The Impact of Working while Studying on the Academic and Labour Market Performance of Graduates: the Joint Role of Work Intensity and Job-Field Match

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Abstract

This paper investigates the effects of working during higher education on students' academic and labour market performance. In particular, we jointly consider the role of work intensity and job-field of study match in a framework that accounts for self-selection into different types of working activities. The empirical analysis draws on data from three successive cohorts of graduates from the Spanish region of Catalonia, who are interviewed 4 years after graduation (2008, 2011 and 2014). Our results point out that working while studying increases time-to-degree and have a slightly negative impact on grade performance, except for full-time jobs related to the field of study that exert a positive effect on high grade achievement. As for labour market outcomes, the probability of being employed 4 years after graduation is significantly higher for students who have worked in jobs well-matched with the attended field of study. For those who have performed a job not related to the field of study, the outcome depends on work intensity. Further, the probability of having a permanent job is positively affected by working while studying, especially in the case of full-time jobs related to the degree, while early career job-qualification match is benefited from pre-graduation working experiences only when the job is related to the field of education.

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1. Introduction

The investment in higher education represents an important decision for enhancing individuals' socioeconomic status throughout the life-cycle. In fact, university graduates generally enjoy better labour market outcomes, relative to less educated workers. However, a growing amount of evidence highlights the existence of significant differentials in employability, remuneration and job quality also among individuals with tertiary education. On the one hand, the field of study represents one of the key elements behind such differentials, since distinct college majors are differently rewarded in the labour market (Altonji et al., 2015). On the other hand, there could be significant disparities in career performance also among graduates who have obtained the same degree. In fact, graduates' career success not only depends on the overall quality of higher education, but also on the amount of human capital, skills and valuable signals that are acquired while enrolled at the university, which ultimately depends on students' choices. In this respect, a fundamental aspect concerns the decision to exclusively focus on studying or to combine university education with some kind of working activity, which might be beneficial to future labour market outcomes. In fact, the choice to engage in some kind of working activity during university -besides forced decisions due to financial constraints- is generally motivated by the willingness to gain work experience and related skills that might improve post-graduation job opportunities (Humburg and van der Velden, 2015). However, there is an important trade-off that should be taken into account when taking the decision to work while studying, since this could divert students' effort away from academic learning, which in turn might have a negative effect on employability.

Given the relevance of this issue, the analysis of the (academic) costs and (employment) benefits of working experiences before graduation have been the object of a wide range of studies during the last decades. The underlying mechanisms behind the relationship between working while studying and either academic or labour market performance can be inferred from the theoretical literature. Human Capital Theories predict a positive relationship between working while studying and future labour market outcomes. This is because employment increases students' general and specific human capital, through the acquisition of relevant work experience and skills that are positively valued by the employers (Becker, 1964).[3]

Concerning academic outcomes, the Theory of Allocation of Time (Becker, 1965) points to a negative effect on the academic performance of students who jointly work and study, since

[3] The same predictions are also consistent with other theoretical frameworks (Signalling theory, Spence, 1973, Social Network Theory, Granovetter, 1973, and Screening approach, Stiglitz, 1975). However, the model of Statistical Discrimination (Arrows, 1973) might predict a negative effect on labour market outcomes, since working while studying can be seen as a signal of students' liquidity constraints that might generate discrimination against students from less-advantaged social backgrounds. See Baert et al. (2015) for an in-depth review of these theoretical frameworks.

working might affect the time dedicated to academic learning and activities (Buscha et al., 2012, Dustmann and van Soest, 2007, Kalenkoski and Pabilonia, 2010). Nonetheless, students who are involved in working activities while in college might not necessarily have a lower academic performance than full-time students if they are able to efficiently organize their time allocation, as in the case of substituting leisure for labour (Dundes and Marx, 2006, Butler, 2007).

From the empirical point of view, there is a substantial amount of evidence about the relationship between working while studying and either academic or labour market outcomes (Theune 2015, Darolia, 2014, Triventi, 2014, Hakkinen, 2006, Geel and Gellner, 2012, among others). The general findings point out that pre-graduation working experiences are detrimental for academic outcomes, but at the same time improve future employment potential. However, the direction and the extent of the impacts of working while studying on performance are likely to depend on specific characteristics of the job performed during higher education.

In this paper we consider two crucial job dimensions: the work intensity and its relationship with the field of study.

Some studies have previously considered the relevance of these two attributes of the job performed during higher education for academic and labour market outcomes, but in a separate fashion. In particular, Triventi (2014), Darolia (2014) and Body et al. (2014) have focused on the relevance of work intensity on academic performance, showing that a negative impact is found when students are employed in full-time jobs, while part-time jobs do not seem to have a significant impact on academic achievements. As for labour market outcomes, the literature has not generally focused on this dimension. An exception is Light (1999), who shows that there exists a premium for working while in school when the working load is higher than 21 hours per week. The relation between pre-graduation jobs and the field of study has been only recently considered by the empirical literature. In particular, Geel and Gellner (2012), Robert and Saar (2012) and Weiss et al. (2014) suggest that students employed in jobs that match their field of study in general enjoy better labour market outcomes.[4]

However, to the best of our knowledge, in the existing literature there are no studies that have tried to address the "interaction" between these two important job dimensions. More specifically, there is a lack of evidence about the joint effect of being involved in a job of a given intensity (i.e. part-time or full-time) and the job relationship with the field of study, on academic performance and post-graduation employment. We believe that these two job features should be jointly considered in an empirical analysis, since different combinations of work intensity and job-field

[4] On the contrary, Baert et al. (2015), using a randomized experiment, consider the effect of the (summer) job relation to the field of study and highlight the absence of any significant effect on the chances of being employed. Further, no studies look at this dimension when considering academic achievements.

match could lead to different payoffs — relative to full-time students — in terms of both academic performance and employment potential. Hence, with this paper we try to fill this gap in the literature.

We use data from three successive waves of the "Survey on Labour Market Outcomes of University Graduates", which include information on graduate students of the Spanish region of Catalonia for the years 2008, 2011 and 2014, concerning individuals who have been graduated four years before (2004, 2007 and 2010). The Spanish case is an interesting case study, given the worrisome figures about the youth labour market in Spain: high risk of unemployment (also among highly educated individuals), prevalence of temporary employment and significant incidence of over-qualification and skills mismatch (see Dolado et al., 2013). Therefore, a better understanding of the factors that could protect graduate's economic potential against unfavourable labour market conditions is a key issue for future policies aimed at promoting employability of recent graduates.

The data contain a wide set of information on individual academic, socio-demographic and labour market characteristics. In particular, they provide information on the working status of students during the last two year before graduation, which is classified according to work intensity (part-time and full-time) and relationship with the field of study. The empirical analysis uses a sample of around 25,000 individuals to analyse the impact of working activities before graduation on a set of academic and (post-graduation) labour market outcomes: time-to-degree, probability of achieving a high final mark, employment status 4 years after graduation, likelihood of having a permanent contract and of performing a job that requires the specific degree obtained.

We start by running simple OLS regressions, which provides conditional correlations between pre-graduation working activities and the selected outcomes of interest. However, OLS estimations are likely to biased due to self-selection into working activities. In fact, there are unobserved factors that might simultaneously affect the probability of working while studying and academic/employment performance, such as individuals' cognitive and non-cognitive abilities, motivation or expectations. Hence, students are not randomly allocated to different types of jobs while enrolled at the university. Existing papers have dealt with this concern using different empirical strategies.[5]

In this paper we control for self-selection through the estimation of a multinomial endogenous treatment model (in a similar vein of Triventi, 2014), using a novel variable as exclusion restriction: a measure of local employment potential. This variable consists in the percentage of registered

[5] The most typical solution consists in the implementation of IV methods, often using local unemployment rate as exclusion restriction (see Hotz et al., 2002, Hakkinen, 2006 and Beffy et al. 2013, among others). Other recent works also apply GMM and fixed effects estimations (Darolia, 2014) or randomized field experiments (Baert et al., 2015) to rule out selection due to unobserved heterogeneity.

employment contracts over working age population (in a given year) within a radius of 30km surrounding the municipality of residence of the individual 2 years before graduation. This measure enables capturing employment opportunities at the very local level, without constraining the local labour market area to be defined only on the basis of administrative borders (i.e. municipality, province or regions) as done in previous papers on this topic.

The results obtained by OLS suggest that working while studying is associated with a modest, but significant, increase in time-to-degree (with a lower effect for part-time jobs related to the field of study), while only graduates who worked part-time in jobs unrelated to the field of education obtain a lower qualification with respect to full-time students. Regarding labour market outcomes, being involved in any type of pre-graduation job is associated with higher probabilities of being employed compared to full-time students, especially in case of performing a job closely-matched with the field of study. The likelihood of having a permanent position raises with the increase in work intensity, although for a given work intensity jobs that match the field of study still yield higher payoffs. Further, only working in occupations that are related to the undergraduate programme increases the chances of having a job that requires the specific degree obtained after 4 years from graduation, while a negative correlation is found for jobs unrelated to the field of study.

Nevertheless, the evidence obtained from the results of the multinomial endogenous treatment model reveals that selection based on unobservable traits strongly matters, thus pointing that OLS estimates do not provide a reliable picture of the effects of working while studying on academic and early career outcomes. More specifically, regarding academic outcomes, the effect of working while in college on increasing the elapsed time-to-degree is exacerbated when selection is controlled for. Also, the negative impact of having a part-time job unrelated to the field of study on the probability of obtaining a high grade persists after ruling out selectivity, while a detrimental effect emerges also for part-time jobs related to the field of study. However, the corresponding coefficients estimates are relatively low in magnitude. Interestingly, full-time jobs related to the degree yields an academic premium, compared to full-time students.

