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11. CAREER TRAJECTORIES OF PHD GRADUATES IN THE SOCIAL SCIENCES AND HUMANITIES

Drivers for Career Moves

INTRODUCTION

The achievement of a doctoral degree has long been considered as a way of preparing for an academic career. However over the past two decades universities have undergone significant transformations, such as the move towards new missions other than teaching and research (Enders & De Weert, 2009), the increasing globalization of the academic sphere, the application of new managerial schemes (Hazelkorn et al., 2010), as well as other changes arising from policy reforms, all of which have combined to reduce employment opportunities in the higher education sector. In fact the published data highlight the shortages of opportunities and the increasing imbalance between the demand and supply sides of the academic labour market (OECD, 2010).

For these reasons, PhD graduates have gradually arrived at a turning point: either the holders of doctorates face high level of unemployment (OECD, 2010) or they accept that they are part of a broader workforce, seeking employment in various sectors (Roach & Sauerman, 2010). In fact there is an emerging need to decouple doctoral training from the academic career path, and to consider it more as a potential passport towards multiple careers (Enders, 2002; Huisman et al., 2002).

However even as doctorates move into the broader market, little is known about the employment choices they will encounter or the changes they will make as they proceed in their careers. Most of the published studies regarding the issue focus on the labour market perspective, meaning on the supply side of the academic positions offered to PhD graduates. There has been some examination of alternative occupations, particularly the role of junior scientist in the private industrial sector, and in this case the direct relationship of the final stages of doctoral education to the individual's employment opportunities and career paths (Mangematin, 2000).

DOCTORAL TRAINING CHANGES: PATHWAY TOWARDS MULTIPLE CAREERS

The recent economic and social changes have prompted PhD graduates to broaden their employment horizons and search for jobs in sectors other than research and

education. The achievement of a doctoral degree, so far, is no longer seen simply as an introduction to an academic career, and the changing situation is leading to careers that are less linear and predictable.

This study examines the career trajectories of PhD graduates in the social sciences and humanities (SSH), exploring the career steps and attempting to highlight the factors likely to impact on the graduate's decisions about various aspects of employment. The current chapter analyses the careers of more than 1000 PhD graduates in 13 European countries, with the objective of identifying which elements influence the decision to change or remain in the same sector of employment, at the moment of passage between two different jobs. The broader aim is to identify those elements that are useful for describing the longer term patterns of mobility in the careers of graduates. The data examined in the chapter derive from the European Community POCARIM study.

The observations are mostly in a longitudinal dimension, as the graduates proceed in the higher education sector or move back and forth to other sectors, both in national and international contexts. A vertical dimension can also be understood, as the graduates advance in career position (Enders, 2002). The aim is to reveal the different career trajectories of SSH PhD graduates, and the factors impacting on their step by step changes in employment. The research questions are: What are the career trajectories of social sciences and humanities PhD graduates? Is it possible to identify patterns of steps in the career trajectories? What factors are likely to impact on the career steps? Is there a pattern of relationships between the first career experiences (employment decisions, periods of unemployment) and the long-run development of the career?

We expect that for SSH PhD graduates, multiple career trajectories are likely to emerge, since they can experience employment outside the academic sphere and may often move between several different sectors. We will examine potential factors impacting on the individual's career steps and their mobility in the labour market, such as the initial characteristics of the career, the age at obtaining the doctoral degree, the individual's gender, family composition, and their mobility during doctoral studies. Finally, we will search for differences in career trajectories and steps, including non-academic employment, relative to the characteristics of the education received within the SSH field itself (Henkel, 2000; Bordieu, 1986, 1999).

The intention of the current work is not to examine the impact of the students' experiences during their doctoral education on their career and employment opportunities. Rather, our intention is to focus on the different career steps and decisions beyond the education stage, illustrating different factors that are likely to impact on the moves and progress of SSH PhD graduates within the labour market.

The next section of the chapter introduces the theoretical framework for the study, serving as the grounding for the analysis. The subsequent sections present the dataset and describe the methodology used in the analysis. The final sections consist of a discussion of the estimation results and a summary of the resulting conclusions.

WHAT CHOICES FOR DOCTORAL DEGREE HOLDERS?

Beyond the gross distinctions of private sector and academic employment, the scientific literature indicates a range of various non-academic choices for individuals with university training in the social sciences and humanities (Inzelt et al., 2014). However there is almost no exploration of the way different factors would be likely to affect the employment choices and career trajectories of SSH PhD graduates. The intention of the current study is to examine and illustrate the different career paths of the SSH graduates, focusing on aspects of step by step mobility, thus bringing out the factors that could impact on their choices and changes in employment.

Auriol et al.'s (2013) study on PhD graduates' careers indicates that compared to social scientists, natural scientists and engineers are more likely to be engaged in research, and thus in the academic sphere, whereas there is a stronger trend for the employment of social scientists in non-research occupations. These authors also point out that those employed outside of the education and research sector show more job to job mobility, meaning more frequent transitions. For the PhD graduate, the aspect of mobility might represent an unintended outcome related to the failure to retain a stable position. The frequency of such failures could reflect the general crisis in the labour market, or patterns of instability relating to specific sectors and employment destinations. For those employed in the business sector, change and mobility reflect the need to secure better contracts and improve their career positions. On the other hand, those employed in the academic sphere seem more likely to accept continuity in their current status, even at the expense of other possibilities of career development.

The literature suggests that in both academic and non-academic contexts, most job changes take place in the initial stages of the individual's career, as the individual strives to attain a better position. Varying patterns of mobility are also often related to marked variations in the labour market opportunities among different countries. Concerning academic positions, among other factors, the "competitiveness" of the national higher education systems seems to impact the most (Janger et al., 2013).

Focusing on scientists and engineers, Dietz et al. (2000) describe what they call "knowledge value" of PhD graduates, meaning a particular set of skills, know-how and relationships, including human, social and scientific capital, which impacts on the individual's professional path, motivations and constraints. The issue of knowledge value makes the career trajectories of the doctorates more challenging and nuanced than those seen in other models of education and employment.

