed (*Labour Force Survey*, 1995). Finally, it is well known that average unemployment spells of young people in Spain are very long-lasting. The *ad hoc module* on school to work transtions, included in the *Labour Force Survey* (2nd quarter, 2000) reveals that Spanish youngsters spent, on average, around 30 months to get a job after completing education. Nonetheless, average employment durations at this first stage of the working life are around 25 months. These are some of the stylized facts that have characterized the poor performance of the Spanish youth labor market in the last years, and that have made the transition process from school to work among the key topics of current social research and policy

interests, as it touches upon the core issue of youth labor market integration.

In this paper we analyze the transition process from school to work, and the connection between the first period of unemployed job search, after completing education, the *first significant job*, and the presence of some type of "skill mismatch". School to work transitions have also been analyzed in other countries. Using Canadian data, Belzil (1995) finds a negative relationship between the job duration and the preceding unemployment spell. The empirical strategy of this author was based on the idea that unemployment durations are affected by Unemployment Insurance benefit duration, and that reemployment durations depend on completed unemployment duration. The author formulates an unemployment/reemployment duration model as a simultaneous (recursive) system. For the Norwegian labor market Bratberg and Nilsen (2000) analyze the connection between search time, hourly earnings and job duration simultaneously, finding a positive relationship between the length of the search period and the employment duration. The econometric analysis developed in this paper is close in spirit to Bratberg and Nilsen (2000). Nonetheless, since the possibility that the type of job match may be connected with search time and employment duration could lead to biased results, we pay particular attention to the endogeneity between, the first period of unemployed job search, the subsequent employment period and the presence of some type of "skill mismatch".

As pointed out by Bratberg and Nilsen (2000), *a priori*, the effect of search time on job duration may be ambiguous. On one hand, we may argue that the length of the unemployment period affects the outcome of the search process adversely. Longer unemployment durations could be interpreted as an adverse productivity signal, or as a signal of low human capital reducing, as a consequence, the arrival rate of job offers. But, on the other hand, longer search periods might improve the quality of the match, resulting in longer employment durations. In this paper we try to shed some light on the relationship between search time and employment duration, for the Spanish youth labour market. For that purpose, we take into consideration the potential interdependence of the search duration, the presence of some type of mismatch between education and work, and the job duration.

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One contribution of this paper to the recent literature that analyzes the transition process from school to work in Spain is that, we model search time, job duration and the probability of being under-educated simultaneously. The fact that unobserved heterogeneity may lead to biased estimates of job duration makes it important to pay particular attention to the endogeneity between the length of the first period of unemployment, after completing education, the subsequent employment duration and the presence of some type of skill mismatch. For instance, *a priori*, unobserved factors increasing the length of the search period might be imagined to reduce the probability of being under-educated, leading to longer employment durations.

Although the study of transitions from school to work has become of paramount importance in understanding the poor performance of the Spanish youth labor market over the last two decades, previous studies were concerned mostly with descriptive statistical methods (e.g Albert, Juárez, Sánchez and Toharia, 2000; Dolado Felgueroso and Jimeno,2000). Regression models have been used to study the employment probabilities of Spanish graduates (Sáez Fernández and Rey Boullón, 2000). Finally, some models analyze the type of job match at first job (Lassibille, Navarro Gómez, Aguilar Ramos and Carolina de la O Sánchez, 2001). However, there is no study which pays attention to the endogeneity between the search period, after finishing education, duration at first significant job, and the presence of some type of mismatch between education and work. This article attempts to fill this gap using the data of the ad hoc module of the Labor Force Survey (2nd quarter, 2000). The module has been specifically designed to generate information on the transition from school to work for people aged 16-35 who left continuous education, for the first time, after 1990. Using this data set, we analyze the labor market entrance of Spanish youngsters focusing, on one hand, on the endogeneity between the time spent searching for the first significant job, and the duration at that job, and, on the other, on the incidence of mismatch between education and work on the success of youths in the labor market.

The main results of this paper can be summarized as follows: First of all, we find that search time, job duration and the probability of being under-educated should be estimated jointly, assuming a multivariate normal dis-

tribution. This estimation procedure provides evidence in favor of a direct negative relationship between search time and duration at first significant job. However, the covariance term suggests the presence of unobserved factors working in the opposite direction. Furthermore, there exists unobserved factors that increase search time and, at the same time, reduce the probability of being under-educated at first significant job. We also find evidence of simultaneity between the probability of being under-educated at first significant job and the duration of that job. In particular, the results suggest that under-educated workers are more likely to exhibit shorter job durations.

The paper proceeds in the following manner. Section 2 presents the econometric model and we describe the data set in Section 3. The empirical results are contained in Section 4 . And Section 5 presents the main conclusions.

