

University Dropout Rates: Factors and Motivations that Influence the Choices of the Students

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Abstract. One of the most significant indicators for assessing the quality of university study paths is the percentage of dropouts between the first and second year. The reference literature and the results that emerged from numerous specific investigations into the abandonment of the university system show that this is a crucial "joint" in the path of the students. The aim of this work is to analyze the evolution of the phenomenon in Italy, trying to bring out the factors and the motivations that influence the choices of the students, such as, for example, an incorrect orientation activity at the entrance, the need to quickly confront each other with the world of work, a supervening consciousness of not being able to deal with a specific course of study.

Keywords: Dropout rate · University study paths · Performance indicators · Student profiles

1 Introduction

To assess the quality of the study paths, one of the most significant indicators is the drop-out rate between the first and second year, understood as a percentage variation between the number of students enrolled in the second year and that of "pure" students in the previous year.

The reference literature on the topic and the results that emerged from numerous specific surveys on the abandonment of the university system show that this is a crucial "junction" in the path of the students, where the great majority of the dropouts or the decision to change the course of study is concentrated [1–3].

The motivations that push a student to abandon the studies can be different, starting from an incorrect orientation activity at the entrance, to the will or need to quickly confront the world of work, to an unexpected awareness of not being able to face a particular course of study rather than a different one. Indeed, abandonment is not

The contribution is the result of joint reflections by the authors, with the following contributions attributed to V. Ricci (Chaps. 4 and 5), to P. Perchinunno (Chaps. 1 and 2), and to F. Traetta (Chap. 3).

© Springer Nature Switzerland AG 2019
S. Misra et al. (Eds.): ICCSA 2019, LNCS 11622, pp. 78–92, 2019.
https://doi.org/10.1007/978-3-030-24305-0_7

necessarily a definitive condition; those who have abandoned can clearly decide to retrace their steps and resume their studies after a certain period of time; just as he may decide to enroll again in a different course of study at his university or at another university.

According to Eurostat data, in 2016 more than 3 million young Europeans gave up their degree. In the ranking of EU countries with the highest number of university dropouts, Eurostat assigns first place to France (with a third of the total number of study disclaimers), followed by Italy with a drop-out rate of 15.8% and third place from the United Kingdom, with 12%. According to Eurostat, various reasons motivate the renunciation of studies. For 24% of students, aged between 20 and 35, abandonment is motivated by the desire to enter the world of work.

International literature has long focused on these analyzes. In particular, Smith and Naylor [4] studied, with respect to the United Kingdom, the possible determinants of the risk of abandoning studies by a cohort of students, observing that the possible causes are: the pre-university education, the degree subject and characteristics of the Department. For Murray [5], domestic or financial problems also affect abandonment, while for other authors, the profile of the student who tends to abandon their studies is dependent only on the subject studied [6].

The objective of this work is to analyze the trend of drop-out rates in Italy, focusing specifically on the reality of the University of Bari A. Moro, following in detail the path of the students who leave and trying to find out what the factors that have the greatest influence on this choice through a logistic regression model and segmentation trees (classification and regression trees).

2 The Dropout Rate in Italy

2.1 The Dropout Rate Among First and Second Year

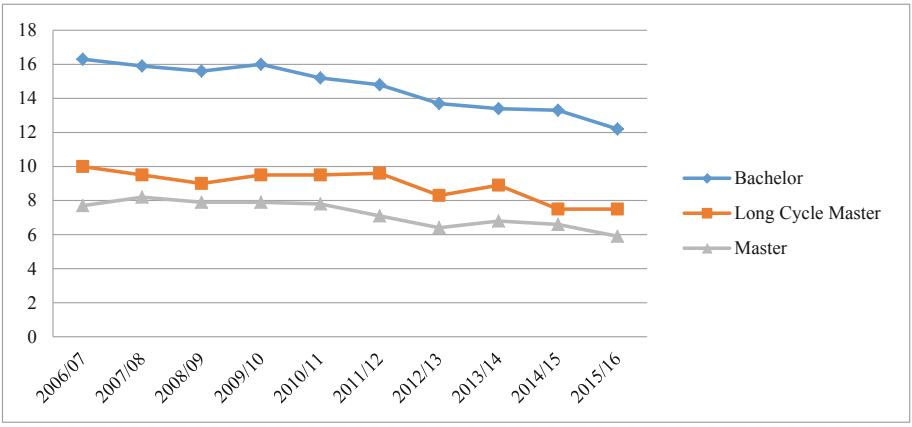
At the national aggregate level, the National Agency for the Evaluation of the University System (ANVUR) monitors the performance of the university system using the data of the National Student Registry (ANS) also in relation to the situation regarding dropouts.

