ISSN 2282-6483

Alma Mater Studiorum - Università di Bologna
DEPARTMENT OF ECONOMICS

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Quaderni - Working Paper DSE N°1228

Against the Odds: Student Performance under Gender Discrimination in Fascist Italy

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July 15, 2026

Abstract

This paper studies gender differences in student performance under explicit institutional discrimination, using a newly assembled panel of Italian secondary schools during Fascism. The regime sought to restrict women's access to advanced education, skilled employment, and teaching positions, yet the feminisation of secondary schooling continued among both students and teachers. Against this hostile institutional background, female students generally outperformed male students, especially in school tracks historically designed for male political and professional elites. The analysis shows that feminisation contributed to this result. A greater exposure to female classmates and female teachers is associated with improved outcomes for girls, particularly in historically male-oriented tracks, whereas the corresponding associations for boys are weaker or differ in sign. These patterns are consistent with peer and role-model mechanisms: female peers and teachers may have made academic success more visible and attainable for girls, lowering the perceived cost of effort in male-typed educational environments. The findings highlight behavioural responses to discriminatory institutions beyond access constraints.

Keywords: secondary school; feminisation; Peer Effect; Role Model; Heterogeneity; Hierarchical Models.

JEL classification: I24, I28, N34, C23, C26

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Non-technical abstract

During the Fascist period, the Italian government introduced explicit measures aimed at limiting women's access to advanced education, skilled employment, and teaching careers. These policies were intended to reinforce traditional gender roles and discourage women from pursuing professional and intellectual careers. Yet our descriptive statistics show that female students systematically performed better than male students, while the presence of women among both secondary-school students and teachers continued to grow.

WE investigates that evidence using a newly assembled dataset covering Italian secondary schools in 1926–27, 1931–32, and 1936–37. The data provide information on school type, student and teacher composition, attendance, and academic performance by gender. They allow us to compare girls and boys across different educational tracks, including classical and scientific lyceums, technical schools, and teacher-training schools.

The results show that female students were less likely than male students to obtain poor grades and, in most school tracks, more likely to achieve excellent results. The female advantage was particularly visible in educational paths traditionally associated with male elites and professional careers.

The analysis also examines whether student performance was related to the gender composition of the school environment. Girls tended to perform better where women represented a larger share of both students and teachers. These associations were generally weaker, or operated in the opposite direction, for boys. The patterns are consistent with the idea that female classmates and female teachers may have made academic achievement appear more attainable and socially legitimate for girls. Their presence may therefore have strengthened girls' sense of belonging and motivation, especially in schools historically perceived as male domains.

The findings do not imply that institutional discrimination was harmless. Women continued to face severe restrictions in education and employment, and the available data do not permit a fully causal interpretation of the estimated relationships. Nevertheless, the evidence shows that discriminatory institutions did not suppress female educational investment. Girls and their families continued to invest in education, and the growing visibility of women within schools may have helped sustain this process.

More broadly, the paper highlights how social environments can shape educational outcomes even under strongly discriminatory institutions. It also contributes to understanding the long-run expansion of female human capital in Italy and the gradual narrowing of gender gaps in education despite deliberate political resistance.

1 Introduction

In settings where women face explicit barriers to education and skilled employment, standard incentive-based arguments would predict lower investment in human capital and weaker educational outcomes. Yet, under Italian Fascism—a regime that imposed formal restrictions on women's access to advanced education, skilled employment, and teaching positions—female students systematically outperformed their male counterparts. At the same time, the feminisation of secondary schooling continued among both students and teachers, despite the regime's explicit attempts to channel women towards traditional family roles and constrain their educational and professional opportunities. This pattern suggests that investment in female human capital, although still limited, continued to expand gradually.

This apparent contradiction speaks to a broader question in economics: how institutional constraints and social norms are associated with the allocation of talent and the accumulation of human capital. Identifying the effects of discrimination on gender differences in educational achievement remains challenging because, in most contemporary settings, *formal* discrimination is absent, indirect, or difficult to isolate from broader social norms. Fascist Italy provides a rare historical setting in which gender discrimination was explicit, legally enforced, and directly embedded in educational and labour-market institutions. It therefore offers a unique opportunity to study how students responded to overt institutional barriers and whether discriminatory environments altered educational incentives beyond restricting access itself. More broadly, it also provides historical evidence on the long-run processes through which gender gaps in education gradually narrowed despite explicit institutional resistance.

The paper makes three contributions. First, it contributes to the literature on gender gaps in education and human capital formation by providing new evidence from an authoritarian regime that explicitly sought to restrict women's educational and professional opportunities. Such settings are rare in the economics literature, which has largely focused on environments characterised by implicit norms, gender stereotypes, or de facto constraints (e.g. Goldin et al., 2006; Bertrand and Pan, 2013).

Second, the paper shows that discriminatory institutions need not simply reduce investment in female human capital. Using a newly assembled panel of Italian secondary schools, we document that female students generally outperformed male students, particularly in educational tracks historically designed for male political and professional elites. More importantly, female performance became increasingly responsive to the gender composition of school types. Greater exposure to female classmates and female teachers is associated with improved outcomes for girls, whereas the corresponding associations for boys are weaker or differ in sign. These asymmetric responses are difficult to reconcile with a simple school-quality explanation, under which improvements in the quality of the type of school would be expected to benefit both genders similarly. Instead, they point to gender-specific behavioural responses to the educational environment.

The mechanism we propose is that explicit gender discrimination altered the incentives and social meaning of academic achievement in ways that operated through types of school. In educational tracks traditionally associated with male elites, the presence of female classmates and female teachers may have reduced the perceived cost of academic effort for girls by making female educational success more visible, legitimate, and attainable. Female peers may have strengthened comparison, belonging, and expectations of achievement, while female teachers may have provided role-model signals that women could occupy intellectual and professional positions despite institutional barriers. These mechanisms imply that increasing female representation need

not affect boys and girls symmetrically, a prediction that is consistent with the empirical evidence. Increasing female representation may raise girls' performance, especially once a critical mass of female peers or teachers is reached, while male outcomes may respond differently depending on the gender identity historically attached to each school track.

Third, the paper contributes to the historical literature by providing the first systematic quantitative analysis of the feminisation of Italian secondary education during the interwar period. Bringing together the history of education and human capital with the economics of peer effects and role models, we document the joint evolution of student composition, teacher composition, and academic performance within a unified empirical framework. More broadly, the paper sheds light on the long-run narrowing of gender gaps in education despite institutional attempts to preserve traditional gender hierarchies and to interrupt a process of school feminisation that had already begun during the Liberal period.

A potential concern is that the observed female advantage reflects positive selection into secondary education rather than differential behavioural responses. Restrictions on female access may have discouraged lower-performing girls from enrolling, mechanically increasing the average performance of those who remained. Several features of the evidence suggest that selection alone cannot account for the observed patterns. Female advantages are particularly pronounced in tracks historically associated with male elites, persist within school–track–cohort comparisons, and become stronger as the representation of female teachers and students increases. If discriminatory barriers merely selected a smaller group of highly able women into schooling, the female advantage would be expected to weaken as female participation expanded. Instead, it persists alongside the continued feminisation of both secondary education and the teaching profession. Taken together, these patterns are consistent with the mechanism proposed above, whereby female classmates and female teachers reduced the perceived cost of academic effort for girls while generating weaker or different responses among boys.

