GENDER DISPARITIES IN SCHOOL-TO-UNIVERSITY TRANSITION IN ITALY: THE ROLE PLAYED BY THE SOCIO-ECONOMIC CONDITION AND THE TYPE OF HIGH SCHOOL[1]

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Abstract. The issue of the gender gap in university enrolment is widely investigated, and it is acknowledged that the school-to-university transition tends to be higher for female students than for males. Gender inequalities in access to the higher education system could derive from the persistence and transmission of gender disparities relying on several factors; in particular, in this work, we intend to assess potential gender inequalities in the school-to-university transition, which could be moderated by different students' socioeconomic conditions or type of high school. Using the integration between two administrative data sources, the INVALSI database and the Anagrafe Nazionale Studenti (ANS) database, our final dataset comprises a total of 420,261 students of grade 13 who graduated in the school year 2018/2019, of which 215,565 are females (51.3%). Among those, 52.6% of all students enrolled in the following 2019/2020 academic year.
Our results suggest that the proportion of female students enrolling in university is consistently higher than that of male students, regardless of the type of diploma or the socioeconomic conditions of the family of origin. Nevertheless, the gender disparity in the school-to-university transition is more pronounced among students coming from technical and vocational high schools and among those with low/middle socioeconomic and cultural status, leaving male students with less prestigious backgrounds even further behind.

1. Introduction

The past few decades have constituted a golden era for Europe regarding the proliferation of individuals with university degrees. Two decades ago, in 2003, only 24.6% of Europeans between the ages of 25 and 34 possessed a tertiary education degree. However, by 2023, this value had risen to 43.1% (Eurostat, 2024). This marked increase offers a promising outlook for the future, showcasing a positive trend that underscores Europe's educational progress. Indeed, these data are often cited to highlight the progress the European Union is making in increasing the

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number of educated individuals, even though it has not yet achieved the strategic goal of 45% in all member states (Council of the European Union, 2021).

The benefits of a highly educated population are extensively documented in academic literature (Bynner *et al.*, 2002), which points to numerous advantages, including enhanced economic growth (Barro, 2013), increased innovation (Bartel and Lichtenberg, 1987), and greater social cohesion (Green and Preston, 2001). A population with higher educational attainment levels is generally better equipped to tackle complex global challenges, from technological advancements to environmental sustainability. This progress in education is often viewed as a crucial element in maintaining Europe's competitiveness on the worldwide stage.

However, it is crucial to note that the overall statistic of 43.1% masks significant disparities between and within countries. For instance, while some nations have surpassed the 45% target, others, such as Italy, lag significantly behind, creating a patchwork of educational attainment across the continent. Moreover, within countries, there are pronounced differences in educational attainment by gender, with women often having higher rates of university education than men, which can lead to new societal and economic dynamics. In Italy, 37.1% of women aged 25 to 34 have a university degree, while the percentage among men drops significantly to 24.4%. This difference (12.7%) is slightly higher than the European average of 11.2% (Eurostat, 2024).

The transition through the higher education system is an essential investment at the individual level, too, which may also highly favour social displacement for students from underrepresented groups (Briggs *et al.*, 2012). Nevertheless, recent research has highlighted that a general increase in educational attainment does not necessarily translate to equitable progress across all social groups (Breen *et al.*, 2010). Disparities based on gender, socioeconomic status, and geographic location remain pronounced, suggesting that while more people obtain degrees, the benefits are not evenly distributed.

Looking at socioeconomic status (SES), it is acknowledged that students from families with higher status have a greater likelihood of enrolling in university (Contini *et al.*, 2018), detecting more severe difficulties in transitioning for those students who come from low socioeconomic backgrounds and geographical areas where the public schools are not well resourced (McGhie, 2017). Nonetheless, Bletsas and Michell (2014) attribute such evidence to the existence of a perverse mechanism: the fact that low SES students are considered as lacking in motivation and preparation compared to their higher SES peers - even if they perform just as well when attending (see, among others: Bradley *et al.*, 2008; Kleemola *et al.*, 2023) - justifies public disinvestment for their educational environments, so that the risks of reproducing such a mechanism further increase. Low SES students in transition are the most affected by financial strain, time pressures, unclear expectations, low

confidence, preparedness, family support and aspirations. Nevertheless, they are also more likely to independently challenge the limitations of their identity and career path (Devlin and McKay, 2014).