In particular, the analysis focuses on the following indices:

1. University drop-out rate between the first and second year between the first and second year of the course (it concerns students who, in the transition to the second year, leave the system, no longer enrolled in any course);
2. Mobility between the first and second year of the course (course changes and university transfers): it is observed if the continuation of the studies, year after year, takes place in the same course of matriculation or in another course, in the same or in other university.

From the data of the last ANVUR 2018 Report on the State of the University System, it emerges that in the bachelor courses the percentage of dropouts between the first and second year in the 2015/16 cohort is 12.2%. Significantly lower drop-out rates are recorded Long Cycle Master courses (Bachelor + master), at 7.5% in the 2015/16 cohort, and in Master courses, which reach 5.9%.

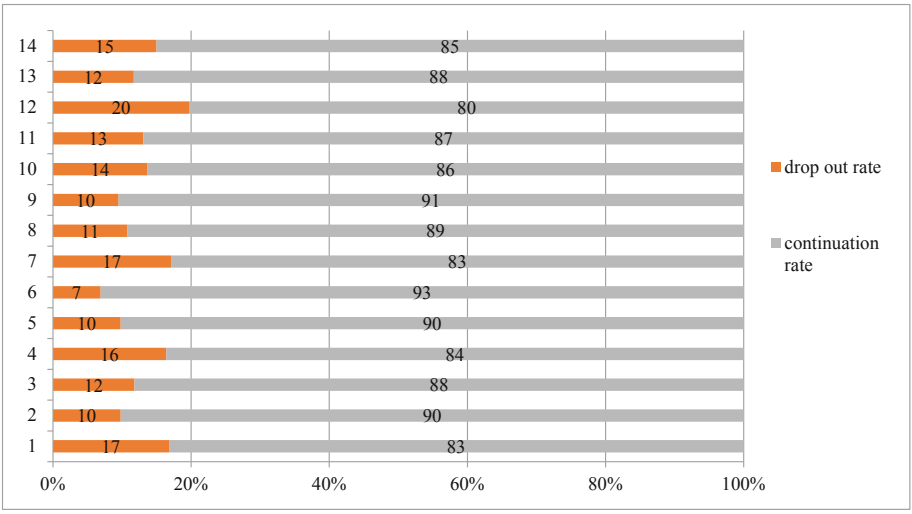
As shown in Fig. 1, the drop-out rates are decidedly down compared to the cohorts of the previous academic years, showing a reduction of 4% points for the bachelor degrees from 2006/07 to 2015/16 and 2% points for the others.



Source: National Register of Students of MIUR-Cineca.

Fig. 1. University dropout rate between I and II year, by type of course (cohorts 2006/07–2015/16)

The tendency to reduce the drop-out rates just highlighted also characterizes the data broken down by scientific area. Distinguishing the CUN course by area of study, a general improvement emerges in recent years; in the few cases where there is an increase in the drop-out rate it is limited and refers to relatively low initial levels.

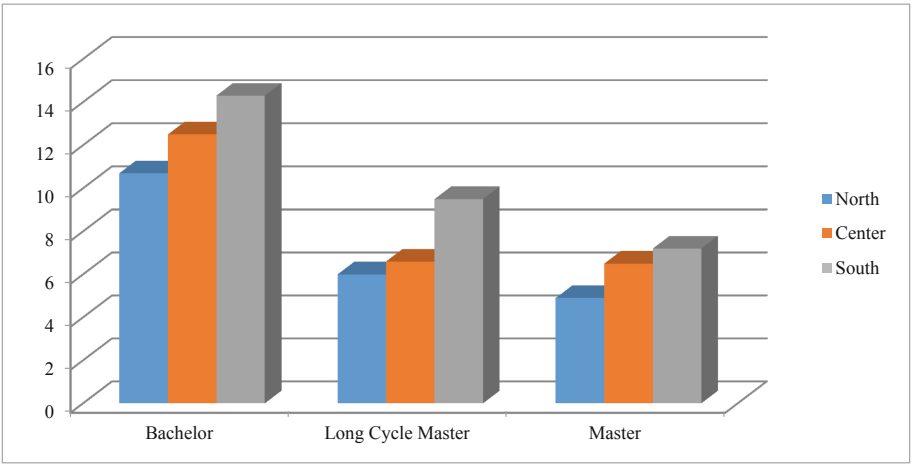


Source: National Register of Students of MIUR-Cineca.