Empirically, we estimate hierarchical multilevel models on gender-specific cohort-level outcomes nested within schools, regions, and years. The dependent variables are the shares of excellent and poor-performing female and male students, while the key regressors to capture role-model and peer effects are the shares of female teachers and female students. The specification includes region, year, cohort, school-type, and resource controls, allows the gender performance gap to vary across schools through random intercepts and slopes, and is complemented by a Mundlak (1978) decomposition separating within-school from between-school effects and by a control-function approach addressing the potential endogeneity of teacher composition.

The paper proceeds as follows. Section 2 outlines the importance of analysing the interwar in light of existing literature and the institutional context of Fascist education policy. Section 3 presents the available data on the secondary school system in Italy between the two wars. Section 4 outlines the conceptual framework underlying the empirical strategy of Section 5. Section 6 discusses the results and robustness checks. Section 7 concludes.

2 The institutional environment

A very large and regionally uneven educational gender gap was a long-lasting feature of Italian economic history. This gap concerned access to education, the opportunity to work as a teacher, and wages. With regard to regional disparities, between the 18th and 19th centuries, when the European school system was taking shape, Italy was divided into several states, most of which were under the influence of foreign governments.

As a result, diverse educational institutions were established, and varied pedagogical models were adopted. Furthermore, the influence of traditional religious education was unevenly distributed across the peninsula. These differences persisted even after unification (Genovesi, 2010) and should therefore be considered in the empirical specification in order to control for regional variation, including the educational gender gap.

The gap in access to primary education narrowed after the country's unification, although this trend was limited to the northern regions (Ciccarelli and Weisdorf, 2019; Cappelli and Vasta, 2021). Bozzano et al. (2024) attributed this difference to the adoption in the north of a more inclusive educational model, which also facilitated women's school attendance. By contrast, admission to secondary school took longer to obtain. Although no law prohibited Italian girls from attending it, principals very often rejected their applications. In this context, Minister Coppino issued, in 1882, a ministerial circular clarifying that women could enrol in any secondary school. Yet, in 1889, only 44 girls were enrolled in secondary schools, compared to 8326 boys. Paradoxically, access to the university had been guaranteed earlier, through the Bonghi Regulations (1875) (Gaballo, 2016; Pironi, 2021).

As regards women's access to the labour market, numerous legal barriers made it difficult and, in many areas, impossible. As we shall see later, the profession of primary school teacher and, subsequently, secondary school teacher, gradually became one of the few viable career paths. Overall, the presence of female teachers in secondary school then became permanent thanks to the Sacchi Law of 1919 (No.1176 of July 17), which represented a real watershed. It opened to women all professions, all ranks of public employment and abolished marital authorization for starting businesses, but maintained the ban on electoral and active voting, the army and the role of magistrate. The parliamentary process of the law was rather straightforward and no opposition accrued to any of the points under consideration. All the speeches emphasized the need to grant greater legal capacity to women, not only as a reward for their contribution during World War I, but also to cancel outdated provisions in many other European countries. (Parliamentary Acts, Chamber of Deputies, 7 March 1919, Discussion of Bill: Provisions relating to the legal capacity of women). The law, as Socialist Congressman Sichel pointed out, opened up important paths for middle class women, "but also all working women, all women of the fields and workshops, though in greater numbers affected by the griefs and heartbreaks of the war, have been able to endure immense sacrifices. And since the reform with which we are concerned does not affect working women, let us at least (...) give them the promise that they too will before long be called upon to decide their destinies," through the recognition of political rights. Thus, 1919 was a watershed in the history of Italian women's work, but also the year in which political forces reached the broadest consensus on granting women new spaces and rights. In 1912, when universal male suffrage was introduced, the Italian Parliament still justified, in several speeches, the denial of women's right to vote. Many things had therefore changed between 1914 and 1919.

2.1 The interwar years: a backlash (?) for Italian women in education

The interwar years are particularly significant because of the efforts to disrupt the feminisation process through restrictive policies targeting female teachers and students.

The Fascist government's policy towards women was very ambiguous, especially in the 1920s. Although it promised modernization and, in 1925, passed law n. 2125 (22 November 1925), never implemented, which granted the right to vote in local elections to some categories of women, many relevant restrictions were

introduced. In practice, the 1920s marked a phase of regression compared to the conquests achieved by women up to that time. The field in which women's employment suffered the strongest attacks was the school sector, partly because a stronger female presence had already taken root there.

The reaction against the growing role of women in the public sphere started with the Gentile Reform, named after Giovanni Gentile, Italy's Fascist-era Minister of Education. "A reform that will bear fruit in the future", with these words, the Minister of Education Giovanni Gentile defended his reform in the parliamentary debate on February 5, 1925.(Parliamentary Acts, Senate of the Kingdom, Legislature XXVII, First Session 1924-1925, debates, February 5 part-session).

The Gentile Reform on the ordering of secondary education (Royal Decree (R.D.) 1054 of May 6, 1923) tried to affect the feminisation process by preventing women from becoming principals (article 12). This policy was consistent with what Gentile wrote in 1918 (before becoming Minister of Education) regarding "the lack in women of those characteristics that should be the cornerstones of school education". The discrimination was exacerbated by the Royal Decree 2480 of Dec. 9, 1926, excluding women from competition for professorships in Literature, Latin, Greek, History, Philosophy, and Political economy in classical and scientific lyceums, as well as from competition for professorships in Italian and History in technical schools. By that time, Pietro Fedele had replaced Gentile as Minister of Education.

Second, the Gentile Reform radically changed the structure of the normal school, which had traditionally been the type of school in which girls were largely enrolled. This reform drastically reduced the number of girls enrolled in this type of secondary school, without any compensatory measures, and thus led to an overall decline in girls attending secondary education. We will return to this point below. It is worth noting that the creation of the female Lyceum in 1923 did not compensate for the reduction of available places in normal schools. Female Lyceums also contributed to the objective of preventing women from entering the labour market. In fact, the female Lyceum allowed neither enrolment in university nor access to teaching or other professions. Its educational and vocational project was so weak that, in 1929, female Lyceums were closed due to very low enrolment.

Notably, despite the significant impact in the short term, both the Gentile reform and especially the royal decree of 1926 did not stop feminisation, although they slowed it down for a few years. This trend has been reported by several studies (Porcheddu, 1978). Barbagli (1974) also proposes an interpretation related to the 1929 crisis and the reduction of employment opportunities for women, which would have pushed families to prolong their daughters' schooling while waiting for better times. However, this interpretation does not seem consistent with the new time series on Italian employment constructed by Mancini (2018), which reports an increase in women's labour force participation between 1931 and 1936. In conclusion, during the Thirties, the growing feminisation of school teaching was part of the wider process of conquest of the public sphere by women, which the legal obstacles introduced by the Fascist government were not able to interrupt, as we also document below.