2 The Econometric Model

2.1 Motivation

The statistical analysis is constructed on the principle that the length of the search period after completing education, the subsequent employment period, and the presence of some type of skill mismatch might be connected in a system of simultaneous equations. First, unobserved factors increasing the length of the unemployment period might be imagined to improve the quality of the match. Second, taking into consideration the endogeneity between employment duration and the type of job match allows us to investigate whether there are unobserved factors that affect the quality of a match and, at the same time, influence job duration. Finally, our approach allows to analyze the effect of the length of the first unemployment period, after completing education on the duration at first significant job. As mentioned in the previous section, search durations may affect employment durations for at least two reasons. Individuals who search longer may get a better match and hence stay longer in the job, but employers may also regard a long search period as a negative signal, or as a signal of low human capital, and so be less prone to give the worker a permanent job.

The econometric model is similar to the one developed by Bratberg and Nilsen (2000), but substituting the wage equation by an equation for the probability of being under-educated. The unavailability of information on earnings does not allow us to include wages in our analysis. In contrast, our data set provides information on the mismatch between education and work. If better matches are related to higher wages, we would expect no significant bias in our estimation results. Thus, a three simultaneous equation model is designed to allow for the endogeneity between search time, employment duration and the probability of being under-educated.

2.2   Model Specification

In the literature we can find various versions of the Tobit model that may be appropriate for the analysis of survey data. The pioneering work was developed by McFadden (1973) and Amemiya (1973). More elaborate simultaneous equation models were introduced by Nelson and Oloson (1978), Heckman (1974), Amemiya (1974) and Lee (1978). However, for survey structures with nested sequences of questions like that described above, these models are not appropriate. On one hand, a nested logit model is not efficient because it fails to use the additional information provided by nested responses. On the other hand, simple Tobit models applied to each question separately are inappropriate because the nested data sets are sequentially censored and the method does not correct for this selection bias. The econometric problem is to estimate sequentially censored equations in a manner that makes full use of the information producing, at the same time, consistent and efficient estimators of the equations' parameters. Lee (1992) proposed the so-called *nested Tobit* model, which is an hybrid of the Tobit and the nested logit model. The nested Tobit model uses the nested logit model structure while utilizing the additional quantitative information as the Tobit model does.

The model used in our analysis is based on that nested Tobit model proposed by Lee(1992). Let $T \tilde{} G(t; x)$ be the time spent in some state, where G is the c.d.f of a density function g , and x is a vector of covariates. The

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hazard rate is defined as:

$$\lambda(t, x) = \lim_{dt \to 0} \frac{\Pr(t \leq T < t + dt | T \geq t; x)}{dt} = \frac{g(t; x)}{1 - G(t; x)}$$

In this model, the distribution must be specified in such a way that allows modelling simultaneous equations. The model must also allow for possible right censoring of both, search and job durations. Let x_s, z_e and x_u denote the vectors of covariates that affect search duration (t_s), job duration (t_e) and the probability of being under-educated $(under)$, respectively. The corresponding coefficient vectors are denoted β_s, δ_e and β_u. The equations to be estimated simultaneously are the following:

$$\ln t_s = \min\left(x_s'\beta_s + u_1, \ln \tau_s\right) \tag{1}$$

$$under = x_u'\beta_u + \eta \ln t_s + u_2 \tag{2}$$

$$\ln t_e = \min\left(z_e'\delta_e + \gamma \ln t_s + \alpha under + u_3, \ln \tau_e\right) \tag{3}$$

where τ_s and τ_e are the censoring times of search and job duration respectively. If we assume that the error terms are jointly normal, that is:

$$u = \begin{pmatrix} u_1 \\ u_2 \\ u_3 \end{pmatrix} \sim N \left\{ \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{21} & \sigma_2^2 & \sigma_{23} \\ \sigma_{31} & \sigma_{32} & \sigma_3^2 \end{pmatrix} \right\} \tag{4}$$

then, the likelihood of the system may easily be constructed by recognizing the three possibilities of censoring. Firstly, t_s may be censored, in which case, neither employment duration, t_e, nor the probability of being under-educated are observed. Secondly, t_s is uncensored while t_e is censored. And finally, both t_s and t_e are uncensored. The likelihood contribution of an individual who is censored at τ_s is simply:

$$\Pr(t_{si} \geq \tau_{si}) = \Phi\left(\frac{x_{si}'\beta_s - \ln \tau_{si}}{\sigma_1}\right) \tag{5}$$

where $\Phi(.)$ denotes the c.d.f of the standard normal distribution.