In terms of labour market outcomes, the probability of being employed after 4 years from graduation is significantly higher for graduates who have been working in occupations related to their field of study compared to full-time students, regardless of work intensity. At the same time, unmatched part-time jobs are no longer beneficial after controlling for selection. Further, any kind of working activity improves the chances of being in a permanent position 4 years after graduation, although after ruling out selectivity the independent effect of work intensity survives only for jobs related to the field of study. Finally, job-qualification match at the early stage of the

career is improved only by pre-graduation working experiences related to the field of study (consistently with the OLS results), but selection-corrected estimates highlight a higher effect of -matched- part-time jobs rather than full-time jobs.

Overall, these findings point out the primary importance of working into jobs related to the field of education while enrolled in higher education to improve graduates' labour market outcomes, without significantly dampening their academic performance. Moreover, the analysis highlights the relevance of jointly considering different dimensions of pre-graduation working activities and confirms the need of accounting for self-selection based on unobservable traits, in order to fully appreciate the costs and benefits of combining study and work for students' outcomes.

The structure of the paper is as follows. In Section 2 we review the theoretical and empirical literature on the relationship between working while studying and academic and labour market performances. In Section 3, we describe the data and present some descriptive statistics. Section 4 explains the details of the empirical strategy, while Section 5 reports the main results. The conclusions are drawn in Section 6.

2. Related Literature

The relationship between carrying out working activities during graduation and academic/labour market outcomes has been widely explored by the literature.

From a theoretical point of view, there are some benchmarks theories that are related to this issue. In terms of labour market outcomes, human capital theories predict a positive relationship between working while studying and future labour market outcomes, since students' employment increases general and specific human capital thorough the acquisition of relevant work experience, practical life skills and knowledge (Becker, 1964), which can translate into additional returns on the labour market. Also, according to the Signalling Theory (Spence, 1973), students' work experience can be seen as a strong signal of work motivation, due to the effort of combining work and study. Social Network Theory (Granovetter, 1973) and Social Capital Theory (Coleman, 1988) predict students' better employment outcomes at career entry due to the linkages students are able to generate while working. Further, Screening theories stress a positive relationship between students' employment and labour market outcomes since there is an increase in the chance to be employed by the same employer due to on-the-job screening (Stiglitz, 1975). Nonetheless, the same work experience can be seen as a signal of students' liquidity constraint, especially when the

performed work is not related to the field of education, which might negatively affect later students' employability (Arrow's, 1973, Statistical Discrimination theory).[6]

In terms of academic outcomes, the benchmark reference can be considered the Theory of the Allocation of Time (Becker, 1965), where it can be inferred a negative impact of employment activities during university on academic performance due to the trade-off between the time dedicated to study and working time. Nevertheless, there might not be necessarily a negative relationship between working and academic achievement in case of an efficient organization of working/studying schedule (such as choice of not compulsory lessons, flexibility in academic planning schedule, etc). Also the trade-off between working and studying could be reduced by substituting working time with leisure, rather than with hours of study (Dundes and Marx, 2006, Butler, 2007).

From an empirical point of view, the impact of working while studying on academic or labour market performance has been widely analysed. Concerning academic performance, empirical studies have generally looked at the impact of working while studying on academic achievements in terms of time-to-degree and credits/mark obtained. Using different methodologies and identification strategies -in order to take also into account endogenous self-selection into working activities- general findings point out a negative impact of pre-graduation working experiences on academic achievements (Theune 2015, Darolia, 2014, Triventi, 2014, Body et al. 2014, Avdic and Gartell, 2015, Wenz and Yu, 2010, Stinebrickner and Stinebrickner, 2013). Nonetheless, the academic penalization due to working while studying seems to depend on working time, as reported by Triventi (2014), Darolia (2014) and Body et al. (2014). Their results show that academic achievement is dampened especially when students perform full-time jobs, while the impact of part-time or low-intensity jobs seems to only marginally affect students' academic achievements. Consistent evidence has been obtained also from studies considering the amount of working hours, which highlight that the negative impact on academic performance increases with work intensity (Wenz and Zu, 2010, Callender, 2008, Beffy et al., 2013). Hence, the impact of working while studying on academic achievements changes when different working intensities are taken into account.

As for employment outcomes, previous empirical literature has pointed out a general positive impact on students' future economic performance in terms of both employability and earnings (Hakkinen, 2006, Geel and Gellner, 2012, Humburg and Van der Veldeen, 2015, Light 1999, 2001, Molitor and Leigh, 2005). In contrast, Hotz et al. (2002) and Baert et al. (2015) have found a negligible or even negative effect. However, the existence of heterogeneous returns according to

[6] See Baert et al. (2015) and Geel and Gellner (2012) for an in-depth review of these theoretical frameworks.

work intensity has been generally neglected in the literature on labour market outcomes. An exception is Light (1999), who shows that there exists a return to work while in school only with a working load higher than 21 hours per week. As for other characteristics that have been taken into account to characterize pre-graduation jobs, Geel and Gellner (2012) consider the relation of the job performed during the degree with the field of study. They show that earnings are higher only when the job performed during the university career is related to the degree. Also, Weiss et al. (2014) and Robert and Saar (2012) investigate the role of the coherence of the job performed during higher education with the field of study for subsequent labour market performance. Their analyses confirm better employment opportunities when working in a job well-matched with the field of study.[7] Hence, also in terms of employment outcomes there is a heterogeneous impact of working while studying according to specific characteristics of the job performed during university career, in particular when considering the relationship between the field of study and the job carried out during higher education.

On the whole these studies point out the relevance of taking into account specific features of the job performed during higher education to achieve a better understanding of the effects of working while studying on academic and early career success of university graduates. In this paper we take into account simultaneously the role of work intensity and job relation with the field of studies in order to consider how these dimensions interact when shaping the impact on performance, an aspect that -to the best of our knowledge- has not previously considered by the existing literature.

3. Data and Descriptive Statistics

The empirical analysis is based on data coming from three successive waves of the "Survey on Labour Market Outcomes of University Graduates", which is implemented by the Quality Assurance Agency for the Catalan University System (AQU). The AQU survey takes place every three years (starting from 2001) and is addressed to individuals graduated four years before in any of the seven public universities of the Spanish region of Catalonia.[8] We use the data from the last three waves of 2008, 2011 and 2014 — covering graduates in 2004, 2007 and 2010 respectively — since they contain homogeneous information for our key variables.

[7] Further, Passaretta and Triventi (2015) look at the impact of working while studying considering the relation of the job performed during tertiary education with the field of study across four European countries. Nonetheless, since they cannot control for unobserved factors which might influence both student employment and returns in the labour market, they claim to interpret their results as descriptive, without attributing them a causal interpretation.

[8] From the 2008 wave, private universities and on-line universities have been progressively incorporated in the survey. However, in this paper we focus only on graduates from public universities (which account for about 75% of the whole population of graduates), since not all the variables of interest are available for private and on-line universities and because these universities are fully covered only in the last wave of the survey (2014). For public universities, the response rate in the last three waves was around 55%, with a sampling error of about 0.6%. More information about the AQU survey can be found at: http://www.aqu.cat/estudis/graus/index_en.html#.VouW2FKrEx9.

The AQU survey contains several questions about individuals' academic and socio-demographic characteristics, as well as labour market variables such as employment status, type of job, required qualification and type of contract, which refer to the year in which the survey takes place (i.e. four years after graduation). Moreover, it encompasses questions on job activities performed during the degree, including information on work intensity (part-time and full-time) as well as the relatedness of the job with the field of education. Further, the AQU survey provides administrative information about the year of enrolment and graduation[9], the specific degree obtained (which we grouped into 15 fields of study, including short degrees), the university of graduation and the municipality of residence during university attendance. The latter variable, as explained in the next section, represents an important value added of the AQU survey and is of crucial importance for our identification strategy.

Our main explanatory variable concerns working experiences while completing the degree. The question refers to the working situation in the last two years before graduation and specifically asks whether the individual was 1) a full-time student, 2) working part-time in a job related to the field of study, 3) working part-time in a job not related to the field of study, 4) working full-time in a job related to the field of study and 5) working full-time in a job not related to the field of study. Therefore, with this information, we are able to simultaneously distinguish for work intensity and job-field match; this distinction, to the best of our knowledge, has never been considered in previous studies on this topic.

Regarding the outcomes we analyse, we dispose of two indicators of academic performance: elapsed time-to-degree (i.e. difference between year of enrolment and year of graduation) and the final grade obtained, where the latter variable is coded into four categories, namely passed (5-6.9 out of 10), notable (7-8.9), excellent (9-9.4) and honour (9.5-10). Regarding labour market performance, we consider employment status and two variables reflecting job quality: having a permanent contract (versus fixed-term contracts or other situations) and the qualification required for the current job, which is defined into three categories: no qualification required, general university degree required and specific university degree required.

[9] Before the implementation of the Bologna Process, university degrees in Spain were divided into standard and short-term degrees. The duration of the former was generally 4 years (except for architecture, engineering and medicine, with 5 years of duration), whereas the length of the short-term degrees was 3 years. Since the reform was gradually implemented only from the academic year 2009/2010, all individuals in our sample are not subject to the reform and completed tertiary education under the previous setting. The details of the Spanish higher education system are not explained here, but are described in detail by García-Quevedo et al. (2010). Notice also that the information on the year of enrolment, which is recovered from administrative records, is not available for one university (Universitat Pompeu Fabra) in the last wave of the survey (2014).

For the purposes of our empirical analysis, we restrict the sample to individuals with age equal or lower than 40 (in order to avoid including individuals in an advanced stage of their career[10]) and we exclude individuals who enrolled at the university while being employed in the occupation they hold in the survey's year. Graduates in Medicine are also excluded, because they are involved in a compulsory specialization internship four years after graduation. We drop the relatively small proportion (7%) of individuals who are self-employed (although the general evidence is not affected by this choice) as well as observations with missing values in relevant variables. Finally, we retained only individuals who resided in Catalonia while studying (93% of the whole sample), since this is necessary for the construction of the instrumental variables used to rule out self-selection into working situations before graduation. In this way, we end up with a final sample of around 25,000 observations for the empirical analysis.

