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Dropout rates in Italian universities: a comparison of online and traditional universities

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Abstract In Italy, the establishment of online universities was formalized by the financial act of 2003. Nonetheless, there is still a gap in the academic literature concerning them. The common perception is that online universities have a lower reputation, attracting students primarily interested in obtaining a degree for public job applications. However, they also offer greater flexibility in time management and eliminate transfer and accommodation costs. To contribute to this debate, we use a propensity score matching procedure to compare dropout rates between cohorts of students enrolled in traditional and online Italian universities from 2010 to 2020.

Keywords: Higher education, online universities, academic outcomes, dropout rates

1. Introduction and theoretical background

In Italy, the establishment of online universities was formalized by the financial act of 2003. Consequently, 11 online universities were founded in a short period, leading the government to prohibit new accreditation by 2006. Despite this, over the last decade, the educational offerings of online universities have increased by 113%, and the number of enrolled students has grown by more than 400%. As a result, online students represent over 10% of the total number of university students in Italy [1]. Palmisano [2] notes that following the COVID-19 pandemic and the resulting cultural shift, the gap between traditional and online universities in terms of student demographics has narrowed. Previously, online universities were primarily characterized by the enrollment of older students who were already employed and seeking to graduate. However, over the past decade, Italian online universities have seen a decline of 20% in students over 31 years old, coupled with an increase of nearly 12% in students under 24 years old.

Despite the limited research on the efficacy and efficiency of online universities in Italy, international literature highlights several advantages of e-learning at the tertiary level. It offers a flexible educational environment at lower costs, enabling students who cannot afford traditional universities to enroll [3]. However, there are notable disadvantages, such as the costs of training instructors, feelings of isolation, and technological gaps [4].

Looking at the online students' perspective, Gillett-Swan [5] emphasizes that online students face barriers primarily related to isolation and difficulties with peer interactions. Online learners require a high degree of responsibility and time management [6]. While they generally possess strong skills in computer use, internet navigation, and communication, their learning abilities unrelated to technology tend to be lower [7]. Despite this evidence, academic literature often prioritizes assessing students' perceptions of online learning over its actual efficacy, finding that satisfaction and persistence in online learning are linked to teaching presence and meaningful, targeted teaching styles, as well as to perceived usefulness and ease of use [8, 9].

As previously mentioned, there is a gap in the academic literature concerning Italian online universities; however, a summary of the ongoing debate around this phenomenon can be outlined. For instance, Palmisano [2] argues that asynchronous teaching, coupled with a lack of human interaction, leads to a decline in academic performance in the short term. In contrast, Miccoli [10] contends that students in online universities differ from traditional students and require a distinct learning experience to thrive in the academic environment. Furthermore, Gavosto [11] highlights common perceptions surrounding online universities, such as the belief that grading is less rigorous and that these institutions have a lower reputation, attracting students primarily interested in obtaining a degree for public job applications. However, online universities also offer greater flexibility in time management and eliminate transfer and accommodation costs.

With respect to dropout rates, the literature has highlighted that online students may have a higher likelihood of dropping out due to factors such as screen fatigue, isolation, technological issues, and a lack of institutional support and social interaction [12, 13]. However, to the best of our knowledge, the differences between online and traditional students have not been explored, likely due to a lack of longitudinal data covering the entire academic career of students.

Therefore, we contribute to this debate by analyzing the differences in academic outcomes between students enrolled in Italian traditional and online universities focusing on students' dropout rates. In particular, we apply the propensity score matching approach to estimate the causal effect related to online universities on students' dropouts by reducing the selection bias related to students' enrollment choices and characteristics [14, 15].