In the second case, t_s observed without censoring and t_e censored, the individual contribution to the likelihood is:

$$\Pr\left(t_{ei} \geq \tau_{ei}, under_i, t_{si}\right) = \int_{\tau_e}^{\infty} f\left(\ln t_{ei}, under_i, \ln t_{si}\right) d\ln t_{ei}$$

This can be expressed in terms of conditional probability, in the following way:

$$\Pr\left(t_{ei} \geq \tau_{ei}, under_i, t_{si}\right) =$$

$$\Pr\left(t_{ei} \geq \tau_{ei}|under_i, t_{si}\right) \times f_{under_i, \ln t_{si}}\left(under_i, \ln t_{si}\right) =$$

$$\Phi\left(\frac{x_{ei}'\beta_e - \ln \tau_e + \Sigma_{21}\Sigma_{11}^{-1}y_i}{\sigma_{3\cdot12}}\right) \times (2\pi)^{-1} |\Sigma_{11}|^{-1/2} \exp\left\{-\frac{1}{2}y_i'\Sigma_{11}^{-1}y_i\right\} \quad (6)$$

where $x_{ei}'\beta_e \equiv z_{ei}'\delta_{ei} + \gamma \ln t_{si} + \alpha under_i$, and:

$$\Sigma_{11} = \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{21} & \sigma_2^2 \end{pmatrix}; \qquad \Sigma_{12} = \begin{pmatrix} \sigma_{13} \\ \sigma_{23} \end{pmatrix}; \qquad \Sigma_{21} = \Sigma_{12}'$$

$$y = \begin{pmatrix} \ln t_s - x_{si}'\beta_s \\ under - x_u'\beta_u - \eta \ln t_s \end{pmatrix}$$

$$\sigma_{3\cdot12}^2 = \sigma_3^2 - \Sigma_{21}\Sigma_{11}^{-1}\Sigma_{12}$$

Finally, the contribution to the likelihood of those individuals with both search and job durations uncensored, is given by:

$$f\left(\ln t_{si}, under_i, \ln t_{ei}\right) =$$

$$= (2\pi)^{-3/2} |\Sigma|^{-1/2} \exp\left[-\frac{1}{2}\left(y_i, \ln t_{ei} - x_{ei}'\beta_e\right)\Sigma^{-1}\left(y_i, \ln t_{ei} - x_{ei}'\beta_e\right)'\right] \quad (7)$$

Collecting all these results, taking natural logarithms of $(5) - (7)$ and summing over individuals, we obtain the following log-likelihood function:

$$L\left(\beta,\Sigma\right) = \sum_{i=1}^{N}(1-d_{1i})\ln\left\{\Phi\left[\frac{x_{si}^{'}\beta_s - \ln\tau_{si}}{\sigma_1}\right]\right\} +$$

$$+d_{1i}(1-d_{2i})\left\{\ln\left[\Phi\left(\frac{x_{ei}^{'}\beta_e - \ln\tau_e + \Sigma_{21}\Sigma_{11}^{-1}y_i}{\sigma_{3\cdot12}}\right)\right] - \ln(2\pi) - \right.$$

$$\left. -\frac{1}{2}\ln\left(|\Sigma_{11}|\right) - \frac{1}{2}y_i'\Sigma_{11}^{-1}y_i\right\} - d_{1i}d_{2i}\frac{1}{2}\{3\ln\left(2\pi\right) + \ln\left(|\Sigma|\right) + $$

$$+(y_i,\ln t_{ei} - x_{ei}^{'}\beta_e)\Sigma^{-1}(y_i,\ln t_{ei} - x_{ei}^{'}\beta_e')\}$$

where d_{1i} and d_{2i} define two indicator functions that allow us to distinguish between censored and uncensored observations of search and job duration, respectively. From this log-likelihood function, each parameter of β and Σ is identified separately. These parameters are then estimated iteratively using the Newton-Raphson method.

3   Data

Empirical results are based on data from the ad hoc module on school to work transitions, included in the Labor Force Survey (2nd quarter 2000), and conducted by the *Instituto Nacional de Estadística* (*INE*). The module consists of 14 additional questions designed to provide information on two main issues: the time spent searching for a job, and the maximum educational level attained by Spanish youngsters.

The module provides some retrospective longitudinal information on the transition from school to work of young people aged 16-35 who left education for the first time after 1990[1]. It provides relevant information on the "first

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[1]Individuals who left education temporarily due to motherhood, grave illness, military or social service, and those waiting for a diploma to access higher levels of education are not included in the analysis.

significant job", which is defined as a non-marginal employment of at least 20 hours per week, that has started after leaving continuous education. It also collects information on some key variables of interest in transition studies, notably social background information, information on level and type of education at first leaving education, the date of first leaving education and training, the search duration until a first significant job had been found as well as the duration and the occupation of this first significant job. Furthermore, the data allow us to identify the type of job match at first significant job. Measuring the type of job match is based on the objective method which consists of using the distribution of qualifications to construct an overeducation index (Cohn & Khan, 1995; Groot, 1993; Verdugo & Verdugo, 1989). A worker is defined as over-educated, if his/her years of education are above the mean educational attainments of the corresponding occupation plus one standard deviation. Adequately educated workers are those whose educational level is higher that the mean educational level of the corresponding occupation minus one standard deviation and lower than the mean educational level plus one standard deviation. And finally, a worker is under-educated if his/her educational attainmentd are below the mean education of the corresponding occupation minus one standard deviation.