Descriptive statistics for the set of variables that are used in the empirical analysis are reported in Table 1, for the pooled sample and separately by wave. The raw data indicates that the average duration of the university career is about 5 years, and the large majority of students obtain a final mark lower than 8 (out of 10). About 90% of individuals in our sample are employed at the time of the survey, although this proportion decreases across waves, due to the worsening of labour market condition during the period of economic crisis. Consistently, the incidence of permanent contracts among those who are working (62% for the pooled sample) decreases over time. Also the match between the job and the obtained qualification has worsened across the three waves, since a lower proportion of individuals for whom the specific degree was required during the hiring process is observed for the last wave. Further, there is a significant degree of overqualification since 17% of our sample graduates are likely to be employed into occupations that do not require any university degree.

Regarding our main independent variable of interest, the data highlight that combining some kind of job with college is a very common situation among individuals in our sample, since only 36% of students declare not to have been involved in working activities during the last two years of undergraduate studies. Most of those who work while studying are employed in part-time jobs, mainly related to their field of education, although an important share of graduates work in occupations unrelated to their university degree. In Table 2 we report descriptive statistics by working situation before completing the degree. As for academic performance, the data indicate that the elapsed time-to-degree increases with work intensity and the percentage of those obtaining high marks decreases with it, even if the difference in performance is reduced when considering jobs related to the field of education. Hence, working activities seem to be negatively

[10] We have also run robustness checks lowering the age threshold to 30 or 35 years old and main results have not changed. These estimates are available upon request.

related to academic performance, being work intensity the major factor behind the difference in performance; such differential is however reduced when the job is related to the field of study. As for labour market outcomes four years after graduation, working while studying is generally associated with better outcomes, even if there are differences according to both working intensity and the relationship between the job and the field of study. In fact, the unconditional probability of being employed is markedly higher among graduates who have worked in jobs related to their field of education. Moreover, the incidence of permanent contract among employed graduates who were already working before completing the degree is generally higher than for full-time students, especially for those working full-time in a job that matches the field of their degree. More remarkably, graduates working in occupations unrelated to their field before completing the university degree are less prone to have a job that requires their specific degree four years after graduation, especially when compared to their counterparts working part-time in a job related to the field of study.

There are also differences in the rest of control variables across working statuses, since the propensity of combining college and working activities is generally higher among males and among individuals having a less advantaged background. Moreover, individuals who worked full-time before completing the degree are somewhat older than others and non-negligible differences are observed across fields of study and universities.

4. Empirical Methodology

In this section we present the empirical strategy we follow to identify the effect of working while studying on academic and labour market performance considering work categories characterized by different work intensity and relation with the field of study.

The starting point of our empirical analysis consists in estimating OLS equations that explain each academic/labour market outcome as a function of exogenous covariates and indicators for different working situations before completing the degree. More specifically, we consider that each outcome (Y_i) depends on pre-determined individual characteristics included in the vector X_i (gender, age, age squared and parental education), field of study and university effects[11] (θ_f and π_u respectively), wave dummies (τ_w) and a set of indicators for each possible working status ($W_i = j$) taking as reference category full-time students:

[11] As briefly commented above, although we dispose of identifiers for the exact degree obtained, we decided to group different degrees in (relatively homogeneous) categories of field of study, in order to reduce the number of parameters to be estimated. The results obtained using more detailed indicators are virtually the same. We also tried to include university-specific field of study fixed effects and, again, the OLS results remain unchanged (not shown, available upon request). Notice also that we include among the regressors an indicator for short-term degrees (3 years of duration).

$$Y_i = \alpha + \beta' X_i + \sum_{j=1}^{J} \gamma_j I(W_i = j) + \theta_f + \pi_u + \tau_w + u_i \quad (1)$$

We estimate equation (1) considering as dependent variable(s): a) the elapsed time-to-degree (in years, logged), b) an indicator for having obtained a mark equal or greater than 9 out of 10, c) a dummy for being employed, d) an indicator for having a permanent contract, e) an indicator that takes the value one if the specific degree was required during the hiring process.

However, OLS estimates are consistent only if the unobservable factors that affect the propensity to work in a specific kind of job during the degree are unrelated to the error term of each outcome, which is unlikely to be the case (as reported by Hakkinen, 2006, Beffy et al., 2013 and Triventi, 2014, among others). Indeed, unobservable traits - such as cognitive and non-cognitive abilities, motivation, expectation, etc. - could affect both the decision to work and any of the outcomes that we consider in this paper.

In order to control for the self-selection bias due to unobservable characteristics that may affect both the propensity to being involved in working activities and the outcomes of interest, we rely on the estimation of a multinomial endogenous treatment model (proposed by Deb and Trivedi, 2006), which enables to jointly modelling working decisions before graduation and academic/labour market outcomes.

We consider that the choice of working status follows a mixed multinomial distribution, which means that the probability of observing individual *i* in working status *j* can be described as:

$$\Pr\left(W_{im} = j \middle| X_i, Z_m, \theta_f, \pi_u, l_{ij}\right) = \frac{\exp\left(\mu_j + \psi'_j X_i + \varphi_j Z_m + \theta_{fj} + \pi_{uj} + \tau_{wj} + \delta_j l_{ij}\right)}{1 + \exp\left(\mu_j + \psi'_j X_i + \varphi_j Z_m + \theta_{fj} + \pi_{uj} + \tau_{wj} + \delta_j l_{ij}\right)}. \quad (2)$$

The likelihood of being assigned to the working status j for the individual i residing in municipality m depends on a set of observed individual (X_i) a measure of local employment potential (Z_m, described below), field/university fixed effects (θ_f and π_u), wave dummies (τ_w) and latent factors l_{ij} that proxy the unobserved individual heterogeneity affecting the propensity of having a certain kind of job before graduation (relative to full-time students). The equation for the final outcome now becomes:

$$Y_{im} = \alpha + \beta' X_i + \sum_{j=1}^{J} \gamma_j I(W_{im} = j) + \theta_f + \pi_u + \tau_w + \sum_{j=1}^{J} \lambda_j l_{ij} + \varepsilon_{im} \quad (3)$$

which corresponds to equation (1) augmented by the latent factors l_{ij}, capturing the unobserved factors determining the decision to work while studying that also affect the final outcome. The associated factor loadings λ_j can be interpreted as selection terms, which capture the correlation

between the unobservable determinants of having a given kind of job (relative to being a full-time student) and each of the outcomes we analyse. Assuming that the latent factors follow a standard normal distribution, the estimation of this joint model can be carried out through maximum simulated likelihood.[12] We cluster standard errors at the municipality level throughout, to account for correlation between errors of individuals residing in the same place while studying.

Given the nonlinear functional form of the multinomial equation, the parameters of this joint model for working decisions before graduation and academic/labour market outcomes is identified even if the variables that appear in the two equations are identical. Nonetheless, we include an exclusion restriction in the multinomial equation (Z_m). The exclusion restriction variable has to be a strong predictor of working choices before graduation and — conditional on the set of explanatory variables included in equation (3) — has to be uncorrelated with unobserved determinants of academic and labour market outcomes.

Several related papers exploited local/regional unemployment rate as exclusion restriction for working conditions before degree completion under the assumption that labour market conditions at the time of taking the decision to work do not affect the final outcome directly (see, among others, Light 1999, Hakkinen 2006, Kalenkoski and Pabilonia, 2010, Beffy et al. 2013, Triventi, 2014). In this paper we adopt a similar strategy, since we also exploit variation at the local level (i.e. the municipality of residence during the degree) to achieve identification. However, instead of using the unemployment rate, we constructed another measure to proxy for local labour market opportunities. This variable consists in the percentage of registered employment contracts over working age population (in a given year) within a radius of 30km surrounding the student's municipality of residence 2 years before the graduation year. This measure allows us to capture employment potential at the very local level, without constraining the area capturing local labour markets to be defined only on the basis of administrative borders (i.e. municipality, province or regions), as done in previous papers on this issue. In particular, the instrument has been constructed as follows. We have first retrieved administrative information about the number of newly registered employment contracts for each municipality of Catalonia during a specific year.[13] Second, we have collected data on working age population from the administrative register of inhabitants at the municipality level. Finally, for each year we have computed the ratio between the total number of registered contracts and the number of working age individuals of all

[12] To perform the estimation we have used the STATA routine 'MTREATREG' (Deb, 2009).

[13] This information is available at the webpage of the Spanish Employment Bureau (Servicio Público de Empleo Estatal, SEPE): https://www.sepe.es/contenidos/que_es_el_sepe/estadisticas/datos_estadisticos/municipios/index.html. The data are recorded monthly and are available since 2005.

municipalities within a radius of 30km[14] from the municipality of residence of the individuals. This variable represents a proxy for (potential) local labour market opportunities in a given period. Since we aim at predicting working activities two years before graduation, we imputed our measure of employment potential on the basis of this information taking the population-weighted average for this time span. More specifically, for individual graduated in 2010 (wave 2014), we assigned the values of the measure for the municipality of residence observed for 2009 and 2008; for those graduated in 2008 (wave 2011), we assigned the values for 2006 and 2005. Unfortunately, the information about the number of registered contracts at the municipality level is unavailable for previous years, which prevents constructing our job availability measure for those who graduated in 2005. This means that the wave 2008 cannot be used for the joint model estimation.[15] The spatial distribution of our proxy for employment potential is displayed in Figure 1, separately for the two periods 2005-2006 and 2008-2009 (which are imputed to waves 2011 and 2014, respectively) and represents the exclusion restriction used as predictor of working activities before graduation (Z_m).