Finally, among the critical factors affecting the school-to-university transition, the high school's curriculum also plays a role. For Italy, empirical research highlighted that the two curricula with the lowest rates of university enrolment are the technological and vocational tracks (Aina *et al.*, 2011; Contini *et al.*, 2018), where female students are typically underrepresented, as well as high SES students.

Our objective is to explore how the family socioeconomic background and the high school curriculum may moderate gender disparities affecting the individual propensity to enrol in the university. Gender can interact with family background and high school curriculum, potentially amplifying or reducing their effects. Moreover, concerning Italy, very few studies have addressed the topic of university enrolment by gender, being more concentrated on other issues about students' academic careers, such as the persisting existence of gender segregation across fields of studies (Triventi, 2010; Barone and Assirelli, 2020).

Previous empirical studies showed that also in the Italian context, women are less likely to leave school early, more resilient, more likely to enrol on university, and more likely to adopt effective coping strategies for adapting themselves during the transition through tertiary education (Borgna and Struffolino, 2017; Cabras and Mondo, 2018); at the same time, students from families with a higher socioeconomic background and students coming from lyceums have a greater likelihood of enrolling in university (Contini *et al.*, 2018). Still, it is not straightforward how the type of high school and the socioeconomic condition of the family of origin moderate the likelihood of university enrolment by gender. For this reason, we ask ourselves the following two research questions: to what extent does the relationship between gender and university enrolment differ according to the student's type of high school? Does the association between gender and university enrolment vary with the student's socioeconomic background?

2. Data and methods

2.1. Data

Our study examines gender differences in Italy's transition from high school to university. To do so, we draw upon two administrative data sources: the first, namely the Istituto Nazionale per la VALutazione del Sistema educativo di Istruzione e di formazione (INVALSI; in English: National Institute for the Evaluation of the Education and Training System) database, contains information about all students of

grade 13th in the school year 2018-2019 who took the INVALSI test and graduated in the same year in an upper secondary school located in the Italian territory; while the second is the Anagrafe Nazionale Studenti (ANS; in English: National Student Registry) database, which includes all students enrolled in an Italian university in the academic year 2019-2020, thus in the year following graduation.

By doing so, our dataset comprises 420,261 students in grade 13th, of which 215,565 are females (51.3%). University enrollees are 220,984 (52.6% of all students considered), and female students are 124,746 (56.5%).

2.2. Methods

As for the methodology, first, we considered a school-level indicator: the entry rate, computed as the ratio between the number of students who took the INVALSI test in a specific year and the number of students enrolling in university the following year. This indicator (referred hereafter to as the female/male entry rate) has been calculated separately for the female and male populations for the three school years available[2].

Second, to investigate whether and how the association between gender and university enrolment varies by type of high school and socioeconomic condition of the family of origin in Italy, we estimated multilevel logistic regression models for the school-to-university transition. The chosen model is the following:

$$\begin{aligned} logit\left(P_{enrol_{ij}}\right) = \quad & \beta_0 + \beta_1 Gender_{ij} + \sum_{q=2}^{Q} \delta_q D^{(q)}_{ESCSquartile_{ij}} + \\ & \sum_{c=2}^{C} \gamma_c D^{(c)}_{curriculum_j} + \sum_{q=2}^{Q} \eta_q Gender_{ij} D^{(q)}_{ESCSquartile_{ij}} + \\ & \sum_{c=2}^{C} \zeta_c Gender_{ij} D^{(c)}_{curriculum_j} + +\beta_2 Ita\_score_{ij} + \\ & \beta_3 Math\_score_{ij} + \sum_{m_v=2}^{M_v} \theta_{m_v} D^{(m_v)}_{v_{ij}} + \sum_{n_v=2}^{N_v} \vartheta_{n_v} D^{(n_v)}_{v_j} + u_{0j} \end{aligned} \tag{1}$$