2. Data and empirical framework

The analysis is based on the archive data from the MOBYSU.IT database, which includes detailed information on the careers and characteristics of all students enrolled for the first time in an Italian university between 2010 and 2020.¹

To compare students in online and traditional universities, we identify whether students' degree programs are provided by an online institution or a traditional university. Second, to analyze students' achievements, we define a dropout indicator that takes value 1 for those that are not observed in any Italian university during their second year of career. Finally, we retain in the database the covariates that may represent potential confounders in estimating the causal effects of attending an online university, such as students' sex, age at enrollment, macro area of residence (i.e. North, Center, and South & Islands), year of enrollment, high school curriculum (i.e. Humanistic Licei, Scientific Licei, Other Licei, Technical Schools, and Vocational Schools) and final mark.

¹The data used in this study have been processed in accordance with the research protocol for the study “*From high school to the job placement: analysis of university careers and university mobility from Southern to Northern Italy*” among the Ministry of University and Research, the Ministry of Education and Merit, the University of Palermo as the lead institution, and the INVALSI Institute. The reference researcher is Mariano Porcu.

To ensure comparability between students in traditional and online universities, we define the final data by applying a set of eligibility. Starting from 2,931,481 students, we retain in the data the degree programs offered by both online and traditional universities. Moreover, we drop information on students for whom we cannot identify the city of residence, the attended high school, and those who entered the higher education system with more than 81 CFUs.² Finally, we classify students according to their age at the time of enrollment in the university as regular or non-regular students. Regular students are those enrolled by the age of 19 years. They constitute the majority of first-year students and represent a 'standard' student profile. Non-regular students are those enrolled after the age of 19. They may be characterized by different characteristics with respect to regular students, especially regarding the proportion of workers among them. Indeed, working students may be more likely to enroll in an online university to benefit from their greater flexibility. However, especially in recent years, the data indicate an increase in the proportion of regular students among those that choose to enroll in online universities (from 64.1% in 2010 to 72.1% in 2022). Following this strategy, the final data includes 1,988,032 students, of which 73,082 have enrolled in an online university (18.5% of whom are regular), while 1,914,950 have enrolled in a traditional institution (76.1% of whom are regular).

To assess the effect of enrolling in an online university, we first need to consider the selection bias related to this choice. Similar to a clinical study, we define two groups: the treated (who is enrolled in an online university) and the controls (who is enrolled in a traditional university). In randomized studies, differences between treated and control groups can be interpreted as causal effects. In contrast, when subjects select their treatment, different outcomes may reflect substantial differences in the treated and control groups not traceable to the effects of treatment [15]. In this context, the propensity score matching (PSM) has been widely regarded as a useful tool i) to reduce selection bias by balancing the characteristics of the two groups and ii) to estimate treatment effects in observational studies where the assignment of treatment is not random. In this context, we first separate regular and non-regular students and, within each group, we use PSM to balance the differences between online and traditional students according to a set of covariates: sex, macroregion of residence, the high school diploma and final mark, and the year of first university enrollment. Online and traditional students are matched by employing the *nearest neighbor* method, which allows each treated student to be associated with the most similar control unit. After the matching procedure, all treated students were associated with a control, leading to a final dataset of 118,642 regular students and 26,934 non-regular students. Then, two logistic regression models are estimated on the matched dataset to evaluate the treatment effect on the choice to dropout in the transition from the first to the second year.

3. Preliminary results and conclusion

Figure 1 presents the standardized mean differences (SMD) for each variable before and after the matching procedure. For each covariate, the SMD quantifies the difference between the

²81 represent the 99th percentile of the distribution of the CFUs in the first year.

means of the two groups in terms of standard deviations. The results reveal a significant imbalance before the matching procedure in terms of high school outcomes, suggesting that these factors play a key role in the decision to enroll in an online university. Furthermore, the observed imbalance in the enrollment year reflects the recent surge in online university enrollments, particularly over the past few years.