Fig. 2. University dropout rate between I and II year, by CUN area (2015/16 cohort)

For the last cohort of enrolled analyzed (ay 2015/16), the dropout rate is relatively high in Area 12 (Legal Sciences) with 19.8%, and Area 7 (Agricultural and Veterinary Sciences) with 17.1% (Fig. 2).

Further differences are found at the geographical level with at least 3% points of difference between the universities of the North and those of the South; in fact, bachelor degrees have a drop-out rate of 14.3% in the South compared to 10.7% in the North. Same thing for those with a Long Cycle Master degree, with a rate ranging from 9.5% for South universities to 6% for North universities (Fig. 3).



Source: National Register of Students of MIUR-Cineca.

Fig. 3. University dropout rate between the first and second year, by geographical area (cohort 2015/16)

2.2 Mobility Between the First and Second Year of the Course

Considering those who continue the course of study it is however interesting to understand if the students between the first and second year continue to attend the same course (linear continuation) or change course, passing to another course in the same university or passing from one course to another university. In the bachelor and Long Cycle Master degrees the continuation involves 73.2% and 77.4% respectively, while the study course changes between I and II involve approximately 15% of the registered students (Table 1).

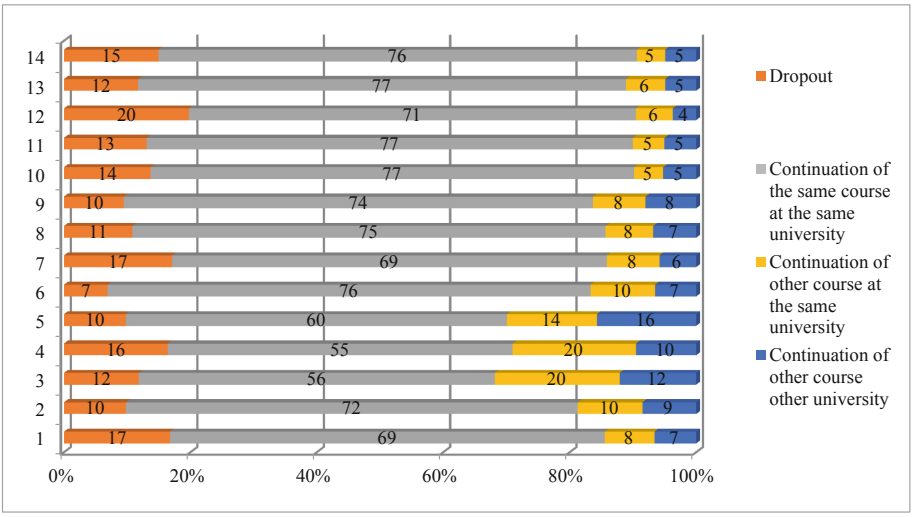
Source: our elaboration on National Register of Students of MIUR-Cineca.

Among those who change course at the Bachelor's and Long Cycle Master's degree, about half carry out a transfer to another university; in the bachelor degree the course changes within the same university prevail slightly (7.7%), while for the Long Cycle Master courses transfers to another university are more frequent (8.2%). In the Master's degree courses these latter values are much more contained and regard negligible percentages.

Table 1. Outcome in the transition between the first and second year of the course, by type of course and type of continuation

	Bachelor	Long Cycle Master	Master
Enrolled	239,727	34,908	108,647
Result between I and II year			
Dropout	12.2	7.4	6.2
Continuations	87.8	92.6	93.8
Continuations			
Same course	73.2	77.4	91.9
Other course	14.6	15.2	1.9
Other course continuations			
Same university	7.7	7.0	0.8
Other university	6.9	8.2	1.1

The analysis of the data disaggregated by scientific area CUN is interesting (Fig. 4). In the case of bachelor's degrees for the last cohort of matriculations analyzed (ay 2015/16), the percentage of those who continue in the other course but in the same university are high in particular in Areas 3 and 4 (both 20%). Those who instead move to another course and to another university are more present in Area 5 (16%) and Area 3 (12%). It is presumably largely students who failed to enter the academic year previous in a closed-study course they enrolled in a course in one of these areas, and then changed course in the second year.



Source: our elaboration on National Register of Students of MIUR-Cineca.