This model posits that the probability of enrolling on the university of a student (the i^{th} student in j^{th} school) can be described as the effects of school-level and student-level covariates, as well as their interactions, and the effect of a residual error term of being in school j (u_{0j}). $D^{(q)}_{SESquartile_{ij}}$ represents a set of dummies for the categories q that the socioeconomic and cultural status (ESCS index) into quartiles can take for student *i* in school *j*; similarly, $D^{(c)}_{curriculum_j}$ represents a set of dummies, one for each category c that the curriculum variable can take for school j. In the

[2] The three available years are: scholastic year 2018/19, 2020/21, and 2021/22. In the subsequent analysis, the chosen model will be applied only to the first year due to numerous missing values for the control variables in the subsequent years.

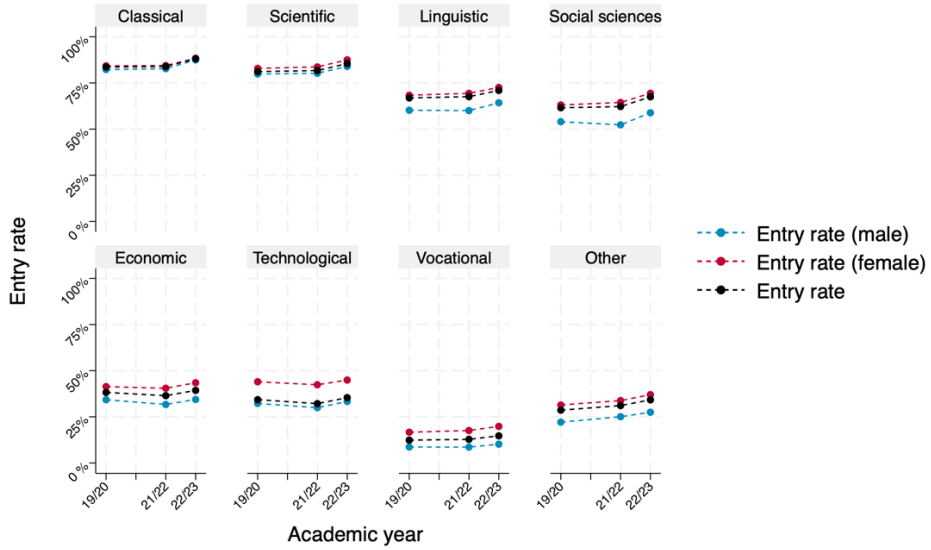
equation, we have also included the interaction between gender and ESCS quartile, as well as the interaction between gender and curriculum.

Finally, we considered four control variables (v) for student i in school j: scores on the INVALSI standardized tests in Italian and Maths (as continuous), migration background (native, first-generation immigrant, or second-generation immigrant), first-term grades in Mathematics and Italian (divided into four categories). Additionally, we included two control variables for school j: the macro area where the high school is located (North-West, North-East, Centre, South, and Islands) and whether the high school was private or public.

3. Results

In Figure 1, entry rates are presented by high school curricula, with the four different types of lyceums in the first row, and the technical and vocational curriculum in the second row.