In the 1930s new legal restrictions were introduced in the civil service sector. Royal Decree No. 1554, Nov. 28, 1933, (converted by Law Jan. 18, 1934, No. 221) authorized public administrations to stipulate in recruitment notices the exclusion of women or to define the limits within which the employment of female personnel may be permitted. Royal Decree-Law No. 1514, Sept. 5, 1938, enshrined the ban on hiring women in proportions greater than 10 percent. Finally, Royal Decree No. 898 of June 29, 1939, in Article 1 indicated the civil service jobs suitable for women: "In addition to the employments pertaining to services which by their

nature cannot be discharged other than by women, the employments pertaining to the following services are recognized, with respect to the State Administrations and public agencies or institutes, as particularly suitable for women (.....): typing services, telephony, shorthand, statistical and computational operations carried out by mechanical means; services for the collection and initial processing of statistical data; services for the formation and maintenance of filing cabinets; services for the processing, printing, verification, grading, counting and control of State and bank notes, money orders and bank checks of the Issuing Institute and paper intended for the relevant manufactures; library and secretarial services of the Royal Middle Institutes of Classical and Magisterial Education (...)"

In a nutshell, the Gentile Reform of 1923 had a deep and lasting impact on the structure of the Italian school system, especially for female students in secondary education. During the interwar years, female students and teachers studied and worked in a hostile environment. Legislation tried, and partially succeeded, to limit the impact of the Sacchi law of 1919 by introducing new restrictions and explicit discrimination against women. There was a clear project to stop teaching feminisation in secondary schools and to direct girls toward the female lyceum. This reinforced the notion that girls were not expected to pursue university education, but rather to be specifically trained for domestic and care roles. The reform promoted a gendered division of knowledge and future roles, excluding women from intellectual and professional careers.

2.2 Schooling between separate spheres and the domestic-public dichotomy

School from the lowest grades prepared children for what would be their role in society, girls to become mothers and wives, boys to enter the world of labour. That is why the ministerial programs insisted on teaching girls home economy and housework (Catarsi et al., 1990, p.-67). These differentiated paths were strengthened in secondary schools, where in the early twentieth century training opportunities were created for girls in function of employment as telegraphists, in the tertiary sector and especially in the welfare field (nurse, midwife, etc.) or the trade of dressmaker, milliner or decorator (Ulivieri, 1992, pp.-30–54).

The path to becoming a schoolteacher deserves separate discussion because of the importance it assumed. The teaching school originated from the Normalschule of the Austro-Hungarian empire, as a school that taught the norm and the method for teaching a class or a group of students. They were created when, in the wake of Enlightenment and positivist thought, education became one of the objectives of national states and the model of individual teaching was overcome. Established by the Lanza law of June 20, 1858, and reconfirmed in 1859 by the Casati law (art.357), the establishment of the Scuola Normale played a central role in the process of feminisation. In fact, the figure of the schoolteacher proved fundamental in accompanying the country's literacy process (Cappelli and Quiroga Valle, 2021) and paved the way for the first "intellectual" profession open to women. Moreover, since in the Normal schools, at least some teaching was entrusted to female teachers, the spread of female teachers has also opened up teaching in secondary schools to women (Gaballo, 2016). The Casati law established 18 Normal schools (9 devoted to male and 9 to female students) which were supposed to train teachers in three years. They could be entered at 15 for girls and 16 for boys. The girls' Normal schools filled up quickly, partly in view of the fact that this was one of the few vocational paths open to middle-class girls. To avoid the closure of the boys' ones due to lack of enrolment, the Normal schools were made promiscuous in 1909. In the meantime, the feminisation of the profession had progressed, so that by the year 1875-76, the number of female teachers (23,818) had surpassed the number of male teachers (23,267). It was a profession

that enjoyed social consensus and that, according to pedagogists of the time, such as Raffaello Lambruschini, required skills that matured spontaneously in women thanks to the innate instinct of a loving mother (D'Amico, 2016). Another factor that contributed to the feminisation of the role of teacher was the attribution of a lower salary to women. According to the Casati Law, their remuneration was one-third less than that of their male colleagues (Art. 341).

Even with all the difficulties and limitations, the feminisation of school teaching made it possible for women to participate in the first professional associations: the Maestre e Maestri Section of the Milan Chamber of labour (1893), the Unione Nazionale Magistrale (1901) and the Federazioni insegnanti scuole medie (1902) (Mapelli and Seveso, 2003). The first achievements also arrived. The Nasi Laws of 1903 forced local governments to pay the same salary to all those who taught in men's classes, while the Regulations of 1904 opened teaching in men's elementary classes to women, including higher grades. Equal pay for men and women also sparked lively debates within some of these organizations.

More complex was winning a space in other secondary schools, both for female pupils and teachers. The Casati Law of 1859 had not discriminated in any way against female secondary school students. However, they were still very often refused enrolment. In the 1870s, some refusals became the subject of public debate, and on May 5, 1879, member of parliament Arisi submitted a question to end discrimination. Although no strong resistance to opening to girls emerged, it should be noted that the minister of education, Coppino, justified refusals in the case of large classes. "Should males be excluded to make room females? So here the school authority has a discretionary power, and the government, for this part, has left it to it; and this is the practice held so far." (Parliamentary Acts May 5, 1879). The question was also followed by a ministerial inquiry to ascertain any contraindications to mixed classes. This led, in 1882, to Minister Coppino's ministerial circular, which established that women could enroll in any secondary school. In 1889, there were 44 girls enrolled in secondary schools compared to 8326 boys. Paradoxically, access to the university had been guaranteed earlier, through the Bonghi Regulations (art.11, 1875), which allowed girls to enroll in any university faculty. However, the numbers remained very low, so that between 1877 and 1888 only 20 female students graduated.

The inclusion of female teachers in the secondary school workforce had also occurred rather slowly, although many of the female graduates had degrees suitable for teaching. In fact, it was only during World War I that, due to the lack of men, women were allowed to teach in every school order and role. The process of feminisation of secondary schooling had not only been much slower than that of elementary schooling but had also raised greater discontent and concern. As late as 1918, Giovanni Gentile (a prominent philosopher), in a famous article in the Italian newspaper Resto del Carlino, listing the critical issues of the Italian school, did not fail to point to the decrease in male teachers, "attracted to more advantageous and virile careers," and the invasion of women "who are now flocking to our universities, and who, it must be said, have not and will never have either that spirited originality of thought or that iron spiritual vigor which are the superior, intellectual and moral forces of humanity and must be the cornerstones of the formative school of the higher spirit of the country." (Il Resto del Carlino, May 4, 1918). The article also suggested other interventions, such as reducing the number of secondary schools to block access to so many students who were just ballast, as well as cutting the number of professors and universities. As we mentioned before, the presence of female teachers in secondary school then became permanent thanks to the Sacchi Law of 1919.

3 The secondary school system in interwar Italy and our data

The macro source of data, from which we can obtain an overall picture of the pattern of male and female students and teachers by type of school, is given by the National Investigations on Secondary Schools published by the Italian Statistical Institute (ISTAT), over the 1909-1936 period. Since the unification of the country, the Italian school system has been based on two types of schools: those that prepare students for university and those that prepare them for specific roles in the workforce. All schools included a preparatory lower level and a concluding upper level. Students chose their educational path at the age of 10, after finishing elementary school. The secondary education system, rearranged by the 1923 Gentile reform, envisages four school tracks:

1. Classical lyceum (*Liceo Ginnasio*), the 5-year preparatory lower level was called ginnasio; the concluding level lasted 3 years.