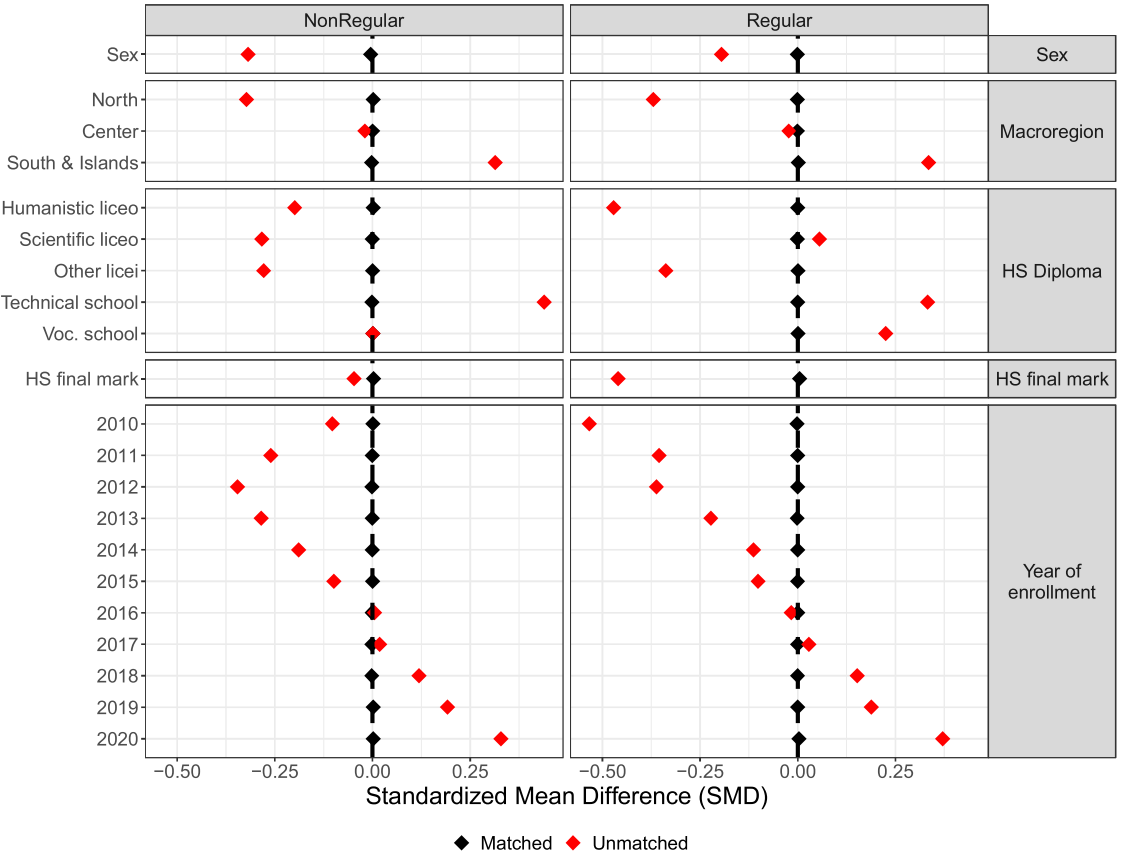


Figure 1: Loveplot: standardized mean differences before and after matching

Finally, we fit two logit models on the matched data to estimate the effect of attending an online university on the probability of dropping out in the transition between the first and second year for regular and non-regular students. Table 1 shows the results in terms of estimated probabilities.

On average non-regular students have an higher likelihood to dropout. When we look at the difference between online and traditional students, we notice that the results are different between the two groups. While online students have a higher probability to dropout among regular students, the same is not true when we consider non-regular students. Indeed, in this case, the dropout probability of treated students is lower than that of controls.

Therefore, our results indicate that students who tend to have difficulties in the educational system, may benefit from enrolling in online universities. A future step of our research will be to investigate this difference by accounting also for several potential confounders such as students' socioeconomic background and geographical position in terms of remoteness of

Table 1: Estimated probabilities of dropping out before and after the matching procedure.

	Regular		Non-regular	
Match	Online	Traditional	Online	Traditional
Matched	0,207	0,139	0,234	0,266
Unmatched	0,207	0,086	0,234	0,237

their residence area. Furthermore, the future steps of our research include several robustness checks and additional exploration of the results in terms of the heterogeneity of the effect based on students' characteristics, the field of study, and the cohort of enrollment.

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