# Adult workers in higher education: enhancing social mobility

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## *Abstract*

**Purpose –** The main goal of this paper is to verify if adult education can contribute to social mobility by analysing how the socioeconomic and professional background of the students affects dropout and graduation hazards in higher education.

**Design/methodology/approach –** An event history analysis approach, with competing risks and discrete time, implemented under a multinomial logit model, is used to investigate how an extensive set of covariates affects the risk of graduation, dropout and persistence of 834 adult student-workers from a higher education institution in Portugal.

**Findings –** Adult education may indeed be effective in promoting social mobility, as academic achievement is higher for student-workers that have low educated parents and low income levels. Also, the probability of achieving graduation seems to be higher for those seeking for higher transformation.

**Practical implications –** Adult education should be encouraged as it generates both efficiency and equity benefits. Some policy recommendations are suggested for the higher-education system to adapt better to the particular characteristics of adult workers and provide conditions to improve the job-study-family conciliation, namely by adjusting the schedule and composition of classes, appreciating the curriculum and providing orientation to candidates, and introducing shorter/simplified versions of the degrees.

**Originality/value –** A separate treatment is given to adult student-workers, whose characteristics are very particular, enriching the literature on academic achievement that has been focused on traditional students. Additionally, the studied dataset merges five sources and provides extensive and original information on personal, degree and employment variables of the students.

**Keywords:** adult education, social mobility, higher education, dropout, student-workers, education policy.

**Paper type:** Research paper

**JEL Codes:** I23, I21, C21

## 1. Introduction

As it is claimed by human capital theory (pioneered by Becker, 1962), achieving graduation in higher education leads to important benefits both for the graduated individuals and for the economy as a whole. The skills acquired during graduation are reflected in higher labour productivities, increasing the competitiveness of firms and allowing higher wages, and graduated individuals have a lower risk of unemployment and a higher chance of being successful entrepreneurs. However, higher education can also contribute to increase socioeconomic inequalities, as socioeconomically deprived learners may not have the same access to opportunities as those able to attend high achieving state school or receive a private education (Duckworth, 2013). For example, while 29.2% of the parents of higher education students in Portugal detained the higher education level themselves in 2010 (Costa and Duarte, 2012), the percentage of population between 40 and 64 years-old with a higher education diploma was only of 10.2% in that year (Portuguese population census, 2011). Considering the definition of social mobility in Atkinson (1981), i.e. the intergenerational transition between income classes, these numbers suggest that higher education is promoting social immobility in Portugal. Also, in the United States, Haveman and Smeeding (2006) concluded that the higher education system "reinforces generational patterns of income inequality and is far less oriented toward social mobility than it should be".

It is important to point out that there are some concerns with the impact of social mobility and with who benefits with it. Indeed, in a community perspective, some warn that social mobility is the wrong goal, as it does not necessarily imply more equality. They argue that social mobility could just mean that different people are poor and that individual success can never be the answer to the wider social problem of growing class inequalities, as many are left behind. Even though, it is generally established that social mobility is beneficial for an economy, essentially based on neoliberal arguments that advocate in favour of complete social mobility (which occurs when there is no correlation between intergenerational income), viewed as "an indicator of the 'openness' of society or of equality of opportunity" (Atkinson, 1981), instead of reverse mobility (which occurs when intergenerational income is negatively correlated).

The extent of social mobility can be limited by several barriers, as for example when there is a two-tier labour market, an imbalanced economy, an unaffordable housing market or, more directly related with the present paper, an unfair education system. Indeed, on the latter, students with a less favourable background are often forced to interrupt their academic progression and enter early the labour market because of financial constraints, even if they display a good academic performance, and their low educational attainment level may lock them into a cycle of restricted employment prospects and low wages (Duckworth and Smith, 2017).

Adult education can mitigate this discrimination and rupture this cycle, as it offers a new opportunity in higher education to adult individuals with a disadvantageous background that are already in the labour market. According to Duckworth and Smith (2017), adult education can be a powerful vehicle for a transformative learning process that promotes adult development and empowerment and drives forward social justice by reintegrating the learners with few qualifications in the society with renewed hope and confidence. Indeed, from the transformative learning theory, adult education helps the individuals to become more autonomous thinkers by learning to negotiate their own values, meanings, and purposes rather than to uncritically act on those of others (Mezirow, 1997). This extended autonomy, together with the acquisition of specific skills, are recognized by their employers to pay dividends, and may also be beneficial in the positive effect it can have on mental health and well-being.

The participation of disadvantaged students in higher education is not a sufficient condition for reducing socioeconomic inequalities and promote social mobility in an effective way, though. Naturally, it is also necessary to adopt policies providing conditions for these particular students to have a good academic performance, with an adequate acquisition of skills, and achieve graduation, so that they can improve their employment prospects and wages, which is often not the case. Indeed, even though policy makers often encourage non-traditional students, including adult unqualified workers, to enrol in higher education, aiming to promote lifelong learning, "they do not seem to be concerned about understanding their needs and circumstances, thereby maintaining an institutional system designed for a very different type of student" (Gilardi and Guglielmetti, 2011). In this regard, Ade-Ojo & Duckworth (2017) observe that the evolution of policy in adult literacy, when based on the principles of human capital theory, as it is the case of most developed countries, is likely to conflict with the promotion of democratic learning spaces where all people can participate and are treated equally. This progressive abandoning of the humanistic and holistic foundations of lifelong learning, together with the risks of scientific and industrial developments referred by Beck (1992) and Giddens (1991), is making it increasingly difficult to compensate those that are socioeconomically deprived.

