Success and failure of Italian university students. Evidence from administrative data[♦]

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Abstract

As the Italian tertiary education system faces several problems – college drop-out and longer time to get a degree - in this piece of work we deal with the second issue that the Italian university system experiences: probability of getting a degree along with completion beyond the legal length required, in order to highlight the major factors that influence the situation mentioned earlier on. Academic success and failure have been studied using administrative data from Cattolica University and the respective goals have been achieved applying diverse methodological approaches. We find that the type of high school, final grade obtained, and geographical origins do matter to the probability of getting a degree. With regards to lengthening-time-to-degree, there is evidence that students who have better abilities are more likely to get a degree with a higher final grade. Also gender differences, familial financial conditions and the fact of coming from another regions influence excess time to graduation. Finally, we find that especially students who face poorest financial situations are more likely to withdraw from university for both voluntary and involuntary reasons. The policy maker, according to the above results, may draw an important lesson, hence it appears that instead of devising new college schemes, to increase the efficiency of universities, mainly in terms of reduction of withdrawal and *Fuori Corso* issues, is more suitable to implement a change of the rules associated with the exams and admission fees applied at each academic year.

Jel Classification: J24
Keywords: college completion, *Fuori Corso*, survival analysis, Italy

[♦] This paper would not have been possible without the outstanding supervision which I have received from Lorenzo Cappellari during my Ph.D. Data availability from the Università Cattolica of Milan is gratefully acknowledged. The author alone is responsible for errors and opinion.

1. Introduction

According to empirical evidence, the amount of education an individual achieves not only affects his/her earnings, but the quality of his/her employment as well. As a result, in the light of the benefits that people may acquire during their entire working life, we might come to the conclusion that it is worth getting a degree rather than dropping out of university before completion, regardless of years spent at college beyond the legal duration. On the other hand, even if it is obvious that undergraduate degree achievement is more desirable than college withdrawal, we cannot avoid evaluating the impact of getting a degree beyond the legal length, as a delayed entry into the labour market might have a direct influence on the working career of each individual. In fact, according to most basic models of education, at first students estimate the benefits and costs associated with enrolment at college, and then they make a decision whether or not to continue studying. In addition, we have to bear in mind that within the costs, aside from the level of tuition fees and efforts, also foregone earnings are included, as a matter of fact it is clear that taking longer to get a degree increases the opportunity costs of attending university. Moreover, staying at college for several years beyond the minimum length, in an era of great technological and economic changes, means that graduates might also experience more difficulty in finding a job - due to the mismatch between their acquired knowledge and skills demanded by firms - besides a delayed graduation reduces the number of an individual's years of peak earnings as she/he joins the labour market later than expected. That being so, this tendency to postpone degree completion might reduce its intrinsic value and its associated benefits as well.

Looking at the statistics for Italian graduates before the introduction of the new educational reform, we note that on average only 16% out of the total amount of graduates has obtained a *Diploma di Laurea* within the legal length[1]. Further, as a general rule, the minimum period required to get a college degree is four years in Italy, while it takes five years if a student is enrolled in the following faculties: medical and veterinary studies, psychology, architecture and engineering. Thus, according to the statistics drawn from "*Indagine sull'Inserimento Professionale dei Laureati dell'anno 1995*", carried out by Istat on a representative sample of Italian graduates, it appears that considering the whole tertiary education system, without making any distinctions amongst the faculties in which students are enrolled, the mean legal duration of a university programme was 4.39, the median effective duration in the same sample was 7 years and the mean was 7.41 and what's more, we note that the tendency to become *Fuori Corso* – as this category of graduates is defined - is widespread in every faculty.

[1] Source: Università e lavoro: statistiche per orientarsi – Istat 2002.

Why should we really worry about the excess time to graduation? Several arguments have been presented to account for this fact. As a result, we may summarise in the following list some compelling reasons why institutions and government have to focus their attention on these issues:

- ✓ **Sustainability of the economic system**: in Italy, over the last few decades, there has been a noticeable enhancement of the age at which the young have their first job experience. On average an individual out of four, aged 25, declares himself/herself to be student. The previous result is mainly supported by family financial conditions – parents prefer students status to unemployment for their children - and by the structure of the Italian tertiary education system. On the contrary we observe an opposite situation in other European countries, wherein young individuals have already had several job experiences by that age.
- ✓ **A waste of knowledge and skills**: staying at university for several years beyond the legal length has twofold effects on the Italian economic system: first, graduates' competence might be obsolete and not in line with what firms are looking for by the time they join the labour market, second the lack of interventions in that concern aims at discouraging the entry of the young into the labour market which will be deprived of the most brilliant and dynamic individuals.

Hence, it is necessary that the following educational reforms aim at removing those factors which are responsible for lengthening of time to get a degree, such as a common belief that being a student is better than being unemployed, which is a viewpoint mainly supported by parents; and a rethink of university structure and rules, especially the opportunity of sitting exams several times over the same academic year, besides measures aiming at improving the level of knowledge achieved before college enrolment are also crucial. Finally, also the introduction of some incentives might induce individuals to complete their studies in time, for example a reimbursement of a part of the tuition fees for those who graduate within the legal length, job facilities, etc.

Consequently, we might come to the conclusion that only wide-ranging interventions resulting from the cooperation between university, firms and government may really improve either competence of graduates, their number and their chances of joining the labour force, and thereby removing aspects that can prevent university enrolment and attendance, for instance family financial constraints might be overcome throughout scholarships which are given by universities or other organizations to pay for the studies of those students with great ability but little money. To develop a competitive and efficient university system, all the aspects

mentioned above must be taken into consideration in the subsequent tertiary education reforms, because it appears to be the best way of attaining the final objectives: raise the level of education in Italy without reducing students' ability, increase labour force participation of the young through the introduction of market oriented programmes and provide equal opportunities to students.

The paper is organised as follows. The next section offers a brief survey of the main results on university completion and time to obtain a degree. Section III provides a description of the data as well as the sample selection criteria. Section IV discusses the econometric approaches used to evaluate the issues mentioned above. The following section presents the results on time-to-graduation, on university performance of graduates, and multiple exits from college. The final section summarizes the results and describes potential extensions for future work.

2. Time-to-degree and completion probabilities: empirical evidence

Although staying at university beyond the legal length is a growing concern in the Italian tertiary education system, empirical evidence on this issue is not widespread, especially using survival analysis approaches.

An extensive work that covers also this aspect has been presented by Checchi et al. (2000). Using administrative data on students enrolled in some public faculties and in a private one, they attempt to analyse both college choice and subsequent students' performance, taking into account the effects of parental background on these aspects as well. Their major findings are that progression towards a degree is positively related to educational records, in other words they show that academic aptitude is an important factor that affects the likelihood of completion along with parental background – higher educated parents increase the chances of getting a degree.

Dornbush, Gentilini and Giavazzi (2000) do not take directly into consideration the issue of time-to-degree in their work, however in order to analyse Italian labour force participation of the youth, using data drawn from the Bank of Italy dataset, they make an attempt to explain this fact throughout the inefficiencies of the Italian university system combined with a degree and level of family support. The most important result in their study is that an increase in the labour market participation of individuals aged 25-29 may occur only when the main problems which affect Italian tertiary system will be removed, for instance elapsed time-to-degree.

An *ordered probit* approach has been employed by Boeri, Laureti and Naylor (2005) to assess the effects of students' abilities prior to their college enrolment and family income on the progression toward the degree, using data of two Italian universities (i.e. Cagliari and Viterbo).

They find that, in general, having attended a general high school increases the probability of completion in comparison with other students who have obtained a diverse high school diploma.

Bratti, Broccolini and Staffolani (2006), instead, using a sample of students who graduated in the Economics Faculty of Marche Polytechnic University and applying a propensity score technique, investigate the effect of the new university reform on students' behaviour and their performance. They highlight that this policy intervention has led to a reduction of drop-out rate, whereas the fact of spending additional years to get a degree regarding the legal length does not seem to have benefited from this new organisation of degree programmes.

Garibaldi et al. (2006) using administrative data of Bocconi University – a private university of Economics located in Milan - evaluate the effect of tuition fees on the time spent at university before obtaining a degree. Their most important result is that an increase in tuition fees during the fourth academic year decreases the probability of taking longer than the legal number of years to graduate.

An important lesson to draw from their work is that the introduction of such intervention in the Italian university system might be helpful in terms of reduction of time spent at university beyond the legal length, especially because, in the Italian college system, students who are enrolled as *Fuori Corso* pay fewer fees, which may encourage them to stay at university.

The issue of elapsed-time-to-degree has been analysed by Brunello and Winter-Ebmer (2002) using data drawn from a survey which was conducted at European level. These authors highlight that excess time to graduation is significantly higher in countries where the share of public expenditure for tertiary education on total expenditure is greater, furthermore they notice that students take longer to graduate in countries with a high rate of unemployment and stricter employment protection. As a consequence, the fact that entry into the labour market is not easy may discourage individuals from completing in time their studies. Moreover, the authors find that those who attend a private university are more likely to take longer to graduate than those who are enrolled in public colleges, a plausible explanation is that, contrary to the Italian situation, private universities across Europe are in general of lower quality than public ones, so they may attract students with lower abilities. Regarding the issue mentioned earlier on, numerous studies have sought to quantify the effect of private schooling on student achievement. The debate is mainly concentrated between the relative quality of public and catholic schools.

Light and Strayer (2000) attempt to determine whether college quality and student ability have causal effects on university completion. The main conclusion they draw from their findings is that ability is an important, positive determinant of college success at large. In addition, they highlight that, at the lowest quality colleges - where the relatively low academic standards should

facilitate progression toward a degree - graduation is mainly hampered by the paucity of other high-ability students, financial aid, and other positive environmental factors, rather than other aspects.

In this work we aim at analysing three aspects: time-to-get a degree, students' performance and students' behaviour in terms of completion and non-completion – underlying the main determinants that influence these decisions.

The final goal of this analysis is to provide additional evidence of the factors that have effects on students' outcomes in order to extend our knowledge of those issues. Our study is focused on students' abilities, either those acquired prior to college enrolment or those reported during the period they are at university. Furthermore, contrary to the main studies related to this topic in which a central role is given to the level of parental education, in this work we turn our attention to the impact of household resources on progression towards a degree. The family income in our analysis will facilitate the identification of the effects of it on completion. In fact, it may occur that having richer parents might reduce time to get a degree due to better job perspectives that those students may face (Checchi, 2000), on the other hand not having financial constraints may encourage students to stay at university beyond the legal length as well, thanks to the subsidy in the form of housing and living support provided by their parents. Regarding students with poor financial resources, household income may also act in both directions, since individuals may graduate in time in order to avoid paying additional tuition fees, or may protract their studies as they might be forced to work to afford their fees, especially due to the private nature of Cattolica University where tuition fees are higher than in public colleges. We may also speculate that students who face poor familial resources might have to work to afford their fees, so the lengthening of time-to-degree might be due to the time spent working which is not spent studying. Thus, being able to shed some light on the mechanism through which household income affects the child's outcomes is desirable as from those findings policy makers can devise new interventions that may attempt to overcome at least the poor financial conditions faced by students. However, it is important to bear in mind that due to the fact that family characteristics effects dominate financial constraints effects, a financial transfer itself would not lead to a significant increase in schooling investment, but also other actions must be implemented (Chevalier and Lanot, 2001). Similar conclusion has been drawn by Jenkins and Schluter (2002) who show that what matters more on children's outcomes is especially the quality of the home environment, rather than financial resources when they account for parental background.

Moreover, apart from the identification of the determinants that influence the achievement of a degree, particular consideration is paid to the relationships between the final

grade obtained at college and the time spent for getting a degree, and to the differences between graduate students, dropouts and stopouts.

3. Data, Sample Selection criteria and variables

3.1 The Data

The data used to examine the performance of university students in terms of completion or non-completion come from the administrative dataset of Cattolica University. Cattolica is a private Italian college which offers undergraduate and graduate degrees in several subject areas, namely education, law, economics, the humanities, languages, maths, banking sciences and political science. However, in this analysis we focus our attention solely on students who are still enrolled, obtained a degree or withdrew from one of those faculties located in the north of Italy[2]. In particular we take into account the following university centres: Milano, Piacenza and Brescia. Milan offers a wide choice of faculties, since each person may decide whether or not to enrol at this university choosing between all the faculties mentioned earlier on, apart from maths as this course programme is available only at the centre of Brescia. Furthermore, students may attend also economics, law and education at Piacenza, instead at Brescia they may enrol in the following faculties as well: the humanities, languages and education. This data source provides us with a large and reliable sample of students, collected during the academic years 1993 to 2001. The analysis sample contains 24,382 individuals, whereof 65% women and 35% men, besides for those we know their status, such as students still enrolled at university, graduates, dropouts and stopouts[3] and these distributions are reported in table 1.