As previously observed, employment potential before graduation can be considered a valid exclusion restriction if it has a strong predicting power to explain the probability of having a given kind of job while studying, but does not affect directly academic and labour market outcomes. The first condition is likely to hold, since the probability of working while studying is influenced by local labour market conditions and the existence of such relationship can be directly inferred from the data. The second condition represents an identifying assumption. As for academic outcomes, this assumption might not hold in case that students' incentives are conditioned by the labour market situation, as in the case of a stagnant labour market that could increase dropout rate and time-to-degree and, in general, affects student's motivation and effort. However, it might be argued that if labour market conditions are directly related to students' academic performance, this should mostly occur at the province/region level, rather than at the very local level (30km surrounding the student's municipality of residence). Moreover, university students are likely to be more reactive (in terms of academic motivation) to labour market condition of young individuals with a similar level of education, rather than to general employment levels (as reflected in the measure we use), which reinforce the validity of the elicited exclusion restriction.[16]

[14] The computations have been obtained through geocoding, considering the centroid of each municipality. We also tried to include municipalities within either 50 Km or 100 Km. The results are qualitatively similar considering broader areas. Since the predictive power of the job availability variable is higher considering a radius of 30 Km, we retained this measure for the empirical analysis.

[15] For this reason we have also carried out OLS estimations only for the last two waves, which yield qualitatively similar estimates than those obtained using all the three waves (see section 5 for additional details on this issue).

[16] Nonetheless, there might still be some correlations between our measure of employment potential and the academic outcomes analyzed thus suggesting that the results from the multinomial endogenous treatment model applied to academic outcomes should be interpreted with some cautious.

As for labour market outcomes, the validity of the use of local employment potential as exclusion restriction might be questioned in case of persistency in local labour market conditions over time, which could affect labour market status 4 years after graduation (Oreopoulos et al., 2012). However, in the setting of this paper this issue is less likely to be a serious concern. In fact, labour market conditions 6 years after the period for which we have computed the employment potential measure (2011 and 2014) are probably widely affected by the impact of the economic crisis, which was not yet in act during the years for which we computed the employment potential measure (i.e. 2005-2006 and 2008-2009). Put in other words, the sharp change in labour market conditions due to the economic downturn has broken the potential link between employment potential in the relevant years for our exclusion restriction and the year(s) of the survey.

5. Results

5.1 OLS Estimates

Table 3 shows the OLS estimates of the impact of combining working activities with university education on academic and employment performance.[17] As for academic outcomes, column (1) shows that time to the degree is generally higher for those who work while studying than for their counterparts not involved in working activities. Nonetheless, the increase in the elapsed time to graduation is relatively low (about 2.3%) and does not concern those who work part-time in a job that is related to the field of study (+0.9%, marginally significant). In terms of the academic mark (column (2)), those who work are penalized only when they work in a part-time job not related to their field of study. Therefore, a first glance reveals that studying and working at the same time has a negative (but moderate) impact on academic achievement, which especially affects the length of undergraduate studies.

Column (3) to (5) of Table 3 show the OLS results for early career outcomes. First of all, it can be noted that the probability of being employed 4 years after graduation is generally higher for those who have worked during tertiary education. The highest values are observed for those who have worked in jobs related to the field of education (+4 percentage points and +5.5 percentage points for part-time and full-time respectively). The employment "premium" for working while studying is lower for those working in jobs not related to the field of education: +1.7 percentage points and +2.9 percentage points for part-time and full-time jobs respectively. When considering the probability of getting a permanent contract (column (4) of Table 3) the picture slightly changes, since work intensity appears to be more relevant than job-field match for the chances of being in a permanent job position. In fact, for those who have worked full-time the probability of having a

[17] Table 3 contains the results for selected coefficients. Table A1 in Appendix shows complete OLS estimations.

permanent contract 4 years after graduation is higher of 8.6 percentage points and 8.1 percentage points (for jobs related and not related to the field of education respectively) with respect to full-time student, while for those working part-time these premiums are of 5.6 percentage points for jobs related to the field of education and 2.7 percentage points for not related jobs. Nevertheless, once keeping fixed work intensity, there is a relatively higher premium associated to the fact that the work carried out before graduation matched the field of study. Finally, considering the match between the job 4 years after graduation and the specific degree obtained, graduates who have worked in jobs not related to their field of education have a significantly lower probability to end up in occupations that match their specific degree (-4.8 percentage points and -14.7 percentage points for part-time and full-time jobs respectively), relative to their full-time students counterparts. On the contrary, individuals who have worked in occupations that match their field of education have a higher probability, with respect to full-time students, to end up into jobs that require their specific degree (+5.1 percentage points and +2.6 percentage points for part-time and full-time jobs respectively).

5.2 Multinomial Endogenous Treatment Model Estimates

The results obtained by OLS suggest that working before graduation in jobs related to the field of education, particularly full-time, is crucial in order to better perform in the labour market at the early stage of the working career, without generating an important penalization in terms of academic performance. However, these estimates might be biased due to the presence of unobserved factors that might simultaneously affect the probability of working while studying and, either the academic, or labour market performance. In order to control for this possible self-selection into working activities, we estimate multinomial endogenous treatment models that allow controlling for latent factors, so that to properly identify the impact of working while studying on academic and future labour market outcomes. As explained in Section 4, we use as exclusion restriction the number of registered contracts over working age population for all municipalities within a radius of 30km from the municipality of residence of the individuals, during the two years before the graduation.[18]

Table A3 in the Appendix shows the estimates from the multinomial selection equation (Eq. (2)) where the corresponding average marginal effects are reported. It is possible to see that our employment potential measure has a significant effect on employment decisions before

[18] Since this measure of employment potential can be constructed only from 2005, we are unable to include observations from the 2008 wave in the estimation of the multinomial endogenous treatment model. In order to ensure comparability, we also re-estimated the OLS equations only for the last two waves of the survey. The main results obtained from OLS models applied to the waves 2011 and 2014 are qualitatively similar to the baseline estimates, as it can be appreciated in Table A2 in the Appendix (full results are not reported, but are available upon request).

graduation, thus confirming the validity of the elicited variable for predicting the endogenous working condition variable. Specifically, the increase in job availability in a radius of 30km surrounding the students' municipality residence (across the two years previous to graduation) has a negative effect on the probability of being a full-time student (-37 percentage points) and exerts a positive influence on the probability of having a part-time job (+11.7 percentage points and +14.4 percentage points for jobs related and not related to the field of education, respectively) and, to a slightly lesser extent, on the probability of being employed full-time in a job unrelated to the degree (+10.1 percentage points).

Table 4 shows selected estimates from the final outcome of the multinomial endogenous treatment model (Eq. (3)). Regarding academic outcomes, taking into account students' self-selection significantly changes the results with respect to previous OLS estimates. The results in Column (1) of Table 4 still show that working while studying increases the time to the degree. The effect is, however, significantly higher with respect to the conditional correlation provided by OLS (around +17% compared to 2.3% in OLS estimates), due to a negative selection in action as revealed by the λ_j coefficients. This means that the unobservables characteristics that affect the decision to work while enrolled at the university are negatively related to college duration, which appears to be more pronounced for those working part-time. Column (2) of Table 4 reports the results for the probability of achieving a high mark, which is slightly lower for part-time students with respect to full-time students when self-selection is taken into account (-2.3 percentage points for jobs not related to the field of education, and -1.6 percentage points for those related). Hence, part-time students are positively selected, suggesting that those who opt for combining college with a part-time job are endowed of unobservable traits that have a modest but positive effect on grade achievements. On the contrary, a positive effect of working in a full-time job related to the field of study emerges now (+4.2 percentage points), which is consistent with the fact that this group of individuals appear to be negatively selected in terms of unobservables.

The last three columns of Table 4 contain the results for labour market outcomes. First of all, the multinomial endogenous treatment model confirms the results obtained by OLS, which highlights the importance of working in a job that matches the field of study to enjoy higher chances of being employed after graduation. Once selection is taken into account, the employment premium for having worked in a job related to the field of study is above 8 percentage points, regardless of whether the student was employed part-time or full-time before graduation. There is also a positive, but more modest, effect of working full-time in a job unrelated to the field of education (+4 percentage points), and a negative effect for having a part-time job mismatched with the field

of education (accompanied by positive selection into this working status), relative to full-time students.

Looking at the probability of ending up with a permanent contract, our findings indicates that having being employed before graduation has generally a positive effect on the chances of having a permanent contract 4 years after completing the university. Nonetheless, there is a remarkable difference with respect to whether the job was full-time and related to the field of study (with a positive effect of up to 39 percentage points) compared to other working situations, for which the increase in probability for being in a permanent position is of around 13 percentage points.

Finally, the evidence regarding post-graduation job-qualification match obtained from the joint multinomial selection model is not significantly different from the OLS results. Indeed, selectivity-corrected estimates confirm that working in a part-time job related to the field of study increases the chances of having a job that requires the specific degree obtained 4 years after graduation (+6.4 percentage points). There is also a modest premium, relative to full-time students, for graduates working full-time in job related to the field of education, but this is not precisely estimated after having taken into account the self-selection. On the contrary, being involved in working activities that are unmatched with the field of study is detrimental for future job-qualification match (-43 and -19 percentage points for part-time and full-time jobs respectively), relative to individuals who were exclusively involved in studying while enrolled at the university. Moreover, there is also evidence of high positive selection of part-time students in jobs unrelated to the field of education, which substantially affects the low negative penalization that was reported by OLS.