Enders (2002, 2004) observes that PhD graduates' career trajectories are becoming more and more diversified in terms of the sectors and the characteristics of the employers. Although not fully explored, the literature indicates a range of choices for individuals with SSH education, beyond the gross distinction of the academic and non-academic areas. Although the achievement of a doctoral degree matters, the individual's labour market outcomes can be affected by other factors, such as the discipline of studies, gender and the choices made in the early

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career stages. Enders (2002) argues that it is in particular the early career steps and initial employment choices that affect the future trajectories of PhD graduates (Enders, 2002), including the sectors of employment. Steijn et al. (2006) again argue that the outset of the occupational career is very likely to influence future career paths. These authors consider that a number of variables can serve as either "opportunities" or "traps" for the long-run shaping of career trajectories. Among these are the period of time for the graduate's transition to work, periods of unemployment, the sector of early employment, the type of contract, and the income and status of the position. As an example of such opportunities and traps, the literature suggests that academic careers are generally linear, without breaks, meaning with no or very limited periods of unemployment, and that unemployment in the early stages of employment history is indeed likely to affect later career developments (Steijn et al., 2006).

Finally, the characteristics of the scientific discipline also matter. Bourdieu (1986, 1999) argues that the different stages of careers in the sciences are strongly related to the characteristics of the particular field, and that each individual's career is defined by "its position in the structure of the system of possible careers". Thus the existence of a single "typical" career pattern is questioned. Instead, different classes of career trajectories are likely to be observed, involving variables such as modes of entering, staying in or leaving research careers. The differences between and across scientific fields are thus likely to influence the shape of occupations and careers, both for those employed in the academic and non-academic spheres.

In the current study we examine the career trajectories of PhD graduates, observing their step-by-step moves, for the purpose of investigating which factors could impact their different employment decisions.

Given the above evidence from the literature, the study begins from the hypothesis that PhD graduates' career moves are affected by highly diversified factors, among these: the choices that they made in their early career stages; periods of unemployment; job characteristics such as the type of contract or location; the individual's geographic mobility; their age of graduation; other individual aspects such as gender and family composition.

The particular aim of the study is to test the following hypotheses: (a) the initial steps of the SSH PhD graduates in the employment market shape different long-term career trajectories and results (e.g. entrance in the labour market in non-academic positions; early moves from one employment sector to another; long periods of unemployment after graduation); (b) differences in career trajectories and in moves between one type of job and another are influenced by country factors, and are likely to be highly diversified across nations.

The approach to the study is grounded in rational choice theory (Scott, 2000), which permits us to explain the rationale of the PhD graduates' choices and the way they base their decisions on cost-benefit calculations.

METHODS AND DATA

The data for the study are drawn from the POCARIM study ("Mapping the population, careers, mobilities and impacts of advanced degree graduates in the social sciences and humanities"), conducted under the European Commission 7th Framework Programme. The study included an online survey of 2652 individuals who had received a doctoral degree in the SSH disciplines between 2000 and 2012, in one of thirteen European countries (France, Germany, Hungary, Italy, Latvia, Norway, Poland, Portugal, Slovakia, Spain, Switzerland, Turkey, United Kingdom). The core aims of the study were to collect information about the SSH doctoral populations and their production in the POCARIM countries, to identify their mobilities across disciplines, sectors and national borders, and to understand the types of impacts generated. The online survey posed questions on these themes, entering into the details of the first steps in the graduates' careers, whether they had chosen the academic environment or a different labour sector, the motivations for these choices, and their subsequent career trajectories.

The overlap of these topics with the aims of our own research makes the POCARIM dataset an excellent source for the analysis of the PhD graduates' career paths. The dataset presents a large number of variables that describe the personal circumstances concerning each individual in the sample. However, for the current study, we are particularly interested in the information concerning the individual's employment status and the decisions between the time of receiving their degree and the date of responding to the online questionnaire.

As a first step, we select a subsample of the POCARIM survey population consisting of all those PhD graduates with at least one change in job status over the period examined. Although the sample size drops substantially, from 2652 to 1068 individuals, this condition is necessary given our intention of analysing the factors that affect the transition from one job sector to another.

Almost half of the subsample consists of graduates who reported they had had more than two jobs since graduation. Table 1 presents the distribution of the sample per number of jobs since graduation, as reported on the survey date. We observe that the individuals have held up to six jobs during this early stage of their career. We define a variable of area of employment (Job area) for each career step of each individual in the sample, based on a grouping of the categories of the employing organization identified in the POCARIM database. We thus have three job areas:

- Higher education (corresponding to POCARIM "Higher education or research organisations");
- Services (including POCARIM "Primary or secondary education institutions, Government or administration organizations, Non-governmental organizations");
- Business/commerce ("Business/commercial entity").

We also cross this information with the sector indicated by the survey respondents (public or private), thus obtaining a discrete variable with six values, describing the job area.

A potential limit of the POCARIM database is that it is does not always permit the identification of whether a Higher education job was effectively in education and research, or rather as part of the university administrative staff. This information can only be deduced for the individual's "current job", for which the data indicate the percentage division of the working hours into research, teaching, administration and other activities. For "current job", the share of workers with at least 50% of working hours devoted to research and teaching is 95.8% in public HEIs, and 91.2% in private HEIs. While it is not possible to specify this data for the preceding jobs in the individual's series, this information on the current position does suggest that the percentage of graduates working in administrative positions would be too small to influence the analysis.

We identify the value of the Job area variable for each career step reported by every PhD graduate. For the last career step there is a potential seventh value, indicating the eventuality that the individual is unemployed at the moment of the survey. The details of the timing of any other periods of unemployment would be very useful for our analysis, however the structure of the POCARIM data renders this information difficult to deduce. Still, as we will see below, we are able to usefully address the question of unemployment in terms of the total period experienced.