3.2 Sample Selection Criteria

In our analysis we are interested in the behaviour of students enrolled at Cattolica University. The main idea is to attempt and to extend our knowledge of the main determinants that affect both completion and non-completion of individuals enrolled at this private college, in order to provide evidence for them. We are conscious that, due to the private nature of this university along with the higher level of tuition applied[4], this college might attract students with specific personalities, tastes and abilities regarding the standards of Italian public universities.

To evaluate the major factors that influence college progression towards the degree attainment we apply the following restrictions to the initial sample at our disposal:

[2] We do not extend our analysis also on those individuals who are enrolled at the same university but at the centre of Rome.
[3] We classified as stopouts those students who withdraw from this university but they do not drop from the entire tertiary education system.
[4] Tuition are determined according to the income tax declaration of the student's household.

a) Firstly, we include in our sample only students between 18 and 28 years old as we address our attention only to individuals who are, with greater probability, active in the academic life. About 8% of the observations had been cut out of the starting sample;
b) Secondly, we exclude from the previous sample the fraction of students with a family income equal to zero. We decide to proceed in this manner since information about household financial conditions has been recorded according to the income tax declaration that students provided the university with. As a result, this piece of information may be biased because of the final aim of the prior declaration, which is to assess the tuition fees that a student has to pay. So it occurs that individuals who already know that, because of their higher family income, have to pay the highest amount of fees that the university charges, avoid reporting their familial income conditions. Clearly, it is important to impose this constraint in order to overcome a misleading interpretation of the results. Applying this further restriction, we remove about 20% of the observations which were included in the previous one. Although we use only information about individuals with a positive household income, we conduct some robustness checks in order to verify whether students who do not declare their financial conditions differ from the others. The results of this sensitivity analysis related to the whole sample (including observations of those who do not report the household income, but excluding from the set of covariates the income variable) are in line with those without those individuals. Therefore, at this stage we prefer to exclude those observations as we think that it is better to include them when we have at our disposal the level of tuition fees paid by each student, as it will be a more reliable proxy of their financial conditions, besides we may avoid any kind of assumptions on this group of students;
c) Finally, in addition to the variables available in the data, we collect information about students' mobility. According to how far away from their parental home they choose to study, we impute to all the students in our sample the existing distance between their hometown and the town where the faculty attended is located. Our idea is to underline whether or not Cattolica University is characterised by high mobility and also if the distance from a student's parental home might influence academic success or failure. Hence, it is obvious that this covariate provides us especially with information on the level of costs that students have to support. Clearly, the costs of attending university are smaller if they live in the same town of the college, they increase if the campus is within a daily commute from home, and they can rise sharply when students must move on[5].

[5] See Johnes and McNabb (2004) about the relation between costs and graduation.

Looking at table 2 we note that in each faculty at least half of the students are *commuters* – students who live less than one hundred kilometres from university -, instead *movers* - those who were used to living more than one hundred kilometres from college -, are more likely to enrol in law. However, looking at the whole sample we may come to the conclusion that students' mobility is still pretty low in Italy even toward the elite universities, such as Cattolica, as only about 14% of students attend a university distant from their parental home. Furthermore, in light of these descriptive statistics and taking into account those reported in table 3 and 4 we may hypothesise that in general especially more qualified students move to another town, sometimes even located in a different region, to attend university (among those who left parental home, one out of four has achieved a maximum final grade at high-school), and contrary to our expectations most of them face poor financial conditions, even if, regarding family income, we observe a similar distribution among students who come from far away.

The empirical work that follows is based upon the sample resulted from the restrictions applied above, additional reductions in the sample size have been imposed on the strength of the goal to be reached every time across our analysis.

3.3 Variables

3.3.1 Dependent Variables

Our empirical investigation can be divided into three parts, namely probability of getting a degree, analysis of graduates' performance and identification of the major determinants which affect academic success or failure.

About the first issue – probability of college completion – we use the dummy variable *graduate*, which takes value 1 for students who graduate during the observed period and 0 when they are at risk of completion.

Regarding students' performance, we investigate the main determinants that influence either the final grade obtained at university or the elapsed time-to-degree, so in order to explain those aspects for such analysis we include in our sample only graduate students, and we consider two dependent variables: *final grade* and *length*. The former is a discrete variable which represents the mark achieved by each graduate and it is defined in the interval 66 and 111[6], whereas the latter is a variable which indicates the number of years that students spend at university to get a degree, so, according to the fact that we include in our sample only students aged 18-28, it varies from 0 to 5[7].

[6] In Italian tertiary education system the minimum final grade is 66 and the maximum is 110 cum laude.
[7] Students who graduated within the legal length take the value 0, the value 1 if they spent an additional academic year to get a degree, and so on.

Finally, for the last part of our work we use *status* as a dependent variable. Those leaving university are divided into four categories: dropouts (*voluntary leavers*), stopouts (*involuntary leavers*), students who are still enrolled, and graduates, which are placed in the reference category.

3.3.2 Explanatory Variables

The choice of explanatory variables is informed by the received literature and dependent on the set of information available in our data. We may divide those variables into different categories, such as personal characteristics, students' abilities prior to university enrolment, academic performance and type of faculties attended, family background information, and geographical origins.

We now go on to present the variables included in each category in more detail:

- ✓ **Personal characteristics:** administrative records contain information about the age and gender of students included in the sample. This information is useful because it allows us to exploit in depth the existence of differences across gender and when the peak of graduation for instance occurs;
- ✓ **Students' abilities prior to university enrolment:** we have at our disposal information about the final high school grade, the type of institution attended and whether or not it was private. All these variables may enable us to analyse how much the level of knowledge achieved before college enrolment counts in terms of academic success;
- ✓ **Academic performance:** the data include follow-up information about the progress of each student. In particular we have the number of exams passed by each student, the average mark, the faculties at which the students are enrolled and both the years of university enrolment and of graduation if it occurs during the period when they are observed. The data contain also the reasons why they withdrew - whether for voluntary reasons or not;
- ✓ **Family background:** the only information related to family is household income as declared for tax purposes and family size, no further information about parental background are available. Although the variables are limited, income may reflect indirectly also the level of education of the parents, as it is more likely that better educated parents have higher incomes. In addition this covariate may contribute to enlarge evidence of how financial conditions may act on college completion, especially we can observe whether family income also matters when individuals are enrolled at university or it is only household financial conditions during early childhood income that counts;

- ✓ **Demographic characteristics:** about this category, the data show us the towns where people were living, but instead of building the regions in which students used to live, we decide to collect information between the distance of the university attended and the hometown, in this way we can have an idea of the rate of students' mobility toward Cattolica University as well as a proxy of the costs that those students have to face according to how far away they live from the faculty attended.

In appendix A we report some additional descriptive statistics. Table 5 shows that the most of the students who enrolled at Cattolica come from *licei*[8] or technical high schools, and in general students from *liceo classico* are reading the humanities and law, whereas those from *liceo schientifico* prefer scientific fields, such as maths, on the contrary technical high school leavers are more likely to enrol in economics or banking sciences. The previous statistics show that the type of high school attended influences the faculties in which students enrol, stressing that the choice of the secondary school is very important since it affects also the following studies.

Regarding the *Fuori Corso* issue, we notice that half of the sample obtains a degree in four years, and this percentage is definitely higher than the national statistics, as on average about 16% graduates in time in Italian universities. In general we observe that students graduate within the time required (52%) or they spend one additional academic year (28%), only less than 7% of individuals take longer than three years beyond the legal length to get a degree. These statistics suggest that Cattolica University is definitely more efficient than other public universities, since most students are able to graduate in time, besides this result may be due to the fact that tuition fees are relative higher compared with those applied in public universities, so students might be encouraged to achieve in good time their degree[9]. On the other hand, there might be also an endogenous effect, since it may occur that those who enrol at this college have higher prior abilities, which may accelerate progression toward the degree.

Table 9 reports a statistical summary of the explanatory variables we use in each step of our analysis.

Finally, a life-table - displaying survivor and hazard functions - is reported in table 10. Regarding the survivor function, this non-parametric approach shows the proportion of students by gender and faculty who are still enrolled at university at each interval relative to the previous period. Figure 1 provides the plots of the life-table survivor functions by gender. This graph

[8] In particular we observe that the most part of students have attended prior to college enrolment a *liceo scientifico* or *liceo classico*, about 30% and 20 % respectively.
[9] The role of the tuition fees on college completion, when those information will be available, must be investigated in depth.

implies that in general women take less time to get a degree – in fact a greater amount of female students complete their studies within the legal length, as less than 60% of the females are still enrolled during the first academic year beyond the minimum duration versus about 65% of males. Moreover from the graph we notice that after the seventh year spent at university the survival is almost the same between males and females. Figure 2, instead, gives the plots of the disaggregated (by faculties) life survivor functions. It is straightforward that a great proportion of students who read economics (Piacenza) tend to graduate within the legal length, as only about 40% of those individuals are still enrolled during the fifth academic year and, they are followed by languages and maths. In addition we observe that the distribution for the other subject areas under consideration is very similar, as we observe, for instance, that the probabilities of surviving beyond the seventh academic year are: 0.11, 0.12 and 0.10 for students enrolled in Economics (Milan), law and the humanities, respectively.

4. Empirical methodology

A major concern of empirical research on the economics of higher education has been the role that various public policies, combined with individuals' abilities and parental background have played in enhancing college enrolment rates, persistence in college and university graduation rates. Over the last few years, as already discussed, Italian tertiary education system has experienced several changes, especially regarding degree programmes. However, in this work, instead of analysing the impact of the new reform on students' outcomes, we still take into consideration only individuals who are enrolled in a *Diploma di Laurea* – students enrolled under the old system - because we think that it is important to extend our knowledge on the behaviour of those students, since in light of the findings obtained it will be much easier to put forward new interventions. Being able to understand the main determinants that affect university success and failure in some depth is definitely useful, mainly because it provides us with additional evidence on the factors that are relevant in terms of college progression, thereby giving us the opportunity to verify whether or not the latest university reform has been able to remove the problems Italian universities have been facing. Furthermore, our analysis is only based upon the data of students enrolled under the "old tertiary education system" since when this study was carried out, information on individuals who are enrolled under the new regime was not available.

In this study we attempt to investigate several aspects: time that elapses for a student to get a degree, university performance of graduates, paying attention both to final grade achieved and years spent at college before graduation and finally, investigation of the reasons for dropping out.

To achieve the respective goals diverse methodological approaches have been applied on partly different sample. We now go on to present the econometric models in more detail.

4.1 The model of time-to-get a degree

In order to explain the elapsed time taken to earn a degree in one of the faculties of Cattolica University we use a duration model approach. Our final purpose, regarding the objective mentioned earlier on, is to analyse the probability of completion among students who are enrolled at this college. At this stage we include in our sample only graduates and those students who are at risk of graduation, as a consequence we exclude from the sample all the individuals who withdrew over the time they were observed, irrespective of the motivation, and those who have been enrolled in whatever faculty under four years, which is the legal length required for getting a degree. In addition, we include in our investigation only those who are aged 18-28, the reason for applying also this restriction is based on the desire to focus our analysis only on students who are more likely to be active in the academic studies. Individuals for whom we do not observe transition out of university – because they get a degree - are right censored and, we assume that the process which gives rise to the censoring is independent of survival time. In our study the event of interest, college graduation, may occur at specific interval time as during each academic year the university fixes three degree sessions when students may discuss their thesis, but due to the availability of only one observation for each academic year, we use a discrete hazard model.

To examine probability of completion a duration model is more appropriate as it may handle aspects like censoring, time varying covariates and it accounts for the differences in time in which each individual is at risk of experiencing the event. In fact a survival analysis approach is more suitable for estimating a change in situation that occurs at different times for different individuals than the regression analyses used in most prior Italian studies.

In order to study college completion we use a complementary logistic model where the dependent variable takes value 1 when individuals graduate over the time they are observed and 0 when they are still enrolled at university. Moreover, the estimation of discrete time duration models requires expanded or person-period data set organized in a way that there will be as many data rows for each individual in the sample as there are time intervals over which the individual in question – student – is at risk of experiencing degree attainment (Jenkins, 2004). Prentice and Gloecker (1978) show that this model is the interval-censored discrete-time equivalent of a continuous-time model with the proportional hazards assumption. Interval censored means that although the actual transition process is discrete with smaller time units than observed in the data, the data are grouped into intervals - in our case time is measured in years.

Proportional hazards means that the duration profile of the hazard is the same for everybody, with the explanatory variables shifting this profile upwards or downwards. As a consequence, in order to make the interpretation of the regression results easier, we may transform the coefficients of this analysis into hazard ratios. This is possible as Prentice and Gloeckler (1978) present the equivalence among interval censored discrete-time model and continuous time model with the proportional hazards assumption.

The hazard ratio is so given by:

$$HR = \frac{\chi(x = a)}{\chi(x = a - 1)} = \exp(\beta\ )$$

where χ is the continuous time hazard rate. This is the relative risk associated with a one unit change in the value of the corresponding explanatory variable, holding everything else constant. Clearly, we cannot suppose that all the individuals with the same vector of explanatory variables face the same expected hazard of getting a degree, so it is reasonable to assume that there are some students who are more or less likely than others to graduate due to unobservable factors. To model the unobserved heterogeneity, we use a complementary logistic model, where the frailty term is normally distributed.

