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The determinants of academic outcomes in a competing risks approach: evidence from Italy

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Keywords: University outcomes, Survival analysis, Competing risks model

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Keywords: University outcomes, Survival Analysis, Competing Risks Model

1. Introduction

Tertiary education is a major driver of economic competitiveness, raising higher-level employment skills and improving knowledge dissemination, use and maintenance for the benefit of society (OECD 2008). Obtaining a university qualification has important outcomes for an individual's subsequent life course: for example, workers with university degrees have an average income which is twice that of those without such qualifications; they have a reduced risk of unemployment and are, on average, more satisfied with life, engaged in society and likely to report that they are in good health (OECD 2011). The economic benefits of education flow not only to individuals but also to society in lower social transfers and in the additional taxes which individuals pay, once they enter the labour market. In OECD countries, GDP growth is closely related to the labour income growth of tertiary educated individuals (OECD 2012).

It is estimated that an average of 62% of today's young adults in OECD countries will enter university-level programmes (OECD 2012). However, choosing to start university does not guarantee that students will actually graduate. Among the 18 OECD countries for which data were available in 2008, some 31% of students who enter tertiary education leave without a qualification (OECD 2010), and this percentage is even higher in Italy (Eurostat 2009).

Students can go along very different pathways in order to complete their university careers, and some of them may finish earlier than others. Students can obtain degrees in the same course in

[1] The study is carried out with the project at University of Padova "Learning difficulties and disabilities from primary school to university: diagnosis, intervention and services for the community" (Prot. STPD08HANE_005), in particular, within the Research Unit 5.

which they enrolled, or can start a course without completing the programme and leave without acquiring a qualification, or can change courses and still obtain a qualification. On one hand, non-completion and course changes are not always negative phenomena: students can plan to enroll in a course without the main goal of graduation, but simply for their personal interest; they may decide to change course once they have enrolled, following their true attitudes. On the other hand, non-completion can also indicate failure to achieve a degree objective, or simply the lack of a specific educational direction which would fully cover their real interests.

Situations such as university withdrawal and transfer, but also progressing slowly towards a degree, have severe consequences for the individuals involved as well as for society, in view of tuition costs and the foregone income of each year of tuition without any return on the initial investment (according to OECD 2012, an individual invests an average of US$ 55,000 to acquire a tertiary qualification, when direct and indirect costs are taken into account; for the costs imposed on society, see the discussion in DesJardins, Ahlburg, and McCall 1999).

Thus, it is worth identifying the factors which influence students' departure from university and the determinants which stimulate successful learning, to maximize the use of resources allocated to education and to improve the performance of both students and the educational system. For these reasons, many studies have been carried out in several countries which analyse students' outcomes during university (see, e.g., DesJardins, Ahlburg, and McCall 1999, 2002; Smith and Naylor 2001; Montmarquette, Mahseredjian, and Houle 2001; Arulampalam, Naylor, and Smith 2004; Scott and Kennedy 2005; Bradley and Lenton 2007; Lassibille and Gomez 2009; Arias Ortiz and Dehon 2011). However, the temporal dimension has not always been considered, and when it is, it is not taken into account in a discrete framework, which is clearly needed in many educational inquiries, since the assumption of continuous time models - that the precise time of occurrence of an event is known – may be unrealistic in educational contexts (Singer and Willett 1993; Scott and Kennedy 2005; Arias Ortiz and Dehon 2011). In addition, researches have not always considered the dependence of various competing outcomes (e.g., different conditions of departure from university), which are in fact important in understanding the complex interdependencies existing between events (see discussion in DesJardins, Ahlburg, and McCall 1999, 2002, and in Arias Ortiz and Dehon 2011).