On the whole, these results point out the following findings. First of all, in order to properly address the impact of working while studying on both academic outcomes and future employment performance, it is crucial to simultaneously take into account work intensity and the relation of the job performed with the field of education, since these two aspects interact with each other. Second, as for academic performance, it is confirmed that working while studying entails a significant increase in the length of studies with respect to full-time students. Moreover, working activities have only a modest negative impact on the final mark, which reverts to a positive effect when the student was involved in a full-time job that matched his/her field of study. Third, the findings concerning post-graduation performance in the labour market reveal that, in general, what really matters is having a job that matches the field of study. In fact, those who have worked in occupations related to their studies have generally better post-graduation labour market outcomes than their counterparts who have studied full-time. The former are also more likely to be employed after graduation than individuals working in occupations unrelated to their field of

study and have better chances of having a job that matches their specific degree. Regarding job stability, there is a substantial higher premium for full-time workers in jobs related to the field of education, although other working activities have also a positive impact on the probability of obtaining a permanent contract four years after university completion (relative to full-time students). Last but not least, self-selection matters and must be taken into account in order to obtain a reliable and clear picture about the effects of working while studying on subsequent academic and labour market outcomes. In fact, the unobservable characteristics that affect the propensity to combine working activities with university education are, in most of the cases, also related to the outcomes that we considered in this paper.

6. Conclusions

This paper investigated the relationship between working while studies and academic and labour market performance, taking into account the joint role of work intensity and job relation with the field of study.

After having taken into account students' self-selection into working activities, which widely affect the outcomes of the analysis, our results point out the following findings. Regarding academic outcomes, working while studying significantly increase the elapsed time-to-degree. On the other hand, the academic performance in terms of likelihood of obtaining a higher mark is only marginally affected by carrying out working activities during university. Interestingly, this likelihood, compared to full-time students, is higher when the job performed is full-time and related with the field of study. As for labour market outcomes, the probability of being employed after 4 years from graduation is, in general, significantly higher for graduates who have been working in occupations related to their field of study, regardless of work intensity. Also job quality at the early stage of the career is positively affected by pre-graduation working experiences that match the field of study, since both the chances of having a stable employment position and the likelihood of having a job that requires the specific degree obtained increase for graduates who worked in jobs related to their field of study.

Overall, these findings highlight the primary importance of working into jobs related to the field of education while enrolled in higher education, which could represent a stepping stone to improve graduates' career success, without significantly dampening academic performance. Moreover, the analysis highlights the relevance of jointly considering different dimensions of pre-graduation working activities to properly address this relationship, since findings change when the interaction between these job characteristics is taken into account. Finally, the investigation

emphasizes the need of accounting for self-selection based on unobservable traits, in order to fully appreciate the costs and benefits of combining study and work for students' outcomes.

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Figure 1: Employment Potential Measure by Wave

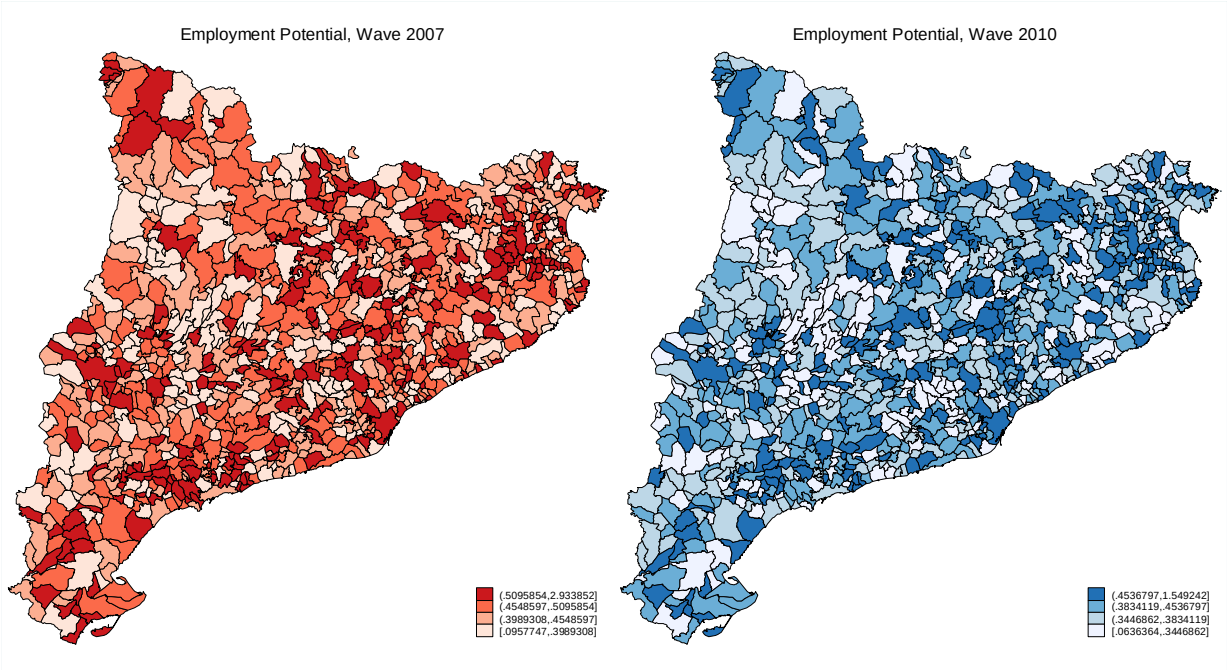

Table 1: Descriptive Statistics (pooled sample and by wave)

	Pooled Sample		Wave 2008		Wave 2011		Wave 2014	
	mean	*s.d.*	mean	*s.d.*	mean	*s.d.*	mean	*s.d.*
Time-to-Degree (Years)	5.07	*2.14*	4.99	*1.94*	5.02	*2.15*	5.21	*2.33*
Final Mark = Passed (5-6.9)	0.47	*0.50*	0.46	*0.50*	0.50	*0.50*	0.46	*0.50*
Final Mark = Notable (7-7.9)	0.50	*0.50*	0.50	*0.50*	0.47	*0.50*	0.52	*0.50*
Final Mark = Excellent (8-9.4)	0.03	*0.16*	0.04	*0.18*	0.03	*0.16*	0.02	*0.15*
Final Mark = Honours (9.5-10)	0.01	*0.07*	0.01	*0.07*	0.01	*0.08*	0.01	*0.07*
Employed	0.90	*0.30*	0.94	*0.23*	0.89	*0.32*	0.86	*0.35*
Permanent Contract	0.62	*0.49*	0.65	*0.48*	0.62	*0.49*	0.58	*0.49*
Specific University Degree Required	0.64	*0.48*	0.69	*0.46*	0.64	*0.48*	0.60	*0.49*
General University Degree Required	0.19	*0.39*	0.16	*0.37*	0.21	*0.41*	0.19	*0.39*
No Qualification Required	0.17	*0.38*	0.15	*0.36*	0.15	*0.36*	0.21	*0.41*
Full-Time Student	0.36	*0.48*	0.41	*0.49*	0.33	*0.47*	0.33	*0.47*
Part-Time Job —Related to the Field of Study	0.27	*0.44*	0.24	*0.43*	0.26	*0.44*	0.31	*0.46*
Part-Time Job —Not Related to the Field of Study	0.17	*0.38*	0.16	*0.37*	0.16	*0.37*	0.20	*0.40*
Full-Time Job —Related to the Field of Study	0.15	*0.35*	0.13	*0.34*	0.18	*0.38*	0.12	*0.33*
Full-Time Job —Not Related to the Field of Study	0.06	*0.23*	0.06	*0.24*	0.06	*0.24*	0.04	*0.20*
Wave 2008	0.35	*0.48*						
Wave 2011	0.33	*0.47*						
Wave 2014	0.32	*0.47*						
Male	0.39	*0.49*	0.39	*0.49*	0.39	*0.49*	0.40	*0.49*
Age	28.90	*2.95*	28.70	*2.67*	29.00	*2.98*	29.02	*3.19*
Highest Parental Education = Primary or Less	0.37	*0.48*	0.40	*0.49*	0.36	*0.48*	0.33	*0.47*
Highest Parental Education = Secondary	0.31	*0.46*	0.31	*0.46*	0.31	*0.46*	0.30	*0.46*
Highest Parental Education = Tertiary	0.33	*0.47*	0.28	*0.45*	0.33	*0.47*	0.37	*0.48*
Area of Study = Humanistic Studies	0.12	*0.33*	0.14	*0.35*	0.12	*0.32*	0.10	*0.31*
Area of Study = Social Sciences	0.47	*0.50*	0.47	*0.50*	0.46	*0.50*	0.48	*0.50*
Area of Study = Hard Sciences	0.10	*0.30*	0.10	*0.30*	0.11	*0.31*	0.11	*0.31*
Area of Study = Health (excluding Medicine)	0.07	*0.25*	0.07	*0.25*	0.06	*0.24*	0.07	*0.25*
Area of Study = Technical Studies	0.24	*0.43*	0.23	*0.42*	0.25	*0.44*	0.24	*0.43*
Field of Study = Humanities	0.07	*0.25*	0.08	*0.27*	0.07	*0.25*	0.06	*0.24*
Field of Study = Language	0.05	*0.22*	0.06	*0.24*	0.05	*0.22*	0.05	*0.21*
Field of Study = Business & Economics	0.14	*0.35*	0.15	*0.36*	0.13	*0.33*	0.15	*0.35*
Field of Study = Law & related Degrees	0.08	*0.27*	0.08	*0.27*	0.08	*0.27*	0.07	*0.26*
Field of Study = Political Sciences & Sociology	0.03	*0.17*	0.03	*0.17*	0.03	*0.17*	0.03	*0.16*
Field of Study = Communication & Documentation	0.04	*0.20*	0.04	*0.18*	0.05	*0.21*	0.05	*0.22*
Field of Study = Psychology & Related	0.04	*0.19*	0.04	*0.19*	0.04	*0.19*	0.03	*0.18*
Field of Study = Education	0.14	*0.35*	0.14	*0.34*	0.14	*0.35*	0.16	*0.36*
Field of Study = Chemistry, Biology & Related	0.08	*0.27*	0.08	*0.27*	0.08	*0.27*	0.09	*0.28*
Field of Study = Physics, Maths & Statistics	0.02	*0.14*	0.02	*0.15*	0.02	*0.15*	0.02	*0.14*
Field of Study = Health (excluding Medicine)	0.07	*0.25*	0.07	*0.25*	0.06	*0.24*	0.07	*0.25*
Field of Study = Architecture & Construction	0.04	*0.20*	0.04	*0.19*	0.04	*0.21*	0.05	*0.22*
Field of Study = Industrial, Chemical & Electronic Eng	0.08	*0.28*	0.08	*0.28*	0.09	*0.28*	0.08	*0.27*
Field of Study = Telecommunication & Informatics	0.09	*0.29*	0.09	*0.28*	0.11	*0.31*	0.09	*0.29*
Field of Study = Agricultural Engineering & Related	0.02	*0.14*	0.02	*0.15*	0.02	*0.13*	0.02	*0.14*
Short Degree (3 years)	0.31	*0.46*	0.30	*0.46*	0.31	*0.46*	0.31	*0.46*
Universitat de Barcelona (UB)	0.28	*0.45*	0.29	*0.45*	0.28	*0.45*	0.28	*0.45*
Universitat Autònoma de Barcelona (UAB)	0.22	*0.42*	0.23	*0.42*	0.23	*0.42*	0.21	*0.41*
Universitat Politècnica de Catalunya (UPC)	0.15	*0.36*	0.15	*0.36*	0.16	*0.37*	0.15	*0.36*
Universitat Pompeu Fabra (UPF)	0.08	*0.27*	0.08	*0.28*	0.08	*0.27*	0.09	*0.28*
Universitat de Girona (UdG)	0.10	*0.30*	0.10	*0.31*	0.09	*0.29*	0.10	*0.30*
Universitat de Lleida (UdL)	0.05	*0.22*	0.06	*0.24*	0.03	*0.18*	0.06	*0.23*
Universitat Rovira i Virgili (URV)	0.11	*0.31*	0.09	*0.28*	0.12	*0.33*	0.12	*0.32*
Job Availability Measure	0.47	*0.06*			0.49	*0.06*	0.46	*0.06*
Number of observations	25,342		8,748		8,413		8,181	