Thus the hazard function for each risk is specified to be of the form:

$$h_{ij} = 1 - \exp(-\exp(\gamma_j(t) + \beta' X_i + \nu_i))$$

Where X_i is the set of explanatory variables, β' is the unknown parameter to be estimated, $\gamma_j(t)$ is the baseline hazard function, and ν_i is the frailty term normally distributed.

The explanatory variables included in the model are both time varying and fixed and, they intend to capture the effects of student ability, family income and students' mobility, as well as a vector of other control variables. The latter include whether a student is a male, his/her age, faculty in which a student is enrolled, family size and the type of high school attended and its nature – whether private or not.

4.2 The model of academic performance

In this section we examine factors influencing college completion. We include in our analysis only graduate students, both those who graduated in time and as *Fuori Corso*, since the final goal of this part of the analysis is to detect the most important determinants that affect excess time to graduation and students' performance.

As we have already discussed, the lengthening of time-to-degree is one of the major problem that the Italian tertiary system, mainly the "old" one, has to face. Clearly, due to this reason we focus our attention on the issue of the *Fuori Corso* with the purpose of underlining the

aspects that prevent completion in time. Several arguments have been presented in order to explain this phenomenon, such as family support, poor labour market conditions, lower tuition fees associated with students enrolled beyond the legal duration.

However, we may take into consideration the economic model of doctoral students' times-to-degree and completion probabilities developed by Breneman (1976) for a better understanding of the Italian case. One aspect of the model focuses on the effect of academic labour market opportunities and financial support for graduate students. In general he observes that improved labour market opportunities, held constant other things, lead students to speed up degree progress and thus shorten times-to-degree. In addition, he argues that the type of financial support is also postulated to affect degree-times and completion probabilities, due to the fact that for example doctorate students who are teaching assistants may have less time than others to devote to studying. In light of these results, we may extend this model also to Italian undergraduate students, since empirical evidence underlines that poor job opportunities may be one of the factors responsible for the excess time-to-degree, as a result of this situation, students might prefer, for instance, spending more time in preparing exams, thereby getting higher marks and enhancing time spent at college. Moreover, especially in a private university, it is definitely important the type of financial support on which students may count. Of course, students who have parents who provide them with all the money they need, should complete college before workers-students, as for the latter job responsibilities may take time away from studies. Unfortunately, in our sample we do not have any information about either labour market conditions or the working status of students, as a consequence we attempt to examine the problem of the *Fuori Corso* considering at the same time the final grade achieved and the additional years spent at university beyond the legal length. The idea is to identify the factors that influence better performance or speed toward a degree, as unobserved quality differences may lead to prefer one aspect – higher final grade - rather than the other one –graduation in less time.

The econometric model is estimated using the Zellner's seemingly unrelated regression estimator (SUREG), so we can estimate both the above aspects simultaneously while accounting for the correlated errors at the same time, leading to efficient estimates of the coefficients and standard errors.. The dependent variables are *final grade* - final grade achieved - and *length* – additional academic years spent at university to get a degree. The equations related to each dependent variable are estimated jointly.

Let O_i be a column vector containing *final grade* and *length,* and Z_i a vector of personal characteristics such as gender and age along with age squared. X_i is a set of students' abilities

prior to university enrolment such as type of high school attended and its nature, high school final grade, college average mark, type of faculty. Finally, information about students' mobility is included in vector Y_i. The regression error term is ε_i. The coefficients are the vectors α, β and γ

$$O_i = Z_i\alpha + X_i\beta + Y_i\gamma + \varepsilon_i \qquad i = 1, \ldots, N \qquad (1)$$

Moreover, since the independent variables are the same in the system, seemingly unrelated regression equations are equivalent to the OLS estimation, equation by equation. However, by estimating (1) as a system, there is a gain in efficiency since the disturbances in performance and speed equations are contemporaneously correlated. In other words, taking account of the correlation of the error terms across the equations lead to new estimates that are asymptotically more efficient than usual least squares estimates. Furthermore, the correlation matrix of residuals between the dependent variables – *final grade* and *length* - might be positive or negative. A negative correlation is expected if students adopt an efficient behaviour towards a degree achievement, whereupon individuals tend to follow a regular path to get a degree, meaning that they attend courses and immediately after they take the corresponding exams. Instead once the correlation of residuals is positive, it acts on the other way around.

4.3 The model of withdrawal from university

In this last part of our analysis we aim at identifying the factors associated with each of the four possible enrolment outcomes we have taken into consideration: being still enrolled, completion of the degree, drop-out and stop-out behaviour. For this investigation we include in the sample students who get a degree over the period they are observed, those who left university and those who are still enrolled as well. Considering that the time spent at university may be noticeably different among students and that they may face diverse external conditions, such as unemployment rates, which might influence their decisions, we include in this part of the analysis only those students who enrolled at Cattolica University during the academic year 1993 and 1994**.**

In general, students at each point in time may decide whether or not staying at university an additional year, hence they assign utility at each of these possible exits in order to decide whether or not to continue their studies, for instance they will obtain a degree when the utility associated with this outcome is higher than the one associated with the other possible exits, for instance they graduate because the utility is greater than the utility associated with stopout exit, which in turn is higher than this related to drop-out behaviour: $U_g > U_s > U_d$.

In our case we define as stopouts those students who move to another university, instead dropouts are those who leave the whole tertiary education system. Hence, we are interested in evaluating if it is possible to distinguish the aspects that may influence one exit.

Given our interest in evaluating the magnitude of each determinant on the diverse exits resulted from the choices made by students over the period they are enrolled at university the *multinomial logit* model is estimated.

We model the following form specification:

$$O_i = \alpha + P_i\delta + A_i\beta + M_i\gamma + \varepsilon_i \quad i = 1,\ldots\ldots N$$

where O_i is the reason student *i* left university. This takes value 0 if the student is graduate, 1 if the student is still enrolled, 2 if a person dropped out and 3 if the student moved to another university. According to Johnson (1994) making a distinction between those two exits is important as he finds that the factors associated with dropping out appear to be very different to those associated with stopping-out.

A_i contains information about students' abilities both prior to college enrolment and during the period they are enrolled. We introduce this set of variables as we want to detect the academic aptitude of each individual, since it has been more than established that academic performance has a significant positive influence on the likelihood that a student will successfully complete college, besides, as completion rates are also found to vary by subject studied, we include also the faculties in which an individual is enrolled in order to verify whether or not the faculty may influence the type of exit . In addition, P_i a vector of personal characteristics such as gender and age is used to capture gender differences in the determinants of attrition. We include in the model also the geographical origins of students (M_i) as we expect that those who live far away from their parental home are less likely to fail as, due to the limited mobility that characterises Italian college system, we suppose they are higher ability students, and also because of the higher costs they have to support.

5. Empirical findings

In this section, we present and discuss the results of our regression analysis. Table 11 shows the determinants which affect the probability of getting a college degree, instead tables 12 and 13 report the results obtained according to the faculties in which a student is enrolled and where the college is located – namely economics and law. Afterwards we present the performance index of graduate students (Checchi et al., 2000) and the corresponding regression, which aims at providing additional evidence of graduates' behaviour. Finally, table 16 shows the results of a *multinomial logit* analysis of student's attrition.

5.1 Results of the probability of getting a degree

In this part we address our attention to the probability of getting a college degree among students enrolled in whatever faculties of Cattolica University for the period 1993 to 2001. The final purpose of this empirical investigation is to shed new light on the factors which influence university degree achievement, taking into account elapsed time to graduation.

The estimation results of the duration approach based on a complementary logistic model of the *graduate* variable on personal characteristics, family size, household income and demographic information, along with faculties, time spent to get a degree and schooling performance are summarised in table 11 – which presents coefficients and hazard ratios of the probability of getting a degree. It contains three columns, the first for both males and females, the second for the male sub-sample and, the third for females. Our discussion of the results in this section will focus on the model with unobserved heterogeneity[10].

First, we consider both males and females in our regression. The logarithm of time spent at university before the achievement of a degree has negative and statistically significant effects on students' probability of getting a bachelor's degree. According to our sample it means that lengthening time-to-degree is not a good procedure to follow, because staying at university additional years beyond the legal length required to attain a degree slightly reduces the probability of college completion. Contrary to our expectations - as the mean effective duration of university programmes in Italy is 7.41 compared with a mean legal duration of 4.39 – our estimate is nevertheless in line with the tendency shown in our sample as a large amount of students graduate in time or one year beyond the legal time (considering only the graduate sample we find as effective mean duration 4.80). We notice that on the one hand longer time spent at university reduces the probability of withdrawal, on the other hand it does not help students to achieve a degree. In addition, looking at the work of Garibaldi et al. (2006) we observe that the effective duration time-to-degree of Cattolica University is definitely more similar to that of Bocconi University (5.0)– a private university of Economics - so we might come to the conclusion that enrolment in a private university encourages a more normal progression toward the degree and, even if students take longer than the legal length to graduate, it takes then less time than those who are enrolled in any public colleges. Apparently, as those authors suggest, these results might be due either to the university's structure and resources, such as pupil-professor ratio, class size which may facilitate individuals' attainment or specific characteristics of students. In fact, those who are enrolled in a private university may differ from those who are attending a public college, for instance, in light of the large tuition applied in

[10] In the Appendix B the model without unobserved heterogeneity is reported.

private universities, it might be possible that students are subject to a selection procedure and, since parents are aware of the major investment that they have to support, they might endorse enrolment in private institutions especially for more determined and high ability students, thereby reducing time-to-degree. This result is in stark contrast to what suggested by Brunello and Winter-Ebmer (2002) that students enrolled in private universities take longer to graduate, especially because of the lower quality of institutions and intrinsic characteristics of students. However, this result does not appear to be as relevant since in Italy there are only few private colleges and in general of high quality – such as Cattolica University, so it is more likely that they attract higher ability students than those less qualified, thereby having a positive effect on the probability of completion in time.

The gender dummy reflects important sex differences in college behaviour. Specifically, male students are less likely to complete their studies than women, about 23% less. Several arguments have been presented to account for that tendency, such as the fact that women are more devoted to studying, men might experience interruption of their studies because of the military service[11] along with greater opportunities of finding a job. Recent research highlights that gender differences in degree performance may arise for a number of reasons, such as differences in the types of subject male and female students study, differences in type and quality of the institutions they attend as well as in students specific attributes that are correlated with attainment (i.e. family background) (Hoskins et al., 1997; Johnes and McNabb, 2004).

The type of high-school attended prior to university has some important effects on completion as well. In fact, Italian post-compulsory schooling system is characterised by four types of upper secondary schools: general schools (*Licei*)[12], teaching schools (*Magistrali*), technical schools (*Istituti Tecnici*) and vocational schools (*Istituti Professionali*). All the high-school dummies have positive and statistically significant effects on the dependent variable - probability of obtaining a degree - and their estimates have to be interpreted as differentials between those types of upper secondary school and the omitted category – *Istituti Professionali.* These findings provide further evidence about the fact that the type of high-school attended appears to be strongly associated to educational outcomes; having achieved either a more academic oriented diploma or a technical one increases the probability of college completion, for instance a student who has graduated at *Liceo Classico* has about 80% higher probability of getting a degree than individuals with only a vocational diploma. These results are in line with the existing empirical evidence for Italy

[11] The military service was still mandatory for the cohorts taken into account.
[12] General schools can be classified according to the subject chosen: *Liceo Scientifico* (science), *Liceo classico* (humanities), *Liceo Linguistico* (foreign languages) and *Liceo Artistico* (art).

Furthermore, we have included in our regression also the nature of the high school, because our idea is to find out whether or not attendance at a private high-school pays in terms of educational output. In line with prior results obtained for the Italian situation, we find that those who have achieved a secondary school diploma in a private institution have lower probability of completion (about 10%). As a general rule, public high-schools are of very high quality in Italy, especially compared with lay private schools. As a consequence, students' level of knowledge is rather elevated among those who have attended a public school. Unfortunately, in this work it has not been possible to make a distinction between catholic private school and lay private school, as we think that this additional information might be useful to extend our knowledge of the determinants that affect college graduation. To support our result we may refer to the paper by Bertola and Checchi (2001) where the authors find that the best college performances are associated to public schools, followed by catholic private schools and lay private schools. Also Brunello and Rocco (2004), taking into consideration the tendency of enrolling in a private high school especially among weak students who are less likely to continue studying, and applying a theoretical model, confirm evidence on this topic. The empirical application of their model highlights for the Italian case that the majority of the preferences is given to the high quality public schools.

Another variable related to the academic performance of students is the final grade obtained at high-school, which is found to be relevant in getting a degree. The omitted category is composed of those students who have achieved the maximum mark. As it is noticeable, there is a positive relationship between mark and graduation, since the lower the final grade attained is, the lower the probability of college completion is. In particular we find that the associated probabilities of completion at each grade interval are the following: about 9% (interval grade 90-99), about 23% (80-89), about 40% (70-79), and about 67% (60-69), which means, for example, that a student who has a mark within the interval mark 70-79 has 40% lower probability of getting a degree than those who have achieved 100 as their final grade. As a matter of fact, this estimate stresses the importance of indicators related to students' abilities as attributes that influence their progression toward the degree.