Table 1. Number of jobs in career

Number of jobs	Number of PhD graduates
2	586
3	356
4	94
5	19
6	13

For the aims of our study we place particular emphasis on the variable of the area of employment (Job state), as a crucial indicator of the steps in the individual's career. For this work, the focus is on the determinants of the passage from one area of employment to the next, and thus for this the analysis requires more than the identification of job area. To explore which are the determinants of the career trajectories, we begin by defining two further variables for each step, describing the type of contract involved and the geographical mobility required of the graduate.

Both variables are discrete. The variable concerning contract type identifies whether each job is fixed-term or permanent (indefinite), and whether it is full time or part time. The variable has five values: one for each combination of the two characteristics (part time fixed-term; part time permanent; full time fixed-term; full

time permanent), and a fifth value to represent the condition of unemployment. The contract variable permits the analysis of if and how the possibility of continuing in the same contract type or changing to a different one can influence the choice between different employment areas, during the passage from one step to the next. We establish this variable separate from that of the job area, because we want to distinguish any choices made by the graduates in favour of improved contract terms from those made only for motives of changing the area of employment.

The variable of location concerns the issue of geographic mobility in the choice of a job type. We propose an index based on the double comparison between the country where the new job is located, the country where the individual obtained their PhD, and the location of the individual for the "leaving" job. We obtain a discrete variable with five values: one for each combination of difference or agreement between the new country and the "education" and "leaving" countries, plus a fifth level for the case of being unemployed. The role of this variable is to check whether the location of the new job with respect to the starting point (i.e., the country where the individual studied and received their degree), or to the current job location, have any role in the individual's choices concerning the change to the new job.

The variables described above vary along the career, and for every step we identify the differing values of each one. Table 2 presents the definitions of the values for the variables "Job area, Contract type" and "Location".

Table 2. Definition of values for job area, contract type, and location

	Job area	Contract type	Job location
0	Unemployed	Unemployed	Unemployed
1	Higher education institution, public sector	Part time, fixed-term	Change from both the country of study and the previous country
2	Higher education institution, private sector	Part time, permanent	The same as the country of study but changes from the previous country
3	Services, public	Full time, fixed-term	Changes from the country of study but the same as the previous country
4	Services, private	Full time, permanent	The same as both the country of study and previous country
5	Business and commerce, public		
6	Business and commerce, private		

A second group of variables concerns the personal characteristics of the PhD graduates and certain aspects of their career history. The first variable of this group is gender, where we use women as benchmark. A second variable concerns family composition. The POCARIM survey did not gather information on the individual's

social or family background, but does provide data on the makeup of the family at the moment of the survey. From this, we create a discrete variable that reports if the family situation involves children, a stable partner, or both or neither of these cases.

Also included are some variables concerning the individual's education and work experience. A first is the disciplinary area of the PhD, for which the sample is differentiated in three categories: Social sciences, Humanities and Interdisciplinary, using the first one as benchmark for the other two. We also use the age at the moment of receiving the doctoral degree, to check on differences related to the age of the graduate as they entered the labour market. Further, we create a dummy variable that is equal to 1 for individuals where the difference between the year of receiving the master's degree and the year of attaining the PhD degree is equal to or higher than 5 (the variable "Distance MA – PhD"). This dummy variable is a proxy, intended to reflect the condition that the individuals who experienced such lengths of time had probably already joined the labour market prior to the end of their PhD studies.

We also employ two continuous variables: total unemployment and length of career. As noted above, we cannot detect when any intervals of unemployment take place during the course of a career. However, the POCARIM survey does provide data on the total months of unemployment experienced by the individual up to the date of graduation, which does permit us to estimate of the overall effect of unemployment on the PhD's choices. Finally, graduates that have entered the labour market in different moments probably experience a different number of job opportunities. In order to verify this possibility we add a variable related to the length of the career, calculated as difference between the year of receiving the PhD degree and the year of responding to the survey.

Finally, to isolate specific country effects we create a dummy for each one, as well as including the variables of the unemployment rate for PhD graduates (by country of the first job in the transition pair) and of the country R&D expenditures and the H-index (of the country of first job in the pair).

Table 3 summarizes the variables.

STATISTICAL MODEL

Given the aims of our study and the available data, the approach of multi-state modelling is a particularly appropriate methodology. The technique models the changes in the PhD graduates' job areas (states) together with a set of covariates. The sample consists of N individuals, each of whom is observed at T points in time (t=1,…,T). The data set is "unbalanced", having a different number of observations for each individual. In the multi-state model:

- time is discrete $t\ (t_1,\ t_2,\ t_n)$;
- there are S discrete states($S_i,\ S_j,\ …,\ S_z$);
- in each period t we observe each individual (PhD graduate);
- we have individual attributes (time dependent and time-independent covariates).

Table 3. Data description

Variable		Obs.	Mean	Std. Dev.	Min	Max	Variable type
1st job	Job state	1068	2.161	1.716	1	6	discrete
	Contract type	1068	2.758	1.045	1	4	discrete
	Job location	1068	3.590	1.031	1	4	discrete
2nd job	Job state	1068	2.070	1.731	0	6	discrete
	Contract type	1068	2.621	1.195	0	4	discrete
	Job location	1068	3.300	1.239	0	4	discrete
3rd job	Job state	482	1.907	1.628	0	6	discrete
	Contract type	482	2.714	1.127	0	4	discrete
	Job location	482	3.214	1.258	0	4	discrete
4th job	Job state	126	1.873	1.743	0	6	discrete
	Contract type	126	2.571	1.261	0	4	discrete
	Job location	126	3.214	1.354	0	4	discrete
5th job	Job state	32	1.813	1.575	0	6	discrete
	Contract type	32	2.375	1.212	0	4	discrete
	Job location	32	3.313	1.281	0	4	discrete
6th job	Job state	13	1.308	0.751	1	3	discrete
	Contract type	13	3	0.707	1	4	discrete
	Job location	13	3.84	0.555	1	4	discrete
Gender		1068	0.486	0.500	0	1	dummy
Total unemployment		1068	4.102	8.175	0	80	continuous
Age		1068	34.053	6.846	25	70	continuous
Length of career		1068	5.996	3.068	1	13	continuous
Distance MA – PhD		1068	0.463	0.499	0	1	dummy
Family composition		1068	2.731	1.239	1	4	discrete
Disciplinary area of PhD		1068	1.526	0.571	1	3	discrete