Fig. 4. Outcome in the transition between the first and second year of the course, for bachelor's degrees and Area CUN. Year 2015/16

In the master's and Long Cycle Master's courses the changes are much more contained and no significant differences emerge between the different CUN Areas.

Source: our elaboration on National Register of Students of MIUR-Cineca.

3 Statistical Analysis of the Dropout Rate of the Students of the University of Bari A. Moro

3.1 Sources and Methods

For a correct understanding of the phenomena covered by this treatment it is useful to analyze data's sources and the methodology related to the calculation of the indices.

The University of Bari Aldo Moro is one of the largest Italian universities, based in Puglia, Southern Italy. Currently the University of Bari is ranked tenth among the Italian Universities and second among the Southern Universities (after the Federico II University of Naples) for the number of student population. Data on the university student population were detected from the National Registry Students (ANS) in March 2019.

In particular, the indicators considered in this section are the following:

1. University drop-out rate between the first and second year of the course (it concerns students who, in the transition to the second year, leave the University of Bari, being no longer enrolled in any course of the same);

2. Mobility between the first and second year of the course (course changes): it is observed if the continuation of the studies, year after year, takes place in the same course of matriculation or in another course, in the same class of degree or in another class.

Therefore it is necessary to specify that in this paragraph the university dropout rate refers to those who do not enroll in the second year in the same university thus including not only those who leave their university studies, even those who move to another university. Therefore they must not be compared with the university dropout rates of the previous paragraph but with the sum of the dropouts plus transfers to another university.

In the last academic years the university population amounted to around 45,000 units; the students enrolled in the 2015/16 academic year are approximately 11,000 and refer to Bachelor's, Long Cycle Master's and Master's degree courses.

3.2 University Dropout Rates Between I and II Year

Our analysis refers only to the university dropouts between the first and second year of the bachelor's and Long Cycle Master's degrees, as the abandonment of only the master's degrees concern negligible percentage of students. Moreover, as already mentioned, the drop-out rate between the 1st and 2nd year considered in this work refers to those who do not enroll in the same university, considering as abandonment even those who enroll in another university.

With regard to the dropout rate, there are clear differences between the different types of study course (Table 2). In fact, it differs by more than 5% points between bachelor's and Long Cycle Master's degrees (respectively 21.8% and 16.4%).

Quite high is the percentage of students who between the first and second year of study change course, especially with regard to those who change undergraduate classes (9.7% bachelor's and 11.6% Long Cycle Master's degree).

Table 2. Outcome in the transition between the first and second year of the course, by type of course and type of continuation of the enrolled students a.a. 2015/16

	Bachelor		Long Cycle Master		Total	
Continuations in the same course	3,924	65.8	964	69.8	4,888	66.5
Course changes between the 1st and 2nd year of the same class	158	2.7	31	2.2	189	2.6
Course changes between the first and second year of another class	579	9.7	160	11.6	739	10.1
Dropout between the first and second year and transfers to another University*	1,302	21.8	226	16.4	1,528	20.8
Enrolled total	**5,963**	**100.0**	**1,381**	**100.0**	**7,344**	**100.0**

* Students who have not renewed their enrollment for the academic year 2016/17 in the University of Bari.
Source: National Register of Students of MIUR-Cineca.

Analyzing the university drop-out rates of the bachelor's degrees for the scientific area of the course of study (CUN area), it emerges as for the cohort of matriculations analyzed (academic year 2015/16), the percentage of dropouts is relatively high in Area 04 (Sciences of Earth) with 39.5% and Area 12 (Legal Sciences) with 36.5% of dropouts. This latter figure appears to be in line with what has been analyzed at national level (Table 3).

Even for Long Cycle Master's degrees (Table 4) the highest percentages of drop-out rates per CUN area are found in Area 12 (Legal Sciences) with 20.7% drop-outs and in Area 07 (agricultural sciences and veterinary) with 20%.

In the specific case of study it appears to analyze also the variation of the abandonment rate according to other explanatory variables such as:

- gender (male or female);
- type of secondary school diploma (high school or vocational school);
- diploma grade (from 60 to 100 cents).
- number of formative credits (credit iformativi universitari, CFU) achieved in 2016.

The influence of the sex variable on the university dropout rate study path is interesting. From the data analyzed on the 2015/16 pure enrollment cohort at the University of Bari, it emerges that men are more likely to abandon the path undertaken with differences of more than 5% points (Fig. 5). In fact, as far as bachelor's degrees are concerned, we will have 25.8% of male students and 19% of females, while for Long Cycle Master's degrees we will have 19.1% for males and 14.8% for women.