Note: the number of observations includes individuals who are unemployed (for whom current job quality variables are not available) and graduates from UPF of the last wave, for whom we do not dispose of information about elapsed time-to-degree.

Table 2: Descriptive Statistics (pooled sample and by working situation before graduation)

	Pooled Sample		Full-Time Student		Part-Time Job – Related		Part-Time Job – Not Related		Full-Time Job -- Related		Full-Time Job – Not Related	
	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.	mean	s.d.
Time-to-Degree (years)	5.07	*2.14*	4.73	*1.75*	5.04	*2.08*	5.07	*2.01*	5.64	*2.70*	5.86	*2.76*
Final Mark = Passed (5-6.9)	0.47	*0.50*	0.44	*0.50*	0.46	*0.50*	0.49	*0.50*	0.54	*0.50*	0.54	*0.50*
Final Mark = Notable (7-7.9)	0.50	*0.50*	0.52	*0.50*	0.51	*0.50*	0.48	*0.50*	0.44	*0.50*	0.43	*0.49*
Final Mark = Excellent (8-9.4)	0.03	*0.16*	0.03	*0.18*	0.03	*0.16*	0.02	*0.15*	0.03	*0.16*	0.03	*0.17*
Final Mark = Honours (9.5-10)	0.01	*0.07*	0.01	*0.08*	0.01	*0.08*	0.01	*0.07*	0.00	*0.07*	0.00	*0.07*
Employed	0.90	*0.30*	0.88	*0.32*	0.92	*0.28*	0.88	*0.33*	0.93	*0.25*	0.89	*0.31*
Permanent Contract	0.62	*0.49*	0.56	*0.50*	0.65	*0.48*	0.57	*0.50*	0.74	*0.44*	0.68	*0.47*
Specific University Degree Required	0.64	*0.48*	0.67	*0.47*	0.70	*0.46*	0.56	*0.50*	0.65	*0.48*	0.42	*0.49*
General University Degree Required	0.19	*0.39*	0.18	*0.38*	0.16	*0.37*	0.22	*0.41*	0.19	*0.39*	0.27	*0.45*
No Qualification Required	0.17	*0.38*	0.15	*0.36*	0.14	*0.35*	0.22	*0.42*	0.16	*0.37*	0.30	*0.46*
Wave 2008	0.35	*0.48*	0.39	*0.49*	0.31	*0.46*	0.32	*0.47*	0.32	*0.47*	0.39	*0.49*
Wave 2011	0.33	*0.47*	0.31	*0.46*	0.32	*0.47*	0.31	*0.46*	0.41	*0.49*	0.36	*0.48*
Wave 2014	0.32	*0.47*	0.30	*0.46*	0.37	*0.48*	0.37	*0.48*	0.27	*0.44*	0.25	*0.43*
Male	0.39	*0.49*	0.38	*0.49*	0.41	*0.49*	0.31	*0.46*	0.46	*0.50*	0.39	*0.49*
Age	28.90	*2.95*	28.05	*2.46*	28.82	*2.69*	28.80	*2.79*	30.38	*3.42*	31.27	*3.55*
Highest Parental Education = Primary or Less	0.37	*0.48*	0.33	*0.47*	0.34	*0.48*	0.39	*0.49*	0.43	*0.50*	0.48	*0.50*
Highest Parental Education = Secondary	0.31	*0.46*	0.31	*0.46*	0.32	*0.47*	0.32	*0.47*	0.30	*0.46*	0.29	*0.46*
Highest Parental Education = Tertiary	0.33	*0.47*	0.36	*0.48*	0.34	*0.47*	0.30	*0.46*	0.27	*0.44*	0.23	*0.42*
Area of Study = Humanistic Studies	0.12	*0.33*	0.12	*0.33*	0.09	*0.28*	0.21	*0.41*	0.04	*0.19*	0.22	*0.42*
Area of Study = Social Sciences	0.47	*0.50*	0.44	*0.50*	0.45	*0.50*	0.49	*0.50*	0.51	*0.50*	0.54	*0.50*
Area of Study = Hard Sciences	0.10	*0.30*	0.15	*0.36*	0.06	*0.24*	0.12	*0.32*	0.05	*0.22*	0.06	*0.24*
Area of Study = Health (excluding Medicine)	0.07	*0.25*	0.07	*0.26*	0.07	*0.26*	0.06	*0.23*	0.06	*0.24*	0.04	*0.20*
Area of Study = Technical Studies	0.24	*0.43*	0.21	*0.41*	0.33	*0.47*	0.12	*0.33*	0.33	*0.47*	0.14	*0.34*
Field of Study = Humanities	0.07	*0.25*	0.06	*0.24*	0.04	*0.20*	0.14	*0.35*	0.02	*0.14*	0.15	*0.36*
Field of Study = Language	0.05	*0.22*	0.06	*0.23*	0.05	*0.21*	0.07	*0.26*	0.02	*0.14*	0.07	*0.26*
Field of Study = Business & Economics	0.14	*0.35*	0.14	*0.34*	0.14	*0.34*	0.09	*0.28*	0.23	*0.42*	0.12	*0.32*
Field of Study = Law & related Degrees	0.08	*0.27*	0.07	*0.25*	0.05	*0.22*	0.11	*0.31*	0.09	*0.29*	0.17	*0.38*
Field of Study = Political Sciences & Sociology	0.03	*0.17*	0.03	*0.17*	0.01	*0.11*	0.05	*0.22*	0.02	*0.13*	0.05	*0.22*
Field of Study = Communication & Documentation	0.04	*0.20*	0.04	*0.19*	0.05	*0.23*	0.05	*0.21*	0.03	*0.18*	0.04	*0.18*
Field of Study = Psychology & Related	0.04	*0.19*	0.03	*0.17*	0.03	*0.18*	0.06	*0.23*	0.03	*0.17*	0.05	*0.21*
Field of Study = Education	0.14	*0.35*	0.14	*0.35*	0.17	*0.37*	0.15	*0.35*	0.12	*0.32*	0.12	*0.32*
Field of Study = Chemistry, Biology & Related	0.08	*0.27*	0.13	*0.33*	0.05	*0.21*	0.10	*0.30*	0.04	*0.19*	0.04	*0.19*
Field of Study = Physics, Maths & Statistics	0.02	*0.14*	0.03	*0.17*	0.02	*0.13*	0.02	*0.14*	0.01	*0.11*	0.02	*0.15*
Field of Study = Health (excluding Medicine)	0.07	*0.25*	0.07	*0.26*	0.07	*0.26*	0.06	*0.23*	0.06	*0.24*	0.04	*0.20*
Field of Study = Architecture & Construction	0.04	*0.20*	0.03	*0.18*	0.07	*0.26*	0.02	*0.12*	0.07	*0.25*	0.01	*0.10*
Field of Study = Industrial, Chemical & Electronic Eng	0.08	*0.28*	0.08	*0.27*	0.10	*0.30*	0.05	*0.22*	0.11	*0.31*	0.06	*0.24*
Field of Study = Telecommunication & Informatics	0.09	*0.29*	0.08	*0.26*	0.14	*0.34*	0.05	*0.21*	0.14	*0.35*	0.05	*0.21*
Field of Study = Agricultural Engineering & Related	0.02	*0.14*	0.02	*0.15*	0.02	*0.14*	0.02	*0.12*	0.02	*0.15*	0.02	*0.13*
Short Degree (3 years)	0.27	*0.44*	0.33	*0.47*	0.28	*0.45*	0.40	*0.49*	0.32	*0.47*	0.27	*0.44*
University of Barcelona (UB)	0.28	*0.45*	0.24	*0.43*	0.27	*0.45*	0.35	*0.48*	0.28	*0.45*	0.40	*0.49*
Autonomous University of Barcelona (UAB)	0.22	*0.42*	0.23	*0.42*	0.20	*0.40*	0.27	*0.45*	0.20	*0.40*	0.24	*0.43*
Polytechnical University of Catalonia (UPC)	0.15	*0.36*	0.12	*0.33*	0.23	*0.42*	0.07	*0.26*	0.21	*0.41*	0.08	*0.28*
Pompeu Fabra University (UPF)	0.08	*0.27*	0.11	*0.31*	0.07	*0.25*	0.07	*0.26*	0.06	*0.24*	0.06	*0.24*
University of Girona (UdG)	0.10	*0.30*	0.11	*0.31*	0.10	*0.30*	0.09	*0.29*	0.09	*0.29*	0.07	*0.26*
University of Lleida (UdL)	0.05	*0.22*	0.06	*0.24*	0.05	*0.21*	0.04	*0.19*	0.06	*0.23*	0.04	*0.20*
Rovira i Virgili University (URV)	0.11	*0.31*	0.13	*0.34*	0.08	*0.28*	0.11	*0.31*	0.10	*0.31*	0.10	*0.30*
Job Availability Measure	0.47	*0.06*	0.47	*0.07*	0.47	*0.06*	0.47	*0.06*	0.48	*0.06*	0.48	*0.05*
Number of observations	25,342		9,041		6,837		4,403		3,676		1,385	