The objectives of the present paper are thus to identify the factors that explain the likelihoods of graduation, dropout and persistence in higher education of adult workers, as representatives of transformative learning and lifelong learning, with a special interest on socioeconomic and professional background variables, and to investigate whether or not adult education can contribute to social mobility. On the latter, it is tested if adult students with a disadvantaged background, assumed as those who receive financial aid (scholarship) due to low household income, have parents with a low schooling level or live in a less favoured geographical region in terms of education and income, have higher chances of graduation and/or lower dropout risk than adult students with a more favourable background. Additionally, it is

also a goal of the present research to suggest policy recommendations for education transformation aiming to increase graduation chances and to decrease dropout rates among adult student-workers.

Dropout behaviour has been intensively studied over the last decades. Tinto (1975, 1988, 1993), in his theory of student persistence showed the importance of individual background and of academic and social integration for a student to remain enrolled at university. Bean (1980), using multiple regression and path analysis, added gender, high school academic performance and the level of commitment of the student with the degree and with the institution as relevant determinants of dropout probability. Using event history analysis with a single risk (dropout), Murtaugh, Burns & Schuster (1999) found that age, initial grades, ethnicity and area of residence have a significant influence on attrition and/or retention rates, while DesJardins, Ahlburg & McCall (1999) documented that key explanatory variables may have different effects over time. Finally, other studies referred additional relevant determinants for dropping out from higher education, as employment (Vickers, Lamb and Hinkley, 2003; Gilardi and Guglielmetti, 2011), field of study (Vickers, Lamb and Hinkley, 2003; Johnes and McNabb, 2004), being a first generation student / parents' education level (Ishitani, 2003; Stratton, O'Toole and Wetzel, 2008), marital status (Johnes and McNabb, 2004; Stratton, O'Toole and Wetzel, 2008) and nationality (Arias Ortiz and Dehon, 2013).

Although very rich, the literature on dropout behaviour focus essentially on traditional (young and non-worker) students, leaving adult student-workers, and their particular characteristics, without a proper and separate treatment. Indeed, adult student-workers have less time available to dedicate to school activities due to their professional obligations and to the fact that they are older, parents and married more often, with the associated family responsibilities. In addition, their motivations to enrol in higher education are very heterogeneous, varying from simple self-satisfaction to goals related with progression within their current professional career or, especially for the ones coming from disadvantageous backgrounds, with pursuing a new and rewarding career and seeking for a higher transformation in their lives. Therefore, the typical determinants of dropout and graduation risks may have particular effects or magnitudes for adult student-workers that do not fit in the pattern of young students, making the structural stability of pooled models (i.e. that include all students, traditional and non-traditional) a remote possibility and justifying the separate treatment given to adult student-workers in the present paper.

A second particularity of this study relies on the extensive and unique database with longitudinal information on 834 adult student-workers from a Portuguese higher-education institution (Leiria Polytechnic Institute, IPLeiria) that was constructed by the authors at the student level by matching five different sources. Beyond the usual covariates considered in the

literature, including gender, age, marital status, nationality, schooling level of the parents and of the residence region, and income level of the household (here, using the attribution of scholarships as a proxy) and of the residence region, the database contains detailed information on the characteristics of the degrees and it includes several new employment variables characterizing the professional background of students. Thus, it allows to extend knowledge on the factors that affect the risks of graduation and dropout in higher education for the case of adult student-workers and to help central education authorities and higher education institutions identifying ways to improve the academic achievement of these students. Furthermore, the longitudinal configuration of the database allows to employ duration/survival analysis (or event history analysis), with competing risks, under a discrete-time setting, and benefit from its well documented advantages (Willett & Singer, 1991; Scott & Kennedy, 2005; Arias Ortiz & Dehon, 2013).

The structure of the paper is as follows. Section 2 describes the construction of the dataset and its variables and presents some summary statistics, and section 3 develops the modelling strategy, highlighting its benefits. The results are then discussed in section 4 and, finally, the main conclusions and policy implications are drawn in section 5.

## 2. Data and descriptive statistics

This study uses longitudinal data on 834 individuals that enrolled in higher education, as student-workers, in an undergraduate degree of IPLeiria, in the academic year of 2008/09 or 2009/10. These students are followed until the academic year 2016/17, allowing to observe if and when a certain student was able to achieve graduation, if he/she interrupted the studies for some years (stopout behaviour) or in a permanent basis (dropouts), or if he/she is still persisting.

The database was built by crossing data from several sources and by adding some constructed variables (Figure 1). First, as students are traceable by an identification number, the nine annual databases (2008/09 to 2016/17) of *Sistemas de Apoio à Decisão - Business Intelligence (SAD-BI)* from IPLeiria, with individual and background information, were joined in a single database. Second, again using a common identification number, the database was merged with *Inquérito Caixa Geral de Depósitos (ICGD),* which provides information on employment variables. Third, as the employer's name is identified in the *ICGD* database for each student, the Iberinform *Insight View* platform was used to extract information on employer's dimension and business sector, according to the legal standards. Next, it was added longitudinal information at the degree level from the databases of *DGEEC – Direção-Geral de Estatística da Educação e Ciência* (Ministry of Education and Science, Portugal). Finally,

socioeconomic information concerning the residence county of students was obtained through *Instituto Nacional de Estatística* (*INE*).