With regard to students' performance during the period they are attending college, we consider students' average marks and the faculty in which they are enrolled.

Looking at the average mark, we find that the probability of getting a degree is higher for those who have a grade equal to A-level, B-level and C-level than those who have an A+ grade, respectively. Instead, those who have a very low average mark - equal to D-level – face about

80% lower chances of graduating than those who obtained the highest average mark. According to empirical evidence, those results underline that the average mark is a relevant piece of information related to students' abilities along with students' progression. In fact, the data highlight that good marks increase the chances of getting a degree, but an average mark equal to A+ acts on the other way around, because having an average mark equal to the maximum grade implies that students perform in each exam at its best. The prior situation entails three scenarios: very high ability students who are able to pass their exams easily and taking the maximum mark without making a considerable effort, students who devote more time in preparing for an exam in order to get the maximum grade, and finally individuals who have refused some exams because the corresponding marks were not equal to the maximum mark, thereby reducing the speed, so it will take longer to complete university even if they are classified as students with higher abilities.

Predictably, completion rates also vary significantly across subject areas, other conditions being equal. Estimates of all the faculties are statistically significant. Students enrolled in economics at Piacenza, banking sciences and in languages at Milan face higher probability to graduate – 55%, 17% and 68% respectively – compared with the omitted category, such as students of economics at the centre of Milan. Instead, the estimates related to the other faculties show lower chances of completion with respect to students enrolled in economics at the faculty of Milan.

We now turn to the impact of family characteristics and geographical origins of students. Contrary to conventional wisdom, we find that living in a large family, composed of at least four individuals or even more, enhances the probability of completion. According to the literature review about this issue, we would expect a negative relationship instead of a positive one, since it has been established that family size has negative effects on child achievement outcomes, because of a dilution of household financial resources available and reduction of parents' time. In order to account for this counterintuitive result we present two arguments. First, parents, when they face liquidity constraints, give their financial support to their high ability children, especially when the level of tuition fees is high, thereby increasing their probability of getting a degree regardless of the family size. Second, according to the empirical evidence living with well-to-do parents does not prevent university enrolment. Furthermore, those students, other things held constant, thanks to their better familial conditions, face better job opportunities, which may provide incentives toward degree attainment. To underpin our explanations we can mention the work by Checchi et al. (2000) in which they discuss the role of family networking, finding that students from richer families have better employment prospects and they are more

likely to get a degree, since for them staying longer at university will entail supporting higher opportunity costs. The effects of family income confirm the result mentioned above: living with richer parents increases the chances of college completion. Regarding the income's distribution in quartiles, it appears that students have a 13%, 12% and 10% lower probability of getting a degree respectively, compared with those from richer families. Hence, we notice that financial support is definitely important in terms of college completion. This result might appear in sharp contrast with the existing literature. For instance Jenkins and Schluter (2002) using German Socio-Economic Panel (GSOEP) underline that educational outcomes are mainly affected by parental background and family income during the period of early childhood, rather than contemporaneous income. In other words poor parental background appears to lower the chance of attending more oriented academic high school, or even worst it precludes children from going to university (Checchi et al., 2000). However, the fact of attending a private university might be the reason why income turns to be significant in our case. In fact, due to the higher level of tuition fees applied, not having credit constraints avoids working, as a result students have more time to devote to their studies thereby facilitating progression toward a degree.

An interesting set of results concerns the geographical origins of students. Individuals who move from their hometown to the town of college are less likely to get a degree than home students, *ceteris paribus.* One might speculate that the relatively lower probability of completion for those students who live far from their parents may be the consequence of the difficulties that students may find to adjust to the new environment along with the major responsibilities they have to face living alone. This result is in line with the study of Card (1993), where he uses a simple indicator for the presence of a nearby college as an instrument for schooling. He finds that men who grow up near a 4-year college have significantly higher education and earnings than other individuals. Contrary to this finding, Johnes and McNabb (2004) show that those who choose to attend a local university in order to cut costs are more likely to drop-out.

We now explore the gender issue further by estimating separate equations for men and for women. A number of important differences may be observed across genders. Again we start by considering the importance of individual attributes. Firstly, prior high-school attended has a positive impact on the probability of completion for both males and females, but we observe a stronger effect on the likelihood of getting a degree for females who have attended a general high-school than for males. Secondly, for both groups having obtained as a final grade the maximum mark enhances the chances of degree achievement. Thirdly, the nature of the high-school, whether or not it is private, affects negatively college completion only for men, probably because they are more likely to attend this type of upper secondary school than women do.

Fourthly, for both groups having a very low average mark at university reduces the probability of obtaining a degree. On the contrary, only for the female sub-sample having an average mark at college equal to A-level or B-level appears to enhance the probability of completion. Fifthly, gender differences are also found when we consider the impact of subject area, although there are a lot of similarities in the results. It is worth noting that women are more likely to complete college when they enrolled in degree courses where the percentage of females is higher, such as education (Milan). Sixthly, a further difference is related to family income quartiles, which appear to be relevant especially for males who have a household income within the first two quartiles, as facing poor familial financial conditions reduces their chances of getting a degree. Seventhly, the results for age within those groups indicate that on average men take longer time to graduate than women. Finally, the impact of geographical origins on completion also varies according to gender. We find that those students who left their hometown for studying face lower probability of getting a degree especially males, highlighting the fact that on the one hand they might encounter more difficulties than women in living without their families as they might be less independent. On the contrary for males we find that being a commuter lowers the chances of completion, this being probably due to the time spent commuting which is not spent at studying, instead women have about 16% higher probability than the home students, because they might study also during the time required to reach their home.

After having reported the results obtained by analysing both the pooled data and the samples of males and females respectively, it is appropriate to draw the main conclusions of the above discussion.

In general we find that prior level of knowledge and academic ability are key factors in terms of university success, such as high-school attended and its nature, high-school final grade and average marks score at university. However, it has been pinpointed that having attended a general high-school and having achieved higher scores at college have a stronger effect on the probability of completion for women than for men. Male students, on the contrary, are more likely to experience non-completion if they have attended a private high-school. In addition, it appears that family income does seem to be relevant in reducing the probability of getting a degree for individuals who face poor financial conditions. Finally, in general we find that students attending a university in the same town where they live are more likely to obtain a degree, apart from females commuter who perform better than home students, especially students who choose to go, for their university experience, far away from their parental home have less probability of completion. A small chance of getting a degree is shown by male students who commute to college as well. These results of geographical area of origins clash

with the earlier findings on this issue though. Johnes and McNabb (2004) find that students who live at home and attend a local university, because of the rise in college admission fees, are more likely than others to drop-out. Furthermore, they argue that the recent UK government policy on widening enrolment, especially in local universities, in order to cut costs will lead to negative results, since this new tendency might reduce completion rates as well as labour market flexibility – since living with parents hampers students from acquiring a taste for moving in order to find a job. On the contrary, evidence from Italy shows that, despite the effects of attending an elite university have been found in terms of better employment prospects and earnings, there is not a long tradition of attending a university distant from the parental home[13] (eg. Brunello and Cappellari, 2005). In addition to existing evidence, we have found that students enrolled at Cattolica University are more likely to achieve a degree if they attend a college in the same town they live. In light of our discussion it appears that not only college enrolment probability depends upon the proximity of universities to their homes, but it does influence also their performance. As a consequence, we may argue that this result might also be related to the specific situation faced by Italian colleges, where the lack of campuses makes the life of those students who left their parental home difficulty.

5.2 Time to get a degree across subject area

In this sub-section we estimate separate equations for the sub-sample of students enrolled at the faculty of Economics and Law, respectively. We decide to take into account only two subject areas - economics and law - because for those we can compare results between faculties with the same subject area, as there are two different college centres. In this manner, apart from the identification of the main determinants which affect university completion, estimates will attempt to highlight whether or not those faculties attract students who have different characteristics, tastes and abilities than those who enrol in other fields, and also if the centre where students study makes a difference in terms of degree achievement.

Table 12 presents results for the sub-sample of students enrolled in the faculty of economics at Milan and Piacenza. First column estimates show the same set of variables that we applied to the whole sample previously. Considering the importance of individual attributes, such as prior high-school attended and its nature, the final grade obtained at upper secondary-school and academic ability (as measured by average mark), we find that having achieved a high-school diploma, which differs from the professional one, enhances the probability of completion. Instead those who attended a private high school do not get any advantages, as they

[13] Brunello and Cappellari (2005), using Italian data, find little students' mobility. In general students from the south of Italy are more likely to attend university far away from their parental home, mainly they enrol at some universities in the Centre.

are less likely to get a degree (about 36%) compared with those coming from a public institution. Very low marks at high-school reduce the chance of graduating, reflecting the relevance of the prior level of knowledge achieved for obtaining a degree. Moreover, university average mark counts in terms of progression toward the degree, in particular students who usually pass exams with the minimum marks lower their probability of graduation. In addition, we find that females are more likely to get a degree than males (about 12%), household income facilitates university completion of richest students and being enrolled at the centre of Piacenza increases the chances of getting a degree of about 58%. As we may notice, among this subject area the most part of the estimates are in line with the findings show for the entire sample of students enrolled at Cattolica University, meaning that the determinants for succeeding at college are similar to all the fields.

In column two of table 12 we add to the previous specification two variables directly related to the prior schooling behaviour, which indicate the interaction of those aspects with the fact of being enrolled at the centre of Piacenza. The inclusion of those two covariates do not change the previous coefficients. The fact of having attended a *Liceo* for individuals enrolled at Piacenza produces higher probability of completion, so this result underlines that a more academic oriented high school has the a larger impact especially on students of this university's centre. Concerning the interaction between a private high school and enrolment in Piacenza is positive and significant, meaning that having attended a private high school, contrary to what happens in general, increases the chances of completion. This result might be strictly related with the narrow number of students enrolled at the faculty of Piacenza coming from a private institution, so it is likely that those individuals, who continue studying, are those who have higher abilities and motivations - skills that may facilitate completion.

The last column of table 12 reports estimates of the complete model. Interaction between family income and the centre of Piacenza does not produce any advantage in terms of completion. On the contrary, concerning the mobility variables, the interactions of the previous variable with the fact of being enrolled at Piacenza' s centre are both negative and significant. As a result there is a specific faculty's effect which reduces the probability of getting a degree for those who live far from their parental home or daily commute. There are two alternative explanations for that: first, students may find hard to settle in Piacenza because of its narrow dimension second, the fact that not many other students face the same situation may find it difficult to integrate socially.

Regarding the sub-sample of students enrolled in the faculty of Law at the centre of Milan and Piacenza estimates are reported in table 13. First column estimates show that prior

schooling achievement has positive effects on completion, but only if students attended a *Liceo*. The previous result highlights once more the importance of a more prior academic education for succeeding in this subject, besides the coefficients of teaching and technical high school are not statistically significant. In addition, very low high school final grade and the lowest average marks reduce the probability of getting a degree, as well as the fact of having attended a private high school. Mobility's variables are statistically significant both for those who daily commute, which highlights that in general those who were used to live in the same town of the college centre, also before university enrolment, have higher probability of obtaining a degree than commuters, probably because this group of students wastes time commuting compared with the others that live in the same town of the faculty and than those who come far away. Finally, poor familial financial conditions lower the chances of completion as well as attending this faculty at the centre of Piacenza..

In column two of table 13 we add two variables, indicating the interaction of the type of prior education achieved with the fact of being enrolled at the centre of Piacenza. Again, we find that it does have a negative effect a private high school especially regarding this centre. Instead the fact of having attended a more academic oriented high school increases, *ceteris paribus*, the probability of getting a degree especially at the centre of Piacenza (about 44%).

Finally the last column of table 13 reports the estimates of the complete model. The premium in terms of higher probability of completion for those with a general high school diploma and enrolled at Piacenza is still positive. There is also a specific familial income positive effect on students enrolled at Piacenza. In fact, those individuals have about 20% higher probability of getting a degree than their counterpart studying at Milan. Then the overall estimates concerning the level of mobility are statistically insignificant. Furthermore, regarding the dummy of students enrolled at the faculty of Piacenza, once we control for income and mobility with Piacenza' s faculty, the premium effect of being enrolled at the faculty of Milan is negligible, meaning that enrolment at the faculty of Law at the centre of Piacenza does not affect completion once parental financial conditions and origins of students are accounted for.

These results shed a light on our knowledge on college completion, since it seems that, not only students' abilities matter, as among students reading for the same subject area the fact of being enrolled in one centre rather than in another one might affect the probability of obtaining a degree. For instance the research and teaching quality of an institution may attract individuals with specific aspects, which may differ from those who induce other people to enrol in the same faculty but in a different town. More research is clearly needed to investigate thoroughly groups' composition, academic environment and the mechanism that persuade people to enrol in

a specific subject area and town, especially in light of the recent researches which have shown that college enrolment depends upon the proximity of colleges to their homes[14] (Butcher and Case, 1993).