Note: the number of observations includes individuals who are unemployed (for whom current job quality variables are not available) and graduates from UPF of the last wave, for whom we do not dispose of information about elapsed time-to-degree.

Table 3: OLS Results (selected coefficients)

Outcome:	ln(Time to Degree)	High Mark	Employed	Permanent Contract	Specific Degree Required
Full-time Student			*reference category*		
Part-Time Job – Related	0.009*	-0.002	0.040***	0.056***	0.051***
	(0.005)	*(0.003)*	*(0.005)*	*(0.008)*	*(0.008)*
Part-Time Job – Not Related	0.024***	-0.011***	0.017***	0.027***	-0.048***
	(0.005)	*(0.003)*	*(0.006)*	*(0.010)*	*(0.009)*
Full-Time Job – Related	0.022***	0.002	0.055***	0.086***	0.026***
	(0.007)	*(0.004)*	*(0.006)*	*(0.010)*	*(0.010)*
Full-Time Job – Not Related	0.023**	-0.004	0.029***	0.081***	-0.147***
	(0.011)	*(0.005)*	*(0.010)*	*(0.015)*	*(0.015)*
Adjusted R^2	0.35	0.01	0.03	0.10	0.10
Number of Observations	24,647	25,342	25,342	22,733	22,733

Note: robust standard errors in parenthesis; ***significant at 1%, ** significant at 5%, * significant at 10%. All regressions include controls for wave dummies, gender, age and its square, highest parental education, dummies for field of study, short term degrees and university. Complete results are reported in Table 2A in the Appendix.

Table 4: Multinomial Endogenous Treatments (selected coefficients)

Outcome:	ln(Time to Degree)	High Mark	Employed	Permanent Contract	Specific Degree Required
Part-Time Job – Related	0.165***	-0.016***	0.084***	0.118***	0.064***
	(0.026)	*(0.006)*	*(0.008)*	*(0.050)*	*(0.021)*
Part-Time Job – Not Related	0.176****	-0.023***	-0.242***	0.146***	-0.427***
	(0.032)	*(0.005)*	*(0.011)*	*(0.035)*	*(0.016)*
Full-Time Job – Related	0.115***	0.042***	0.083***	0.386***	0.024
	(0.010)	*(0.009)*	*(0.011)*	*(0.039)*	*(0.017)*
Full-Time Job – Not Related	0.076***	-0.010	0.040***	0.131***	-0.188***
	(0.017)	*(0.010)*	*(0.015)*	*(0.037)*	*(0.028)*
λ_1	-0.168***	0.015***	-0.060***	-0.054	-0.037
	(0.031)	*(0.005)*	*(0.010)*	*(0.059)*	*(0.020)*
λ_2	-0.161***	0.013***	0.314***	-0.113***	0.423***
	(0.036)	*(0.004)*	*(0.006)*	*(0.039)*	*(0.015)*
λ_3	-0.085***	-0.057***	-0.016	-0.325***	-0.023
	(0.008)	*(0.004)*	*(0.011)*	*(0.042)*	*(0.018)*
λ_4	-0.052***	0.005	-0.011	-0.014	0.019
	(0.009)	*(0.005)*	*(0.010)*	*(0.037)*	*(0.020)*
Number of Observations	15,884	16,579	16,579	14,479	14,479

Note: standard errors (in parenthesis) are clustered at the municipality level; *** significant at 1%, ** significant at 5%, * significant at 10%. All regressions include controls for wave dummies, gender, age and its square, highest parental education, dummies for field of study, short term degrees and university.

Appendix

Table A1: OLS Results

Outcome:	ln(Time to Degree)	High Mark	Employed	Permanent Contract	Specific Degree Required
Full-time Student			*reference category*		
Part-Time Job — Related	0.009*	-0.002	0.040***	0.056***	0.051***
	(0.005)	*(0.003)*	*(0.005)*	*(0.008)*	*(0.008)*
Part-Time Job — Not Related	0.024***	-0.011***	0.017***	0.027***	-0.048***
	(0.005)	*(0.003)*	*(0.006)*	*(0.010)*	*(0.009)*
Full-Time Job — Related	0.022***	0.002	0.055***	0.086***	0.026***
	(0.007)	*(0.004)*	*(0.006)*	*(0.010)*	*(0.010)*
Full-Time Job — Not Related	0.023**	-0.004	0.029***	0.081***	-0.147***
	(0.011)	*(0.005)*	*(0.010)*	*(0.015)*	*(0.015)*
Wave 2008			*reference category*		
Wave 2011	-0.019***	-0.008***	-0.057***	-0.038***	-0.051***
	(0.005)	*(0.003)*	*(0.004)*	*(0.007)*	*(0.007)*
Wave 2014	0.010**	-0.013***	-0.088***	-0.080***	-0.106***
	(0.005)	*(0.003)*	*(0.005)*	*(0.008)*	*(0.008)*
Male	-0.014***	0.005*	-0.005	0.001	0.004
	(0.005)	*(0.003)*	*(0.005)*	*(0.007)*	*(0.007)*
Age	0.229***	-0.054***	-0.016	0.111***	-0.068***
	(0.014)	*(0.007)*	*(0.010)*	*(0.016)*	*(0.016)*
Age Squared	-0.003***	0.001***	0.000	-0.002***	0.001***
	(0.000)	*(0.000)*	*(0.000)*	*(0.000)*	*(0.000)*
Highest Parental Education = Primary or Less			*reference category*		
Highest Parental Education = Secondary	0.006	0.001	0.002	-0.000	0.011
	(0.005)	*(0.003)*	*(0.005)*	*(0.007)*	*(0.007)*
Highest Parental Education = Tertiary	0.012**	0.007***	-0.006	-0.025***	0.016**
	(0.005)	*(0.003)*	*(0.005)*	*(0.008)*	*(0.008)*
Adjusted R squared	0.35	0.01	0.03	0.10	0.10
Number of Observations	24,647	25,342	25,342	22,733	22,733

Note: robust standard errors in parenthesis; *** significant at 1%, ** significant at 5%, * significant at 10%.