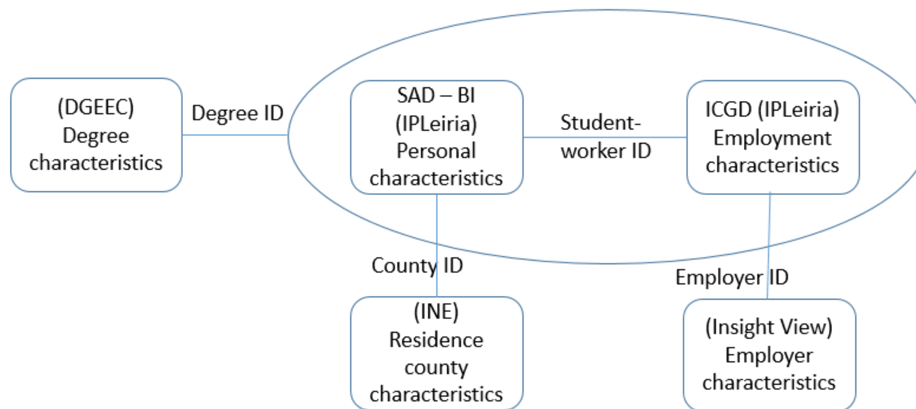


Figure 1: Database composition

The database was reorganised afterwards to construct a person-period dataset of 2556 observations including a record for each year of enrolment of each student, so that event history analysis tools can be applied. Beyond the event variable (1 if and when the student graduates, 2 if and when he/she drops out, and 0 whenever no event occurs), the database includes the following variables (a detailed description is given in the Appendix, Table A.1, Table A.2 and Table A.3, respectively):

a) individual characteristics: gender, age, nationality, marital status, parents' schooling years, residence county, school-residence geographical distance, residence-county average schooling years, residence-county purchasing power, scholarship, first call admission, admission regime, first option, part-time status, retention years, stopout, and final grade point average (GPA) and completion time of the students achieving graduation;

b) degree characteristics: field of study, daytime/post-work schedule or e-learning regime, number of students in the degree, degree average and standard deviation of final GPA, degree average and standard deviation of age, and degree percentages of student-workers and part-time, scholarship, same gender and foreign students;

c) employment variables: qualified/unqualified job, self-employed/employee, size and business sector of the employer organization, and unrelated job (with the field of study of the degree).

The definition of dropout is of a student that interrupts his/her studies permanently. However, as the observation period is finite, such definition is not implementable, leading most research to consider dropouts as the cases when students interrupt their studies without returning to school within a sufficiently larger time interval (usually of two years or more). In the present

paper, this last definition is also adopted, with a required interruption period of three academic years. Given that dropout behaviour can occur at most in year 5 for the students observed during eight years (those who enrolled in 2009/2010), the database is restricted to its first five years, implying a reduction from the initial 2556 to 2443 total person-period observations. This assures that all events of interest are observed in any time period in an unbiased way. According to Heublein (2014), the timing must be chosen "in such a way that" in the last year "the share of students that are still in higher education is not greater than 20%" of the initial students in the dataset, which is verified in the present work, as year 5 contains less than 9% of the initial individuals.

The summary statistics are presented in Table 1 and are computed considering the complete sample (column 1) and the subsamples of individuals that, within the five-year observation period, achieve graduation (column 2) or dropout (column 3).

Table 1: Summary statistics

| | **Complete sample** | **Graduated** | **Dropout** |
|---|---|---|---|
| **Variable** | **Mean (St.Dev.)** | **Mean (St.Dev.)** | **Mean (St.Dev.)** |
| Gender (Male) | 48.0% | 42.0% | 57.7% |
| Marital Status (Married) | 32.5% | 34.9% | 28.4% |
| Age (years) | 30.8 (8.5) | 31.5 (8.9) | 29.2 (7.6) |
| Nationality (Foreign) | 1.1% | 1.5% | 0.4% |
| Low parents' schooling | 43.9% | 48.6% | 39.6% |
| School-residence distance (km) | 39.6 (75.0) | 42.6 (78.4) | 39.5 (74.8) |
| Residence-county schooling level (years) | 7.6 (0.6) | 7.5 (0.6) | 7.6 (0.6) |
| Residence-county purchasing power (index) | 90.4 (15.5) | 89.5 (15.0) | 91.7 (15.6) |
| Scholarship | 5.6% | 6.5% | 4.0% |
| First-call admission | 90.0% | 90.5% | 87.3% |
| First option | 88.5% | 90.4% | 84.8% |
| Part-time status | 4.8% | 4.8% | 4.8% |
| Retention years | 0.36 | 0.24 | 0.46 |
| Admission regimes | | | |
| CNAES | 45.8% | 45.1% | 47.7% |
| M23 | 54.2% | 54.9% | 52.3% |
| Daytime schedule | 25.2% | 29.5% | 19.0% |
| Post-work schedule | 71.1% | 67.9% | 74.5% |
| E-learning | 3.7% | 2.6% | 6.5% |
| Field of degree | | | |
| Arts | 7.9% | 8.9% | 6.6% |
| Education | 2.5% | 2.8% | 2.6% |

| | | | |
|---|---|---|---|
| Health | 13.8% | 19.4% | 5.2% |
| Information technologies | 0.4% | 0.7% | 0.0% |
| Engineering | 16.3% | 11.2% | 21.0% |
| Services | 9.3% | 9.5% | 9.8% |
| Social sciences and law | 49.8% | 47.5% | 54.8% |
| Degree average final GPA (0-20 scale) | 13.9 | 14.0 | 13.8 |
| Degree final GPA standard deviation | 1.30 | 1.31 | 1.28 |
| Degree average age (years) | 30.0 | 29.7 | 30.6 |
| Degree % student-workers | 39.4% | 38.6% | 40.5% |
| Degree number of students | 171.0 (75.1) | 171.2 (74.1) | 170.7 (79.3) |
| Degree % same gender | 35.6% | 35.1% | 38.5% |
| Self-employed | 8.0% | 7.9% | 8.7% |
| Unrelated job | 44.4% | 47.3% | 42.4% |
| Qualified job | 46.6% | 46.2% | 47.2% |
| Employer size | | | |
| Large | 39.5% | 40.2% | 37.6% |
| Medium | 16.8% | 13.4% | 24.8% |
| Small | 13.9% | 14.5% | 11.5% |
| Micro | 29.8% | 32.0% | 26.0% |
| Business sector | | | |
| Manufacturing | 16.4% | 14.3% | 19.3% |
| Construction | 4.5% | 4.6% | 3.4% |
| Wholesale and retail trade | 20.1% | 18.3% | 26.3% |
| Public administration | 17.9% | 21.0% | 12.3% |
| Education | 3.6% | 4.4% | 2.5% |
| Health | 6.7% | 8.6% | 3.2% |
| Other services | 23.8% | 22.8% | 24.3% |
| Accommodation and food services | 5.3% | 16.4% | 5.9% |
| Other sector | 1.6% | 1.1% | 2.8% |
| Number of observations | 2443 | 1513 | 757 |