Since the time series is discrete, we estimate the transition probabilities by the sample proportions. Where S_t is the state of the process at time t, and P is the transition matrix, then:

$$p^{ij}(t) = \Pr(S(t) = j \,|\, S(t-1) = i); \; \forall i, j \in Z \text{ and } t > 0 \tag{1}$$

In the same way, we can form an overall transition matrix (presented in Table 4) that fully describes the dynamics of the multiple state model, as follows:

$$P(t) = \left\| p^{ij}(t) \right\| = \begin{pmatrix} p^{ij}(t) & \dots & p^{1j}(t) \\ \vdots & \ddots & \vdots \\ p^{ij}(t) & \cdots & p^{ij}(t) \end{pmatrix} \tag{2}$$

The basic quantities of interest are the transition intensities, which is a non-parametric model (in this case we ignore the influence of covariates). Here, $i \rightarrow j$ denotes a transition from job state i to job state j; $S(t)$ is the state occupied at time t and $q_{ij}(t)$ is the corresponding transition intensity. The transition intensity expresses the instantaneous risk of a transition from state i to state j at time t. The transition intensities are fundamental characteristics of any multi-state Markov model, which fully describe the underlying dynamic process. The estimate of transition intensities can be used to derive the transition probabilities conditional on the previous job state. It is defined as:

$$q_{ij}(t) = \lim_{\delta x \to 0} P(S(t + \delta t) = j \mid S(t) = i) / \delta t \tag{3}$$

Within this formula there is an implicit assumption that the multi-state model is Markovian, since this is a Markov chain, which implies that the probability of going to a future state $S(t+1)$ depends only on the present state $S(t)$ and not on the history. Next we have a q matrix with size $R \times R$ where the diagonal is:

$$q_{rr} = -\sum q_{ij} \tag{4}$$

After estimating the q matrix (estimations results are reported in Table 5), the next step is to add the covariates to the model to understand the effect of each attribute on the transition from one employment area (state) to another. We have applied panel data likelihood methods for discrete time hazard models, given that we have repeated observations for each PhD graduate (more than one row in the dataset for each individual analysed). In this situation, linear form characteristics would not provide a good fit. The model calculated is a classical multinomial logit, applied separately for each state. Here, we maximize the panel-data likelihoods with numerical derivatives and Hessian matrix calculations. The Hessian matrix is the square matrix of second-order partial derivatives of a function, serving to indicate the local curvature of a function of many variables. In the first step the estimators were too slow to converge. To speed up the convergence we added the analytical second derivatives.

The likelihood function for observing the sequence of states S is:

$$L_j = \prod_{t=t_0}^{t_1-1} P(s_t \rightarrow s_t + 1 \mid x_t, \gamma = j, \beta_{s_t,s_{t+1}}) \tag{5}$$

where L_j is the likelihood of an individual (in this case a PhD graduate) being of type j and x_t are individual attributes. This model allows estimation of the covariate effects on each transition of state. The unconditional likelihood for the individual becomes:

$$L = \sum_{j \in \Gamma} q_j L_j \tag{6}$$

To resolve the maximisation of the difficult likelihood functions, we calculate the analytic gradient and Hessian function for multinomial probit:

$$\log(L) = y \log(\Phi(X'\beta)) + (1 - y)(\Phi(-X'\beta)) \tag{7}$$

$$g_j = \frac{\partial \log(L_j)}{\partial(X'\beta)} = y\varphi(X'\beta)/\Phi(X'\beta) - (1 - y)(\varphi(X'\beta)/\Phi(-X'\beta)) \tag{8}$$

$$H_j = \frac{\partial^2 \log(L_j)}{\partial(X'\beta)^2} = \frac{\varphi(X'\beta)(X'\beta)(\Phi(X'\beta)) - (\varphi(X'\beta))(\varphi(X'\beta))}{\left[\Phi(X'\beta)\right]^2}$$
$$= -g_j(g_j + X'\beta) \tag{9}$$

ESTIMATION RESULTS

Tables 4 and 5 present the matrices of transitions between the job states (as percentages, Table 4; as estimations of intensity, Table 5) while Tables 6a and 6b presents the results from the multi-state modelling (Tables 6a and 6b). Table 4 reports the distribution of the "target" job states (employment areas) departing from each starting job state, while the coefficients reported in Tables 6a and 6b represent the trend of incidence for each explanatory variable on the change in employment. The tables present only the statistically significant results, so as to focus on the main indications revealed by the estimates. For this, not all the changes between pairs of job states are reported.

A first interesting result is that examining the estimations in Tables 6a and 6b, there is almost no combination where state 1, or Public-sector higher education, is detected as the arrival point of a transition. The only exceptions are the passage from Private-sector business and commerce (state 6) and from Private-sector services (state 4), where the only variable that presents statistically significant coefficients is the one for change from both the country of study and that of the previous job.

The first column of Table 4 assists in suggesting an inference from this result. Here, we see that public-sector higher education is the arrival job status with the highest percentage of transition, apart from the elements on the main diagonal of the table. This means that the PhD graduates involved in our analysis have a high propensity to move to Public-sector higher education, a propensity that is almost strong as to remain in the same job state. The fact that there are no elements in Tables 6a and 6b that explain this passage allows us to say that PhD graduates see Higher education in the public sector is seen as their "natural destination": they tend to choose public universities and research organizations, and such choices are not conditioned by any personal characteristics or contract conditions.

However, Public-sector higher education is not the only destination observed in the sample, and the variables included in the estimations do have an effect on other combinations of changes in the area of employment. Focusing on the variable of gender, we observe that the coefficient is negative for all passages that involve a transition from Higher education, whether public or private sector, to any "non-education" job state. On the other hand, we observe that the coefficient is positive when the arrival point is Private-sector higher education. Therefore, compared to women, men have greater reluctance to leave Higher education and a high propensity towards this field of employment. These results suggest that there is a concentration of men towards the higher education sector, through processes of lower abandonment and higher adhesion.

