PROPENSITY TOWARDS MASTER'S DEGREE: CHOICES OF NORTHERN STUDENTS AFTER BAS?

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ABSTRACT: The study aims to explore northern students' choices after Bachelor's degree, focusing on which individual and contextual factors affect the likelihood to continue studying at MAs. The study is population-based, and the used dataset is extracted from the Italian Ministry of University's administrative databases. Students' characteristics are used to study the probability of enrolling in a Master's degree by generalized linear mixed models. Model estimation results can be used to predict the probability of continuing the studies for students at first enrolment and update them during their studies. From the university's point of view, this can represent an essential tool for monitoring the students' careers.

KEYWORDS: Enrollment at MAs, GLMM models, Northern students' mobility', Spatial and contextual effects.

1 Introduction and aims

In the last decades, the literature on educational mobility at national (Barriolu-engo & Flisi, 2017) and international (Van Bouwel & Veugelers, 2013) levels has grown in importance. In the Italian context, much interest has been set on the South–to–North flows at first university enrollment (see, for instance, Attanasio *et al.*, 2020). Furthermore, the multi-cycle organization, based on a 3-years first-cycle degree (Bachelor's degree) and a 2-years second-cycle degree (Master's degree), offers the opportunity to examine further aspects of the students' training paths and study the transition between consecutive levels of the academic studies (Mollica & Petrella, 2017). This study aims to disentangle individual and contextual factors' role in the northern Italian students' behavior after the first level qualification. Besides the classical predictors of academic outcomes, particular attention is devoted to aspects of students' paths, trying to answer the following questions: Do the context of origin and the university of bachelor degree affect the choice of transition? Do stayers and movers at first-

level careers show a different propensity to enroll on a master's programme? Which is the trend of Northern students' enrollment in Master programmes?

The study is structured as follows. Section 2 is devoted to the data and methods description. Model results and discussion are reported in Section 3.

2   Data and Methods

The study uses a cohort-based dataset collected using the Italian Ministry of University's administrative databases (Mobysu.it, 2016, update 2022). The analysis regards the cohorts of students who reached the Bachelor's degree in the academic years 2012/13 - 2016/17, which allow observing the Bachelor (BA) to Master (MS) transition. Therefore, we focus on BA students who attended a high school in northern Italian regions, and we exclude students enrolled in medicine, veterinary, or other 5-year courses. Furthermore, students enrolled in health professions and engineering courses are excluded from the analysis because of their extremely low and high enrolling rates, respectively.

The first step in data analysis is based on simple descriptive statistics. The selected database considers students enrolled in 80 universities during the Bachelor's course (mostly in northern universities $\sim 98.2\%$). The number of Northern students enrolled at MS degrees increased by 76.4% in the period, with great heterogeneity across high school regions (from 45% of Trentino Alto Adige (TAA) to 100% of Liguria). Considering the Northern regions of BA, the relative increase in MS students ranges from 58% of TAA to 111% of Veneto. However, this increase in MS students is mainly due to the growth of students entering the university's first-level programmes. As a result, the transition rates from BA to MS decreased in the period. Figure 1 details the transition rates for students who obtained the BA degree in 2016/17, distinguished by individual and contextual factors. Flows between categories visually highlight the rates of MS enrolling students belonging to the two specific categories of adjacent factors. At the same time, the associated white background labels refer to the enrolling rates conditioned on the flow. Blue background labels, instead, report, from top to bottom row: the category name, its proportion to the whole population and the marginal enrolling rate in that specific category. For example, it highlights the effect of the interaction between the field of study and degree mark, showing that scientific and economic-related graduates display higher enrolling rates, 83.7% and 59.7%, respectively, compared to the average in the mark range (100,109], 66.4%. Briefly, the highest rates of transition in the 16/17 cohort are registered for movers males (62.7%), with BA degree in fields "math-bio" or "other" (75.1% and 77.3%, respectively), with

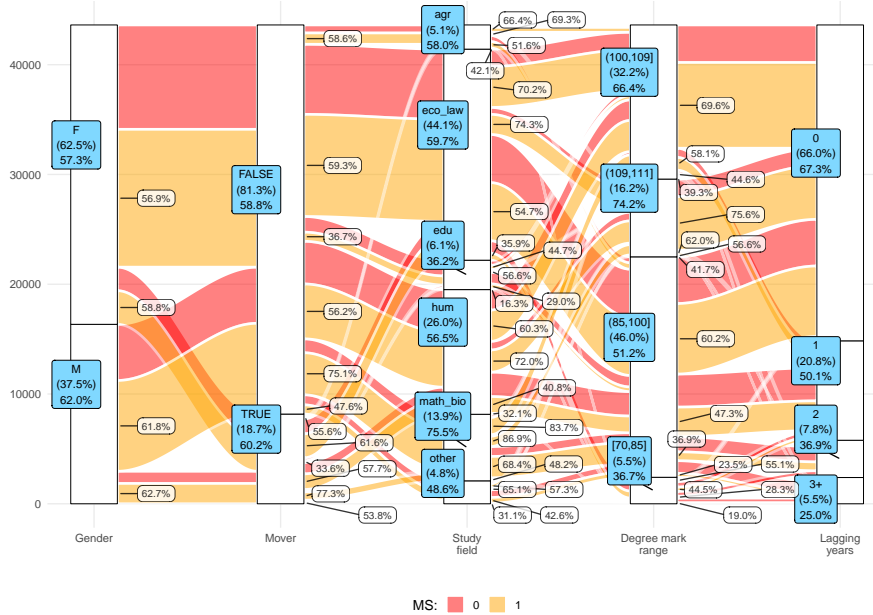BA degree mark > 109 and a regular duration of studies at BA.

Figure 1. *Rates of transition to MS of students with BA degree in a.a. 2016/17 by Gender, mobility at BA level, the field of study at BA, degree mark at BA, duration of studies at BA.*

To in-depth study this phenomenon, we adopted a model-based approach. In particular, we compare several possible GLMM configurations with random intercept components on a 20-fold cross-validation run on the training data (70% of the available observations). The final model configuration is chosen by monitoring its goodness of fit, via AIC and BIC and its predictive performance, via AUC, on the 20 folds. The models are fitted in `R` with the `glmmTMB` package (Brooks *et al.*, 2017), which allows for the integration of random effects through Laplace approximation.

3 Model results and comments

The chosen model exhibits a cross-classified random intercept, with random components accounting for the high-school municipality and the BA university. Finally, the model is refitted on the whole training partition, obtaining a

predictive AUC on the test sample of the 73%, in line with the cross-validation results. Detailed model estimates are omitted for space reasons.

From an interpretation point of view, the model estimation represents a tool for monitoring the students' careers and predicting their transition behavior. The type of high school attended and the BA study field, as well as their interactions with the corresponding degree marks, emerge as very informative for the MS enrollment choice. Students from scientific fields and students with classic and scientific high school backgrounds are the most likely to further their university education. Furthermore, many individual-specific characteristics play a crucial role in explaining the probability of enrollment, among which the distance from the high-school municipality, as well as the age at graduation and the numbers of years enrolled, play a detrimental role. Finally, the model highlights a significant gender gap, with male students more likely to enrol on an MS. The temporal dimension of the phenomenon enters the model with a set of binary predictors encoding the academic years of reference. The estimates show a sharp drop in the enrollment probability from 2012/2013 to 2014/2015, followed by a softer decrease till 2016/2017.

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