Due to the lack of appropriate data, Italian research in the area of the determinants of students' departure from university is not so well-established as in the international one (see discussion by Belloc, Maruotti, and Petrella 2010). Only recently have researchers started to explore the determinants of Italian university students' performance (see, e.g., Di Pietro 2004; Biggeri and Bini 2004; Boero, Laureti, and Naylor 2005; Grilli and Rampichini 2007; Cingano and Cipollone 2007; Di Pietro and Cutillo 2008), but analyses have not yet considered the multiple and complex university paths in a temporal dimension. This paper aims to fill this gap by examining the factors influencing the various outcomes of a university career (withdrawals, course changes, delays, and completion of degrees) and the discrete temporal dimension within the methodological approach of survival analysis. In particular, a discrete-time method for competing risks event history analysis is applied to individual longitudinal data for cohorts of students first entering three-year degree courses (tertiary education - ISCED 2011 level 6, first-degree programmes) at the University of Padova, a large public university in North-East Italy. We thus attempt to identify those categories of students who are most greatly exposed to the risk of unsuccessful departure from university. We also examine whether such students are differentiated according to the study fields of the courses in which they are enrolled. In addressing these issues, this article contributes to the growing literature on determinants of effective university careers. The results may be indicative not only for individual students, but also potentially for universities, in designing policies and interventions to prevent students from unfavourable behaviour in higher education.

2. Institutional context

Since 1999, the Italian university system has been reformed and is now organised into three cycles, according to the Bologna Process goal of establishing a European Higher Educational Area (Euridyce, 2010; EACEA et al., 2012). The first-cycle academic degree (*Laurea Triennale*) grants access to the second cycle (*Laurea Magistrale*) which, in turn, gives access to third-cycle courses, awarding PhDs. In this paper, we focus on first-cycle studies, which aim at guaranteeing students adequate command of general scientific methods and contents as well as specific professional skills.

Although first-cycle degree studies last three years, there are no time-limit regulations. Many courses are offered; in particular, the Italian Ministry for Education, Universities and Research (MIUR) has classified first-degree courses into 47 different classes, grouped into four main subject areas: professional health sciences (Medical Professions, such as nursing and physiotherapy, Pharmacy, Veterinary Medicine), humanities (Arts and Philosophy, Education, Psychology), social sciences (Economics and Management, Law, Political Sciences) and scientific sciences (Agriculture, Astronomy, Biology, Biotechnology, Chemistry, Engineering, Mathematics, Physics, Statistics)[2]. Degree courses may be given different names by different universities, but they all have similar learning outcomes and teaching/learning activities.

In the international context, Italy is one of the OECD countries with the lowest proportion (15%, compared with an OECD average of 30%) of individuals with tertiary education (OECD 2011). One of the main problems is withdrawals: considering first-cycle degree courses offered by Italian universities, 18.2% of first-entering students enrolling in academic year 2008/2009 did not enrol in the second year (MIUR 2011). In addition, only 24.3% of students in first-cycle courses obtained their degrees in the correct period of three years, and four out of ten students were out-of-course (MIUR 2011).

In this study, we used administrative data from the University of Padova, which is one of the ten largest public institutions in Italy. This university is quite representative of the Italian higher education system (particularly of Northern Italy: for example, in 2005, the graduate/student ratio was around 21% at Padova, compared to 19% at system level in Northern Italy and 16% at national level). Its educational offer is very large and varied, as regards both subjects and organisational structure, location, admission requirements, entrance tests, and type (actual presence of students at courses and distance learning). The present study considered students enrolled in 84 different courses, which adequately represent the educational offer of the first-cycle Italian educational system.

