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## Job Opportunities and Academic Dropout: the Case of the University of Trieste

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### Abstract

We analyze the factors influencing dropout, defined as not enrolling in the second year of the three years bachelor programs at the University of Trieste. We consider 23,333 undergraduate students available from the University of Trieste records and enrolled in the first year from 2003 to 2010.

The probability of dropout is modeled assessing the impact of individual and university characteristics and job placement, including their interactions. Our estimates highlight that all these dimensions are influencing the outcome. With respect to the existing literature we aim at exploring a wider set of possible covariates. We employ the random lasso procedure in order to keep into account the uncertainty due to model selection, which is substantial because of the relatively high number of potential explanatory variables involved.

We find, among the other results, that exists a positive effect on the probability of retention of working in the second year of the bachelor program and a negative effect on dropout.

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### 1. Introduction

The matter of withdrawal from Italian universities is rather relevant because of the persistence of low graduation rate compared to the average of the OECD countries (OECD, 2013). In addition, the larger part of dropout occurs at the end of first year after enrollment, indicating a probable misleading academic choice. The various factors related to the dropout have been considered in the Italian and international literatures. To infer the differences in likelihood of dropping out, both the socioeconomic and educational backgrounds, the university performance and the labour market conditions are investigated.

Attempting to estimate the causes of university retention, several authors have noticed that the academic failure is affected by the educational background along with some personal characteristics of the student (Montmarquette et al., 2001; Byrne and Flood, 2008; Powdthavee and Vignoles, 2009). The Italian literature on this issue has only recently developed using administrative data (Boero et al., 2005; Di Pietro and Cutillo, 2008; Belloc et al., 2011). In

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fact, dealing with Italian students dropout, the main problem concerns data availability, because consistent national databases with full individual student records do not exist. Our paper will carry on the utilisation of administrative individual data and perform an improvement in the measure of dropout risk, introducing an individual measure of occupation status. In our analysis as in most of the literature, university dropout is measured by means of a binary variable indicating retention versus dropout.

Researches based on individual data indicate that socioeconomic and educational backgrounds affect the decision to enroll at university and, conditional on enrollment, students with better preparedness are less likely to dropout. In accordance with this literature, Di Pietro and Cutillo (2008) employ a bivariate probit model to predict the university participation of a representative sample of high school graduates surveyed 3 years after the conclusion of their studies. They confirm, in line with Cappellari and Lucifora (2009), that students with good high school performance and whose parents hold a degree, are less likely to withdraw. As regards the score obtained at the end of high school, Boero et al. (2005) estimate a probit model using administrative data on students of Cagliari and Viterbo universities and they find, not surprisingly, that higher marks influence negatively the dropout probability. The quality of high school is also considered by Belloc et al. (2011) who analyse students enrolled at Sapienza University of Rome. They employ a multinomial model taking into account the different causes of dropping out during the three years bachelor program (dropout, change faculty, change university) and confirm the reduction effect on dropping out of high final mark of diploma. They notice a mixed effect of the different types of diploma and consider also a mark-type of diploma interaction. Moreover, the low university performance of the students is positively related with both withdrawal and changing faculty or university. Smith and Naylor (2001) include in their analysis the level of unemployment rate in the country of prior residence of undergraduate students in the UK universities. Using a binomial probit model they find that, for both male and female students, the dropout probability is positively affected by labour market conditions, and particularly by unemployment in the country of prior residence.

The aim of this paper is to investigate which factors are related to the probability of dropping out at the end of the first year, considering the individual and social characteristics of the students and their occupation state in the Friuli Venezia Giulia (FVG) region. We are able to investigate such an effect thanks to the availability of the individual data on university-to-work transitions in the labour market of the FVG region. In order to discover the existing relationships between the withdrawal likelihood and the covariates, we introduce different variable selection techniques.

It is rather common in published statistical analysis trying to predict dropout decisions to estimate a model with a fixed (and relatively limited) set of covariates, drawing conclusions based on their significance or non significance in statistical terms. We take a different approach on this respect in that we widen the set of possible covariates substantially (by considering transformations of the original variables as well as numerous interactions) and try to discern which ones are more relevant to predict the phenomenon. The use of random lasso mitigates the risk of finding spurious relationships.

In particular the random lasso procedure gives a measure of relevance for each variable which is obviously less clear cut but also more informative than the mere inclusion/exclusion of the variable itself as in the traditional methods. Moreover it allows to evaluate the uncertainty of the estimated coefficients keeping into account the uncertainty due to model selection.

As a secondary outcome of our paper, we consider three different variable selection mechanisms, in order to identify the most useful and predicting ones. As noted by Wang et al. (2011) variable selection has been studied extensively in the literature (see i.e. Tibshirani (1996); Zou and Hastie (2005)), whereas the lasso method proposed by Tibshirani (1996) has gained much attention in recent years. For the purpose of our estimates, we compare a standard AIC stepwise selection with the lasso and random lasso.

The plan of the paper is as follows. Section 2 describes the sample selection and the relevant variables for the analysis; section 3 presents the statistical model specification. Empirical results and conclusions are detailed in section 4 and 5, respectively.

## 2. Data

The empirical analysis is based upon a data set obtained by matching administrative data of the University of Trieste with data from the job market Agency of the FVG Region, concerning students who have entered the university for the first time in academic years 2003/04 to 2010/11. 23,333 students enrolled in 12 faculties are considered, of which

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