The survey was administered to more than 180,000 individuals. However, only about 15,000 'school-leavers' were asked about the first significant job obtained after leaving the educational system. After deleting observations with missing variables, we were left with a sample of 9,071 individuals[2]. For these individuals we construct an unemployment variable measuring the number of months from completing school until employment, assuming that school-leavers are also job seekers. For those who did not find yet a first significant job, the variable measures the number of months searching for that job. Only for those school-leavers with complete job search durations, we can observe employment durations. This leaves us with a subsample of 6,895 individuals with uncensored search duration. Out of 6,895 individuals with complete unemployment durations, 5,541 still remain employed (incomplete

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[2]Individuals with zero or one month of joblessness were not included in the estimation.

job durations), while the remaining 1,354 already left the first significant job.

There are several factors that may affect both, unemployment and employment durations. One of them is the level of education. If there is competition for good quality jobs, individuals with higher educational levels are expected to be more likely to get a job offer after finishing their education. However, education might increase the length of the search period because higher education is normally associated with higher reservation wages.

Studying the effects of field of education on early labor market integration is, also, of paramount importance in our analysis. Apart from the increased enrollment in higher education, one of the most relevant features of the Spanish university system refers to the relative importance of social science degrees. As pointed out by Dolado et.al (2000), the percentage of people in social sciences, in 2000, was around 50% of the total amount of those enrolled in collegue education. Furthermore, for 1996, Spain showed the highest percentage of people with a social science degree among the OECD group. In contrast, the percentage of people with engineering and other science degrees was relatively small.

Another factor that may influence search time and employment duration is the local unemployment rate. We would expect the structural circumstances of the local market to play an important role in determining time spent searching for a job and employment duration. A higher unemployment rate is likely to increase the time individuals spend searching for a job, but it may also induce workers to stay longer in a job.

Finally, one factor that might affect significantly the duration at first significant job would be the type of job match. Following the Matching Theory (Jovanovic, 1979, b) a match between a worker and a job can be treated as a pure experience good: The only way to determine the quality of a particular match is to form the match and "experience it". Under this reasoning, the presence of some type of mismatch clearly influence the separation of a worker from his/her job, either due to dismissal or voluntary separation.

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Table 1: Variable Definition

Variable	Equation	Definition
Male	1, 3	Dummy variable indicating individual is male
Ext	1	Dummy variable indicating individual is non -Spanish
Age	1, 2	Age (1): Age (years) when leaving the school
		Age (2): Age (years) when b egining the first significant job
Unem.Rate	1, 3	Unem. Rate (1): Local unem. rate in year education was completed
		Unem. Rate (2): Local unem. rate in year when beginning first job
Primary Ed.	1, 2, 3	Primary education
Secondary Ed.	1, 2, 3	Secondary edu cation
Education	1, 2, 3	Dummy variable indicating field of tertiary education: Education
Arts	1, 2, 3	Dummy variable indicating field of tertiary education: Arts
Social Science	1, 2, 3	Dummy variable indicating field of tertiary education: Social Science
Science	1, 2, 3	Dummy variable indicating field of tertiary education: Science
Engineering	1, 2, 3	Dummy variable indicating field of tertiary education: Engineering
Agriculture	1, 2, 3	Dummy variable indicating field of tertiary education: Agriculture
Health	1, 2, 3	Dummy variable indicating field of tertiary education: Health
Services	1, 2, 3	Dummy variable indicating field of tertiary education: Services
Over -educated	3	Dummy variable indicating individual is over -educated
Adeq. educated	3	Dummy variable indicating individual is adeq. educated
Under -educated	3	Dummy variable indicating individual is under -educated (endogenous)
O1-O10	2 , 3	Occupational dummy variables

Equation (1): Search time
Equation (2): Probability of being under -educated
Equation (3): Job duration

Table 1 contains the variable definitions. Given that the model is designed as a simultaneous recursive system, the issue of identification arises naturally. Clearly identification will require exclusion restrictions for some of the exogenous variables of the system. The applied restrictions become clear from table 1, where the measurement of some of the explanatory variables at different points of time contributes to identification.