Figure 1 - *Entry rate by high school curriculum.*



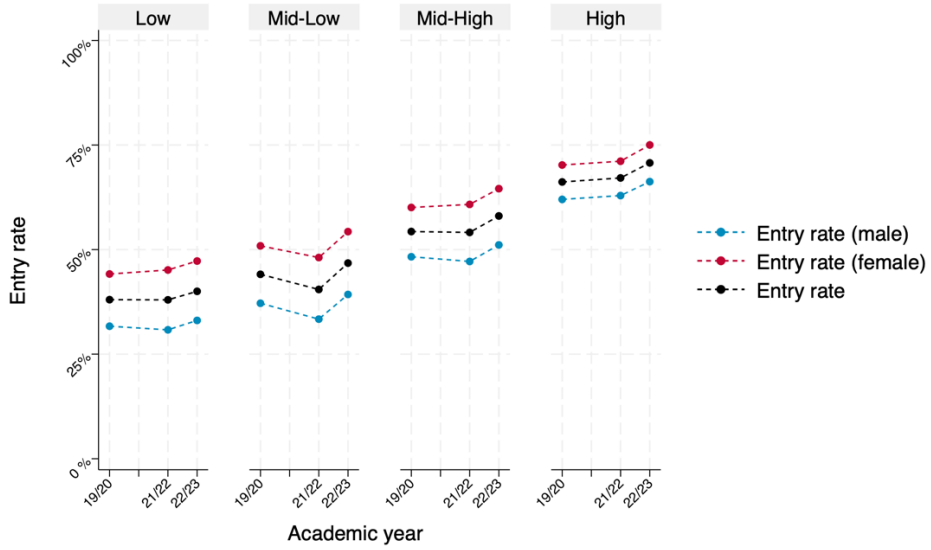
Note: own elaborations on INVALSI data and ANS data.

Regardless of the school curriculum, the percentage of female students enrolling in university is consistently higher than that of male students. This trend highlights a gender disparity in the school-to-university transition, with a prevalence of females

accessing higher education. Moreover, the entry rate varies considerably according to the school curriculum, ranging from a minimum in the Vocational track (13.3%) to a maximum in the Classical track (85.3%).

Figure 2 presents the entry rate values for the four quartiles based on the ESCS index, where "low" represents the lowest socioeconomic and cultural status, and "high" means the highest. Here, it is evident that the strong influence of the family's ESCS on students' likelihood of enrolling in university is evident: as the family ESCS rises, so does the entry rate. This gap is particularly striking when comparing the extreme quartiles, with students with the lowest ESCS having an entry rate roughly half of the entry rate observed for students with the highest ESCS (68.1%). This stark contrast highlights the crucial role that socioeconomic and cultural factors play in shaping educational outcomes and access to higher education opportunities.

Figure 2 - *Entry rate by ESCS.*

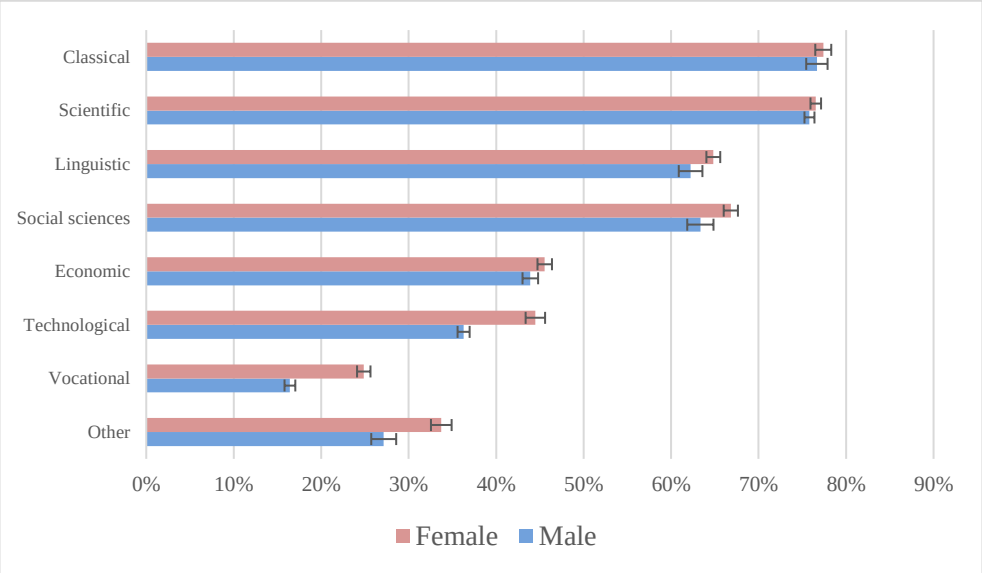


Note: own elaborations on INVALSI data and ANS data.