It can be observed that 48% of the students in the complete sample are male and 32.5% are married. They have, on average, 30.8 years old (much higher than the average age of 24.1 years of IPLeiria overall students and of most student-workers samples found in literature) and the percentage of students with poor parental educational background (both parents with at most 4 years of schooling) is of 43.9%, which is near the double of the percentage that would be obtained for all IPLeiria students, revealing that IPLeiria student-workers are essentially adults with a less favourable background searching for a new opportunity to improve their lives.

County schooling level is very similar across subsamples but the county purchasing power is higher in the dropouts subsample. Additionally, the average age and the average percentages of students with scholarship and with poor parental educational background increase when only the graduates subsample is considered. This suggests that socioeconomically disfavoured adult student-workers perform relatively better in higher education. The percentages of foreign, female, married and distant from school students are also higher in the graduates subsample.

Although in Portugal there are seven possible regimes to be admitted in higher education, the two main ones, designed for students to enrol for the first time in higher education (and the ones considered in the present study), are the M23 local access system, which does not require secondary education and is exclusive for students over 23 years old, representing 54.2% of the observations in the sample, and the regular CNAES (national access system), representing 45.8%.

Summary statistics on Table 1 also suggest that dropout rates are lower for students enrolled in daytime schedule degrees (with classes between 8am and 6pm) than for students that enrol in post-work schedule (classes from 6pm to 12pm) or e-learning degrees (with no traditional classroom lectures).

Almost half of the students in the sample are enrolled in degrees from the social sciences and law field (and more than half if only the dropout subsample is considered). Health, information technologies and arts are more present in the graduates subsample, and the contrary occurs with engineering. The subsamples are relatively similar considering the patterns of final GPA and age within the degree, while the proportion of student-workers and of the same gender are higher in the dropout subsample.

On employment variables, 8.0% of the students are self-employed and 46.6% exercise qualified jobs. With respect to the unrelated job variable, it is a *dummy* constructed by the authors with value 1 for the students whose job has no relation at all with the scientific field of the degree, and 0 if there is some relation. For example, a student enrolled in a management degree working as an electrician has a value of 1, while if he/she exercises commercial functions gets a value of 0. The percentage of students with unrelated jobs is significant (44.4%) and increase when only graduates are considered, which again suggests that those with a poor socioeconomic background (as they are pursuing a new professional career and a significant transformation in their lives) perform better in school.

On the business sector of the employers, accommodation and food services, health, education, public administration and construction are relatively more present in the graduates subsample. Large firms employ 39.5% of the student-workers in the sample, while 29.8% of them work in micro firms.

## 3. Modelling

In this section, following Scott & Kennedy (2005) and Arias Ortiz & Dehon (2013), an event history analysis approach, with competing risks and a discrete-time setting, is developed so as to explore the determinants of dropout and graduation probabilities in the present paper.

The benefits of event history analysis, which models when the events occur, as opposed to most traditional methods that model only whether or not the events occur, are well documented in Willett & Singer (1991). First, it allows the risk of each event to vary across time, which is very likely to occur in the case of graduation and dropout as the risk of dropout is higher in the first year than in subsequent years (given that dropout cost increases with time) while the risk of graduation is naturally higher in the period corresponding to the normal duration of the degrees (followed by the nearest subsequent periods). Second, it is possible to consider time-varying and time-constant covariates, for which the effects on the probability of each event can vary with time. Third, all individuals are jointly considered, without need to separate those who experienced a particular event from the rest of the individuals, such as in two-sample comparisons for example, thus avoiding the definition of subjective cut-off points. Finally, it allows to include and analyse censored data (individuals that observe no event during the observation period) in addition to the individuals who observe an event.

DesJardins *et al.* (1999), Murtaugh *et al.* (1999) and Ishitani (2003) were among the first to apply event history analysis to study dropouts and/or graduations. However, they considered a single risk framework, which has the caveat of ignoring that dropout and graduation are correlated, as they compete to be the outcome for each individual. For example, a graduated individual is no longer at risk of dropping out as well as an individual that drops out from school is no longer at risk of graduating. Hence, the risks of graduation and of dropping out are interdependent and have to be jointly estimated under a competing risks approach, as concluded by DesJardins, Ahlburg & McCall (2002), who showed that when there are interdependencies between events, single-risk models may be inappropriate and lead to spurious conclusions.

In case of educational data, the precise time of ocurrence is in general unknown and the information tend to be clustered at the end of years, semesters or quarters. Using continuous-time models, like Cox regression, would be problematic if the probability of two observations sharing the same event time is not small enough (Arias Ortiz & Dehon, 2013; Scott & Kennedy, 2005; Singer & Willett, 1993; Singer & Willett, 2003), thus making discrete-time settings preferable. Moreover, Scott & Kennedy (2005) show that an event history analysis model that combines competing risks with discrete-time can be estimated using a multinomial logistic regression, which makes the considered approach more accessible.