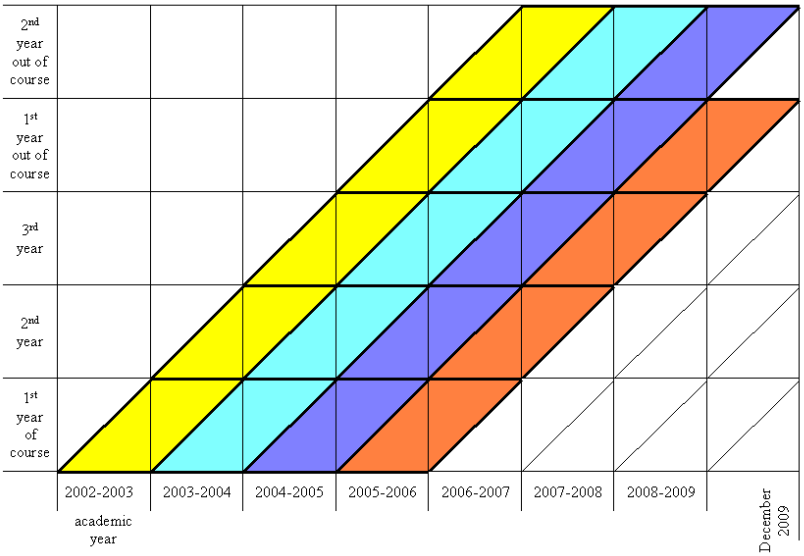
3. Empirical evidence

3.1. Data and methods

Data come from the administrative archives of the University of Padova. The academic careers of 32,258 students enrolled in the four academic years from 2002/03 to 2005/6 in four study fields are examined. For all students, information on their careers is available for a maximum period of five years and in any case not after December 2009 (see figure 1). Due to the characteristics of the archives, for the first three cohorts (students enrolled in 2002/03, 2003/04 or 2004/05) we observe outcomes for up to two years after the end of courses (first or second year out-of-course); for the last cohort (students enrolled in 2005/06) we observe outcomes only up to one year after the end of courses. Apart from data from the first year of enrolment to withdrawal, course change or graduation, the administrative archives contain data on students' previous education (type of secondary school, results of the secondary school final examination, school career regularity) and some personal characteristics (gender, age at enrolment, place of residence, nationality).

[2] For details of complete list of courses at the University of Padova, see http://www.unipd.it/sites/en.unipd.it/files/1st_cycle_2012_2013.pdf

Figure 1. Students' cohorts available for this study.



We define the four outcomes of interest as follows:

- course change: the student has transferred to another course in the same or in another faculty of the University of Padova;
- withdrawal: the student has formally given up the first-cycle degree course, without re-enrolment in the University of Padova, for whatever reason (students who leave before completing their degrees and transfer to other institutions are thus reported as withdrawals, although they may have entered other undergraduate courses outside the University of Padova);
- degree completion: the student has obtained a degree;
- delay: the student is still enrolled in the first or second year out-of-course (further delays are not considered, as the observation is censored at the fourth or fifth year).

Although students may change courses, withdraw, or obtain degrees at any time during the academic year, due to lack of information we measured time until the first of these events as the number of years from the first year of enrolment. For students who are still enrolled and have not taken their degrees by the time of our last observation, duration is considered as censored at this point. The first three outcomes described above (course changes, withdrawals, and degree completion) are the events forming the basis of our competing risks analysis, with delays (student still remains in university), considered as survival. In this setting, the time unit adopted is thus the academic year. To take into account the discrete-time nature of information, the data are considered in the so-called person-period format, which includes a record for each time period in which the individual is at risk of the events (see Allison 1984; Singer and Willett 1991; Yamaguchi 1991; Scott and Kennedy 2005). The maximum number of periods (years) for which an individual may be at risk is five. In this way, the final dataset contains 99,612 person-period records of the 32,258 students. To combine the discrete-time base and the competing risks context, the single-outcome case can be extended by multinomial logistic regression (Allison 1995), in which separate regressions of the probabilities of leaving university through the three different outcomes are estimated (for details on models, see Scott and Kennedy 2005, and Arias Ortiz and Dehon 2011). The models employ a general specification of time, with a separate dummy variable for each time period.

3.2. Covariates

All variables included in the administrative dataset and used as covariates in our models are time-invariant. Student's gender has been suggested by several authors to be related to academic

outcomes (see, for example, Mastekaasa and Smeby 2008), but previous studies report conflicting results. Male students are found to be more at risk of withdrawal than females (Barefoot 2004; Charlton, Barrow, and Atkinson 2006), whereas female students are more likely to graduate than males (DesJardins, Ahlburg, and McCall 2002; Lassibille 2011; Arias Ortiz and Dehon 2011). Other studies did not find any gender effect (see reviews by O'Neill et al. 2011, and Reason 2009).