2. Scientific lyceum (*Liceo Scientifico*) started in 1923 and included a 4-year preparatory level, the Istituto tecnico inferiore, and 4 years upper level, Liceo scientifico.

3. Technical school (*Istituto Tecnico*), including lower and upper levels of 4 years.

4. Normal school (*Istituto Magistrale*), primary teacher-training school (based on 4 + 3 years).

These schools could be *Governative (governmental)*, when directly managed by the state, or *Paritarie e pareggiate (accredited independent)*, when run by municipalities, provinces, or other institutions, including private ones. These last schools awarded diplomas with the same legal status as those from state schools and were different from the so-called *Private* schools, which were not accredited. Their students had to sit rigorous qualifying or licensing examinations at a state school or an accredited one to obtain a recognised qualification. To complete the picture, it is important to note the existence of vocational schools, which were under the jurisdiction of the Ministry of Economy rather than the Ministry of National Education. They gradually came under the jurisdiction of the Ministry of Education between 1928 and 1967. These schools were not included in the statistical surveys of secondary schools.

The overall feminisation trends of students and teachers from the national sources are presented in Table 1 and Figure 1. Unfortunately, data for students and teachers in governmental and accredited independent schools are available for different periods. To ease comparison, the last part of Table 1 presents the shares of students and teachers over the common period 1926-1936. Figure 1 is based on the period, 1917-1936, common to students and teachers in governmental schools.

From Table 1 we see that the Gentile Reform slowed down the feminisation of students in Normal schools, producing an overall decline of about 7 percentage points in the period 1923-1926 for females, compared with a decline of 3 percentage points for males. Male students seem to have flocked to Technical schools and the newly established Scientific Lyceum, while we do not find a similar reallocation with regard to female students. The proportion of female students in Classical Lyceum does not seem to have been affected by the Gentile Reform. A different picture emerges concerning teachers in governmental schools: we observe a decline in the female component of about 6 percentage points in Normal schools and almost 3 percentage points in Classical Lyceum, with an overall decrease in female teachers in governmental schools of almost 8% in the 1923–1926 period,

Table 1: National distributions of students and teachers

	Classical L.		Scientific L.		Technical S.		Normal S.		Total	
	F	M	F	M	F	M	F	M	F	M
Students, 1909-1936										
Avg.	9.89	35.46	0.21	1.51	3.04	17.82	28.42	3.66	41.55	58.45
(std. dev.)	(3.00)	(4.70)	(0.23)	(1.63)	(1.25)	(3.62)	(12.44)	(3.11)	(9.66)	(9.66)
Students, 1917-1936, and effect of 1923-1926 period										
Avg.	11.70	36.26	0.30	2.12	3.77	18.94	22.80	4.12	38.56	61.44
(std. dev.)	(0.63)	(3.68)	(0.21)	(1.56)	(0.51)	(3.57)	(8.95)	(3.59)	(8.51)	(8.51)
pp.	0.19	2.79	0.26**	1.37**	0.42	4.85**	-6.97**	-2.90**	-6.10**	6.10**
Teachers (gov.), 1917-1936, and effect of 1923-1926 period										
Avg.	10.44	33.42	0.57	2.50	7.51	18.99	16.41	10.15	34.94	65.06
(std. dev.)	(4.17)	(3.87)	(0.41)	(1.78)	(3.44)	(2.94)	(6.48)	(2.18)	(5.51)	(5.51)
pp.	-2.65*	3.43**	0.25*	1.40**	0.32	4.36**	-5.57**	-1.45	-7.65**	7.65**
Students, 1926-1936										
Avg.	11.83	38.11	0.41	3.03	3.64	19.39	17.32	6.27	33.20	66.80
(std. dev.)	(0.54)	(2.88)	(0.08)	(0.78)	(0.40)	(3.69)	(3.55)	(3.63)	(3.58)	(3.58)
Teachers (gov.), 1926-1936										
Avg.	13.20	31.74	0.86	3.68	10.02	19.42	12.33	8.74	36.42	63.58
(std. dev.)	(3.32)	(4.26)	(0.08)	(0.43)	(1.14)	(3.07)	(2.14)	(1.32)	(6.41)	(6.41)
Teachers (accr. indep.), 1926-1936										
Avg.	12.86	42.56	0.56	2.41	7.71	12.60	16.93	4.37	38.06	61.94
(std. dev.)	(2.51)	(4.87)	(0.29)	(1.57)	(4.63)	(7.77)	(13.78)	(3.57)	(7.76)	(7.76)

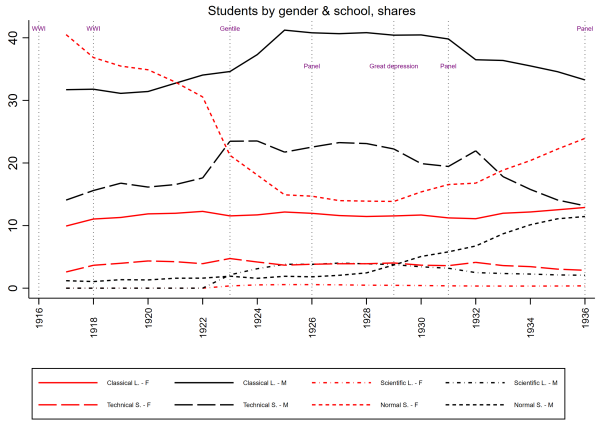
Note: Average shares are expressed as percentages; "pp." denotes changes in percentage points. One and two stars indicate statistical significance at the 10% and 5% levels, respectively. Women accounted for 3.6% of head teachers in governmental schools (0.2% in Classical Lyceum since 1936 and 3.4% in Normal Schools since 1926) and 29% in accredited independent schools (6% in Classical Lyceum and 23% in Normal Schools since 1930). Blue colour emphasises that male students and teachers prevail in Classical Lyceum, while red colour emphasises that female students and teachers prevail in Normal Schools.

likely reflecting a temporary effect of the Gentile Reform. Overall, after the Gentile Reform (see the 1926–1936 period in Table 1), we observe a decline in female students and an increase in female teachers.

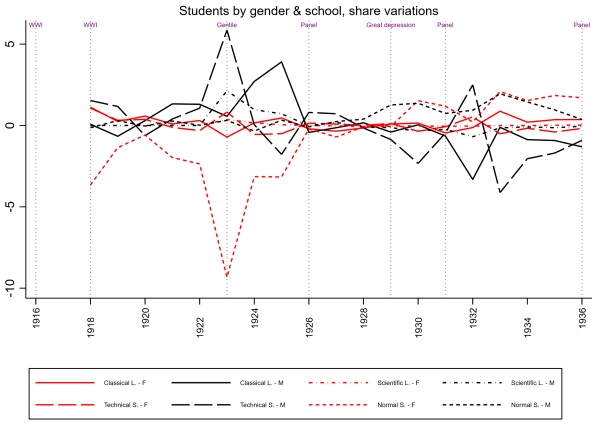
The second source of data, at the panel level, is given by the first detailed investigation conducted in 1926 to assess the effectiveness of the Gentile reforms introduced in 1923. The data were collected in a series of yearbooks titled *Statistiche dell'Istruzione Media*, published every five years. For the period under study, we also use the Italian Statistical Yearbooks (*Annali Statistici Italiani*) for the school years 1926–27, 1931–32, and 1936–37 (Istat, 1931; Istat, 1936; Istat, 1940). The source of panel-level data is depicted in Figure 2.