The following hazard model for individual i (i=1,…,834) of event k (k=1,2, with 1 standing for graduations and 2 for dropouts) at time t (t=1,…,5) is then proposed:

$$h_i(k,t) = \frac{exp[(\alpha_{k1}D_{i1}+\cdots+\alpha_{k5}D_{i5})+(\beta_k X_{it}+\gamma_k Z_{it}+\delta_k W_{it})]}{1+\sum_{j=1}^{2} exp[(\alpha_{j1}D_{i1}+\cdots+\alpha_{j5}D_{i5})+(\beta_j X_{it}+\gamma_j Z_{it}+\delta_j W_{it})]}, \quad (1)$$

where $X_{it}$, $Z_{it}$ and $W_{it}$ are the vectors of individual, degree and employment covariates, respectively (including both constant and time-varying variables), $\beta_j$, $\gamma_j$ and $\delta_j$ are the vectors of parameters associated with the covariates and the outcome j, and $D_{i1},\ldots,D_{i5}$ are time period dummy variables identifying each year ($D_{i1}=1$ if the observation for individual i comes from the first year of enrollment, and $D_{i1} = 0$ if the observation comes from any subsequent year). The intercept parameters $\alpha_{k1},\ldots,\alpha_{k5}$ capture the baseline level of hazard (the hazard probabilities when the value of all covariates is zero) in each year. The vectors of parameters $\beta_k$, $\gamma_k$ and $\delta_k$ measure the effects of the covariates on the baseline hazard function, on a logit scale.

Taking logistic transformations on both sides of Equation 1, it comes:

$$\log\left[\frac{h_i(k,t)}{h_i(0,t)}\right] = (\alpha_{k1}D_{i1} + \cdots + \alpha_{k5}D_{i5}) + (\beta_k X_{it} + \gamma_k Z_{it} + \delta_k W_{it}), \quad (2)$$

where $h_i(0,t)$ is the hazard of the non-event defined as $1 - \sum_{j=1}^{2} h_i(j,t)$. Is it now visible that the covariates are linearly related with the logistic transformation of the hazard ratio and not directly with the hazard probabilities. Note that the ratio $h_i(k,t)/h_i(0,t)$, usually referred as the outcome-specific hazard ratio, measures the risk of experiencing event k relatively to the risk of observing no event (the reference category in this multinomial logit model).

On the specific explanatory variables included in the model, the vector of individual covariates $X_{it}$ contains the following variables: gender (male), marital status (male and female), age, nationality (foreign), low parents' schooling (a *dummy* with value 1 if both student's parents have at most four years of schooling), scholarship, school-residence distance, residence-county schooling level, residence-county purchasing power (2009), first call admission, first option, CNAES admission regime (multiplied by each year *dummy*; M23 is the baseline regime), part-time status, retention years and stopout. The vector of degree covariates $Z_{it}$ includes the variables: day schedule, e-learning, field of study (arts, education, health, information technologies, engineering, services; social sciences and law is the baseline), degree total number of students, degree average final GPA, degree final GPA standard deviation, degree average age, degree age standard deviation, and degree percentages of same gender, student-workers, part-time students, scholarship and foreign students. Finally, the vector of employment variables $W_{it}$ includes the size of the employer organization (micro, medium, large; small is the baseline) and its business sector (manufacturing, construction, wholesale and retail trade, public administration, education, health, other services, accommodation and food

services; other sector is the baseline), self-employment (male and female), qualified job (male and female) and unrelated job (male and female).

## 4. Results

The results are presented in the following two subsections. The hazard functions are computed and discussed in the first subsection and the multinomial logit estimates are presented and analysed afterwards.

### *4.1 Hazard functions*

In Figure 2, the hazard functions are displayed in order to visualise the evolution of the risk of graduation or dropout over time. The hazard of a certain event in time *t* is the probability that the event occurs in time *t* conditional that the non-event has happened in each period before *t*. Therefore, for each year, the proportion of students that observed each event (graduation and dropout) is computed among the students still persisting. For example, in year 1, with all the 834 initial student-workers at risk, 157 drop out and 0 obtain their degree, implying hazards of 18.8% and 0%, respectively. The hazards for year 2 are determined considering those individuals that did not graduate nor dropped out in the first year (meaning they are still at risk).

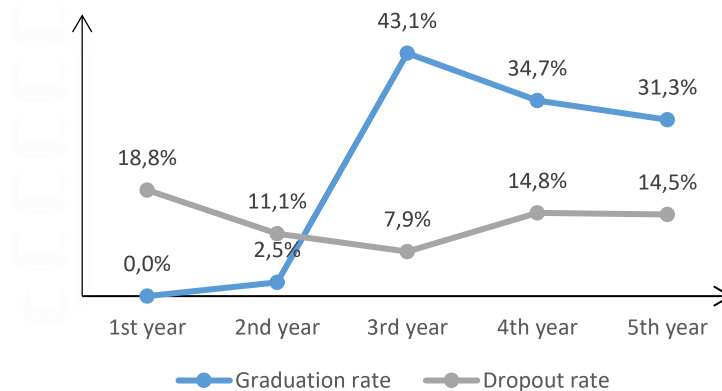


Figure 2: Dropout and graduation hazard functions

The observed dropout rate in the first year (18.8%) is higher than the dropout rate of non-worker students in IPLeiria. This value is however low when compared to related literature. For example, Gilardi & Guglielmetti (2011) observed in their sample a first year dropout rate of 32.5%, while in Arias Ortiz & Dehon (2013) this percentage is of 29.9%.