Table 3. Outcome in the transition between the first and second year of the course, for bachelor's degrees and Area CUN. Year 2015/16

CUNArea	Dropout	Course changes in the same class	Course changes with another class
01 - Mathematical and computer science	22.8	2.8	5.1
02 - Physical sciences	27.3	3.0	15.2
03 - Chemical sciences	17.7	0.0	37.2
04 - Earth Sciences	39.5	1.4	26.2
05 - Biological sciences	18.8	11.3	25.9
06 - Medical sciences	6.6	4.7	15.7
07 - Agricultural and veterinary sciences	28.4	8.5	12.2
10 - Antiquity, philological-literary and historical-artistic sciences	21.3	1.4	5.0
11 - Historical, philosophical, pedagogical and psychological sciences	13.6	0.4	4.8
12 - Legal sciences	36.5	1.7	7.8
13 - Economics and statistics	25.2	1.0	4.3
14 - Political and social sciences	24.7	0.2	7.3
Total	**21.8**	**2.7**	**9.7**

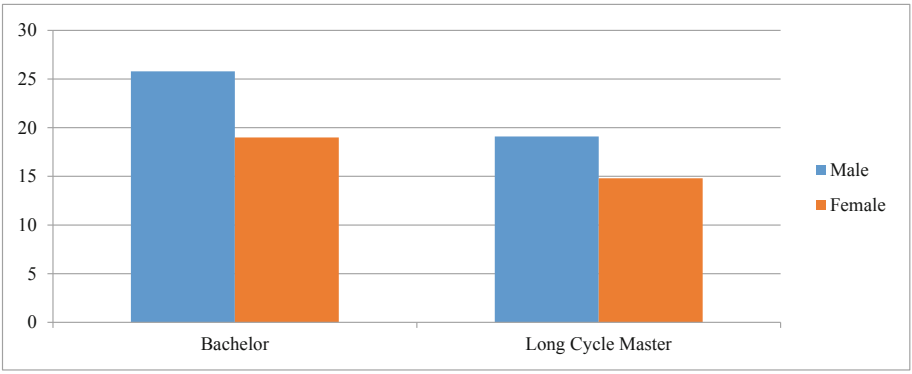
Source: National Register of Students of MIUR-Cineca.

The type of high school diploma also influences the drop-out rates (Fig. 6): those who leave the studies come mainly from professional Institutes (35% Bachelor and 48% Long Cycle Master) and technical Institutes (respectively 26.7% and 35, 3%).

Table 4. Result of transition between the first and second year of the course, for Long Cycle Master's degrees and Area CUN. Year 2015/16

CUNArea	Dropout	Course changes in the same class	Course changes with another class
03 - Chemical sciences	12.5	0.0	12.5
05 - Biological sciences	16.3	6.0	32.1
06 - Medical sciences	2.3	1.7	0.6
07 - Agricultural and veterinary sciences	20.0	0.0	13.3
11 - Historical, philosophical, pedagogical and psychological sciences	1.6	0.0	3.3
12 - Legal science	20.7	0.9	5.4
Total	**16.4**	**2.2**	**11.6**

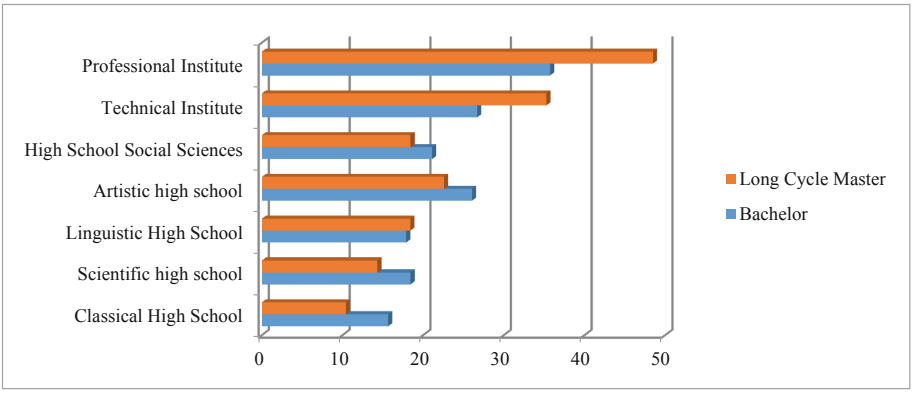
Source: National Register of Students of MIUR-Cineca.