Also as regards students' nationalities, empirical evidence is mixed. Non-Italian students have a reduced probability of completing their degree (Arias Ortiz and Dehon 2011). The underlying observation is that these students are often suddenly confronted by an environment with new and different peers. Non-Italian students are also particularly vulnerable to financial stress (Lyons 2004). Conversely, other authors have found that foreign students have a high incentive to complete their degrees, because of the high financial and psychological costs they face in transferring to a country different from their own (Belloc, Maruotti and Petrella 2010).

Students' residence is measured according to whether they live in the university's own city (Padova) or whether they commute. In this way, a three-category variable is used, distinguishing students living in Padova, commuters, and those who live outside Padova but who are resident in it for study reasons ("resident students"). Students who do not live in Padova have higher attendance costs, and time constraints, since they have to spend more time travelling and, for resident students, performing domestic tasks, and this means that the time thus spent is not available for study (Dolton, Marcenaro, and Navarro 2003). For these reasons, students living in Padova are expected to be advantaged, but this does not necessarily mean more successful careers than other students, who may be more motivated to perform better and may be more integrated with their peer groups and the student community (Smith and Naylor 2001).

Enrolment age is expressed by a dichotomous covariate, indicating whether students enrolled immediately after leaving school or not. It is included in the statistical models as a regressor, in the hypothesis that older students are more likely to have interrupted careers than those enrolling immediately after leaving school, in view of time constraints (e.g., jobs, family), higher opportunity costs, and a shorter period of time during which they can benefit from their educational investment (Charlton, Barrow, and Atkinson 2006; Lassibille and Gomez 2009). Findings are not always consistent (Lassibille 2011); another point to be considered is the fact that older students may have stronger motivations to conclude their degree courses once they have enrolled (Belloc, Maruotti, and Petrella 2010).

The type of secondary school may be considered as a proxy for academic preparedness, together with the results of the secondary school final examination. A three-category covariate describes the type of secondary school: high school (*licei*), polytechnic (*istituti tecnici*) and vocational schools (*istituti professionali*). High schools provide students with comprehensive preparation, well suited for university; the other secondary schools, particularly vocational ones, focus more on providing a vocational education and are thus not expected to prepare students completely adequately for university (as found, for example, by Lassibille and Gómez 2011). The score obtained in the secondary school final examination is measured as a continuous covariate and also controls for students' pre-enrolment abilities. Previous studies have shown that higher scores reduce the risks of dropping out (Lassibille 2011): the underlying theory is that students' ability lowers their educational costs and increases their motivation (DesJardins, Ahlburg, and McCall 2002). The regularity of secondary school careers, measured by a dichotomous variable, is another indicator of students' performance at secondary school. Completing secondary school on time positively influences the probability of degree completion (Arias Ortiz and Dehon 2011).

3.3. Descriptive analyses

Less than half the students (47%) obtain their degrees; 22.7% withdraw and 21.4% have delays; 8.8% make course changes. Although it should be remembered that some careers are censored, interesting features appear in Table 1, which shows that this picture masks a great diversity across type of courses. Confirming findings from the literature (see review by Lassibille 2011), students in

professional health studies (8%) perform better: as many as 75% of entering cohorts enrolled in this sector obtain their degrees, and unsuccessful departures from university are under 10%. The situation is completely different among students enrolled in humanities, in which less than half the entering students complete their degrees, and the percentages of withdrawals, particularly delays, are very high (16.3% and 32.2%, respectively). Students enrolled in social and scientific courses show similar performances in intermediate positions, in comparison with both the above types of courses. These differences also indicate that the determinants of university outcomes may act in different ways according to type of course.

Table 1. Outcomes of students enrolled from academic years 2002/03 to 2005/*6* at University of Padova, according to study field.