5.3 University degree dilemma: summa cum laude or graduation in time?

In this section we investigate in depth the behaviour of graduates. We mainly focus our attention on the *Fuori Corso* issue. The lengthening of time-to-degree is in fact a big concern in Italian universities, and the major arguments presented to explain this phenomenon are related to the didactic organization of Italian higher institutions along with poor labour market conditions.

As mentioned above, we now study the major factors that influence even elapsed time-to-degree or college final grade. Before discussing the results related to those issues, we present in table 8 the descriptive statistics that summarise the academic performance of students. Using the performance's index suggested by Checchi et al. (2000) it is possible to tie the time spent at university to the number of exams passed over each academic year, and the average mark scored within each faculty. The index of performance applied is:

$$Performance = averagemark * speed = \frac{\sum_{i=1}^{p} m_i}{p} * \frac{p}{n}$$

where p is the number of passed exams, m_i is the grade obtained in the *i-th* exam and n is the number of years spent at university. In this way for every faculty in the sample we may observe: average mark, average performance and average speed as well, pointing out the differences in the composition of students, as, by definition, higher speed occurs when students pass many exams during the period they are enrolled at university. Of course a person has to face this trade-off as he/she has to decide whether or not to favour higher marks or graduation in time.

Within our data these statistics show that the average mark over the faculties is very similar, apart from the faculty of political sciences which presents the lowest mark compared to the other degree programmes. Regarding the values related to the average speed we note that students enrolled at the humanities, languages, education and economics at the faculty of Piacenza are characterised by double speed compared with all the other faculties. Finally, considering the average performance of graduates, we observe that the values are almost homogeneous among the faculties, underlying that the best results are reported by those who graduated in the humanities, maths and law at the centre of Piacenza.

[14] Further investigation about students' behaviour of college enrolment is desirable because it might provide additional evidence on the reasons that induce individuals to attend university as well as their intrinsic characteristics. Most notably, we might find that mobility reflects unobserved aspects of the student's personality and their higher abilities – which can improve academic success.

To provide evidence on the issue described above, Zellner's seemingly unrelated regressions are estimated jointly (SUREG). In this analysis we include all students who graduated over the period we considered, both graduates in time and those as *Fuori Corso.* From this estimation we find that, as reported in table 15, the correlation matrix of residuals is negative (-.0571), meaning that the equations are related through a negative correlation in the errors, besides Breusch-Pagan test shows that the residuals from the two equations are independent (P=.0000).

Estimated results are reported in table 14. Regarding the final grade obtained by graduates, we notice that prior performance combined with the academic one are positively correlated to the mark achieved after having discussed the graduation thesis. In particular, the estimates indicate that those who have achieved the maximum mark are more likely to score higher final grades. On the contrary, students who attended a technical high school and those who got lower high school marks have lower probabilities of getting a high final grade. In addition, as expected, the lower the average mark obtained after having passed all the exams is, the lower the final grade will be, since it results from the average mark by adding few points to it – as a general rule during the discussion of the thesis, depending on the level of the dissertation, the academic board decides whether or not to increase the average mark. Results highlight also that students who have attended private institutions before enrolling at college are less likely to obtain a higher final grade than their counterpart – graduates coming from a public high-school.

Regarding the gender, the probability of obtaining a higher final grade is greater for females than males, underlining once again that in general a female college student is a willing helper compared with males (McNabb, Pal and Sloane, 2001). Clearly, such behaviour is due to the existing gender differences, as mentioned above, female students are more devoted to studying than males and they want to make a good impression on families and friends, whereas male students prefer to complete their studies in less time, probably because of better job perspectives which lead them to pass more exams instead of making an effort to achieve a higher mark.

Furthermore, the best performance in terms of final grade is associated to students reading the humanities, languages, education and political science – they achieve higher final marks compared with students reading economics, law, banking sciences and maths.

Students, among the sample of graduates taken into account, who live far away from their parental home are more likely to complete university both with a lower mark and longer than the legal length. These results may reflect the specific situation they face, since not living with their own family may charge students of more responsibility, such as taking care of the house, besides

limited parents' supervision may induce those students to devote part of their time to non-academic activities which, reducing the time for studying, might favour especially lengthening time-to-degree.

To sum up, we notice that in general better grades are mainly correlated to abilities and level of knowledge acquired before college enrolment, academic performance and the subject areas attended by students. Regarding the last aspect mentioned, it may be due to the fact that the rate of return on degrees in these disciplines is low, so students may decide to complete college with a good mark and in more time rather than with a lower final grade in less time, so this behaviour reflects poor labour market opportunities associated to these faculties (Steel and Sausman, 1997). Regarding family income we find in the previous paragraph that it matters in terms of completion. However, family financial conditions do not have any effect on the probability of getting a higher final grade, stressing one more time that for this aspect individuals' characteristics and their abilities are definitely more important.

Then, looking at the fact of lengthening time-to-degree, we find that irrespective of the type of school attended prior to university the effects on time-to-degree are the same: graduation beyond the legal length compared with those who achieved a professional diploma. However, having achieved very low high school marks facilitate completion in fewer years compared to the others, and we can only speculate on the reason for this as it may be due to the different taste of these people: they prefer completion in fewer years than a better final grade.

Students reading law, irrespective of the town, are more likely to graduate in more years beyond the legal length than those who are enrolled in the faculty of economics of Milan. Instead, those who are reading education or political science are more likely to finish their studies in fewer years.

Finally, contrary to empirical evidence, students who have very poor family financial conditions are more likely to complete university in time than those who are very rich, probably because of the higher level of tuition fees applied. As discussed in the previous subsection, richer students have in general a greater probability of getting a degree than their counterpart, hence this result might appear controversial. However, the fact of having considered, in this section, only graduates, has automatically excluded the amount of those poorer students at risk of graduation that may have influenced the results obtained in the completion probability analysis. In other words it appears from this sample that poor graduates, due to their limited financial resources, to avoid the payment of additional fees prefer to get their degree in time, contrary to what seems to happen when we include in the sample also poor students at risk of completion.

5.4 Graduates, *dropouts* and *stopouts*: which are the main determinants that affect such behaviours?

In this last part of our analysis we attempt to explain whether or not students who have left university have been influenced by some specific factors, which of course may differ from others according to the reasons that lead students to exit from college. Up to now we have considered only a single exit from university, namely graduate students combined with those who are at risk of graduation, as they spent at university at least four years - the legal length required to get a degree.

In this section we present the results related to students who drop out of college by grouping among those individuals according to the following destinations: graduates, still enrolled, dropouts and stopouts. Clearly, our final goal is to verify whether or not it is possible to observe a number of important differences between those categories of students. Our idea is that students are different according to each category, mainly because graduates achieve their final purpose – getting a degree -, instead dropouts fail as they do not complete their university studies and they do not return, stopouts who withdraw from Cattolica University but they enrol in another college. Finally those who are still enrolled might be at risk of experiencing all these exits, since, over the period they may obtain a degree, or change university at which they are enrolled or drop-out of the tertiary education system This investigation was possible as in our sample information about the reasons why students have left university are available. Furthermore, we include in this part of the analysis – as discussed in the prior section - only those students who enrolled at Cattolica University during the academic year 1993 and 1994.

The econometric approach adopted, in order to analyse the main determinants that influence those exits, is a *multinomial logit* model. As noted above four regimes are identified: still enrolled in one of the faculties taken into consideration, completion of the degree, stopout (which refers to "involuntary dropouts"), and dropout (which may be classified as "voluntary")[15] and the results are reported in table 16.

The estimates indicate first that both voluntary and involuntary non-completion are negatively related to performance prior to university entry. Especially those students who have attained a vocational diploma are more likely to drop out of university instead of getting a degree, in addition individuals who enter university on the basis of a high school final grade lower than the highest mark are more likely to withdraw than the latter. In particular we notice that students with an academic oriented high school diploma are less likely to drop-out, in fact it appears that a better level of knowledge enhances the chances of completion.

[15] See Johnes and McNabb (2004).

Interestingly, students who enter university having attended a private high-school are more likely to drop-out from college than all the others. Again our findings support the empirical evidence for Italy on this issue, as it has been established that those students who attended private institutions prior to university enrolment have a weaker preparedness, especially those coming from lay high schools, as a result they have a greater probability of encountering difficulties which may induce those individuals to non-completion.

The results indicate that men are more likely to stop-out than women. This finding has been associated with more general gender differences regarding the determinants of the withdrawal problem. For instance, Tinto (1993) advances an explanation for these issues, he finds that females leave university mainly because of social factors, while for males the major cause of quitting is related to their academic performance.

An important factor which has a direct effect on the probability of withdrawal is the average mark of students, in general those who have passed exams with very low marks, highlighting their poor abilities, are more likely to leave from college without a degree and without coming back. This analysis shows that those who do not complete their university studies are in general individuals with lower abilities and weaker level of preparedness achieved prior to college enrolment, underlying that weaker students face more difficulties compared to those who had a stronger academic orientation during high-school.

As expected, attrition rates vary significantly across subject areas, other things held constant. We observe that students reading law and languages are more likely to withdraw from university irrespective of the reasons, instead those who are enrolled in the faculty of economics at the centre of Piacenza are less likely to stop-out or drop-out. Furthermore, those who are enrolled in the faculty of political science are less likely to exit from the tertiary education system for good.

Finally, we notice that especially students who face poor familial conditions are more likely to drop-out for both reasons. In fact, for those students the opportunity costs are greater than those supported by richest individuals, so if they receive an interesting job offer they may find it more convenient to leave college studies than get a degree. Furthermore, if we consider income also as an indirect proxy of the level of education of parents, it might occur that those who are reared in richer families have benefited of a better support in terms of stimulating environment (i.e. books) and human capital investment since their childhood, as a result they might find it easier to get a degree.

To conclude we consider the major determinants that characterise those who are still enrolled at university compared with graduates. In general, we notice that students with a better

prior education are more likely to get a degree. In addition, we observe that those who report lower marks at college are more likely to be enrolled than graduates. Considering the household financial resources the estimates show, in line with the evidence, that the probability of getting a degree is higher among those individuals who have parents with the highest income. Being males reduces the chances of obtaining a degree as they are more likely to be enrolled than females. Finally, we notice a different behaviour across subject areas: students enrolled in law and languages (Brescia) are more likely to be enrolled than graduates, on the contrary those reading economics (Piacenza), languages (Milan) and political science are less likely to be enrolled compared with those who complete their studies. Within each of the categories taken into account in this analysis we may also underline that the coefficients associated to the mobility are never statistically significant.

6. Concluding remarks

We have provided evidence for undergraduate students at Cattolica University in all the faculties that their completion rates, their times-to-degree and their drop-out rates are all sensitive to both abilities prior to college enrolment and academic performance.

We have assessed whether or not individuals' abilities have a direct effect either in terms of success or failure. In this work we have mainly addressed our attention to the following aspects:

- ✓ Probability of completion of students enrolled at this university;
- ✓ Identification of the major determinants that influence lengthening time-to-degree;
- ✓ Students' behaviour regarding the withdrawal process by distinguishing between graduates, dropouts and stopouts.

Under the first point, we find that the most important aspect is related to students' abilities. The probability of getting a degree is in fact higher among those students who attended a general high school, which is more academic oriented, rather than other types of high-school (mainly professional one). In addition, we notice that also the final grade obtained at high school affects students' progression toward a degree, in particular we find that not having obtained the maximum mark reduces the likelihood of completion. Completion rates also vary significantly across subject areas, other conditions being equal. Contrary to what Brunello and Winter-Ebmer (2002) suggest, the fact of studying in a private university seems to pay, at least in terms of time-to-degree, as in general we highlight that about half of the students in our sample graduate within the legal length. Finally, another interesting result is related to geographical origins as it appears that students who left parental home are less

likely to get a degree regarding those who live in the same town where the university is located.

With regards to lengthening-time-to-degree, we observe that students who have higher abilities are more likely to get a degree with a higher final grade. On the contrary, students who come from private high school are less likely to achieve a high final mark, but they are more likely to complete their studies in time than those who attended a public high school. Also gender differences influence excess time to graduation, as males are more likely to get a lower final grade than females. In general those students who are reading the humanities and languages have a greater probability of getting a higher final grade; this tendency might be related to the limited job opportunities that these disciplines offer, so they might prefer to complete their studies with a better mark, even if it implies that they have to stay longer at university. Students with a low high school mark and with poor family financial conditions are instead more likely to obtain a degree in less time. Finally, we note that students who left their parental home face both higher probability of graduating beyond the legal length and with a lower final grade.