Source: National Register of Students of MIUR-Cineca.

Fig. 5. Dropout rate between the first and second year for the course of study and gender

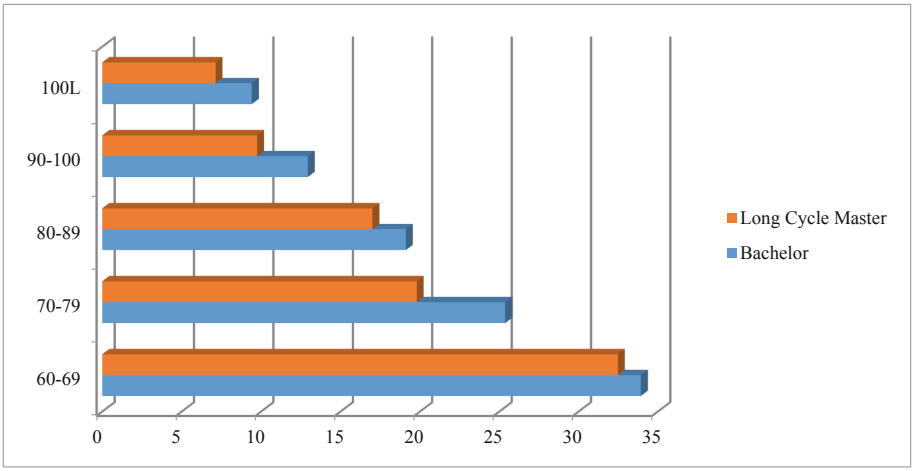
Even more evident is the link between the diploma grade and the drop-out rate (Fig. 7): in fact, the lower the diploma grade, the more the drop-out rate increases (going from 8% for 100 and praise) to 33% for the class of vote below 69/100).



Source: National Register of Students of MIUR-Cineca.

Fig. 6. Drop-out rate between the first and second year for high school diploma and study course

Table 5 shows that students achieving less than 12 CFU in the first year of staying at university have a drop out rate of 61.7% (54.1% for long cycle master and 63% for bachelor), while those having more than 12 CFU present a very low risk of abandon, about 5%.



Source: National Register of Students of MIUR-Cineca.

Fig. 7. Drop-out rates between the I and II year high school graduation classes and study course

Table 5. Drop-out rates between the I and II year according CFU achieved in the first year of enrollment

CFU	Drop out
0–12	61.7
13–24	16.1
25–36	5.7
36–48	1.4
49–60	0,4
>60	0,4
Total	**21.8**

4 The Profiles of Students Who Drop Out

The risk of abandonment can be measured using qualitative variables, by constructing logit-type dependency models, in order to identify the most significant determinants of groups of students with a different potential risk of abandoning their studies.

Therefore, the logistic regression model was used to identify which variables, among those detected, most influence the risk of abandonment. The response variable "DROPOUT" is of dichotomous type, equal to 1 if the student has abandoned and to 0 otherwise. The regressors introduced in the model are those reported in Table 6.

The AREA variable distinguishes the medical-scientific area courses from the socio-humanistic area, DIPLOMA the type of diploma achieved by the student, depending on whether he is of high school or other type, the DEGREE variable distinguishes the type of university path undertaken (Bachelor's or Long Cycle Master's degree). The CREDITS

Table 6. Variables used in logistic regression

Variable	Values
AREA	1 = scientific, health; 0 = social, humanistic
AGE	1 = M; 0 = F
GENDER	1 = classical/scientific high school; 0 = other diploma
DIPLOMA	1 = Bachelor; 0 = Long Cycle Master courses
DEGREE	Graduation Rate in cents
SCORE_DIPLOMA	Age in years
CREDITS	Formative credits achieved in 2016

variable measures the formative credits (CFU) achieved by students in year 2016. The model to be estimated is the following:

$$logit(\pi_i) = \log\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_{0+}\beta_1 AREA_i + \beta_1 GENDER_i + \beta_2 DIPLOMA + \beta_3 DEGREE_i + \beta_4 SCORE_DIPLOMA_i + \beta_5 AGE_i + \beta_6 CREDITS_i$$

Where $\pi_i = Prob(DROPOUT = 1|\boldsymbol{X})$ and X is the vector of the regressors and indicates the probability of abandonment. The software R was used to estimate the model parameters and the results are presented in Table 7.