In the two following figures, predicted values for the probability of enrolling in university after graduation and deriving from the results of the logistic model (1) are presented by gender and high school curriculum (see Figure 3) and by gender and ESCS (see Figure 4), whereas in Table 1 odds ratios from the estimated model are reported. As expected, the highest probability of enrolling in university is for male and female students who come from a classical or a scientific track, showing at most

1.2 percentage points (p.p.) between the two genders in favour of females. For other types of lyceums (namely, linguistic and social sciences), differences in the probability of enrolment are still modest. On the contrary, female students are more likely to transition to university than their male counterparts coming from a technical or a vocational track, with the highest gap for the last type of high school curriculum (9.1 p.p. in favour of female students).

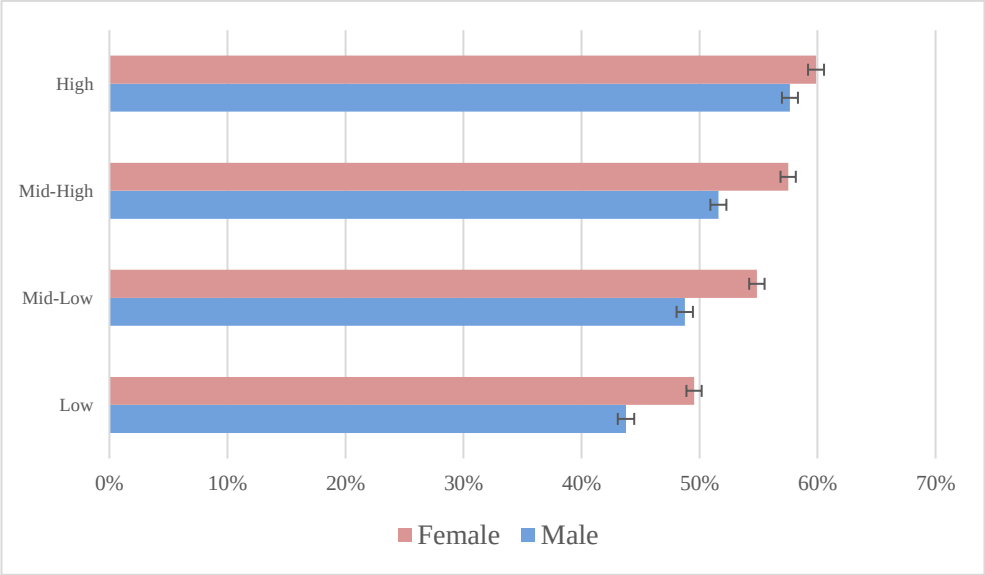
Figure 3 - *Predicted probability of enrolling to the university by gender and high school curriculum.*



Note: Control variables: high school macro area, student's migratory background, first-term grades in Maths and Italian, scores on the INVALSI tests in Maths and Italian, private/public high school.

Looking at the heterogeneity by socioeconomic and cultural background (see Figure 4), the gender gap in the predicted probability of transitioning to university is similar for the three groups of low, mid-low and mid-high ESCS students, who have a disparity in predicted likelihood in favour of female students around 4.2-4.6 p.p.; instead, the difference is reduced to 2.2 p.p. (nearly halved) among students with a high ESCS. Thus, once the student's socio-demographic characteristics and school career are controlled for, the gender gap is modest, concerning what is illustrated in Figure 2. Moreover, it is essential to note that the gaps between ESCS levels are much higher than within ESCS levels by gender.

Figure 4 - *Predicted probability of enrolling to the university by gender and ESCS.*



Note: Control variables: high school macro area, student's migratory background, first-term grades in Maths and Italian, scores on the INVALSI tests in Maths and Italian, private/public high school.

4. Conclusions and discussion

In this work, we investigated the issue of the gender gap in university enrolment, in particular, assessing how potential gender inequalities in the school-to-university transition could be moderated by different students' socioeconomic conditions or types of diplomas.