In the last analysis we look at these alternative destinations: degree, dropouts and stopouts, taking into account also those who are still enrolled. We discover that both voluntary and involuntary non-completion are negatively related to performance prior to university entry. Especially those students who attended a private high-school are more likely to drop-out than all the others. Then results indicate, in line with the earlier studies, that men are more likely to stop-out than women. Moreover, individuals drop-out of college especially when they have a low level of preparedness. Results underline also that students who have poor familial financial conditions are more likely to withdraw from university for both voluntary and involuntary reasons. Regarding those students who are still enrolled at college we notice that the probability of getting a degree is lower for those who have a non-general high school and poor academic results. On the contrary, in line with the previous studies, graduation is greater among those who face better job perspectives, such as students with the highest level of income.

Evidence provides here, of course, it is a study of only one institution's experience, and furthermore it is also private. Would similar results be found for other institutions? Do individuals' abilities matter more than other factors for degree completion? Does being enrolled in a private university really reduce time-to-degree? To answer such questions our analyses should be replicated at other institutions and for other fields.

In conclusion we have learned a lot about the determinants of students' completion and attrition. Further researches should aim at improving our knowledge of these issues and at analysing in more detail the effects of tuition on time spent at university and the role of peer effects on educational achievement. A better understanding of the factors that influence college behaviour is especially important in terms of the recent university reform.

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Appendix A: Descriptive statistics

Table 1 Students' distribution by gender

Status	Male	Female
Still enrolled	37.19	62.81
Graduate	30.90	69.10
Dropout	40.04	59.96
Stopout	42.19	57.81
Total	35.69	64.31

Table 2 Students' mobility within each faculty

Faculty	Home students	Commuter	Move-to-faculty
Economics_Mi	26.30	63.14	10.56
Economics_PC	25.36	60.54	14.10
Law_MI	18.91	53.16	27.93
Law_PC	27.37	47.05	25.58
The Humanities	21.36	66.36	12.28
Banking Sciences	16.67	67.30	16.04
Education	16.98	78.00	5.01
Languages_MI	19.05	71.37	9.58
Natural Science	17.82	75.29	6.90
Political Sciences	24.25	60.42	15.33
Total	21.41	64.72	13.87

Table 3 Interval distribution of high school final grade by students' mobility

High school final grade	Home students	Commuter	Move-to-facutly
60-69	25.77	64.89	9.34
70-79	23.19	65.47	11.34
80-89	19.21	66.59	14.20
90-99	17.17	63.79	19.04
100	16.02	58.01	25.97
Total	21.37	64.78	13.85

Table 4 Income quartiles of students by their mobility

Incombe_quartiles	Home students	Commuter	Move-to-facutly
First quartile_income	18.79	64.33	16.88
Second quartile_income	18.59	68.93	12.48
Third quartile_income	21.39	67.14	11.47
Fourth quartile_income	28.45	57.51	14.04
Total	21.41	64.72	13.87

Table 5 Type of high-school attended by faculties in which students are enrolled

Faculty	Science	The Humanities	Other_liceo	Teaching	Technical	Vocational
Economics_Mi	37.82	9.59	11.13	1.07	38.10	2.29
Economics_PC	33.03	9.43	1.00	2.76	52.57	1.23
Law_MI	29.13	36.55	11.28	4.44	16.46	2.14
Law_PC	30.84	28.53	3.37	8.74	25.47	3.05
The Humanities	29.15	37.40	12.82	9.54	8.84	2.26
Banking Sciences	29.69	6.10	7.63	1.64	53.02	2.20
Education	22.73	12.14	8.85	32.37	19.22	4.68
Languages_MI	20.62	13.26	27.22	11.42	23.97	3.52
Natural Science	59.20	9.20	1.72	10.34	15.52	4.02
Political Sciences	29.94	20.12	15.99	6.77	24.13	3.05
Total	29.98	19.57	11.25	10.23	26.15	2.83

Table 6 Times-to-degree by faculties

Faculty	0	1	2	3	4	5
Ecnomics_Mi	48.87	30.48	13.77	5.58	1.17	0.13
Economics_PC	67.03	21.36	7.43	2.79	1.08	0.31
Law_MI	39.55	32.20	19.00	7.42	1.62	0.21
Law_PC	56.60	25.00	10.38	4.72	2.83	0.47
The Humanities	50.25	24.31	15.67	8.24	1.53	0.00
Banking Sciences	52.95	30.75	11.81	4.28	0.20	0.00
Education	60.70	24.03	10.23	4.09	0.94	0.00
Languages_MI	50.08	32.47	13.63	3.68	0.15	0.00
Natural Science	60.53	27.63	3.95	6.58	1.32	0.00
Political Sciences	57.59	25.19	11.85	4.44	0.93	0.00
Total	52.24	28.12	13.24	5.25	1.06	0.09

Table 7 Legal and effective duration of degree's programmes by faculties

Faculty	Mean legal duration	Mean effective duration
Sciences	4.01	6.94
Chemistry and Pharmacy	4.66	6.95
Geo-biology	4.17	7.63
Medical school	5.77	8.28
Engineering	4.99	7.73
Architecture	4.99	8.79
Agriculture sciences	4.83	8.21
Economics and statistics	4.04	6.74
Political Sciences	4.02	7.23
Law	4.02	7.04
Arts	4.02	7.61
The Humanities	4.02	7.38
Teaching	4.01	8.55
Psychology	4.92	6.71
CATTOLICA University	4.00	4.80
TOTAL	4.39	7.41

Table 8 Descriptive statistics of student performance

Faculty	Exams required to complete the career	Minimum years to complete course	Theoretical maximum of performance	Average performance	Average speed	Average mark
Ecnomics_Mi	26	4	201.50	139.05	5.65	24.49
Economics_PC	32	4	248.00	185.82	7.44	24.86
Law_MI	26	4	201.50	132.02	5.18	25.33
Law_PC	26	4	201.50	147.77	5.73	25.61
Humanities	23	4	178.25	127.68	4.99	25.46
Banking Sciences	29	4	224.75	159.98	6.44	24.71
Education	40	4	310.00	224.27	8.94	25.03
Languages_MI	37	4	286.75	209.60	8.08	25.85
Maths	23	4	178.25	131.78	5.18	25.19
Political Sciences	24	4	186.00	126.54	5.38	23.39

Table 9 Variable definitions and Sample Characteristics

VARIABLE	DEFINITION	MEAN
LNDURATA	natural logarithm of the time spent at university	1.65
MALE	0 -1 dummy variable equals to one if a student is male	0.35
AGE	individual's age	19.38
SCIENCES HIGHSCHOOL	0 -1 dummy variable equals to one if a student is enrolled	0.28
HUMANITIES HIGHSCHOOL	0 -1 dummy variable equals to one if a student is enrolled at the humanities high school	0.19
OTHER LICEO	0 -1 dummy variable equals to one if a student is enrolled at another liceo	0.11
TEACHING	0 -1 dummy variable equals to one if a student is enrolled at teaching high school	0.10
TECHNICAL HIGHSCHOOL	0 -1 dummy variable equals to one if a student is enrolled at technical high school	0.28
PRIVATE HISHSCHOOL	0 -1 dummy variable equals to one if a student attended a private high school	0.27
HIGHSCHOOL MARK90_99	0 -1 dummy variable equals to one if a student obtained as final grade at high school from 90 to 99	0.14
HIGHSCHOOL MARK80_89	0 -1 dummy variable equals to one if a student obtained as final grade at high school from 80 to 89	0.25
HIGHSCHOOL MARK70_79	0 -1 dummy variable equals to one if a student obtained as final grade at high school from 70 to 79	0.31
HIGHSCHOOL MARK60_69	0 -1 dummy variable equals to one if a student obtained as final grade at high school from 60 to 69	0.21
EDUCATION_MI	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Education at the centre of Milan	0.16
EDUCATION_BS	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Education at the centre of Brescia	0.05
ECONOMICS_PC	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Economics at the centre of Piacenza	0.04

LAW_MI	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Law at the centre of Milan	0.17
LAW_PC	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Law at the centre of Piacenza	0.03
LANGUAGES_MI	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Languages at the centre of Milan	0.18
LANGUAGES_BS	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Languages at the centre of Brescia	0.13
BANKING SCIENCES_MI	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Banking Sciences at the centre of Milan	0.05
MATHS_BS	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Maths at the centre of Brescia	0.01
POLITICAL SCIENCES_MI	0 -1 dummy variable equals to one if a student is enrolled in the faculty of Political Sciences at the centre of Milan	0.05
UNI AVERAGE MARK_A	0 -1 dummy variable equals to one if a student has as average mark at university from 27 to 28	0.13
UNI AVERAGE MARK_B	0 -1 dummy variable equals to one if a student has as average mark at university from 24 to 26	0.54
UNI AVERAGE MARK_C	0 -1 dummy variable equals to one if a student has as average mark at university from 21 to 23	0.25
UNI AVERAGE MARK_D	0 -1 dummy variable equals to one if a student has as average mark at university from 18 to 20	0.05
NUMBER OFCOMPONENTS4	0 -1 dummy variable that equals one if student's family is composed by 4 individuals	0.42
NUMBER OF COMPONENTS5+	0 -1 dummy variable that equals one if student's family is composed by 5 individuals or more	0.13
FIRTS QUARTILE_INCOME	natural logarithm of first quarter of equivalised family Income	0.26
SECOND QUARTILE_INCOME	natural logarithm of second quarter of equivalised family Income	0.39
THIRD QUARTILE_INCOME	natural logarithm of third quarter of equivalised family Income	0.10
MOVE_TO_FACULTY	0 -1 dummy variable that equals one if a student comes far away from their parental home	0.13
COMMUTER	0 -1 dummy variable that equals one if a student dayly commutes from home to university	0.65

Note: Mean reported in the table is referred to the whole sample.

Table 10 Empirical hazard and survivor function by faculties

Group	Interval	Total	Deaths	Survival	SE Survival	Hazard	SE Hazard
Economics_Mi	4-5	4898	1759	0.6409	0.0069	0.4377	0.0102
	5-6	3139	1277	0.3802	0.0069	0.5107	0.0138
	6-7	1862	819	0.2129	0.0058	0.5639	0.0189
	7-8	1043	502	0.1105	0.0045	0.6338	0.0268
	8-9	541	304	0.0484	0.0031	0.7815	0.0413
	9-10	237	200	0.0076	0.0012	1.4599	0.0706
	10-11	37	37	0.0000	.	2.0000	0.0000
Economics_PC	4-5	981	561	0.4281	0.0158	0.8009	0.0310
	5-6	420	221	0.2029	0.0128	0.7141	0.0449
	6-7	199	106	0.0948	0.0094	0.7260	0.0657
	7-8	93	36	0.0581	0.0075	0.4800	0.0777
	8-9	57	31	0.0265	0.0051	0.7470	0.1245
	9-10	26	17	0.0092	0.0030	0.9714	0.2059

	10-11	9	9	0.0000	.	2.0000	0.0000
Law_Mi	4-5	3359	1011	0.6990	0.0079	0.3543	0.0110
	5-6	2348	964	0.4120	0.0085	0.5166	0.0161
	6-7	1384	691	0.2331	0.0073	0.5547	0.0217
	7-8	783	367	0.1238	0.0057	0.6122	0.0304
	8-9	416	227	0.0563	0.0040	0.7504	0.0462
	9-10	189	178	0.0033	0.0010	1.7800	0.0608
	10-11	11	11	0.0000	.	2.0000	0.0000
Law_PC	4-5	642	217	0.6620	0.0187	0.4067	0.0270
	5-6	425	153	0.4237	0.0195	0.4390	0.0346
	6-7	272	131	0.2196	0.0163	0.6344	0.0526
	7-8	141	74	0.1044	0.0121	0.7115	0.0773
	8-9	67	30	0.0576	0.0092	0.5769	0.1009
	9-10	37	22	0.0234	0.0060	0.8462	0.1635
	10-11	15	15	0.0000	.	2.0000	0.0000
The Humanities	4-5	2399	870	0.6373	0.0098	0.4430	0.0146
	5-6	1529	573	0.3985	0.0100	0.4612	0.0187
	6-7	956	436	0.2168	0.0084	0.5908	0.0270
	7-8	520	283	0.0988	0.0061	0.7477	0.0412
	8-9	237	126	0.0463	0.0043	0.7241	0.0601
	9-10	111	104	0.0029	0.0011	1.7627	0.0817
	10-11	7	7	0.0000	.	2.0000	0.0000
Banking Sciences	4-5	1003	410	0.5912	0.0155	0.5138	0.0245
	5-6	593	280	0.3121	0.0146	0.6181	0.0351
	6-7	313	144	0.1685	0.0118	0.5975	0.0475
	7-8	169	97	0.0718	0.0082	0.8050	0.0748
	8-9	72	42	0.0299	0.0054	0.8235	0.1158
	9-10	30	30	0.0000	.	2.0000	0.0000
Education	4-5	4341	2035	0.5312	0.0076	0.6123	0.0129
	5-6	2306	1042	0.2912	0.0069	0.5838	0.0173
	6-7	1264	582	0.1571	0.0055	0.5982	0.0237
	7-8	682	362	0.0737	0.0040	0.7226	0.0354
	8-9	362	202	0.0272	0.0025	0.9224	0.0576
	9-10	202	111	0.0016	0.006	1.7760	0.0775
	10-11	7	7	0.0000	.	2.0000	0.0000
Languages	4-5	1337	661	0.5056	0.0137	0.6567	0.0241
	5-6	676	429	0.1847	0.0106	0.9296	0.0397
	6-7	247	184	0.0471	0.0058	1.1871	0.0704
	7-8	63	59	0.0030	0.0015	1.7612	0.1087
	8-9	4	2	0.0015	0.0011	0.6667	0.4444
	9-10	2	2	0.0011	.	2.0000	0.0000
Maths	4-5	140	67	0.5214	0.0422	0.6291	0.0730
	5-6	73	37	0.2571	0.0369	0.6789	0.1050
	6-7	36	13	0.1643	0.0313	0.4407	0.1192
	7-8	23	12	0.0786	0.0227	0.7059	0.1907
	8-9	11	7	0.0286	0.0141	0.9333	0.3120
	9-10	4	2	0.0143	0.0100	0.6667	0.4444
	10-11	2	2	0.0000	.	2.0000	0.0000
Political Sciences	4-5	1094	479	0.05622	0.0150	0.5606	0.0246
	5-6	615	274	0.3117	0.0140	0.5732	0.0332
	6-7	341	162	0.1636	0.0112	0.6231	0.0465
	7-8	179	92	0.0795	0.0082	0.6917	0.0677
	8-9	87	49	0.0347	0.0055	0.7840	0.1030
	9-10	38	34	0.0037	0.0018	1.6190	0.1630
	10-11	4	4	0.0000	.	2.0000	0.0000

Note: The third column is the total number of subjects at risk of failure(death) at the interval time shown in the second column. The fourth column –death- shows the number of students dying at each time. The estimates of the survivor function together with hazard rate are shown in the remaining columns.