A reduced form equation for search time should include the following individual attributes: sex, non Spanish nationality, age when completing education and its square, the highest educational level completed, and the field of education for those individuals completing tertiary education[3]. Apart from these personal characteristics, we control the transition process from school to work for local labor market conditions, including explicitly in the model the unemployment rate of the entire population in the home region at the

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[3]We consider the age when obtaining the diploma as that when beginning job search. Furthermore, field of education for people with tertiary/university education was classified into twenty five detailed categories which could be aggregated into nine broad categories.

Table 2: Descriptive Statistics

Variable	Full Sample (N=9,071)		t_s (uncensored) (N=6,895)		t_s (censored) (N=2,176)	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
t_s	29.749	25.402	32.370	25.748	22.018	22.804
$\ln t_s$	2.933	1.059	3.048	1.043	2.591	1.032
t_e			25.306	22.162		
$\ln t_e$			2.840	0.929		
Male	0.517	0.499	0.569	0.495	0.369	0.483
Ext	0.011	0.103	0.010	0.102	0.010	0.102
Age (1)	19.494	3.995	19.591	3.955	19.263	4.093
Age (2)			21.821	3.799		
Primary Ed.	0.324	0.468	0.298	0.457	0.393	0.488
Secondary Ed.	0.210	0.407	0.213	0.409	0.201	0.401
Education	0.028	0.166	0.026	0.159	0.035	0.185
Arts	0.034	0.181	0.033	0.178	0.037	0.189
Social Science	0.192	0.394	0.199	0.399	0.171	0.376
Science	0.040	0.195	0.043	0.202	0.033	0.179
Engineering	0.091	0.287	0.107	0.309	0.043	0.202
Agriculture	0.008	0.093	0.010	0.100	0.004	0.067
Health	0.051	0.219	0.048	0.215	0.061	0.239
Services	0.021	0.143	0.021	0.142	0.021	0.145
Unem. Rate (1)	20.104	6.238	19.648	5.937	21.435	6.884
Unem. Rate (2)			18.035	5.852		
Over-educated			0.167	0.373		
Adeq. educated			0.716	0.451		
Under-educated			0.116	0.321		

moment when the individual started the job search.

The equation for the probability of being under-educated at first significant job includes the following explanatory variables: unemployment duration, age when beginning the first job and its square, level and field of education, and a set of ten occupational dummy variables.

Finally, the explanatory variables included in the employment equation relate to both, personal and job characteristics: sex, highest educational level completed and field of education, search time before getting that job, the type of job match, and a set of ten occupational dummy variables. Finally, we also control for structural circumstances, by including as an explanatory variable the local unemployment rate at year when finding the job. Summary statistics for the full sample, the individuals getting a job (complete job search durations) and individuals not getting a significant job after leaving the educational system, are given in Table 2. We find that 23.99% of the full sample is censored, while the remaining 76.01% corresponds to complete job search durations. It is worthy mentioning the long period of time that

Spanish youngsters have to spend searching a job after completing education. As shown in table 2, it takes, on average, around 30 months for young people in Spain to find a job after leaving the educational system.

4   Empirical Results

In this section we present the main empirical results. We shall start by providing some descriptive statistics for the sample used in our analysis. Tables 3 and 4 show that higher educational levels are related to both shorter unemployment durations and longer first job durations. This pattern is similar for both, males and females. Although there are no significant differences in terms of average search and job durations for males and females, we can appreciate some gender differences as regards unemployment durations by level of education. Females exhibit, on average, a slightly shorter unemployment duration. However, looking at different educational levels, we find that females with university education completed, need more time to get a job after finishing education.

Tables 5 and 6 report mean search an job duration by field of tertiary education. As can be observed, those individuals with education, arts and social science backgrounds exhibit the longest unemployment durations (almost 30 months is the time needed for these individuals to get a job). This pattern is also observed for males but not for females, for whom the longest unemployment periods correspond to agricultural backgrounds. Those with engineering and service backgrounds, in contrast, show the shortest unemployment duration (around 22 or 23 months). Turning to job durations, the results suggest that an agricultural background is associated with the longest first job duration, around 31 months, in contrast to the 23.79 months of average employment duration exhibited by those with a service background. These results are in support of the hypothesis that the field of education attended by school-leavers might play an important role as regards labor market integration.

Table 3: Mean Search Duration (months) by sex and educational level

	Sex		
Educational Level	Female	Male	Total
	(N=4,381)	(N=4,690)	(N=9,071)
Primary Ed.	31.579	35.141	33.798
Secondary Ed.	30.849	31.625	31.258
Tertiary Ed.	26.989	25.304	26.249
Mean Duration	28.946	30.498	29.749

Table 4: Mean Job Duration (months) by sex and educational level

	Sex		
Educational Level	Female	Male	Total
	(N=3,009)	(N=3,886)	(N=6,895)
Primary Ed.	22.938	21.200	21.743
Secondary Ed.	25.357	25.088	25.201
Tertiary Ed.	26.404	27.781	27.064
Mean Duration	25.439	24.764	25.059