Table 7. Estimate of the logit model parameters

Covariate	Estimate	Std. Error	Z value	Pr(>|z|)	Sig.
(Intercept)	−0.500116	0.407417	−1.228	0.21962	
AREA	−0.384218	0.083418	−4.606	4.11E−06	***
AGE	0.031005	0.012125	2.557	0.01056	*
GENDER	0.337606	0.081022	4.167	3.09E−05	***
DIPLOMA	−0.217468	0.082036	−2.651	0.00803	**
DEGREE	0.115641	0.107503	1.076	0.28206	
SCORE_DIPLOMA	0.010002	0.003642	2.746	0.00603	**
CREDITS	−0.127246	0.003477	−36.596	<2,00E−16	***

Sig. codes: 0 '***' 0,001 '**' 0,01 '*' 0,05 ',' 0,1 '' 1

From the estimation of the parameters of the proposed model it emerges how the risk of dropout has a very significant influence in the order: CREDITS, AREA, GENDER, SCORE_DIPLOMA and DIPLOMA. In particular, we have that the probability of abounding in the examined collective decreases with the increase of the diploma grade and the amount of credits achieved, the same increases among those who have attended a higher secondary education institution other than high school and among male students. The contribution in explanatory terms of the other AGE

regressors does not seem rather important (p-value = 0.01056) and above all DEGREE; we can conclude that the age has a fairly small influence, while there are important differences in the drop-out rate between the different areas to which the study courses are linked and the different types of them. The most important covariate seems to be CREDITS, meaning that students which pass exams during their first year of enrollment have a very small probability to abandon the university, while inactive students have a serious risk of dropping out. The results obtained on the examined collective appear to be in line with those of other studies of the same genus [7]. We point out that the covariate CREDITS can be measured only a posteriori, if the logistic regression would be used a priori to predict and measure for each student his own risk of drop out this variable can't be employed, an only the other variables in Table 5 have to be used in prediction. For this reason, we propose also an alternative model, excluding the covariate CREDITS and the results are presented in Table 8.

Table 8. Estimate of the logit model parameters (excluding CREDITS covariate)

Covariate	Estimate	Std. error	Z value	Pr(>|z|)	Sig.
(Intercept)	1,5261	0,3051	5,003	5,65E−07	***
AREA	−0,0432	0,0635	−0,681	0,496114	
AGE	0,0151	0,0083	1,814	0,069627	.
GENDER	0,2381	0,0622	3,829	0,000128	***
DIPLOMA	−0,5290	0,0631	−8,386	<2,00E−16	***
DEGREE	0,0609	0,0839	0,726	0,467558	
SCORE_DIPLOMA	−0,0382	0,0027	−14,154	<2,00E−16	***

Sig. codes: 0 '***' 0,001 '**' 0,01 '*' 0,05 ',' 0,1 '' 1

Excluding CREDITS changes something in estimates of logistic model parameters: AREA become no significative, AGE lost part of its significativeness, while DIPLOMA and SCORE_DIPLOMA increases their influence in the drop out risk. The pseudo R^2 falls from 0.44 to 0.05.

Another statistical technique used in the literature for the study of abandonment risk is the segmentation trees (CRT = classification and regression trees) [8]; is a methodology having the objective of obtaining a segmentation of a set of statistical units by identifying rules or paths that exploit the relationship existing between a class of belonging and the variables detected for each unit. This tool also makes it possible to identify the profile of the subjects most at risk of drop outs. Also in this case the R software was used for processing. The most important variables for segmentation purposes were CREDITS, AREA, DIPLOMA and GENDER, as already emerged from the logistic regression. Hierarchical segmentation is shown in Fig. 8. The first discriminating variable is the number of credits achieved during the first year of enrollment grade: the dropout rate is reduced to 5% among those who have achieved more than 12 CFU, while it is very high (63%) in the cluster of those that have achieved less than the threshold identified by the statistical software. Within this group, the second discriminating variable is linked to the area of the course: students enrolled in clinical

area have a smaller drop out rate (38.2%), while those enrolled in social area register the highest rate (70%). In this cluster, those who have achieved a non-high school maturity the drop-out rate is 74.6% with a significative difference according to the gender (78.7% male vs 71.5% female).

Using the information obtained from the CRT and those obtained with the exploratory analysis and logistic regression in the preceding paragraphs, we can affirm that in the cohort of the pure registrations of the University of Bari in the academic year 2015-16 the subjects at greatest risk of abandonment were male students, with a maturity of non-high school classical or scientific (technical, professional, master's degree, linguistic, artistic) and above all with less than 12 CFU achieved during the first year on staying at university. The results obtained with the CRT present many points of contact with a previous study conducted always among the matriculated students of the University of Bari who used segmentation trees [9].