Figure 1 Survivor function by gender

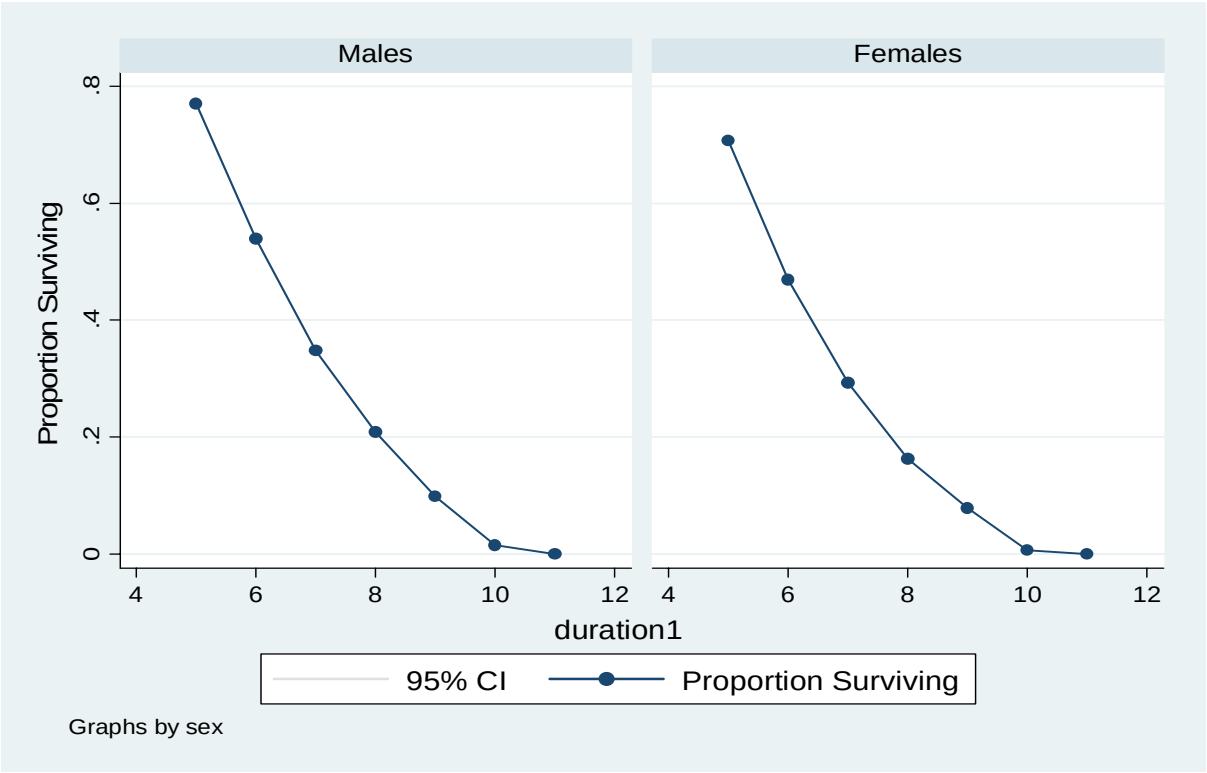
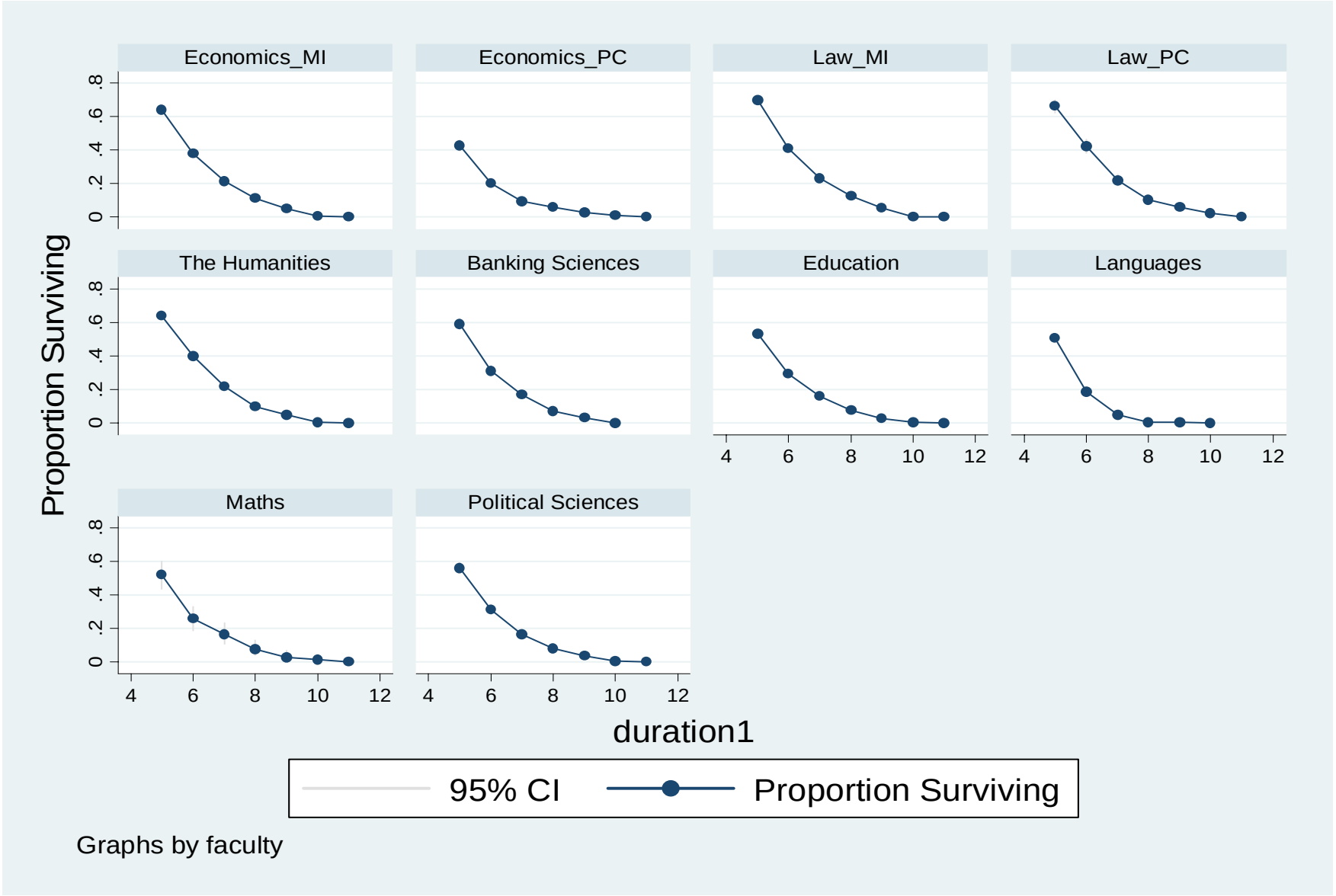


Figure 2 Survivor function by faculties.



Appendix B: Econometrics results

Table 11 Probability of completion by gender

	Males+Females			Males			Females		
Variable	**Coeff.**	**T**	**Haz.Ratios**	**Coeff.**	**t**	**Haz.Ratios**	**Coeff.**	**t**	**Haz.Ratios**
Lndurata	-6,1702	***	.0021	-6.5596	***	.0014	-6.4601	***	.0016
Male	-.2593	***							
Age	.8448	***	2.3275	.9178	***	2.5038	.8843	***	2.4213
Sciences high school	1.0997	***	3.0033	1.2788	***	3.5923	1.0504	***	2.8588
Humanities high school	1.0391	***	2.8267	1.2953	***	3.6521	.9786	***	2.6607
Other liceo	.9891	***	2.6888	1.3116	***	3.7121	.8535	***	2.3478
Teaching high school	.8616	***	2.3669	.7204	***	2.0552	.7907	***	2.2049
Technical high school	.6684	***	1.9511	.7828	***	2.1876	.6605	***	1.9357
Private high school	-.0981	***	.9065	-.3634	***	.6953	.0462		1.0473
High school mark_90-99	-.0922	**	.9119	-.2066	**	.8133	-.0539		.9475
High school mark_80-89	-.2649	***	.7673	-.3644	***	.6946	-.2350	***	.7906
High school mark_70-79	-.5005	***	.6063	-.7765	***	.4601	-.3978	***	.6718
High school mark_60-69	-1.0892	***	.3365	-1.3897	***	.2491	-.9858	***	.3731
Education_MI	-.6423	***	.5261	-1.0901	***	.3362	.6782	***	1.9703
Education_BS	-.5843	***	.5575	-1.0228	***	.3596	-.603	***	.5472
Economics_PC	.4412	**	1.5546	.4944	***	1.6395	.4022	***	1.4951
Law_MI	-.0856	**	0.9179	-.0236		.9767	-.1208	***	.8862
Law_PC	-.4779	***	.6201	-.2636	*	.7683	-.6363	***	.5292
Languages_MI	.5237	***	1.6883	.5419	***	1.7193	.5211	***	1.6839
Languages_BS	-.8010	***	.4489	-.9537	***	.3853	-.7773	***	.4596
Banking Sciences_MI	.1559	***	1.1687	.1352		1.1447	.1446	*	1.1556
Maths_BS	-.1455	*	.8646	.4512		1.5702	.0097		1.0097
Political Sciences_MI	-.0493	***	.9518	.1023		1.1077	-.1424	*	.8673
Uni average mark_A	.3817	***	1.4648	.4197	**	1.5215	.4575	***	1.5802
Uni average mark_B	.6973	***	2.0083	.659	***	1.9328	.8125	***	2.2535
Uni average mark_C	.4331	***	1.5420	.6181	***	1.8554	.4503	***	1.5688
Uni average mark_D	-1.5207	***	.2186	-.6813	**	.5059	-2.4273	***	.0883
Number of components_4	.1971	***	1.2179	.1382	***	1.1482	.2324	***	1.2616
Number of	.2675	***	1.3067	.2970	***	1.3458	.2653	***	1.3038

components_5+									
First quartile_income	-.1314	***	.8769	-.1741	***	.8402	-.1007	***	.9042
Second quartile_income	-.1239	***	.8835	-.1840	***	.8319	-.0911	***	.9129
Third quartile_income	-.0972	**	.9074	-.0580		.9436	-.1201	**	.8868
Move-to-faculty	-.1187	***	.8881	-.1803	***	.8351	-.1028	*	.9023
Commuter	.0290		1.0294	-.1743	***	.8400	.1487	***	1.1603
Constant	-12.0960	***		-13.2144	***		-12.7710	***	

Note: This table reports the effects of each explanatory variables on the probability of getting a degree. The first column shows results for the entire sample, the second only for males and the last one for females. Regression has been run taking into account frailty.
Excluded categories: female, professional high-school, public high school, highest final grade at high school, Economics at the centre of Milan, college average mark equal to A-level, family size less than 4, richest families, living in the hometown.
The likelihood ratio test 1625.20; 491.38; 1155.26 for the whole sample, for males and for females, respectively suggests statistically significant frailty, so as expected unobserved heterogeneity has effects on model parameters.