In the data description section we defined the variable "Family composition" as a discrete variable with four different levels, indicating combinations of the presence or absence of a partner or children. Focusing on the presence of children, we observe that those PhDs indicated as level 3 (having children but no partner) or level 4 (children and a partner) present positive coefficients for passages from Higher education jobs (especially private sector) to all the other areas of employment. On the other hand, the inverse passage from Services (private sector) to Higher education (private) presents a negative coefficient. More in general, job areas such as Services and Business/commerce (private) seem to be more attractive for PhDs with children than they are to other graduates, presenting a higher concentration of positive coefficient in combinations where these jobs represent the arrival state. These results suggest that the PhD graduates with children tend to be less interested in an academic career, which presents a greater degree of uncertainty, and more interested in employment areas that seem to have greater stability and regularity, such as in public services or business and commerce.

Next, we examine a group of variables that describe the effects of different personal conditions at the moment of the PhD graduate's entry to the labour market. For instance, the age of graduation has a direct impact on the choice of the job area, with varying connotations. The first aspect we notice is that there is a positive trend related to the age of graduation, for the shift from Higher education jobs (public and private sectors) to jobs in Services (private). On the other hand, we observe that the coefficient of transition from private sector to public sector education, if present, is

negative. Further, the positive coefficient for shifts from Services (both public and private sectors) to the other private sectors reinforces the idea that a high age of graduating with the PhD is an incentive to move to the private sector.

Apart from age at graduation, the variable of Distance MA – PhD (passage of at least five years of time between degrees) is another aspect that describes the personal characteristics of the individual at the moment of entering the labour market. As noted, the variable is a proxy indicating those PhD graduates that had probably begun work before completing their studies. The findings from the modelling suggest that the proxy hypothesis is correct. In fact all the coefficients associated with the variable are negative, whatever the starting point for the change in job area. This leads us to think that for the graduates represented by this variable, their PhD degree becomes a tool to reinforce their career in the same area of employment, but not to direct it. The sole exceptions to this pattern are given by choices for transitions from Higher education (public) and Business/commerce (private) to Public business and commerce.

The disciplinary area of the individual's degree is another important element in their passage from the pursuit of education to the labour market, with effects that continue through the remainder of their career. For this, the sample is divided into three categories: holders of social sciences, humanities and "interdisciplinary" degrees, using social sciences as the benchmark. Thus, comparing Humanities and Social sciences, we notice that the former graduates are more present in Private higher education. This result is underlined by the positive coefficient for the transition to Private-sector higher education, and by the negative coefficients for the passage from this area of employment to all others. In other words, Humanities graduates tend to move more often towards Private higher education and to leave this job area with less frequency. The results suggest that these individuals have less probability of obtaining employment outside the academic sectors, compared to Social sciences graduates.

Finally, we analyse the effect of two variables concerning the overall period of the PhD graduate's career. The first one is the length of career as a PhD graduate. The coefficients related to this variable seem to suggest that the longer is the career, the stronger is the trend to move outside the Higher education areas and towards the private sector (i.e. Services and Business/commerce). This result suggests that PhDs that have not been able to stabilise a career in the Higher education area, whether private or public sector, tend to move to other jobs with less restrictions on entrance, which would be those in the private sector. However, the results also suggest a related interpretation: private sector employers seem interested in hiring PhD graduates, and this interest is directly proportional to the graduates' experience (approximated by the length of their careers).

The second element concerning the graduate's overall career arc is the total of unemployment suffered by the individual. The coefficients show a negative correlation between unemployment and the private sector, without further differences for the various job areas. A first interpretation of this result is that the private sector

in effect offers flexibility for entrance, thus reducing the observed unemployment period for the PhD graduates who choose this career direction. However, there is also a second and complementary interpretation: if unemployment is negatively correlated to the private sector, this means that graduates moving towards the public sector tend to accumulate longer periods of unemployment. And in the public sector, the large part of graduates are employed in Higher education, suggesting that those who want to work in Public higher education are willing to pay for this ambition with longer periods of unemployment. The negative coefficients associated with transitions out of Public higher education seem to reinforce this hypothesis.

Moreover, unemployment is one of the statuses that the graduates included in our sample can reach as the "current" step of their career, but we find no statistically significant coefficients for combinations that involve this event. This lack of observations seems to suggest that in general unemployment is not strictly related to the objective, observable characteristics of the PhD graduate, and that we cannot forecast any future state of unemployment, at least on the basis of the elements investigated in our analysis.

As to the other variables that can vary throughout the individual's career, concerning Contract type and geographic mobility (Location), we find less consistencies in the estimation results. About Location, there seems to be no

Table 4. Probability of transition between job states (areas)

From/to	Public higher education	Private higher education	Public sector services	Private sector services	Public business/ commerce	Private business/ commerce	Un-employed
Public higher education	79.82%	5.76%	4.10%	2.09%	0.30%	4.40%	3.53%
Private higher education	30.02%	53.12%	4.94%	2.10%	0.12%	7.17%	2.53%
Services public sector	28.75%	5.69%	51.38%	3.19%	0.33%	5.16%	5.50%
Services private sector	20.37%	6.93%	8.13%	50.68%	1.10%	4.73%	8.06%
Public business and commerce	24.15%	6.82%	6.27%	3.05%	42.91%	15.40%	1.40%
Private business and commerce	27.87%	7.17%	5.20%	1.84%	0.65%	52.82%	4.46%

common thread of correlation between the different values for the variable and the combinations of changes in job state. In essence, we cannot find a direct and clear effect from changing or continuing in the same country (as the location of the individual's current job), on the choice of the next employment area in their career trajectory. On the other hand, concerning contract type, we find that permanent and full time contracts have a positive effect on all combinations of transition, without relevant differences by area or public/private sector of the jobs.