Table A1 (continued): OLS Results

Outcome:	ln(Time to Degree)	High Mark	Employed	Permanent Contract	Specific Degree Required
Field of Study = Humanities	0.043***	0.040***	-0.107***	-0.359***	-0.211***
	(0.009)	*(0.007)*	*(0.011)*	*(0.016)*	*(0.016)*
Field of Study = Language	0.022**	0.045***	-0.038***	-0.353***	0.012
	(0.010)	*(0.008)*	*(0.010)*	*(0.017)*	*(0.017)*
Field of Study = Business & Economics			*reference category*		
Field of Study = Law & Related Degrees	-0.042***	0.007	-0.008	-0.119***	0.078***
	(0.010)	*(0.004)*	*(0.009)*	*(0.013)*	*(0.014)*
Field of Study = Political Sciences & Sociology	0.008	0.001	-0.045***	-0.279***	-0.226***
	(0.011)	*(0.007)*	*(0.014)*	*(0.021)*	*(0.021)*
Field of study = Communication & Documentation	-0.135***	0.011	-0.038***	-0.228***	-0.016
	(0.011)	*(0.007)*	*(0.011)*	*(0.018)*	*(0.018)*
Field of Study = Psychology & Related	-0.049***	0.01	-0.044***	-0.255***	0.038*
	(0.012)	*(0.007)*	*(0.012)*	*(0.019)*	*(0.020)*
Field of Study = Education	-0.256***	0.010**	0.012*	-0.290***	0.227***
	(0.008)	*(0.004)*	*(0.007)*	*(0.012)*	*(0.012)*
Field of Study = Chemistry, Biology & Related	0.090***	0.010**	-0.031***	-0.364***	0.115***
	(0.009)	*(0.005)*	*(0.009)*	*(0.014)*	*(0.014)*
Field of Study = Physics, Maths & Statistics	0.157***	0.019**	0.038***	-0.321***	0.129***
	(0.013)	*(0.009)*	*(0.012)*	*(0.023)*	*(0.023)*
Field of Study = Health (excluding Medicine)	-0.083***	0.003	0.019**	-0.205***	0.268***
	(0.009)	*(0.005)*	*(0.009)*	*(0.015)*	*(0.014)*
Field of Study = Architecture & Construction	0.160***	-0.007	-0.030**	-0.249***	0.184***
	(0.013)	*(0.005)*	*(0.013)*	*(0.021)*	*(0.021)*
Field of Study = Industrial, Chemical & Electronic Eng.	0.052***	-0.006	0.033***	-0.106***	0.121***
	(0.011)	*(0.004)*	*(0.009)*	*(0.015)*	*(0.016)*
Field of Study = Telecommunication & Informatics	0.114***	0.010*	0.047***	-0.097***	0.098***
	(0.011)	*(0.005)*	*(0.008)*	*(0.014)*	*(0.015)*
Field of Study = Agricultural Engineering & Related	0.103***	-0.015***	-0.028*	-0.209***	0.139***
	(0.017)	*(0.005)*	*(0.016)*	*(0.026)*	*(0.026)*
Short Degree	-0.103***	-0.015***	-0.036***	-0.031***	-0.061***
	(0.006)	*(0.003)*	*(0.005)*	*(0.008)*	*(0.008)*
University of Barcelona (UB)			*reference category*		
Autonomous University of Barcelona (UAB)	0.008	0.006*	0.014**	0.011	-0.013
	(0.005)	*(0.004)*	*(0.006)*	*(0.009)*	*(0.009)*
Polytechnical University of Catalonia (UPC)	-0.020**	0.001	-0.001	0.077***	-0.002
	(0.009)	*(0.005)*	*(0.008)*	*(0.013)*	*(0.014)*
Pompeu Fabra University (UPF)	-0.105***	-0.004	0.012	0.074***	0.058***
	(0.008)	*(0.005)*	*(0.008)*	*(0.013)*	*(0.013)*
University of Girona (UdG)	-0.044***	0.007	0.015**	-0.009	0.007
	(0.007)	*(0.004)*	*(0.007*	*(0.012)*	*(0.011)*
University of Lleida (UdL)	-0.010	0.006	0.026***	-0.056***	0.001
	(0.010)	*(0.006)*	*(0.009*	*(0.016)*	*(0.016)*
Rovira i Virgili University (URV)	-0.026***	-0.003	0.015**	-0.012	0.014
	(0.007)	*(0.004)*	*(0.007)*	*(0.012)*	*(0.011)*
Constant	-2.564***	0.864***	1.212***	-1.059***	1.822***
	(0.204)	*(0.103)*	*(0.155)*	*(0.245)*	*(0.240)*
Adjusted R squared	0.35	0.01	0.03	0.10	0.10
Number of Observations	24,647	25,342	25,342	22,733	22,733

Note: robust standard errors in parenthesis; *** significant at 1%, ** significant at 5%, * significant at 10%.

Table A2: OLS Results, Waves 2011 and 2014 (selected coefficients)

Outcome:	ln(Time to Degree)	High Mark	Employed	Permanent Contract	Specific Degree Required
Full-time Student			*reference category*		
Part-Time Job – Related	0.017***	-0.004	0.039***	0.060***	0.042***
	(0.006)	*(0.004)*	*(0.007)*	*(0.010)*	*(0.010)*
Part-Time Job – Not Related	0.032***	-0.012***	0.019**	0.043***	-0.068***
	(0.007)	*(0.004)*	*(0.008)*	*(0.012)*	*(0.012)*
Full-Time Job – Related	0.032***	-0.006	0.071***	0.102***	0.013
	(0.009)	*(0.004)*	*(0.008)*	*(0.012)*	*(0.013)*
Full-Time Job – Not Related	0.025*	-0.006	0.041***	0.108***	-0.164***
	(0.015)	*(0.007)*	*(0.013)*	*(0.019)*	*(0.020)*
Adjusted R^2	0.35	0.02	0.03	0.10	0.10
Number of Observations	15,884	16,579	16,579	14,479	14,479

Note: robust standard errors in parenthesis; ***significant at 1%, ** significant at 5%, * significant at 10%. All regressions include controls for wave dummies, gender, age and its square, highest parental education, dummies for field of study, short term degrees and university.

Table A3: Average Marginal Effects from Mixed Multinomial Logit

ΔPredicted Probability:	Full-Time Student	Part-Time Job — Related	Part-Time Job —Not Related	Full-Time Job — Related	Full-Time Job —Not Related
Employment Potential (Z_m)	-0.369***	0.117*	0.144**	0.007	0.101***
	(0.070)	*(0.062)*	*(0.060)*	*(0.046)*	*(0.036)*
Male	0.038***	-0.017**	-0.026***	0.003	0.002
	(0.008)	*(0.007)*	*(0.006)*	*(0.005)*	*(0.004)*
Age	-0.048***	0.010***	0.003**	0.025***	0.011***
	(0.002)	*(0.002)*	*(0.001)*	*(0.001)*	*(0.001)*
Highest Parental Education = Primary or Less			*reference category*		
Highest Parental Education = Secondary	0.017**	0.016*	-0.021***	-0.009	-0.004
	(0.009)	*(0.009)*	*(0.008)*	*(0.006)*	*(0.004)*
Highest Parental Education = Tertiary	0.039***	0.031***	-0.034***	-0.021***	-0.015***
	(0.009)	*(0.009)*	*(0.008)*	*(0.006)*	*(0.004)*
Field of Study = Humanities	-0.002	-0.101***	0.269***	-0.220***	0.054***
	(0.022)	*(0.023)*	*(0.016)*	*(0.008)*	*(0.010)*
Field of Study = Language	0.058***	-0.000	0.123***	-0.208***	0.027***
	(0.020)	*(0.026)*	*(0.016)*	*(0.011)*	*(0.010)*
Field of Study = Business & Economics			*reference category*		
Field of Study = Law & Related Degrees	-0.018	-0.062***	0.117***	-0.098***	0.061***
	(0.015)	*(0.013)*	*(0.012)*	*(0.012)*	*(0.010)*
Field of Study = Political Sciences & Sociology	0.006	-0.129***	0.236***	-0.173***	0.060***
	(0.024)	*(0.017)*	*(0.024)*	*(0.015)*	*(0.012)*
Field of study = Communication & Documentation	-0.047***	0.070***	0.095***	-0.135***	0.016
	(0.016)	*(0.018)*	*(0.017)*	*(0.021)*	*(0.011)*
Field of Study = Psychology & Related	-0.035*	-0.028	0.171***	-0.132***	0.023*
	(0.020)	*(0.022)*	*(0.022)*	*(0.014)*	*(0.012)*
Field of Study = Education	-0.021	0.074***	0.065***	-0.122***	0.004
	(0.013)	*(0.016)*	*(0.009)*	*(0.010)*	*(0.006)*
Field of Study = Chemistry, Biology & Related	0.165***	-0.104***	0.124***	-0.168***	-0.017***
	(0.016)	*(0.014)*	*(0.013)*	*(0.010)*	*(0.005)*
Field of Study = Physics, Maths & Statistics	0.164***	-0.057**	0.077***	-0.189***	0.005
	(0.022)	*(0.028)*	*(0.018)*	*(0.013)*	*(0.010)*
Field of Study = Health (excluding Medicine)	0.073***	0.022	0.021*	-0.102***	-0.014**
	(0.016)	*(0.017)*	*(0.012)*	*(0.014)*	*(0.007)*
Field of Study = Architecture & Construction	0.048**	0.099***	-0.036***	-0.075***	-0.035***
	(0.022)	*(0.024)*	*(0.012)*	*(0.020)*	*(0.005)*
Field of Study = Industrial, Chemical & Electronic En	0.087***	0.023	-0.006	-0.092***	-0.012*
	(0.017)	*(0.020)*	*(0.011)*	*(0.016)*	*(0.007)*
Field of Study = Telecommunication & Informatics	0.023	0.102***	-0.018*	-0.082***	-0.025***
	(0.016)	*(0.018)*	*(0.011)*	*(0.015)*	*(0.005)*
Field of Study = Agricultural Engineering & Related	0.108***	0.007	0.041**	-0.153***	-0.003
	(0.025)	*(0.023)*	*(0.019)*	*(0.014)*	*(0.015)*
Short Degree	-0.101***	-0.011	0.069***	0.025***	0.017***
	(0.008)	*(0.018)*	*(0.013)*	*(0.008)*	*(0.005)*
University of Barcelona (UB)			*reference category*		
Autonomous University of Barcelona (UAB)	0.041***	-0.035***	0.002	-0.008	-0.001
	(0.011)	*(0.011)*	*(0.009)*	*(0.007)*	*(0.004)*
Polytechnical University of Catalonia (UPC)	0.024*	0.041**	-0.056***	-0.007	-0.002
	(0.014)	*(0.018)*	*(0.012)*	*(0.011)*	*(0.007)*
Pompeu Fabra University (UPF)	0.131***	-0.050***	-0.046***	-0.024**	-0.010**
	(0.017)	*(0.014)*	*(0.016)*	*(0.012)*	*(0.005)*
University of Girona (UdG)	0.077***	-0.004	-0.026*	-0.039***	-0.009*
	(0.014)	*(0.013)*	*(0.015)*	*(0.011)*	*(0.005)*
University of Lleida (UdL)	0.140***	-0.058***	-0.074***	0.007	-0.015**
	(0.016)	*(0.017)*	*(0.010)*	*(0.011)*	*(0.007)*
Rovira i Virgili University (URV)	0.134***	-0.086***	-0.018*	-0.025***	-0.005
	(0.019)	*(0.013)*	*(0.011)*	*(0.009)*	*(0.008)*
Number of Observations	16,579	16,579	16,579	16,579	16,579

Note: standard errors (in parenthesis) are clustered at the municipality level; *** significant at 1%, ** significant at 5%, * significant at 10%. Estimates are obtained from the joint model applied to the final mark as final outcome.