The evolution of the risk of dropping out is similar to the observed in the majority of related literature (for example Arias Ortiz & Dehon, 2013). It is the highest in year 1, it decreases until the normal duration of the degree (three years here), it increases in a later year (year 4 in this case), after which it decreases progressively towards zero. The students that withdraw in year 4

or 5 are expected to be sensitive to different determinants than those who give up in the first year of enrolment, justifying the importance of longitudinal data.

The graduation hazard function observes a peak in the third year of enrolment, which corresponds to the normal duration of the degrees and reveals a good academic performance of the student-workers that are able to graduate.

### *4.2 Multinomial logit model*

The multinomial logit model described above was estimated under maximum likelihood using Stata and Gretl. The fitted model predicts correctly 75.4% of the true events/outcomes over the 2443 observations considered in the regression, corresponding to a statistically significant McFadden $R^2$ of 45.2% (log-likelihood ratio = 1246.24, p-value = 0.0000).

The results are presented in Table 2. Each estimated coefficient is to be interpreted as follows: when its associated covariate increases by one unit (while holding everything else constant), the outcome-specific hazard ratio is multiplied by the exponential of the coefficient (Arias Ortiz & Dehon, 2013).

Table 2: Multinomial Logit, 2443 observations

| *Variable* | *Graduation (1)* | *Dropout (2)* |
|---|---|---|
| Constant | -0.3819 | -4.3089 |
| Year 1 | -43.7594 | 2.3266 *** |
| Year 2 | -6.9290 *** | 1.3369 ** |
| Year 3 | -2.4546 *** | 0.9205 * |
| Year 4 | -1.4527 *** | 0.7937 |
| Male | -0.6021 * | 0.8093 *** |
| Age | 0.0040 | -0.0202 * |
| Married male | 0.4681 * | -0.0899 |
| Married female | 0.4392 * | 0.5513 ** |
| Low parents schooling | 0.3379 ** | 0.0732 |
| Foreign | 0.0908 | -0.6354 |
| Scholarship | 0.2687 | -0.7577 * |
| School-residence distance | 0.0017 * | 0.0019 ** |
| Residence-county schooling level | 0.1227 | 0.0821 |
| Residence-county purchasing power | -0.0124 | 0.0027 |
| First-call admission | -0.3652 | -0.3461 |
| First option | 0.5302 ** | -0.3983 * |
| Part-time status | -1.0463 ** | -0.1679 |
| Retention years | -1.4717 *** | 1.1008 *** |
| Stopout | -1.8030 *** | 1.0655 ** |
| CNAES (year 1) | 0.0020 | -0.3739 * |
| CNAES (year 2) | 0.8478 | -0.5363 * |
| CNAES (year 3) | -0.0096 | -0.3823 |
| CNAES (year 4) | -0.1679 | -0.0630 |
| CNAES (year 5) | -0.9963 ** | -0.1257 |
| Daytime Schedule | 0.2922 | -0.9240 ** |
| E-Learning | -0.0932 | -0.4933 |

| | | |
|---|---|---|
| Arts | 1.2901 *** | -0.1676 |
| Education | 1.1530 ** | 0.4276 |
| Health | 1.3552 *** | -0.4423 |
| Information technologies | 1.6861 | -39.3044 |
| Engineering | -0.4668 | -0.7811 ** |
| Services | 0.1999 | 0.0541 |
| Degree number of students | -0.0031 * | 0.0002 |
| Degree % same gender | 0.1275 | 0.7700 ** |
| Degree % student-workers | 1.5543 | -3.4649 *** |
| Degree % part-time | 0.9552 | 0.3675 |
| Degree % scholarships | 0.0696 | 0.3997 |
| Degree % foreign | -1.1801 | -8.6483 * |
| Degree average final GPA | -0.1420 | 0.1849 |
| Degree final GPA standard deviation | 2.6888 *** | -1.7105 *** |
| Degree average age | 0.0376 | 0.1054 * |
| Degree age standard deviation | -0.1569 | -0.0219 |
| Manufacturing | -0.2049 | -0.8905 ** |
| Construction | 0.2050 | -1.3205 ** |
| Wholesale and retail trade | 0.1239 | -0.5306 |
| Public administration | -0.3171 | -0.9778 ** |
| Education | -0.5326 | -1.1705 ** |
| Health | -0.4581 | -1.4057 ** |
| Other services | -0.2647 | -1.0792 ** |
| Accommodation and food services | -0.2184 | -1.1163 ** |
| Micro size | 0.1859 | -0.2787 |
| Medium size | 0.5531 * | -0.4624 * |
| Large size | 0.4062 | -0.2345 |
| Self-employed (male) | 1.5083 *** | 0.6850 ** |
| Self-employed (female) | -0.9771 ** | 0.2033 |
| Qualified job (male) | 0.0345 | -0.3096 |
| Qualified job (female) | -0.3003 | 0.1029 |
| Unrelated job (male) | 0.4510 * | -0.1444 |
| Unrelated job (female) | -0.1984 | -0.1679 |

*p-value<0.1, **p-value<0.05, ***p-value<0.01

*Time dummies*

By estimating a model where the residual category is the fifth year of enrolment, it is observed that, after controlling for several other covariates, the probability of graduation increases systematically with enrolment time. Coherently, the probability of dropping out is decreasing with the number of enrolment years when controlling for all covariates.

*Individual characteristics*

Female student-workers have a lower probability of dropping out and a higher probability of graduating than males. Married student-workers have a higher chance of graduation than single students, and, in case of females, they also have a higher probability of dropping out relatively to persisting. Similarly, distance from home also increases the probability of graduating and of dropping out, which means that students that are far from home are less persistent. This may be

explained by their higher time and financial costs, comparing to students that live nearby the school.