We found that, regardless of the type of diploma or the socioeconomic conditions of the family of origin, the propensity of female students to enrol in university is consistently higher than that of male students, thus confirming a higher investment in the education of girls than boys across the different high school curricula and social strata. In particular, this universal advantage of girls across social strata highlights that the selection effect, which once led only girls from higher social classes to achieve higher education due to female emancipation that began in those classes, is no longer visible. Nevertheless, we found both horizontal heterogeneity among high school curricula and vertical heterogeneity among socioeconomic conditions of the family of origin.

Table 1 – *Model results of enrolling to the university by gender and ESCS (odds ratio).*

	OR	SE
Gender (base: Male)		
Female	1.075*	0.044
ESCS quartile (base: Low)		
Mid-Low	1.222***	0.020
Mid-High	1.370***	0.022
High	1.750***	0.030
Curriculum (base: Classical)		
Scientific	0.954	0.035
Linguistic	0.501***	0.022
Social sciences	0.526***	0.024
Economic	0.238***	0.009
Technological	0.173***	0.007
Vocational	0.060***	0.002
Other	0.113***	0.006
Gender × ESCS quartile		
Female × Mid-Low	1.013	0.022
Female × Mid-High	1.007	0.022
Female × High	0.869***	0.020
Gender × Curriculum		
Female × Scientific	0.999	0.041
Female × Linguistic	1.074	0.051
Female × Social sciences	1.119**	0.056
Female × Economic	1.026	0.044
Female × Technological	1.351***	0.060
Female × Vocational	1.616***	0.074
Female × Other	1.311***	0.070

Note: *** p<.01, ** p<.05, * p<.1. *Control variables: high school macro area, student's migratory background, first-term grades in Maths and Italian, scores on the INVALSI tests in Maths and Italian, private/public high school.*

The horizontal heterogeneity between the two genders in the attended high school is reflected in two points. First, we identified a very narrow gender gap in pathways where the transition to tertiary education is very high, e.g., classical and scientific tracks: in this case, the advantage in continuing studies is very similar between genders, given a student's social class and academic performance. For those high school tracks, continuing in higher education is very common, and most students who attend these schools decide very early (even if their decision may be revised) to enrol to university, irrespective of their gender. Second, we found a pronounced gender gap in pathways where the transition to tertiary education is low, like in technical and even more in vocational tracks, where the propensity to continue studies in higher education is more remarkable for girls. This striking gender gap may be partly explained by the persisting existence of gender segregation across fields of studies in Italy, which is already visible in technical and vocational

tracks (Triventi, 2010; Barone and Assirelli, 2020). Indeed, boys tend to be more inclined towards technical pathways that require more physical strength and offer better employment prospects in demand, supply, and salaries, such as in the industrial or IT sector. Conversely, girls tend to gravitate towards care-oriented pathways, with worse employment prospects in demand, supply, and salaries. Consequently, having a tertiary education degree can enhance girls' skills and their chances of better job opportunities in the labour market.

Regarding the vertical heterogeneity among socioeconomic classes, the gender gap is smaller in the highest social class than the others, thus reversing the selection effect favouring only high SES girls existing in the past. Nowadays, boys from higher social classes have more to gain from continuing their studies than boys from lower classes once their socio-demographic characteristics and school abilities are considered. Thus, whereas students from high social-class families continue their studies regardless of their abilities, students from low social-class families tend to drop out. In terms of mechanisms, this underscores the importance of social origin in transmitting socioeconomic advantages of the affluent classes and consolidating their original social position through education, acting equally across both genders.

To sum up, the gender disparity in the school-to-university transition is more pronounced among students coming from technical and mainly vocational high schools and among those with a mid or low socioeconomic and cultural status, leaving male students with less prestigious backgrounds even further behind in terms of tertiary education (and all the consequent impacts on employment prospects and earnings) compared to female students with the same characteristics. With our work, we intend to shed light on these dynamics, looking at which factors contributed to gender-unbalanced enrolments at universities in Italy.

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