	Total	Course change	Withdrawal	Degree completion	Delay
Professional Health studies	8.1	8.4	8.7	74.6	8.3
Humanities	19.9	5.9	16.3	45.6	32.2
Social Sciences	34.6	8.6	12.7	52.7	26.0
Scientific Sciences	37.4	7.5	12.6	52.1	27.8
N	32,258	2,837	7,340	15,175	6,906

In addition, as shown in Table 2, the four study fields serve different clientèles and this aspect also suggests potential differentiated factors associated with students' departure from university (see, with reference only to medical courses, Arulampalam, Naylor and Smith 2004). First of all, scientific studies have a much higher proportion of male students (71.3%) compared with the other courses which show that most enrolled students are female, particularly in professional health studies (73.8%) and humanities (74.7%). The percentages of foreign students are low in all courses, but higher among professional health studies. The highest percentages of students from the city of Padova are found in professional health studies (70.3%) and, at the opposite end of the scale, the lowest percentages are among those enrolled in the social sciences (44.4%). Students in the four types of courses also differ in terms of age at enrolment and secondary school characteristics. For example, students in scientific courses perform better in terms of secondary school scores and regularity than those enrolled in other courses, particularly professional health studies.

Table 3 gives an idea of the process of students' departure from university (in all courses, considered as a whole). For each subgroup defined by the characteristics of Table 2, the proportion of each of the four outcomes is listed. Results show that female students have more successful careers than males, with higher percentages of degree completion and lower ones of withdrawal. There are no great differences in the percentages of outcomes according to place of residence, but very different percentages in outcomes are observed between Italian and foreign students, the latter having more frequently interrupted and less successful careers. Among students enrolling immediately after leaving school, about half successfully graduate, whereas the percentage of degree completion is lower among those who did not enrol immediately after school: and this group has the highest proportion of withdrawals. Students enrolling after completing high schools have, on average, greater proportions of degree completion and lower percentages of withdrawal and delay than students from other types of secondary schools. Secondary schools seem to be important in discriminating more or less successful careers, also as regards the scores obtained in final examinations and students attending regularly or not: students with delays (and to a lesser extent those with course changes) and, particularly, those who withdrew during university had lower secondary school scores (mean score 76) than those who obtained degrees (mean score 84). In the same perspective, students with regular school careers are those with higher proportions of degree completion and lower percentages of delay and withdrawal.

Table 2. Descriptive statistics of students, according to study field.

	Total	Professional health studies	Humanities	Social sciences	Scientific sciences
Gender					
Female	54.8	73.8	74.7	68.2	28.7
Male	45.2	26.2	25.3	31.8	71.3
Nationality					
Italian	96.6	95.7	96.4	96.4	97.1
Other	3.4	4.3	3.6	3.6	2.9
Residence					
Padova	50.9	70.3	53.8	44.4	50.8
Resident students	20.9	17.9	27.8	26.1	32.3
Commuting students	28.2	11.8	18.4	29.5	16.9
Enrolment after leaving school					
Immediately after	84.6	66.6	81.1	83.0	91.8
Not immediately after	15.4	33.4	18.9	17.0	8.2
Type of secondary school					
High school	60.1	55.9	66.7	63.2	55.1
Polytechnic	33.1	31.2	25.6	30.4	39.7
Vocational school	6.8	12.9	7.7	6.4	5.2
Secondary school score					
Mean	80.4	76.0	79.4	79.7	82.9
Median	80.0	74.0	78.0	79.0	83.0
Regularity of school career					
Regular	81.6	73.6	79.1	80.4	85.8
Not regular	18.4	26.4	20.9	19.6	14.2

Clearly, all these percentages are marginal and the net effect of each characteristic should be obtained by multivariate analysis, which allows us to control simultaneously for multiple factors. In addition, as mentioned above, their effects may depend on type of course, so that separate models for the four study fields are estimated in the discrete-time competing risks approach described above. Covariates are presented in Tables 2 and 3. They are grouped into two dimensions: personal characteristics (gender, nationality, residence, age at enrolment) and educational background (type of secondary school, score, regularity).