For the four school tracks and the three academic years 1926–1927, 1931–1932, and 1936–1937, the source provides a set of information used in our empirical analysis.

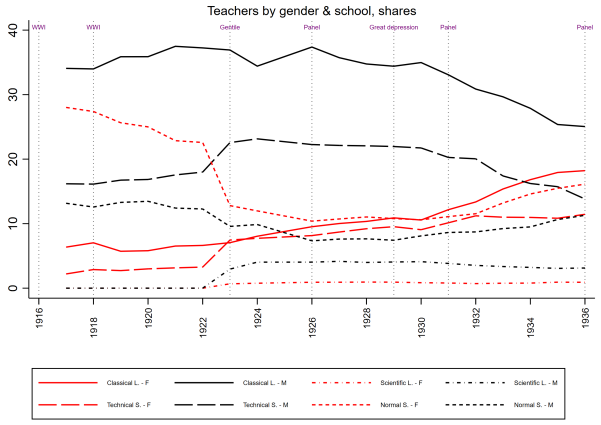
- Identification of the type of school, distinguishing between governmental (Gov) and accredited independent (Par) institutions. We also generated an index of eight schools: Gov-LC and Par-LC for Classical



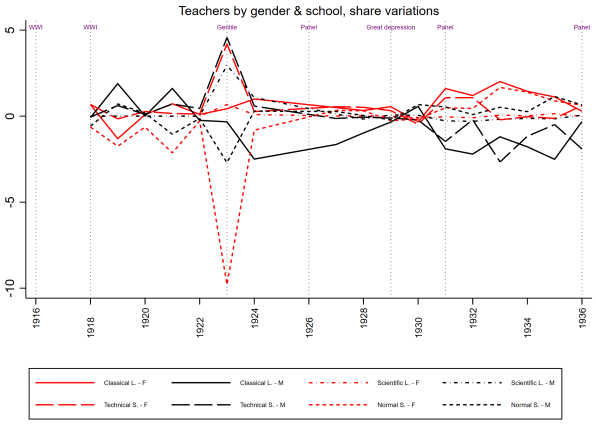
(a) *Student shares (% values)*



(b) *Variations of student shares*



(c) *Teacher shares in gov. schools (% values)*



(d) *Variations of teacher shares in gov. schools*

Figure 1: Aggregated historical data, 1917-1936


ISTITUTO CENTRALE DI STATISTICA
DEL REGNO D'ITALIA

SERIE VI – VOL. XII. 1931 – X.

Annali di Statistica

Statistica dell'Istruzione Media
nell'anno scolastico 1926-27

ROMA
ISTITUTO POLIGRAFICO DELLO STATO
1931 – Anno X

(a) *Yearbook 1926-1927*

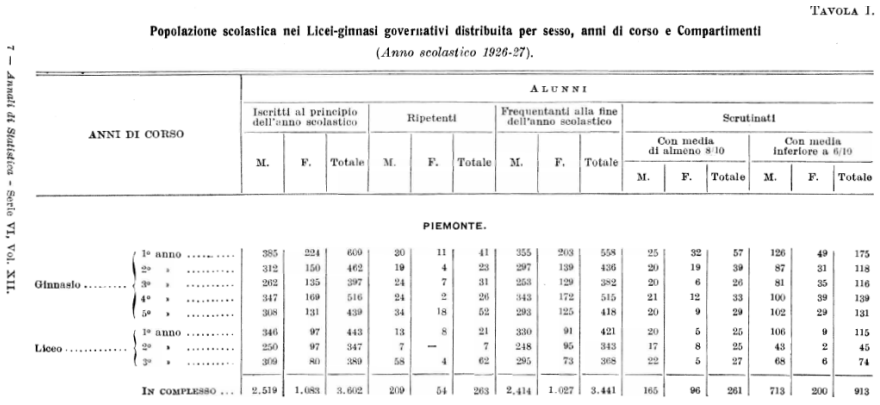


TAVOLA I.

Popolazione scolastica nei Licei-ginnasi governativi distribuita per sesso, anni di corso e Compartimenti

(*Anno scolastico 1926-27*).

ANNI DI CORSO	ALUNNI														
	Iscritti al principio dell'anno scolastico			Ripetenti			Frequentanti alla fine dell'anno scolastico			Scrutinati					
										Con media di almeno 6/10			Con media inferiore a 6/10		
	M.	F.	Totale	M.	F.	Totale	M.	F.	Totale	M.	F.	Totale	M.	F.	Totale
PIEMONTE.															
Ginnasio — 1° anno	385	224	609	30	11	41	355	203	558	25	32	57	126	49	175
2° »	312	150	462	19	4	23	297	139	436	20	19	39	87	31	118
3° »	202	135	397	24	7	31	253	129	382	20	6	26	81	35	116
4° »	347	169	516	24	2	26	343	172	515	21	12	33	100	39	139
5° »	308	131	439	34	18	52	293	125	418	20	9	29	102	29	131
Liceo — 1° anno	346	97	443	13	8	21	330	91	421	20	5	25	106	9	115
2° »	250	97	347	7	—	7	248	95	343	17	8	25	43	2	45
3° »	309	80	389	58	4	62	295	73	368	22	5	27	68	6	74
IN COMPLESSO ...	2.519	1.083	3.602	209	54	263	2.414	1.027	3.441	165	96	261	713	200	913

(b) *Example of table that was digitalized*

Figure 2: Panel-level data

Lyceum; Gov-LS and Par-LS for Scientific Lyceum; Gov-IT and Par-IT for Technical Schools; Gov-IM and Par-IM for Normal Schools.

- Data on eight cohorts: cohorts 1-–3 of *scuola media* (lower secondary education or middle school, ages 11-–14); cohorts 4—5 of *ginnasio*; and cohorts 6-–8 of *Liceo* and *Istituto tecnico superiore* (upper secondary education or secondary school, ages 14-–18), which prepared students for university.

- Geographic coverage across eighteen regions (*Compartimenti*): Piemonte, Liguria, Lombardia, Venezia Tridentina, Veneto, Venezia Giulia e Zara, Emilia, Toscana, Marche, Umbria, Lazio, Abruzzi e Molise, Campania, Puglie, Basilicata, Calabrie, Sicilia, and Sardegna.[1]

- Information on teachers' libraries, including both the number of books available and the number of books lent. Their ratio provides a measure of library usage and teacher engagement with educational resources.