Finally, we consider a set of country-related variables, namely the rate of unemployment for PhD graduates in the country of the first job of the "transition pair", as well as the expenditure on R&D and the H-index for that country, as proxies of the conditions that the individual faces. To these variables we add a set of dummies, one for each country, in order to isolate specific country effects. A first interesting observation is a lack of correlations: country unemployment rates and R&D expenditures do not have statistically significant effects on transitions in employment area. On the other hand, the H-index presents a negative coefficient for transitions leaving Public higher education, indicating that PhD holders tend to remain in university settings in those countries where research has a strong impact.

Table 5. Intensity matrix (q matrix)

From /to	Public higher education	Private higher education	Public sector services	Private sector services	Public business/ commerce	Private business/ commerce	Un-employed
Public higher education	−0.267650	0.082192	0.056902	0.029505	0.004215	0.060063	0.034773
Private higher education	0.426471	−0.666667	0.073529	0.029412	0.000000	0.117647	0.019608
Services public sector	0.413462	0.081731	−0.692308	0.052885	0.004808	0.076923	0.062500
Services private sector	0.252747	0.109890	0.142857	−0.692308	0.021978	0.065934	0.098901
Public business and commerce	0.300000	0.100000	0.100000	0.050000	−0.850000	0.300000	0.000000
Private business and commerce	0.389558	0.112450	0.080321	0.024096	0.012048	−0.666667	0.048193

Table 6a. Estimates

Explanatory Variables								
From	To	Gender	Total unemployment	Length of career	Age at graduation	Distance MA – PhD[1]	Family composition	
1	2							
1	3	−0.116** (0.057)	−0.006** (0.003)					
1	4	−0.206*** (0.070)		0.023* (0.013)	0.015* (0.008)		(2)	−0.233** (0.099)
1	5	−0.717*** (0.116)	−0.062*** (0.010)			0.675*** (0.141)	(4)	−1.814*** (0.185)
1	6		−0.016*** (0.002)	0.031*** (0.007)			(2)	0.135*** (0.051)
2	3	−0.146* (0.079)					(2)	0.316*** (0.094)
							(4)	0.379*** (0.095)
2	4	−0.423*** (0.087)			0.028*** (0.009)			
2	6		−0.006*** (0.002)	0.034*** (0.007)		−0.076* (0.041)	(2)	0.364*** (0.061)
							(3)	0.337*** (0.112)
							(4)	0.417*** (0.058)

Explanatory Variables

From	To	Gender	Total unemployment	Length of career	Age at graduation	Distance MA – PhD¹	Family composition
3	2				-0.042* (0.024)	-0.576*** (0.137)	(2) 0.402*** (0.143)
3	4	-0.320*** (0.073)	0.037*** (0.003)	0.075*** (0.012)	0.078*** (0.013)		(2) -0.318*** (0.109) (4) 0.301* (0.167)
3	6			0.035** (0.016)	-0.026*** (0.009)	-0.435*** (0.133)	(3) 0.396* (0.215)
4	1						
4	2	2.634*** (0.762)	-0.066*** (0.013)	-0.289*** (0.107)	0.302** (0.137)	-0.848* (0.449)	(4) -1.633*** (0.388)
4	3			0.473*** (0.132)	-0.329*** (0.079)		(2) 2.752*** (0.531) (4) 2.805*** (0.722)
4	6		-.038*** (0.014)	-2.319*** (0.484)	2.025*** (0.429)	-1.279*** (0.182)	
5	2		0.028*** (0.010)				
6	1						
6	2						
6	3	-0.112** (0.053)					

(Continued)

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Table 6a. (Continued)

Explanatory Variables							Family composition	
From	To	Gender	Total unemployment	Length of career	Age at graduation	Distance MA – PhD¹		
6	4	−0.116* (0.066)	0.016*** (0.005)	0.023** (0.011)	0.015** (0.007)		(4)	0.167** (0.085)
6	5	−0.535*** (0.089)	0.096*** (0.010)		0.137*** (0.013)	0.905*** (0.073)	(3)	1.807*** (0.185)
							(4)	2.161*** (0.234)
1	1							
2	2	−0.183** (0.081)						
3	3		−0.018** (0.007)		−0.065** (0.027)		(2)	0.329** (0.147)
							(4)	0.532*** (0.176)
4	4	−1.151*** (0.091)	−0.124*** (0.015)	−0.124*** (0.018)				
6	6		−0.012*** (0.002)	0.025*** (0.007)	0.011*** (0.003)	0.096** (0.039)	(2)	0.125*** (0.049)
							(4)	0.157*** (0.049)

+ Country indexes: 1 = Belgium, 2 = Brazil, 3 = Canada, 4 = Switzerland, 5 = Germany, 6 = Denmark, 7 = Spain, 8 = France, 9 = Greece, 10 = Hungary, 11 = Ireland, 12 = Italy, 13 = Latvia, 14 = Netherland, 15 = Norway, 16 = other, 17 = Poland, 18 = Portugal, 19 = Romania, 20 = Slovakia, 21 = Turkey, 22 = United Kingdom, 23 = United States

1 Length of time from Master to PhD conclusion

Table 6b. Estimates

Explanatory Variables						
From	To	Area of PhD	Location	Contract type	Country dummies[++]	H-index
1	2		(4) −0.403*** (0.152)	(4) 0.186* (0.100)	(7) −0.539* (0.286) (8) −0.564** (0.266) (10) −0.792* (0.410) (17) −0.732** (0.369)	−0.001* (0.001)
1	3	(2) −0.139*** (0.053)	(4) 0.244* (0.128)	(2) 0.581*** (0.202)		
1	4			(3) 0.207** (0.088)	(1) −1.360*** (0.352) (5) −0.425** (0.205) (7) −0.421** (0.180) (9) −0.753*** (0.291) (11) −1.211*** (0.386) (17) −0.690** (0.270) (18) −1.353*** (0.337)	−0.0005* (0.0003)

(Continued)

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Table 6b. (Continued)

Explanatory Variables							
From	To	Area of PhD	Location	Contract type		Country dummies[++]		H-index