Of particular relevance to the present study is the fact that the adult student-workers whose parents have at most four years of schooling observe a higher probability of graduation. This contradicts the typical positive correlation between the academic performance of the traditional students and their parents' years of schooling which suggests that higher education contributes to social immobility. As an unfavourable family background seems to be a motivation driver for adult student-workers in higher education, it is expected that their education contributes to decrease the positive correlation between the social status of consecutive generations and thus to enhance social mobility.

Dropout risk seems to decrease with age among adult student-workers, but there is no evidence that the covariates on their socioeconomic context at the residence-county level affect the probabilities of graduation or of dropping out.

On the effect of scholarships due to low household income, the estimations show that financially deprived adult student-workers, when financially assisted, are more persistent on pursuing graduation and less susceptible to drop out.

Additional results are that students enrolling in their most preferred degree (first option) have a lower dropout risk and a higher graduation likelihood, while students with more retention years and/or with stopout periods have lower graduation chances and higher dropout risk. Expectedly, the lack of academic progression may either postpone an eventual graduation to outside the observation period or lead to a permanent interruption due to decreased motivation. Also, even though it is considered an essential policy instrument to decrease dropout rates, part-time students observe a lower graduation hazard. This may however be explained, at least partly, by their higher graduation time and consequent lower probability of achieving graduation in the observation period.

Finally, by comparing the effects of the two admission regimes over time, it is possible to conclude that CNAES' students are less willing to drop out in the first two years and have a lower graduation hazard in the fifth year.

*Degree characteristics*

Student-workers enrolled in degrees with a daytime schedule observe a lower risk of dropping out than those attending classes in a post-work time schedule or enrolled in an e-learning degree, which may reflect their greater availability for school and/or a higher time flexibility of their professions. On the field of study, students enrolled in arts, health or education seem to have higher chances of graduating, while engineering students appear less likely to drop out.

The characterization of the degrees concerning the students that compose them is also found to affect the academic achievement of adult students, as it is relevant for their academic integration. In detail, a higher proportion of student-workers within the degree seems to decrease the probability of dropping out, while a higher percentage of students from the same gender and a higher average age within the degree appears to increase the hazard of dropout. In addition, a higher dispersion of final GPA within the degree (i.e. higher heterogeneity between the academic performances of the students) increases the graduation hazard and decreases dropout risk. Finally, the probability of graduation decreases with the size of the degree, assessed by its total number of students, while a higher percentage of foreign students contributes to decrease the probability of dropping out.

*Employment variables*

The business sector of the employer seems to be important for the probability of dropping out, as students working in any sector other than trade observe lower dropout rates than the baseline category (other sectors). Also, workers from medium size organization reveal higher graduation and lower dropout rates than those working on micro, small or large firms.

Self-employed males persist less in higher education (they observe higher hazards of both graduation and dropout) but self-employed females are less likely to graduate. Finally, for male student-workers, enrolling in a degree unrelated with their job seems to increase the likelihood of graduation. This may reflect that, in general, adult student-workers that enrol in a degree unrelated with their job are professionally unfulfilled and return to school to search for a deep process of transformation that makes them to foresee higher benefits (not only economic, by allowing them to find a new and more rewarding professional career, but also psychologic and social) than the students enrolling in degrees related with their jobs who generally aim only to progress within their current profession.

## 5. Conclusion and Policy Implications

In Portugal, student-workers in higher education represent currently around 8.5% of the total students and are mainly low qualified adults that have been in the labour market for several years and return to education for getting a new opportunity to increase their qualifications and thus searching for better social and economic conditions. The analysis of the longitudinal dataset that was built with information from five sources on 834 adult student-workers from IPLeiria confirms that the majority of these students have indeed a poor socioeconomic and professional background.

As participation in higher education is not by itself sufficient to guarantee effective social mobility, a multinomial logit model identifying the factors that explain the graduation and dropout hazards of adult student-workers was estimated and an important conclusion came out:

within adult student-workers, those that have a less favourable socioeconomic and professional background are more committed to obtain graduation and less willing to dropout. This result proves that adult education and the associated transformative learning can be effective in promoting social mobility of disadvantaged individuals, which was the key research question of the present paper.

Despite the above, dropout rates are observed to be higher among adult student-workers than within traditional young and non-worker students. This may be partially explained by the lack of specific education policies directed to them (i.e. that take into consideration their particular characteristics, time constrains, extended family responsibilities and time gap since their previous stage in school), as they are in general more fitted for the traditional students. Considering the large set of individual, degree and employment covariates analysed in the present research, with some of them controlled by policy makers, education institutions or students themselves, several policy indications can be suggested so as to transform and adapt the education system aiming to increase the participation and academic performance of adult student-workers in higher education, in particular of those with poorer socioeconomic and professional background, thus contributing to enhance social mobility.

The attribution of scholarships to economically deprived students is proved to be an important incentive for them to complete their degree. In addition, while offering post-work class schedules is important for the participation of adult student-workers in higher education, scheduling daytime classes to the students who can attend them may contribute to decrease dropout rates.

Gender differences are evident here as men are more likely to drop out and, in general, more influenced by employment variables, as for example self-employment, job qualification level and job-degree relation. For women, marriage seems to increase the risk of dropout, which may reflect their higher devotion to household responsibilities. As such, it is important that policies designed to conciliate better the job-study-family dimensions consider the gender differences.

The aforementioned result of male student-workers being more committed to graduate if they enrol in an unrelated degree may also reflect that students enrolling in related degrees may be interested only in part of the formation to reinforce a specific set of skills, and not properly on completing it. In these cases, introducing some flexibility in the degree and offering shorter and simplified versions of the degrees can be helpful to pre-empt students from dropping out so often and lead them to achieve graduation. It may also be important to develop and disseminate studies that show to the employers the benefits of having their employees returning to school seeking for job-specific formation and increasing their skills in order to lead them to facilitate the work-study relation, to participate more often in the financing of the education costs of their employees and to reward more rapidly graduated workers.