- The source reports both enrolled and attending students. In the empirical analysis, we focus on attending students, as they more accurately capture actual exposure to schooling. The number of attending students is systematically lower than the number of enrolled students across all schools and genders, indicating that enrolment overstates effective participation. Moreover, academic grades are observed only for attending students, making attendance the relevant reference population.

- The total number of attending students, the number achieving an overall average grade of at least 8, and the number obtaining an average grade of 6 or below at the end of the school year, for all eight cohorts and separately by gender. From these data, we construct the share of high-performing ("excellent") students (average grade ≥ 8) and the share of low-performing ("poor") students (average grade ≤ 6) by gender. Table 2 summarises the percentages of students with poor and excellent performance, by gender and school track.

- Two variables capture the gender composition of the school environment. The first measures the share of female teachers within each school-year-region cell and captures the feminisation of the teaching body. The second measures the share of female students within the student environment relevant for each observation. Since the dataset is organized by gender-specific student groups, this share varies by student gender: for female students, higher values correspond to greater exposure to female peers, whereas for male students they imply a lower share of male classmates. The two variables therefore capture distinct dimensions of school gender composition: institutional exposure through teachers and peer exposure through students.

Figure 3 presents scatter plots based on data disaggregated by gender, school track, and school type. For each of the eight schools, the figure reports the distribution of the gender-specific shares of attending students ("% Attending"), teachers ("% Teachers"), high-performing ("% Excellent"), and low-performing ("% Poor") students. Each point represents a region-year-cohort observation within a given school group.

The two upper panels display the share of attending students and teachers by gender across schools, in line with Table 1. Female students are predominantly concentrated in Normal Schools (Gov-IM and Par-IM), while male students are more prevalent in Classical Lyceum (Gov-LC and Par-LC), Scientific Lyceum (Gov-LS

[1] Prior to 1861, the peninsula was divided into several states—such as the Kingdom of Sardinia, the Kingdom of the Two Sicilies, the Papal States, the Grand Duchy of Tuscany, and Austrian-controlled Lombardy-Venetia—characterized by heterogeneous political regimes, administrative traditions, and external influences. These historical legacies may still shape regional educational patterns in our period of analysis.

and Par-LS), and Technical Schools (Gov-IT and Par-IT). A similar pattern emerges for teachers, with a higher presence of female teachers in Normal Schools. Disaggregated data relating to the eight cohorts in the three academic years 1926-1927, 1931-1932, and 1936-1937, hence, respect national shares.

The lower panels show the distribution of student performance. The share of high-performing students exhibits substantial dispersion across schools and genders, while the share of low-performing students is more evenly distributed, though still with noticeable variation across schools.

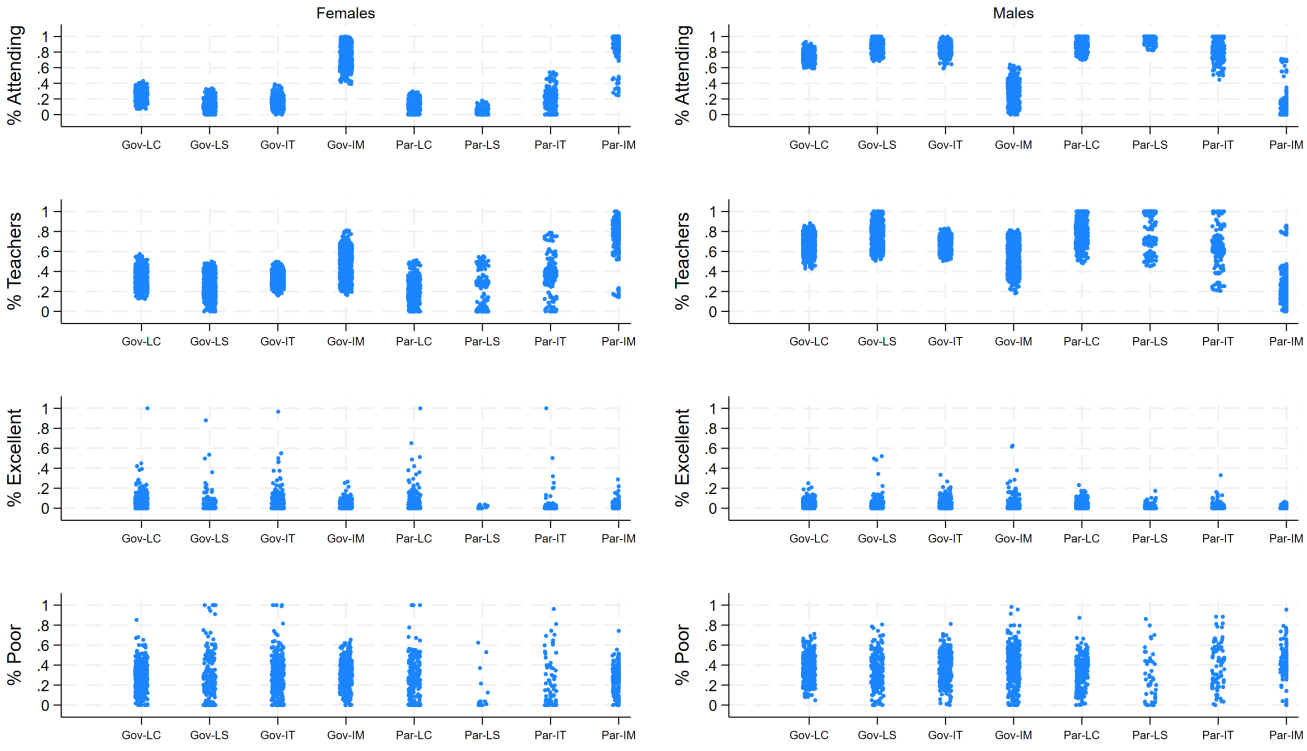


Figure 3: Distribution of attendance rates, teachers' composition, and student performance by gender and across the eight school tracks.

As mentioned before, Table 2 reports the average shares of high- and low-performing students by gender and school.

Two stylized facts emerge from Figure 3 and Table 2. First, female students exhibit better performance on average: female students are characterised by higher rates of excellent performance in all school tracks except the Scientific Lyceum, while also displaying lower rates of poor performance across all tracks. These systematic gender differences in performance may reflect underlying role and peer effects, which are discussed in the conceptual framework in Section 4 and empirically modelled in Section 5. Second, performance outcomes for female students display greater dispersion than for males, suggesting the presence of unobserved heterogeneity across schools and heteroskedasticity in the variance structure, which we explicitly account for in the empirical model presented in Section 5.

Table 2: Student Performance by Gender and School

	Excellent (≥ 8)		Poor (≤ 6)	
School group	Female	Male	Female	Male
Gov-LC	7.8	4.6	27.8	38.5
Gov-LS	3.5	3.9	27.4	33.8
Gov-IT	5.9	3.9	30.2	37.6
Gov-IM	3.5	2.8	30.0	38.4
Par-LC	6.4	3.9	27.8	33.8
Par-LS	0	1.9	12.6	28.5
Par-IT	4.0	2.4	23.4	38.9
Par-IM	2.9	0.3	27.5	43.6
Total	5.2	3.5	28.3	37.1

Note: Shares of high-performing (average ≥ 8) and low-performing (average ≤ 6) students by gender and school (in percentages). Female students exhibit higher rates of excellent performance in all school tracks except the Scientific Lyceum, while also displaying lower rates of poor performance across all tracks.