Table 12 Probability of completion between the faculty of Economics located in Milan and Piacenza

Variable	Coeff.	t	Haz.Ratios	Coeff.	t	Haz.Ratios	Coeff.	t	Haz.Ratios
Lndurata	-5.9653	***	.0026	-5.9641	***	.0026	-5.9831	***	.0025
Male	-.1317	**	.8766	-.1321	**	.8762	-.1318	**	.8765
Age	.8117	***	2.2517	.8122	***	2.2528	.8151	***	2.2594
Sciences high school	1.2177	***	3.3794	1.2461	***	3.4767	1.2461	***	3.4767
Humanities high school	1.2687	***	3.5562	1.3032	***	3.6811	1.3074	***	3.6965
Other liceo	1.2782	***	3.5902	1.3091	***	3.7028	1.3063	***	3.6925
Teaching high school	.9561	**	2.6015	.8843	*	2.4213	.8692	**	2.3850
Technical high school	.8026	***	2.2313	.7932	***	2.2104	.7913	***	2.2063
Private high school	-.4381	***	.6453	-.4741	***	.6224	-.4670	***	.6269
High school mark_90-99	-.1152		.8912	-.1150		.8914	-.1158		.8906
High school mark_80-89	-.2341	*	.7913	-.2314	**	.7934	-.2312	**	.7936
High school mark_70-79	-.5497	***	.5771	-.5483	***	.5779	-.5466	***	.5789
High school mark_60-69	-1.0727	***	.3421	-1.0714	***	.3425	-1.0642	***	.3450
Uni average mark_A	.5314	**	1.7013	.5338	**	1.7054	.5373	**	1.7114
Uni average mark_B	.8656	***	2.3764	.8631	***	2.3705	.8679	***	2.3819
Uni average mark_C	.6718	***	1.9577	.6668	***	1.9479	.6691	***	1.9525
Uni average mark_D	-1.2174	**	.2959	-1.2413	***	.2891	-1.2519	***	.2859
Economics_PC	.4598	***	1.5837	.5203	***	1.6825	.9850		2.6778
Number of components_4	.1527	**	1.1649	.1508	***	1.1628	.1524	***	1.1646
Number of components_5+	.1845	**	1.2026	.1826	**	1.2003	.1832	**	1.2010
First quartile_income	-.0507		.9505	-.0429		.9581	-.0458		.9552
Second quartile_income	-.2041	***	.8154	-.1962	***	.8218	-.2066	***	.8133
Third quartile_income	-.244	**	.7835	-.2396	***	.7869	-.2556	***	.7744
Move-to-faculty	.0058		1.0058	.0005		1.0005	.0727		1.0754
Commuter	.0369		1.0376	.0349		1.0355	.1356	**	1.1452
Private_school*Eco_PC				.4367	**	1.5476	.4264	**	1.5317
Liceo*Eco_PC				-.1946	**	.8232	-.2153	*	.8063
Income*Eco_PC							-.0066		.9934
Mover*Eco_PC							-.4779	***	.6201
Commuter*Eco_PC							-.3316	*	.7178
Constant	-12.0119	***		-12.0300	***		-12.1411	***	

Note: This table reports the effects of each explanatory variables on the probability of getting a degree for students enrolled in the faculty of economics at the centre of Milan and Piacenza. Regression has been run taking into account frailty.

Excluded categories: female, professional high-school, public high school, highest final grade at high school,
college average mark equal to A-level, family size less than 4, richest families, living in the hometown.
The likelihood ratio test 517.81; 518.68 and 512.61 for students enrolled in Economics at the centre of Milan and Piacenza suggests statistically significant frailty, so as expected unobserved heterogeneity has effects on model parameters.

Table 13 Probability of completion by students enrolled at faculty of Law in Milan and Piacenza

Variable	Coeff.	t	Haz.Ratios	Coeff.	t	Haz.Ratios	Coeff.	t	Haz.Ratios
Lndurata	-7.8898	***	.0004	-7.9811	***	.0003	-8.0015	***	.0003
Male	-.1039		.9013	-.1164	*	.8901	-.1148	*	.8915
Age	1.1214	***	3.0691	1.1348	***	3.1105	1.1351	***	3.1115
Sciences high school	.8084	***	2.2443	.6045	**	1.8303	.6094	**	1.8393
Humanities high school	.8289	***	2.2908	.6319	**	1.8812	.6417	**	1.8997
Other liceo	.8621	**	2.3681	.6702	**	1.9546	.6696	**	1.9534
Teaching high school	.2001		1.2215	.2067		1.2296	.1973		1.2181
Technical high school	.3438		1.4103	.3061		1.3581	.3066		1.3588
Private high school	-.2255	**	.7981	-.1928	**	.8246	-.1752	**	.8393
High school mark_90-99	-.0414		.9594	-.0492		.9519	-.0434		.9575
High school mark_80-89	-.3198	**	.7263	-.3338	**	.7162	-.3319	**	.7175
High school mark_70-79	-.6355	***	.5297	-.6426	***	.5259	-.6328	***	.5311
High school mark_60-69	-1.3041	***	.2714	-1.3210	***	.2669	-1.3219	***	.2666
Uni average mark_A	.2506		1.2848	.2608		1.2979	.2526		1.2874
Uni average mark_B	.1157		1.1226	.1335		1.1428	.1261		1.1344
Uni average mark_C	-.0179		.9822	-.0178		.9823	-.0304		.9701
Uni average mark_D	-1.7494	***	.1739	-1.7812	***	.1684	-1.7921	***	.1666
Law_PC	-.4834	***	.6167	-1.0309	***	.3567	.0988		1.1038
Number of components_4	.1100		1.1163	.0999		1.1050	.2508	**	1.2851
Number of components_5+	.2542	**	1.2894	.2447	**	1.2772	-.3237	***	.7235
First quartile_income	-.3715	***	.6897	-.3832	***	.6817	-.3237	***	.7235
Second quartile_income	-.1379	*	.8712	-.1496	**	.8610	-.1186	*	.8882
Third quartile_income	-.1417		.8679	-.1507		.8601	-.1298		.8783
Move-to-faculty	-.2983	***	.7421	-.3035	***	.7382	-.2653	**	.7669
Commuter	-.1628	**	.8497	-.1724	**	.8416	-.1233		.8839
Private_school*Law_PC				-.4979	*	.6078	-.6203	**	.5378
Liceo*law_PC				.8922	***	2.4405	.8568	***	2.3556
Income*Law_PC							.1776	**	1.1943
Mover*Law_PC							-.2927		.7462
Commuter*Law_PC							-.2631		.7687
Constant	-14.7629	***		-14.7384	***		-14.7813	***	

Note: This table reports the effects of each explanatory variables on the probability of getting a degree for students enrolled in the faculty of law at the centre of Milan and Piacenza. Regression has been run taking into account frailty.

Excluded categories: female, professional high-school, public high school, highest final grade at high school, college average mark equal to A-level, family size less than 4, richest families, living in the hometown.
The likelihood ratio test 446.83; 435.29 and 434.86 for students enrolled in Law at the centre of Milan and Piacenza suggests statistically significant frailty, so as expected unobserved heterogeneity has effects on model parameters.

Table 14 Seemingly unrelated regression of performance and speed among graduates

	College Final Grade		Elapsed Time to Degree	
Variable	**Coeff.**	**P-value**	**Coeff.**	**P-value**
Male	-.2429	0.003	-.0602	0.000
Age	-.3002	0.000	.7219	0.000
Sciences high school	.3712	0.150	.2312	0.000
Humanities high school	.4269	0.107	.2374	0.000
Other liceo	.1277	0.649	.2116	0.000
Teaching high school	-.4387	0.112	.2809	0.000
Technical high school	-.5692	0.027	.1779	0.000
Private high school	-.5253	0.000	-.0058	0.663
High school mark_90-99	-.6381	0.000	.0134	0.491
High school mark_80-89	-1.4822	0.000	-.0001	0.996
High school mark_70-79	-2.4817	0.000	-.0223	0.260
High school mark_60-69	-2.9678	0.000	-.0981	0.000
Education_MI	6.9131	0.000	-.2033	0.000
Education_BS	6.7803	0.000	-.2155	0.000
Economics_PC	-2.9352	0.000	.1379	0.997
Law_MI	-3.3954	0.000	.1379	0.000
Law_PC	-3.1008	0.000	.0983	0.006
Languages_MI	3.1876	0.000	.0033	0.853
Languages_BS	3.0193	0.000	-.0079	0.674
Banking Sciences_MI	-.5877	0.001	-.0019	0.937
Maths_BS	-1.0621	0.009	-.0206	0.722
Political Sciences_MI	6.2909	0.000	.2221	0.000
Uni average mark_A	-2.9364	0.000	.0940	0.020
Uni average mark_B	-8.9249	0.000	.1896	0.000
Uni average mark_C	-18.1191	0.000	.2928	0.000
Uni average mark_D	-24.9891	0.000	.2671	0.003
Number of components_4	-.0126	0.867	-.0159	0.142
Number of components_5+	.0787	0.471	-.0049	0.752
First quartile_income	-.0376	0.712	-.0410	0.005
Second quartile_income	-.0781	0.396	-.0115	0.263
Third quartile_income	.0646	0.602	.0158	0.374
Move-to-faculty	-.3579	0.006	.0828	0.000
Commuter	-.3579	0.305	-.0031	0.802
Constant	-.0898	0.000	-16.8107	0.000

Note: This table reports the effects of each explanatory variables on final grade obtained and times-to-degree.
Excluded categories: female, professional high-school, public high school, highest final grade at high school, college average mark equal to A-level, faculty of economics at the centre of Milan, family size less than 4, richest families, living in the hometown.

Table 15 Correlation Matrix of Residuals of SUREG regression

	Final Grade	**Length**
Final Grade	1.0000	
Length	-.0613	1.0000

Breusch-Pagan Test of Independence: $\chi^2 = 37.794$ P-value=0.000

Table 16 Determinants which affect withdrawal students' behaviour

	Iscritti		Dropouts		Stopouts	
Variable	**Coeff.**	**P-value**	**Coeff.**	**P-value**	**Coeff.**	**P-value**
Male	.2512	0.001	.1799	0.128	.3868	0.007
Age	-.0699	0.151	.2214	0.003	-.1240	0.192
Sciences high school	-.8541	0.000	-.6604	0.031	-1.2399	0.000
Humanities high school	-.6888	0.001	-.8897	0.006	-1.2941	0.000
Other liceo	-.8547	0.000	-.7047	0.035	-1.1371	0.003
Teaching high school	-.4186	0.063	-.1379	0.675	-.8145	0.038
Technical high school	-.5481	0.007	-.3548	0.235	-.7771	0.019
Private high school	.1139	0.200	.3128	0.017	.1560	0.357
High school mark_90-99	-.0409	0.808	.1547	0.584	.7904	0.086
High school mark_80-89	.3214	0.039	.5075	0.054	1.0141	0.022
High school mark_70-79	.7094	0.000	.8353	0.002	1.4030	0.001
High school mark_60-69	.7960	0.000	1.1351	0.000	1.7658	0.000
Education_MI	.2454	0.050	.0201	0.920	.2435	0.411
Education_BS	.2773	0.166	.0392	0.900	.3287	0.485
Economics_PC	-1.0977	0.000	-.8515	0.005	-.9765	0.045
Law_MI	.7949	0.000	.4474	0.006	1.8148	0.000
Law_PC	1.8355	0.039	2.5283	0.010	-30.0956	1.000
Languages_MI	-.6960	0.000	.5505	0.003	.4764	0.093
Languages_BS	1.1192	0.000	.2343	0.211	1.0119	0.000
Banking Sciences_MI	-.0672	0.677	-.1182	0.636	-.2036	0.607
Maths_BS	-.5684	0.317	-1.2889	0.243	-.29.2480	1.000
Political Sciences_MI	-.4459	0.008	-.5342	0.022	-.1327	0.664
Uni average mark_A	-.0889	0.826	-1.5973	0.000	16.5071	0.000
Uni average mark_B	.2303	0.556	-1.5438	0.000	16.7573	0.000
Uni average mark_C	1.1341	0.004	-.4172	0.266	18.0499	0.000
Uni average mark_D	2.6744	0.000	2.4074	0.000	20.7153	0.000
Number of components_4	-.3196	0.000	-.2776	0.012	-.0029	0.984
Number of components_5+	-.4053	0.000	-.1151	0.481	.1595	0.438
First quartile_income	.3449	0.001	.8835	0.000	.5475	0.003
Second quartile_income	.4288	0.000	.5441	0.000	.1605	0.370
Third quartile_income	.2502	0.029	.2663	0.162	.0683	0.761
Move-to-faculty	.1745	0.153	-.2003	0.323	.0589	0.803
Commuter	.0635	0.444	-.0145	0.905	.1198	0.460
Constant	-.3058	0.824	-8.0513	0.000	-18.3573	0.000
Cons	82.8405	0.034	134.7207	0.024	143.9833	0.046

Note: This table reports the effects of the explanatory variables on the exit events considered: still enrolled, graduate, dropout and stopout.

Excluded categories: female, professional high-school, public high school, highest final grade at high school, faculty of Economics at the centre of Milan, college average mark equal to A-level, family size less than 4, richest families, living in the hometown.