Table 3. Descriptive statistics of students, according to academic career outcome.

	Course change	Withdrawal	Degree completion	Delay
Gender				
Female	9.1	19.9	51.1	19.9
Male	8.5	26.2	42.1	23.2
Nationality				
Italian	8.6	22.3	47.8	21.3
Other	14.7	35.0	24.8	25.5
Residence				
Padova	8.8	22.4	46.1	22.7
Resident students	9.0	24.5	49.0	17.5
Commuting students	8.5	22.1	47.4	22.0
Enrolment after leaving school				
Immediately after	8.9	20.1	49.5	21.5
Not immediately after	8.2	37.3	33.6	20.9
Type of secondary school				
High school	9.8	18.1	52.2	19.9
Polytechnic	7.1	28.6	40.5	23.8
Vocational school	8.1	35.4	33.4	23.1
Secondary school score				
Mean	79.2	75.8	84.3	77.4
Median	78.0	74.0	85.0	76.0
Regularity of school career				
Regular	8.8	19.5	51.1	20.6
Not regular	8.9	37.2	28.9	25.0

4. Results

Preliminary analyses (not reported here for space reasons), considering a single model for all courses and controlling for study fields, showed that students in professional health studies have a higher probability of completion than students in other courses (as observed in the reviews by Lassibille 2011, and Arias Ortiz and Dehon 2011): even if they are more at risk of course changes, they are also less prone to withdraw. Conversely, students in scientific studies and humanities perform significantly worse than their peers: students enrolled in scientific studies have a lower probability of degree completion and a higher risk of withdrawal (as found by Arias Ortiz and Dehon 2011) and those in humanities have a lower propensity of obtaining degrees. Students in social studies are less prone to withdraw than their counterparts in scientific sciences, but they have similar patterns of degree completion.

Tables 4a, 4b, and 4c list coefficient estimates of covariates in a competing risks setting, separately for each study field: Table 4a shows the contrast between course change and no event (i.e., censored information/delay), Table 4b shows the contrast between withdrawal and no event, and Table 4c the contrast between degree completion and no event. As presumed, they all show that the effects of some covariates differ across the study fields, whereas other characteristics have a similar impact. In general, all else remaining the same, foreign students have a higher risk of interrupted careers than Italian ones: the former more prone to unsuccessful behaviour, such as course changes (for humanities and scientific studies) and withdrawals (in all courses except professional health studies) and are less likely to obtain degrees in all courses. Similarly, the characteristics of secondary school career (type of school, score, regularity) also tend to have the same effects across different study fields. All other factors remaining the same, as observed in

previous studies, regression results indicate that secondary school scores are powerful predictors in the expected direction of both withdrawal and degree completion. The score effect on course change is mixed: a higher score increases the risk of change in social sciences but decreases those in scientific studies, and no effects are found among students in professional health studies and humanities. As suggested by Belloc, Maruotti, and Petrella (2010), this mixed evidence may be due to the fact that individuals with high educational backgrounds are more sensitive to courses and, when they realize they are not enjoying them, they change. Students entering university with a polytechnics diploma and particularly those with a vocational education are more prone to withdraw (an exception is observed in professional health studies among students from polytechnics) and are less likely to obtain degrees (although the effect is only weakly significant among students in professional health studies) than students from high schools. In fact, except students in humanities, for all fields, students with high school diplomas run a higher risk of course change. Lastly, a regular secondary school career increases the probability of obtaining a degree in all fields, and decreases the risk of withdrawal (except in professional health studies); no significant differences between students with regular careers and those without are observed in the risk of course change.

The first characteristic with highly differentiated effects across study fields is gender: it is interesting to note that, net of other factors, in scientific studies, although female students are more likely to withdraw than male students (Table 4b), women are also more likely to graduate (Table 4c), as shown by most studies. The opposite occurs for students in humanities: men run greater risk of withdrawing than women (Table 4b), but they are also more likely to graduate (Table 4c). Lastly, male students in professional health studies (as found by Arulampalam, Naylor, and Smith 2004) and social sciences courses run greater risks of withdrawal, but no significant differences with respect to women in degree completion are found.