4 The conceptual framework

This section introduces a simple conceptual framework to guide the empirical analysis. It proposes a mechanism through which the feminisation of students and teachers may affect academic performance in a highly gendered institutional environment, such as Fascist Italy.

Our idea is that, in a context characterized by explicit gender discrimination and a sharp division between male and female social roles, changes in gender representation within schools may alter the incentives of students to exert effort.

We assume that student achievement depends both on innate ability and the effort invested in learning. In turn, the learning effort is affected by the social environment (Bénabou (1993), Bénabou (1996), Epple and Romano, 2011). Specifically, in the spirit of Akerlof and Kranton (2000), the effort cost is shaped by social norms and identity, which vary with the gender composition of both peers and teachers.

Within this framework, we interpret role models through the lens of *same-gender teacher effects*, defined as the premium associated with being taught by teachers of the same gender as the student. This interpretation is consistent with recent evidence showing that, in secondary education, same-gender teacher effects on student achievement are near-universally positive across countries and outcomes. Using large-scale administrative data, Gendre et al., 2024 estimate a statistically significant average effect, based on more than one million student-level observations from secondary schools.

Similarly, we interpret peer effects as *same-gender student effects*, defined as the premium associated with being exposed to a sufficiently large share of same-gender peers (Lavy and Schlosser, 2011; Carrell et al., 2010).

In our framework, however, role-model and peer effects are not assumed to operate uniformly across schools. Instead, they are conceptualized as context-dependent and shaped by the gender identity historically associated with different types of secondary schools (Akerlof and Kranton, 2000). In Fascist Italy, schools were not neutral educational spaces: they were socially categorized institutions, embedded in gender norms and endowed with symbolic meanings regarding appropriate roles and expected life trajectories. As an example, normal schools (i.e., secondary schools oriented toward training primary-school teachers) were historically constructed

as female-typed institutions, closely associated with care-oriented professions and characterized by a high baseline presence of women among both students and teachers. In such schools, the gender congruence between female teachers and students was likely to be less salient, as female representation was already normative. By contrast, classical and scientific lyceums and technical schools were designed to educate the future male elite and skilled workforce. In these male-typed institutions, the presence of female teachers could constitute a stronger role-model signal, potentially altering students' perceptions of academic roles and the costs of exerting effort. Likewise, the presence of female peers may have exerted a stronger influence on students' learning effort in these institutions.

Accordingly, within our framework, role-model and peer effects arise from the interaction between peer and teacher gender and school-specific gender identities. This perspective motivates an empirical approach that allows the impact of female teachers and female students on student performance to vary systematically across types of secondary schools, rather than treating same-gender student and teacher effects as homogeneous across educational environments.

4.1 Educational achievement and effort

Consider students enrolled in secondary school, indexed by gender $g \in \{M, F\}$. Each student is endowed with an innate ability a, drawn from the same distribution for males and females. Educational achievement is given by

$$A = a + e, \tag{1}$$

where $e \geq 0$ denotes learning effort chosen by the student.

Students derive utility from educational achievement net of effort costs. The marginal cost of effort is affected by innate ability and the gender composition of the school environment. Formally, utility takes the form

$$U(e; a, g, s) = A - \frac{1}{2} c_{gs}(a, S_s^F, T_s^F) e^2, \tag{2}$$

where the marginal disutility of effort, $c_{gs}(\cdot)$, depends on innate ability, the share of female students in school s, S_s^F, and the share of female teachers, T_s^F.

This formulation captures the idea that the interaction between individual identity and the surrounding institutional and social context influences learning effort. Specifically, we assume that:

$$c_{gs}(a, S_s^F, T_s^F) = \frac{c_0}{a} + \alpha_g \max\{S_s^F - \overline{S}_s^F, 0\} + \beta_g \max\{T_s^F - \overline{T}_s^F, 0\}. \tag{3}$$

where innate ability negatively affects the cost of effort and the parameters $\overline{S}_s^F$ and $\overline{T}_s^F$ represent school-specific thresholds beyond which gender composition becomes socially salient. These thresholds capture historically rooted gender norms about which students and teachers, respectively, "belong" in a given school type. Hence, the second and third terms on the right-hand side of (3) reflect the effect of deviations from the baseline gender identity associated with each institution.[2]

[2]Figures 4 and 5 below indicate that the threshold share at which female peer and role-model effects become salient varies by school type. For female students, the relevant threshold is reached below the median in Normal schools, above the median in Classical Lyceums, and only above the 75th percentile in Technical schools. For female teachers, the positive contextual effect emerges around a 34% share, which corresponds to the third quartile in Classical Lyceum and Technical schools but is already exceeded at the 25th

This reduced-form specification follows the identity-based approach of Akerlof and Kranton (2000), whereby changes in the social environment may affect behaviour by modifying the psychological and social costs of actions. Institutional heterogeneity and school-specific gender identities provide a rationale for analysing academic performance separately across school types and for explicitly accounting for variation in the gender composition of students and teachers.

Maximizing (2) with respect to the effort yields the following:

$$e^*_{gs} = \frac{1}{c_{gs}(a, S^F_s, T^F_s)}. \tag{4}$$

From (3), increases in female representation among peers and teachers may reduce the cost of female students' effort once the relevant thresholds are exceeded ($\alpha_F \leq 0$, $\beta_F \leq 0$). Greater representation may strengthen identification with academic roles, reduce perceived barriers, and increase motivation.

For male students, the same changes may increase effort costs ($\alpha_M \geq 0$, $\beta_M \geq 0$), reflecting potential disengagement or erosion of male-oriented norms in traditionally masculine environments. In their discussion, Akerlof and Kranton (2000) note that the entry of women into traditionally male-dominated occupations, such as the armed forces, may lower morale and perceived prestige among incumbent men, thereby generating adverse behavioural reactions.

At the aggregate level, the framework predicts that average academic performance may respond differently across genders and school types as the shares of female students and teachers increase.

4.2 Guidance for the empirical analysis

The framework delivers three testable implications that guide the empirical analysis. First, academic performance may differ systematically by gender, even conditional on school type, cohort, and region. Second, the gender composition of peers—measured by the share of female students in the school—may affect performance through peer or compositional effects, potentially in a gender-specific manner. Third, the gender composition of teachers—measured by the share of female teachers in the school—may affect performance through contextual or role-model effects, again allowing for heterogeneous responses by student gender and school type.

These implications motivate an empirical strategy that jointly examines gender-specific performance, peer composition, and teacher composition within a unified framework, while allowing for institutional heterogeneity across schools (and over time).

5 The empirical strategy

Our empirical approach is based on multilevel hierarchical modelling, which provides a natural framework for analysing educational data with nested structures and contextual interactions (Goldstein, 2011; Bryk and Raudenbush, 2002; Hox and Roberts, 2011; Snijders and Bosker, 2012). Multilevel models are widely used in education economics and related fields to account for dependence across observations and to distinguish between individual- and group-level sources of variation.

percentile in Normal schools.