Still on employment variables, the size and business sector of the employer were also shown to be relevant, which is valuable information to be used by higher education institutions when assessing the curriculum of adult candidates in the admission process. It may also be important for a suggested orientation of adult candidates prior to the process of application to higher education in order to make more adequate matches between students and degrees.

To conclude, a suitable definition of classroom composition can also contribute to improve the academic integration of adult student-workers and thus to decrease their dropout rates. For example, by concentrating student-workers in the same classroom, decreasing the number of students in the classroom and promoting GPA heterogeneity within the classroom.

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## 6. References

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## 7. Appendix

Table A.1: Description of individual characteristics

| | |
|---|---|
| Event variable (year t) | 1 if the student obtained graduation in year t; 2 if the student dropped out from IPLeiria in year t; 0 otherwise. |
| Gender (Male) | Dummy: 1 if the student is male; 0 otherwise. |
| Marital Status (Married) | Dummy: 1 if the student is married; 0 otherwise. |
| Age | Continuous variable tracking student's age. |
| Nationality (Foreign) | Dummy: 1 if the student does not have Portuguese nationality; 0 otherwise. |
| Low parents' schooling | Dummy: 1 if both parents of the student have at most 4 years of schooling; 0 otherwise. |
| Scholarship | Dummy: 1 if the student receives social financial support; 0 otherwise. |
| School-residence distance | Average distance, in km, between the county of residence of the student and school's location. |
| Residence-county schooling level | Average number of schooling years of residence county's population, in 2011. |
| Residence-county purchasing power | Residence county's purchasing power index, in 2009 (the baseline 100 is the national average) |
| First-call admission | Dummy: 1 if the student enrolled the degree in the first admission call (in September); 0 otherwise. |
| First option | Dummy: 1 if the student is enrolled in his/her first option degree; 0 otherwise. |

| | |
|---|---|
| CNAES | Dummy: 1 if the student was admitted in the degree through the Portuguese national access regime for higher education; 0 otherwise. |
| M23 | Dummy: 1 if the student was admitted in the degree through the regime designed for people over 23 years old; 0 otherwise. |
| Part-time status | Dummy: 1 if the student has the part time status; 0 otherwise. |
| Retention years | Number of accumulated retention years. |
| Stopout | Number of accumulated enrolment interruptions. |

Table A.2: Description of degree characteristics

| | |
|---|---|
| Daytime schedule | Dummy: 1 if the classes of the degree occur between 8 a.m. and 6 p.m.; 0 otherwise. |
| E-Learning | Dummy: 1 if the student-worker is enrolled in an e-learning degree; 0 otherwise. |
| Arts | Dummy: 1 if the degree is in the field of arts; 0 otherwise. |
| Education | Dummy: 1 if the degree is in the field of education; 0 otherwise. |
| Health | Dummy: 1 if the degree is in the field of health; 0 otherwise. |
| Social Sciences and Law | Dummy: 1 if the degree is in the field of social sciences or law; 0 otherwise. |
| Engineering | Dummy: 1 if the degree is in the field of engineering; 0 otherwise. |
| Information Technologies | Dummy: 1 if the degree is in the field of information technologies; 0 otherwise. |
| Services | Dummy: 1 if the degree is in the field of services; 0 otherwise. |
| Degree total number of students | Number of total students in the degree. |
| Degree % student-workers | Percentage of student-workers in the degree. |
| Degree % same gender | Percentage of students with the same gender of the student, within the degree. |
| Degree % part-time students | Percentage of part-time students in the degree. |
| Degree % scholarships | Percentage of scholarship students in the degree. |
| Degree % foreign students | Percentage of foreign students in the degree. |
| Degree average final GPA | Average final GPA within the degree. |
| Degree final GPA standard deviation | Standard deviation of final GPA within the degree. |
| Degree average age | Average age of students within the degree. |
| Degree age standard deviation | Standard deviation of the age of students within the degree. |

Table A.3: Description of employment variables

| | |
|---|---|
| Manufacturing | Dummy: 1 if the student works in the manufacturing sector; 0 otherwise. |
| Construction | Dummy: 1 if the student works in the construction sector; 0 otherwise. |
| Wholesale and retail trade | Dummy: 1 if the student works in the wholesale and retail trade sector; 0 otherwise. |
| Public administration | Dummy: 1 if the student works in the public administration sector; 0 otherwise. |
| Other services | Dummy: 1 if the student works in other services sectors; 0 otherwise. |
| Education | Dummy: 1 if the student works in the education sector; 0 otherwise. |
| Health | Dummy: 1 if the student works in the health sector; 0 otherwise. |
| Accommodation and food services | Dummy: 1 if the student works in the accommodation and food services sector; 0 otherwise. |
| Micro size | Dummy: 1 if the size of the employer organization is classified as micro according to the legal definition; 0 otherwise. |
| Small size | Dummy: 1 if the size of the employer organization is classified as small according to the legal definition; 0 otherwise. |
| Medium size | Dummy: 1 if the size of the employer organization is classified as medium according to the legal definition; 0 otherwise. |
| Large size | Dummy: 1 if the size of the employer organization is classified as large according to the legal definition; 0 otherwise. |
| Self-employed | Dummy: 1 if the student is a self-employed worker; 0 otherwise. |
| Unrelated job | Dummy: 1 if the student enrolls in a degree that has no relation at all with the job; 0 otherwise. |
| Qualified job | Dummy: 1 if the student-worker exercises a qualified job according to the legal definition; 0 otherwise. |