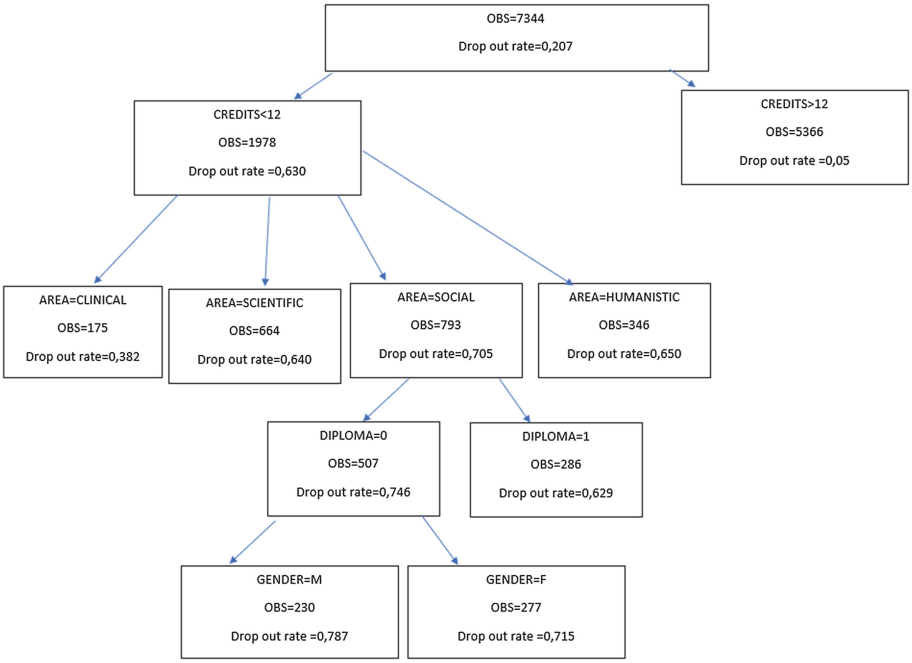


Fig. 8. Tree of classification of the risk of dropout in the cohort of students enrolled in the academic year 2015–16

5 Final Remarks

The abandonment of studies by a considerable number of students has long been indicated as one of the main "pathologies" of the Italian higher education system. The objective of reducing the size of the phenomenon and its negative impact on the productivity of the system and on the profitability of the investment in education by the

public sector and private individuals (students and their families) is one of the qualifying elements of the reform of the educational offer and, more generally, of system reforms carried out in Italy since the 2000s.

The literature shows that the main motivation for abandonment is failure in studies, with the consequent fall in individual motivation and loss of confidence in personal abilities. Other negative circumstances are the discontinuity of the training path and the non-frequency of places of study, which can reduce the possibility of mobilizing resources and devising strategies to combat difficulties and delays.

The analysis carried out on the students of the University of Bari Aldo Moro indicates that the risk of leaving school is greater for inactive (less than 12 CFU achieved), male students, with non-brilliant scholastic study paths (grade of maturity lower than 70/100) and that come mainly from professional or technical institutes. Preparation gaps, insufficient knowledge of the university environment, poor mastery of effective study methodologies are in fact elements that can negatively affect students' careers.

It is advisable to adequately monitor these conditions both at entry and during the course of studies, especially in their initial phase which is strategic to define the chances of success or failure. The University of Bari has launched numerous initiatives to reduce the drop-out rate and course changes in the transition between the first and second year, both in the phase of orientation at the entrance, with initiatives aimed at students of the 4th and 5th years of middle school superior (Open Day, Week of orientation and awareness orientation, etc.), both with tutoring activities in itinere, addressed to students of the first year of the course, supported by teaching tutors.

However, the difficult conditions of the labor market, which may also have a direct negative influence on enrollment and continuation of studies, particularly on young people facing difficult individual or family economic conditions, which can make the choices forced to renounce pursuing one's own training project.

Ultimately, therefore, guidance, counseling and possibly support at the entrance appear essential, as well as accompanying and support interventions during the studies, through tutoring services and other tailor-made interventions aimed at reducing the rate of university dropout. However, financial support (scholarships and accommodation for students in poor economic conditions) is also necessary to minimize the number of cases of study interruption.

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