Table 5: Mean Search Duration (months) by sex and field of education

	Sex		
Field of Tertiary Ed.	Female	Male	Total
	(N=2,369)	(N=1,854)	(N=4,223)
Education	29.631	28.294	29.366
Arts	29.738	28.259	29.107
Social Science	27.704	26.590	27.338
Science	26.631	24.087	25.268
Engineering	22.368	24.033	23.819
Agriculture	30.485	24.543	27.025
Health	25.191	24.282	25.024
Services	21.295	25.241	22.500
Mean Duration	26.989	25.304	26.249

Table 6: Mean Job Duration (months) by sex and field of education

	Sex		
Field of Tertiary Ed.	Female	Male	Total
	(N=1,739)	(N=1,600)	(N=3,339)
Education	24.267	26.323	24.655
Arts	28.632	30.357	29.464
Social Science	25.594	28.826	26.750
Science	29.144	26.557	27.672
Engineering	23.813	26.879	26.518
Agriculture	29.615	31.255	30.637
Health	29.075	30.646	29.384
Services	24.851	21.755	23.790
Mean Duration	26.404	27.781	27.064

Table 7: Mean Job Duration (months) by type of job match and level of education

Type of Job Match	Educational Level			
	Primary	Secondary	Tertiary	Mean Duration
Under-educated	19.174	17.195	16.983	17.961
Adeq. educated	22.390	26.417	29.335	26.263
Over-educated	-	26.407	26.058	26.118
Mean Duration	21.743	25.201	27.064	25.059

Table 8: Mean Job Duration by Search Time

t_s	Mean (t_e)			
	Complete Durations	Incomplete Durations	Total	N
<=12	18.365	31.954	28.204	2,109
12-24	17.778	32.064	28.789	1,243
24-36	16.527	28.602	26.318	973
36-48	15.941	26.644	24.938	753
>48	12.956	18.821	18.310	1,817
N	1,354	5,541	25.059	6,895

Table 7 contains mean durations at first significant job for over-, under-, and adequately educated workers, by level of education[4]. As can be observed, independently of the educational level, under-educated workers exhibit shorter employment durations than those correctly allocated. In contrast, no differences on average employment duration are observed between over-, and adequately educated workers. In Table 8, mean job durations by length of previous period of unemployment are reported. The results reveal that, average job durations seem to decrease with the length of the search period. This pattern holds for both censored and uncensored observations. Next, we will see how the three simultaneous equation model developed in Section 3 of this paper yields the same result. Maximum likelihood estimates of the system $(1)-(3)$ presented in that section are given in Table 9. Wald tests for the null hypotheses of covariance terms, σ_{12}, σ_{13}, and σ_{23} significantly equal to zero are applied. The obtained results suggest that the three equations should be estimated simultaneously, and that estimating them independently would yield biased results.

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[4] As shown in Table 2 the majority of workers, 71.60%, are correctly allocated, 16.70% are over-educated, and the remaining 11.60% are classified as under-educated.

Table 9: Simultaneous Equation Model

	Ln t_s		Under		Ln t_e	
	Coef.	t	Coef.	t	Coef.	t
Ln t_s			0.014	0.78	-0.502	-3.47
Male	-0.012	-0.45			-0.027	-0.48
Ext	0.227	2.07				
Age	-0.408	-10.74	-0.045	-3.66		
Age^2	0.007	8.84	0.001	3.20		
Education						
Primary	-0.442	-7.09	0.033	1.83	0.204	1.47
Secondary	-0.171	-3.88	-0.016	-1.08	0.232	2.53
Education	0.066	0.84	0.044	1.58	-0.051	-0.29
Arts	0.068	0.97	0.016	0.66	0.007	0.04
Social Science	-	-	-	-	-	-
Science	-0.079	-1.24	-0.014	-0.65	0.059	0.40
Engineering	-0.229	-4.83	0.035	2.01	-0.062	-0.49
Agriculture	-0.068	-0.55	0.042	0.97	-0.605	-2.52
Health	-0.079	-1.30	-0.010	-0.49	0.284	1.98
Services	-0.267	-3.08	-0.031	-1.01	-0.164	-0.86
Unem. Rate	0.025	12.65			0.038	7.40
Type of Job match						
Over-educated					0.261	2.94
Adeq. educated					-	-
Under-educated					-0.606	-0.45
Constant	7.718	18.04	0.829	4.78	6.223	13.25
N	9,071		6,895		6,895	
Uncensored Observations (%)	76.01		19.64		19.64	
Log Likelihood			-15,277			

In equations 2 and 3 a set of 10 occupational dummy variables were included as explanatory variables

$$\hat{\Sigma} = \begin{pmatrix} 0.987^{***} & -0.042^{***} & 0.666^{***} \\ & 0.343^{***} & -0.201^{*} \\ & & 1.447^{***} \end{pmatrix}$$