From	To	Area of PhD		Location		Contract type		Country dummies[++]		H-index
1	5	(2)	1.087*** (0.204)	(2)	−2.220*** (0.187)	(2)	−2.825*** (0.254)	(3)	−2.646*** (0.439)	
						(3)	−1.802*** (0.128)	(6)	−0.669*** (0.215)	
						(4)	−1.836*** (0.174)	(8)	0.931*** (0.171)	
								(10)	2.222*** (0.241)	
								(15)	2.818*** (0.236)	
								(17)	2.006*** (0.297)	
								(20)	1.629 (0.325)	
								(22)	−0.808*** (0.185)	
								(11)	−1.305*** (0.282)	
1	6			(4)	−0.153*** (0.056)	(2)	−0.415*** (0.080)			

Explanatory Variables

From	To	Area of PhD		Location		Contract type		Country dummies[++]		H-index
2	3	(2)	−0.374*** (0.078)	(2)	−0.495*** (0.176)	(3)	−0.264*** (0.084)	(13)	1.031** (0.435)	
				(4)	−0.503*** (0.130)	(4)	0.267*** (0.104)	(22)	−0.734*** (0.255)	
2	4					(2)	−0.599** (0.274)	(5)	−1.263*** (0.279)	
						(4)	0.531*** (0.193)	(12)	−0.288** (0.130)	
								(13)	−0.546** (0.243)	
								(17)	−0.800*** (0.268)	
								(20)	−1.493*** (0.288)	
								(22)	−0.961*** (0.254)	
2	6	(2)	−0.112** (0.045)	(2)	−0.314** (0.134)	(3)	−0.128** (0.091)	(7)	−0.314** (0.145)	
		(3)	0.138* (0.075)					(22)	−0.246* (0.136)	

(Continued)

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Table 6b. (Continued)

Explanatory Variables

From	To	Area of PhD		Location		Contract type		Country dummies[++]		H-index
3	2	(2)	0.474*** (0.126)	(2)	1.112*** (0.395)	(2)	2.504*** (0.630)	(3)	0.852** (0.364)	
		(3)	0.429** (0.200)			(4)	0.926*** (0.261)	(7)	−1.467** (0.740)	
3	4	(2)	0.365** (0.153)	(2)	−0.521** (0.210)	(3)	−0.548*** (0.124)	(7)	−3.557*** (0.278)	
				(3)	−1.036*** (0.286)			(8)	−1.019*** (0.195)	
				(4)	−0.670*** (0.161)			(12)	−0.766*** (0.172)	
								(17)	−2.25*** (0.338)	
								(20)	−1.764*** (0.514)	
								(21)	−2.263*** (0.335)	
								(22)	−2.113*** (0.340)	

Explanatory Variables

From	To	Area of PhD		Location		Contract type		Country dummies[++]		H-index
3	6	(2)	−0.472* (0.112)	(2)	−0.509** (0.207)	(2)	−0.550** (0.244)	(1)	2.038*** (0.478)	
				(3)	−0.964*** (0.260)	(3)	−0.261** (0.114)	(5)	1.420*** (0.360)	
						(4)	−0.603*** (0.124)	(7)	0.756** (0.326)	
								(17)	0.771** (0.338)	
4	1			(4)	−0.528* (0.296)					
4	2	(2)	1.316** (0.523)							
4	3	(3)	2.467*** (0.745)							
4	6							(12)	−2.883*** (0.656)	
5	2									

(Continued)

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Table 6b. (Continued)

Explanatory Variables						
To	Area of PhD	Location		Contract type	Country dummies[++]	H-index
1		(1)	0.919*** (0.109)		(9)	−1.528** (0.759)
		(2)	0.870*** (0.113)			
		(3)	0.936*** (0.126)			
		(4)	0.949*** (0.096)			
2		(1)	0.753*** (0.234)	(1) 0.301*** (0.107)		
		(2)	0.904*** (0.236)	(3) 0.212*** (0.075)		
		(3)	0.873*** (0.239)			
		(4)	0.829*** (0.211)			

Explanatory Variables

From	To	Area of PhD	Location	Contract type	Country dummies[++]	H-index
6	3		(1) 1.138*** (0.155)	(1) −0.255** (0.102)	(1)	
			(2) 0.909*** (0.173)		(4) 0.448* (0.259)	
			(3) 0.540*** (0.208)	(3) −0.354*** (0.060)	(5) 0.436* (0.244)	
			(4) 0.835*** (0.126)		(8) 0.685*** (0.253)	
					(12) 0.785*** (0.280)	
					(21) 0.864* (0.396)	
					(23) 0.890** (0.398)	
6	4	(2) 0.160** (0.067)	(3) 0.591*** (0.168)	(1) 0.429*** (0.127)	(1)	
		(3) 0.414*** (0.149)	(4) 0.540*** (0.1447)	(2) 0.635*** (0.144)	(11)	
					(12) −0.530*** (0.153)	
					(17) −0.69* (0.269)	
					(18) −0.921** (0.413)	
					(20) −0.734*** (0.196)	

(Continued)

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Table 6b. (Continued)

Explanatory Variables		Area of PhD	Location	Contract type	Country dummies[++]	H-index
From	To	(2)	(2)	(2)	(3)	
6	5	−1.258*** (0.137)	−3.274*** (0.253)	2.729*** (0.150)	−1.140*** (0.245)	
				(3)	(5)	
				0.674*** (0.077)	2.819*** (0.317)	
					(6) 1.604*** (0.333)	
					(8) 0.473*** (0.141)	
					(10) −0.252* (0.135)	
					(12) −0.432* (0.239)	
					(13) −0.708*** (0.220)	
					(15) 0.832*** (0.169)	
					(17) 2.191*** (0.240)	
					(20) −0.940*** (0.228)	
					(22) 0.928*** (0.240)	
1	1				(9) −1.454* (0.780)	

Explanatory Variables

From	To	Area of PhD	Location	Contract type	Country dummies[++]	H-index
2	2	(2) 0.166** (0.079)	(2)	(3) 0.753*** (0.289)	(8) −0.844** (0.342)	
3	3			(3) −0.226** (0.102)	(5) 1.180** (0.480)	
				(4) 0.893*** (0.328)	(7) 0.979** (0.387)	
					(15) 1.075*** (0.376)	
					(21) 2.526*** (0.608)	
					(23) 0.930** (0.394)	
4	4					