Table 4a. Coefficient estimates of covariates in a competing risks model with three destinations in four study fields: contrast between course change and no event.

	Professional health studies	**Humanities**	**Social sciences**	**Scientific sciences**
Intercept	-1.23**	-1.97***	-2.70***	-0.97***
Year (*ref: 5)*				
1	-3.29***	-0.94***	-2.27***	-1.23***
2	-4.62***	-1.81***	-2.75***	-1.95***
3	-1.47***	-1.43***	-0.72***	-1.14***
4	-0.25	-0.23	-0.33**	-0.39***
Gender (*ref: female*)				
Male	-1.36***	-0.13	0.01	-0.30***
Nationality (*ref: Italian*)				
Other	0.06	0.59***	-0.15	0.64***
Place of residence (*ref: Padova*)				
Resident students	0.06	-0.05	0.39***	-0.21**
Commuting students	-0.06	-0.11	0.01	-0.02
Enrolment after leaving school (*ref: immediately*)				
Not immediately	-0.09	-0.09	0.06	-0.15
Secondary school (*ref: High school*)				
Polytechnic	-0.38**	0.08	-0.58***	-0.26***
Vocational school	-0.57**	0.05	-0.34**	-0.25*
Secondary school score	0.01	-0.01	0.01***	-0.01***
School career (*ref: Regular*)				
Not regular	0.09	-0.09	-0.11	0.01

***= p<.001; **=p<0.05; *=p<0.10

Table 4b. Coefficient estimates of covariates in a competing risks model with three destinations in four study fields: contrast between withdrawal and no event.

	Professional health studies	Humanities	Social sciences	Scientific sciences
Intercept	-0.53	-1.24***	-1.29***	-0.39**
Year (*ref: 5)*				
1	-1.18***	0.42***	-0.03	0.89***
2	-2.42***	-0.34**	-0.69***	-0.38***
3	-1.78***	-0.81***	-0.65**	-0.64***
4	-0.71	-0.26	-0.45**	-0.28**
Gender (*ref: female*)				
Male	0.30**	0.13**	0.15***	-0.11**
Nationality (*ref: Italian*)				
Other	0.27	0.57***	0.43***	0.28**
Place of residence (*ref: Padova*)				
Resident students	0.56***	0.34***	0.34***	0.36***
Commuting students	0.14	0.09	0.05	0.11**
Enrolment after leaving school (*ref: immediately*)				
Not immediately	-0.20*	0.54***	0.63***	0.34***
Secondary school (*ref: High school*)				
Polytechnic	0.20	0.32***	0.33***	0.65***
Vocational school	0.49***	0.50***	0.40***	0.95***
Secondary school score	-0.01**	-0.02***	-0.02***	-0.03***
School career (*ref: Regular*)				
Not regular	0.12	0.34***	0.43***	0.34***

***= p<.001; **=p<0.05; *=p<0.10

Place of residence also has differentiated effects across the type of course. In general, being a resident student implies having higher risks of withdrawal than a student living in the same university city in all courses, but the disadvantages for resident students are particularly evident in their lower propensity to obtain degrees in professional health courses (Table 4c). Conversely, resident students are motivated to complete their degrees in humanities and social sciences; this result is probably due to attendance costs, but it is not clear why this effect is not observed among the other courses. Commuting students have no significant differences with respect to students from Padova, although they have a lower risk of degree completion in professional health studies.

Professional health studies may represent special types of courses (as observed by Arulampalam, Naylor, and Smith 2004): besides the weak effects of the type of secondary school observed above, the effects of age at enrolment are interesting. The expectation that enrolling immediately after leaving school significantly increases the probability of degree completion and decreases the risk of withdrawal is confirmed in all courses except health studies, for which students enrolling immediately after school run greater risks of withdrawal and lower ones of degree completion.