Wald test for $H_0 : \sigma_{12} = 0$; 4.38 $(p = 0.036)$

Wald test for $H_0 : \sigma_{13} = 0$; 14.23 $(p = 0.000)$

Wald test for $H_0 : \sigma_{23} = 0$; 1.62 $(p = 0.207)$

To interpret the estimated coefficients of this simultaneous equation model, we scale the marginal effects in the duration equations by the fraction of complete observations[5]. The coefficient which raises most interest is the one

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[5] In censored regression models, the marginal effect of some variable x_k on the outcome

associated with the completed unemployment duration variable (in log), included as an endogenous explanatory factor in the employment equation. As can be observed, the results provide evidence in favor of the hypothesis that longer search periods affect the outcome of the search process adversely. Thus, longer unemployment durations seem to reduce the arrival rate of job offers, maybe because they are interpreted by employers as an adverse productivity signal. Nonetheless, the covariance terms σ_{12} and σ_{13} indicate the presence of unobserved factors working in the opposite direction. The intuition behind this result is that, the time spent searching might increase the employment duration ($\sigma_{13} > 0$) if longer search periods improve the quality of the match ($\sigma_{12} < 0$). Finally, the covariance term between equations (2) and (3) is negative, although not very significant. The sign of this term would suggest that under-educated workers tend to stay shorter in the job. This result is quite reasonable if we take into account that, labor market integration tends to imply a first period where firms can realize how qualified are their employees. Under this reasoning, the fact of being under-educated at the first stages of the working life obviously increases the probability of dismissals.

Turning to the effects of education on search and job durations, some points are worthy to mention. Leavers with tertiary education and with a social science background, exhibit longer search periods than those with just primary or secondary education completed. Individuals with this type of educational background are also less likely to leave unemployment after completing education than those with engineering and service backgrounds. This result reveals one of the main features of the Spanish youth labor market, the problems faced by individuals with a social science degree in obtaining a job. This problem is even more important if we take into account that this sector of the population represents a very significant proportion of those investing in university education[6]. As regards the effect of education on the

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for a random individual i in the sample, who may or may not be censored, is $\beta_k \cdot \Pr(i$ is uncensored).

[6]Looking at the results reported in Table 2, it can be observed that individuals with a social science background represent more than 40% of the total amount of people investing

probability of being under-educated, the results reveal that undereducation is less likely for higher levels of education.

Non-Spanish citizenship increases the time needed to get a job. This result reveals that ethnic minorities in Spain might suffer from longer unemployment periods.

We also find that the probability of leaving unemployment is positively related to the age at which the individual completed education. However, the estimated coefficient of the variable $Age^2(1)$ indicates a non-linear relationship between unemployment duration and age when starting the search period. In contrast, we find a negative, and non-linear, relationship between the probability of being under-educated and the age when finding the first significant job.

As expected, the results provide evidence in favor of a negative relation between the likelihood of leaving unemployment and the local unemployment rate at year when finishing education. Furthermore, our results suggest a positive relationship between duration at the first significant job and the local unemployment rate at year when starting that job. The argument behind this result might be the following: High unemployment rates are usually associated with recession periods of the economy. It is reasonable to think that finding a job at that time involves lot of difficulties, so that those workers getting employed at that time are very likely to stay at that job for a longer period of time.

We also find a positive and significant effect of over-education on employment duration. The argument behind this result could be the following: Two circumstances may determine the separation of a worker from his/her job. The worker may leave the job voluntarily or he/she may be dismissed. The latter will be very unlikely when the worker is over-educated since firms, other things equal, prefer workers with higher levels of education. But also, the voluntary separation of a worker from his/her job will be very unlikely if that worker has not better outside options.

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in tertiary/university education.

Table 10: Simultaneous Equation Model

	Ln t_s		Over		Ln t_e	
	Coef.	t	Coef.	t	Coef.	t
Ln t_s			-0.115	-3.21	-1.602	-3.89
Male	-0.022	-0.57			-0.016	-0.16
Ext	0.185	1.47				
Age	-0.202	-3.23	0.031	1.29		
Age^2	0.003	2.34	-0.000	-0.52		
Field of Education						
Education	-0.018	-0.18	-0.068	-1.87	-0.153	-0.53
Arts	-	-	-	-	-	-
Social Science	-0.071	-1.00	-0.005	-0.21	-0.078	-0.40
Science	-0.147	-1.67	-0.007	-0.23	-0.116	-0.47
Engineering	-0.279	-3.59	-0.061	-2.01	-0.497	-1.92
Agriculture	-0.139	-1.02	-0.079	-1.56	-0.971	-2.58
Health	-0.151	-1.75	-0.082	-2.59	-0.085	-0.31
Services	-0.332	-3.11	-0.228	-5.54	-1.160	-2.52
Unem. Rate	0.028	9.72			0.057	5.79
Type of Job Match						
Over-educated					-2.237	-1.90
Adeq. educated					-	-
Under-educated					-2.408	-23.15
Constant	5.377	7.34	-0.057	-0.16	10.862	6.55
N	4,223		3,339		3,339	
Uncensored Observations (%)	79.07		17.55		17.55	
Log Likelihood			-7,319			