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Explanatory Variables

From	To	Area of PhD	Location	Contract type	Contract type	Country dummies[++]	H-index
6	6		(1)	0.455*** (0.101)	(1) 0.141** (0.065)	(1) −0.3637** (0.171)	
			(3)	0.596*** (0.098)	(3) −0.260*** (0.047)	(7) 0.325*** (0.114)	
			(4)	0.524*** (0.080)		(8) −0.367** (0.147)	
						(9) −0.375** (0.166)	
						(10) −0.236** (0.113)	
						(11) −1.423*** (0.277)	
						(12) −0.184* (0.102)	
						(13) −0.411*** (0.108)	
						(15) −0.267** (0.131)	
						(17) −0.231** (0.113)	
						(18) −0.322* (0.169)	
						(22) −0.302*** (0.106)	

[++]Country indexes: 1 = Belgium, 2 = Brazil, 3 = Canada, 4 = Switzerland, 5 = Germany, 6 = Denmark, 7 = Spain, 8 = France, 9 = Greece, 10 = Hungary, 11 = Ireland, 12 = Italy, 13 = Latvia, 14 = Netherland, 15 Norway, 16 = other, 17 = Poland, 18 = Portugal, 19 = Romania, 20 = Slovakia, 21 = Turkey, 22 = United Kingdom, 23 = United States

Concerning the country dummies, we notice that the coefficients are generally negative for job transitions that start from universities, both public and private. This confirms that the preference for academic employment is transverse across the countries examined. A partial exception is given by the transition from Higher education (public sector) to Business/commerce (public), which shows positive coefficients for graduates employed in France, Hungary, Norway, Poland and Slovakia. A further interesting result is that the transition from private to public business and commerce also shows positive coefficients, for a similar set of countries: for graduates in France, Norway and Poland, but also Germany and the UK.

CONCLUSIONS

The current study has focused on the factors likely to affect the employment choices and the career trajectories of recent PhD graduates in the social sciences and humanities, by examining the step-by-step moves in their professional lives. Our questions concerned the career trajectories of the graduates, the different steps that can be traced, the factors likely to impact on them, and finally the relationships between the events and choices at the outset of the individual's career and those concerning areas of employment in the long run. As the factors impacting on employment decisions, especially in the initial stage of careers, we consider: the age at the end of the PhD, the duration of unemployment experienced, the type of contract (part/full-time, permanent/term), the aspect of job location (geographic mobility), and personal variables such as the individual's gender, their area of studies, age at graduation, and the composition of their family.

The data examined confirm the view that a PhD is no longer simply a passport towards an academic career, and that instead, doctoral graduates often move towards employment in fields other than higher education. However for the population of graduates under study, the area of public-sector higher education still represents the top employment choice, particularly for those with a degree in the humanities. In fact only a small part of the sample took jobs in areas other than education and research (public and private), regardless of the personal characteristics of the individuals concerned, such as gender and family status. Differently, the personal feature of age at graduation seems to be a relevant factor in driving employment choices towards the private sector, instead of academia. Related to this is that that those who are older at graduation have probably already begun some form of employment, and their degree seems to serve as a way to continue advancing their career in the same area, rather than for entry into some new area.

As far as patterns of mobility from one job area to another, the data confirm some of the insights of existing scientific literature, however with previously unreported specificities. First, PhD graduates employed in the academic sphere are likely to be less open to mobility than those employed in other areas. Second, any changes in job area are likely to take place at the beginning of career, but they do not seem to shape the long-term choices. Some differences arising from personal characteristics

emerge, especially concerning the composition of the individual's family. For instance, we observe that men are more likely than women to remain within the university context (whether public or private), and that on average, the graduates taking employment in higher education are mainly men without children. From this, we can argue that those employed in the higher education area, especially men, are reluctant to leave, except in the case that they have a partner and children. In this case, there is a preference for a career that appears more stable than an academic one, and we are more likely to observe moves towards other areas and sectors of employment with greater stability and higher incomes.

The analysis confirms that most of the changes between academic and non-academic positions take place in the initial steps of a career. This highlights that just after graduation, the main driver for changing between jobs inside or outside academia is generally the need to secure a better position in the labour market. This does not hold true in the long run, confirming that those employed in academia are willing to remain in this sector, even at the expense of longer periods of unemployment. Also, SSH graduates continue to show moves from non-academic to academic jobs, suggesting that there are less restrictions on the entry to an academic career than the literature has suggested.

Country specificities do not emerge as relevant variables in the career moves for our sample, except for employment opportunities in the HE sector. In this case, the countries investing more in research emerge as those better able to achieve the recruitment of PhDs. Higher investments in research would logically allow the countries to be more flexible in their offer, and graduates to have more stable career trajectories instead of fragmented ones. The analysis confirms that for individuals choosing academic job positions, the competitiveness of the national higher education system is a relevant factor.

To conclude, PhD graduates in the social sciences and humanities are still largely employed in academia, but fragmented work histories and non-academic career trajectories are also likely to be observed. Beyond the public education and research sector, individual characteristics play an important role in defining the graduates' careers. Factors such as the age at completing the doctorate, the individual's family composition, the time required for transition from graduation to work, and finally the subject area of the PhD (social sciences versus humanities) all emerge as having an impact on the frequency of career moves and on choices of employment in sectors other than academia.

Finally, the analysis suggests that PhD graduates in the social sciences and humanities often wish to remain in the public university environment, even though unemployment might be the cost of this choice. Moves towards employment in sectors other than academia seem to be driven mostly by uncertainty and constraints on employability, rather than preferential choices. In this respect, national policies for investment and recruitment in the higher education and research sectors might reduce the mismatch between the areas of PhD studies and the employment

possibilities open to the graduates, with positive long-run effects on the stability of employment.

NOTE

[1] The names of the authors are in alphabetic order.

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