These findings raise important questions about the management of learning processes in the different fields of study. University courses should prepare specific academic support plans for at-risk students differentiated across study fields.

Table 4c. Coefficient estimates of covariates in a competing risks model with three destinations in four study fields: contrast between degree completion and no event.

	Professional health studies	Humanities	Social sciences	Scientific sciences
Intercept	-1.44***	-3.67***	-3.09***	-4.06***
Year (*ref: 5)*				
1	-7.51***	-5.92***	0.00	-7.32***
2	-7.75***	-6.21***	-6.47***	-7.23***
3	-0.34	-1.09***	-0.45***	-0.07
4	0.36	0.22**	0.19***	0.22***
Gender (*ref: female*)				
Male	0.14	0.17**	-0.06	-0.24***
Nationality (*ref: Italian*)				
Other	-0.65***	-1.28***	-1.27***	-0.93***
Place of residence (*ref: Padova*)				
Resident students	-0.42***	0.19***	0.28***	-0.04
Commuting students	-0.36***	0.09	-0.02	-0.01
Enrolment after leaving school (*ref: immediately*)				
Not immediately	0.41***	-0.35***	-0.36***	0.02
Secondary school (*ref: High school*)				
Polytechnic	-0.17*	-0.20***	-0.45***	-0.44***
Vocational school	-0.24*	-0.63***	-0.98**	-0.87***
Secondary school score	0.03***	0.04***	0.04***	0.05***
School career (*ref: Regular*)				
Not regular	-0.28***	-0.38***	-0.50***	-0.44***

***= p<.001; **=p<0.05; *=p<0.10

5. Discussion and future research

In this work, we applied discrete-time competing risks survival analysis to explain why university students change course, withdraw, or graduate. The subject is important in its implications for individuals and institutions, in view of the rising costs of attendance and the increased importance of tertiary education in Western societies.

This study was conducted with data from a single institution but, since the University of Padova may be considered a representative example of the Italian higher education system (see Section 2), this paper can shed light on the performance of all Italian universities. In addition, the use of administrative data typically available to most institutions without expensive surveys (and, thus, avoiding sample attrition problems common in longitudinal studies) is clearly an advantage.

We found that the risk factors for university careers in some cases differ across the fields of study. General elements of risk, implying higher probability of withdrawal and lower probability of degree completion, are: being a foreign student, coming from vocational secondary schools or polytechnics, having low secondary school final scores, and irregular school careers. Thus, interventions aimed at improving students' performance should focus on these at-risk students; such targeted programmes would benefit both students and institutions. Other students at risk differ according to their study fields: among students enrolled in professional health studies, particular attention should focus on resident and commuting students. Among the humanities and social sciences, students who did not enrol immediately after leaving school constitute groups at risk. In scientific studies, male students have a lower probability of degree completion, although they are less at risk of withdrawal.

The fact that students' characteristics influencing their university careers are differentiated according to their study fields suggests that contradictions in the literature about the different

factors affecting university outcomes may only be apparent. In addition, this mixed evidence may also be connected with the use of models with different levels of control of personal, background and contextual factors.

We are aware that, in order to reach more reliable results, which would give us indications about what kind of supportive initiatives should be promoted (and directed to specific student targets), we still need to improve both available data and statistical techniques. Unfortunately, our administrative archives do not provide information on students' family background, which has been found to be important in their progress (Lassibille 2011). Information on subjective (strategic, motivational, emotive) aspects affecting academic success (Daniels et al. 2009; Pekrun, Elliot, and Maier 2009) may also be collected by *ad hoc* surveys.

Lastly, in order to exploit to maximum advantage the hierarchical nature of our dataset, a multilevel approach could be used. Together with study fields, the structural and organisational characteristics of the 84 degree courses offered at the University of Padova may affect students' outcomes. For this purpose, data from the university administrative archives should be integrated with further information on degree courses and the organisational and structural characteristics of degree courses within a multilevel framework.

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