In equations 2 and 3 a set of 10 occupational dummy variables were included as explanatory variables.

$$\hat{\Sigma} = \begin{pmatrix} 0.990^{***} & 0.096^{***} & 1.711^{***} \\ & 0.359^{***} & 0.433^{***} \\ & & 2.224^{***} \end{pmatrix}$$

Wald test for $H_0 : \sigma_{12} = 0$; 6.34 ($p = 0.011$)

Wald test for $H_0 : \sigma_{13} = 0$; 16.74 ($p = 0.000$)

Wald test for $H_0 : \sigma_{23} = 0$; 4.53 ($p = 0.033$)

Finally, it is noteworthy that when the econometric analysis is restricted to individuals with tertiary education completed, there is no evidence of endogeneity between search time, undereducation, and job duration[7]. In contrast, for this subsample, we find evidence of potential interdependence between

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[7]The covariance terms, σ_{12} and σ_{23} are not significantly different from zero.

search duration, the probability of being over-educated at first significant job, and the duration at that job. Thus, a three simultaneous equation model is designed to allow for this endogeneity. The results are reported in Table 10.

As in the analysis for the whole sample, the estimation results provide clear evidence in favor of a negative relationship between the length of the first period of unemployment, after completing education, and the subsequent employment period[8]. Nonetheless, the coefficient which raises most interest is the one associated with the variable $\ln t_s$, included as an endogenous explanatory factor in the equation for the probability of being over-educated. The negative and significant estimated coefficient on this variable suggests that longer search periods tend to reduce the probability of overeducation. This result might indicate that longer periods of unemployment allow Spanish graduates to obtain more adequate jobs to their levels of qualification. Although, the covariance term, σ_{12}, indicates the presence of unobserved factors that increase the length of the search period and that, at the same time, increase the probability of overeducation.

The results also reveal that the field of tertiary education affects significantly the probability of being over-educated at first significant job. Taking people with an arts background as the reference group, we observe that those individuals with education, engineering, health and services backgrounds exhibit a lower probability of being over-educated than the omitted category.

So far as the effect of overeducation on job duration is concerned, the results show a direct negative effect of over-education on employment duration. This contrasts with the result obtained for the total sample analysis, where we observed a direct positive effect. Thus, when the analysis is restricted to people with tertiary education completed, over-education tends to reduce employment duration. Nonetheless, the positive and significant covariance term σ_{23} suggests unobserved factors that increase the probability of being over-educated and that, at the same time, increase duration at first significant job. Finally, we find that under-educated workers tend to separate sooner

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[8]However, unobserved factors suggest again a relationship in the opposite direction.

from the first significant job than those adequately educated. As mentioned before, the argument behind this result could be that, being under-educated at the first stages of the working life increases the probability of dismissals.

5   Concluding remarks

In this paper we have analyzed the transition process from school to work for Spanish youngsters for the 1990-2000 period, using a new data set collected within the Labor Force Survey (2nd quarter, 2000). Using a simultaneous equations procedure we are able to provide a better understanding on the relationship between search time after completing education, duration at first significant job and the presence of some type of skill mismatch. Failing to control for the endogeneity of previous period of job search and the type of job match in the employment equation would lead to an erroneous conclusion on the relationship between search time and job duration. When taking the endogenity into account, we found that individuals tend to separate sooner from their first significant job the longer the period spent in unemployment. Nonetheless, we also found unobserved factors working in the opposite direction.

The results also suggest that the level and field of education play an important role in labor market integration. Taking people with tertiary education and a social science background as the reference group, we find that this group of individuals exhibit longer unemployment durations than those with just primary or secondary education completed. In contrast, those with an engineering or services background seem to find sooner a first significant job after completing education than the reference group.

Apart from education, another factor that seems to play a key role in the transition process from school to work is the local unemployment rate. Our results reveal that longer periods of search are positively related to higher values of local unemployment rate at time when completing education. Furthermore, we find evidence in favor of a positive relationship between the local unemployment rate at time when finding the first significant job and

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the duration of that job.

Finally, we show how the results are not robust to a separate sample analysis. Taking a subsample of workers with tertiary education completed, we find evidence of a potential interdependence between the length of the first period of unemployed job search, the subsequent employment period and the probability of being over-educated.

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