Our data exhibit a hierarchical structure. Outcomes are observed for gender-specific student groups within cohorts and school-years; these groups are nested within schools, which are in turn nested within regions and observed across non-consecutive years. Ignoring this structure would confound within-group variation with contextual influences arising from schools, peers, and teachers, leading to biased inference.

A key advantage of multilevel modelling is that it allows outcomes to be decomposed into within-group and between-group components, while explicitly modelling how group-level characteristics shape the outcomes of lower-level units. This perspective is particularly well suited to our setting, where both peer composition and teacher gender composition are central objects of interest. Within this framework, we distinguish the two conceptually distinct contextual mechanisms. The first mechanism is the effect of peers, which arises when outcomes depend on the gender composition of the student body. The second mechanism is the role-model effect, which arises when outcomes respond to the gender composition of authority figures. In our setting, the two effects capture how exposure to a larger share of same-gender students and same-gender teachers influences school performance by shaping the social environment and potentially altering the costs of exerting effort through gender norms and gender identity within specific school tracks. These effects are measured by cross-level interactions between student gender and the share of female students and female teachers in the school.

Both mechanisms are contextual effects, but operate through different channels: peer effects reflect horizontal interactions among students, while role-model effects reflect vertical interactions between students and teachers. Multilevel models allow both mechanisms to be estimated simultaneously while accounting for unobserved school-level heterogeneity.

We observe cohorts $c = 1, \ldots, 8$ within three non-consecutive years $y \in \{1926, 1931, 1936\}$. Within each cohort-year-school, outcomes are measured separately for gender-specific units $g \in \{0, 1\}$, corresponding to male and female students. Schools $s = 1, \ldots, 8$ are nested within regions $r = 1, \ldots, 18$. The unit of observation is therefore a gender-specific cohort within a given school, region, and year, and outcomes are group-level percentages rather than individual test scores.

The model used to explain $performance_{cygsr}$—defined alternatively as the percentage of students with marks ≥ 8 (excellent performance) or with marks ≤ 6 (poor performance)—is given by:

$$\begin{aligned} performance_{cygsr} = {} & \beta_0 + \beta_1 Female_{cygsr} + \beta_2 ST_{ysr} + \beta_3 SA_{ygsr} \\ & + \beta_4 \left(Female_{cygsr} \times ST_{ysr} \right) + \beta_5 \left(Female_{cygsr} \times SA_{ygsr} \right) \\ & + \gamma_r Region_r + \delta_y Year_y + \theta_y \left(Year_y \times Female_{cygsr} \right) \\ & + \lambda_1 T\_BookRate_{ysr} + \lambda_2 Type_s \\ & + \zeta_c Cohort_c + \eta_{yc} \left(Year_y \times Cohort_c \right) \\ & + u_{0s} + u_{1s} Female_{cygsr} + \varepsilon^{(g)}_{cygsr} \end{aligned} \tag{5}$$

Here the subscript $cygsr$ denotes a specific cohort–year–gender–school–region unit. The indices reflect the data structure in which gender-specific cohort outcomes are observed within schools and years, with schools nested within regions.

Equation 5 is a mixed-effects model in which some parameters are "fixed" (i.e., constant across all levels of the hierarchy), while other parameters are “random” and vary at the school level of the hierarchy. Compared to

the standard fixed-effects specification, a mixed model has several advantages (Hill et al., 2020). In particular, it allows inference about the broader population of schools rather than being limited to the specific clusters observed in the sample. This feature is especially relevant in our context, where the sampled schools represent only a subset of the evolving school system during the interwar period, and their distinct characteristics are not completely known *a priori*.

Performance is evaluated conditional on a rich set of controls capturing heterogeneity across regions, cohorts, and time. These include region fixed effects (parameters γ_r), cohort fixed effects (parameters ζ_c), and cohort-by-year interactions (parameters η_{yc}). We also include cluster-level covariates, such as the type of school (captured by the binary variable $Type$, equal to 1 for accredited independent schools and 0 for governmental schools, parameter λ_2) and the rate of books lent in teachers' libraries ($T\_BookRate$, parameter λ_1). These controls help account for observed differences between schools and reduce unexplained between-school variability.[3]

Conditional on these controls, the parameters in equation 5 can be interpreted as follows. The cross-level interactions capture how group-level variables moderate gender-specific outcomes. In the empirical specification, the theoretical role-model and peer composition variables are operationalised using observed school-level shares. Specifically, the share of female teachers, ST_{ysr} in year y, region r and school s, serves as an empirical measure of the theoretical role-model composition T_s^F, while the gender-specific share of female attending students relevant for student group g, SA_{ygsr}, measures the theoretical peer composition S_s^F. Accordingly, parameters β_2 and β_4 capture role-model effects associated with the feminisation of the teaching staff, while parameters β_3 and β_5 capture same-gender peer effects associated with the gender composition of the student body.

Parameter β_0 represents the expected performance for male students in the reference categories, while β_1 captures the average gender performance gap. The parameters δ_y capture time effects on male students, and θ_y capture female-specific changes in performance over time.

The coefficient on $Female$ is allowed to vary across schools through a random slope. Accordingly, the random intercept u_{0s} captures school-specific deviations in average male performance, while the random slope u_{1s} captures school-level heterogeneity in the gender performance gap. The error term $\varepsilon_{cygsr}^{(g)}$ captures within-school residual variation at the gender-specific cohort level.

The random effects in equation (5)—the school-specific intercept u_{0s} and the school-specific random slope u_{1s}—are assumed to follow a joint normal distribution:

$$\begin{pmatrix} u_{0s} \\ u_{1s} \end{pmatrix} \sim \mathcal{N}\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_{u_0}^2 & \sigma_{u_{01}} \\ \sigma_{u_{01}} & \sigma_{u_1}^2 \end{pmatrix} \right],$$

where all variances and covariances are freely estimated. The residual variance is allowed to differ by gender, with $\varepsilon_{cygsr}^{(g)} \sim \mathcal{N}(0, \sigma_g^2)$ for $g \in \{\text{Female}, \text{Male}\}$.[4]

The mixed-effects model in equation (5) relies on the assumption that the school-level random effects are uncorrelated with the regressors (no endogeneity because of heterogeneity). In particular, it assumes that

[3] Failing to account for the hierarchical structure of the data can lead to incorrectly specified dependence across observations and biased standard errors, particularly for predictors measured at higher levels of aggregation. This concern applies even when cohort and year effects are included but their nested structure is ignored.

[4] The dispersion of performance outcomes around gender-specific means, as measured by the standard deviation, is larger for girls than for boys.

unobserved school-level heterogeneity is orthogonal to key covariates such as the share of female teachers and the rate of books lent in teachers' libraries. If this assumption is violated, the random-effects estimator may be inconsistent due to correlation between the random effects and the regressors.

To assess the validity of this assumption, we adopt the approach proposed by Mundlak (1978), which augments the mixed-effects specification by including school-level means of time-varying covariates. This procedure allows us to control for unobserved, time-invariant school characteristics that may be correlated with the regressors, and provides a formal test of the random-effects assumption.

The Mundlak-augmented specification is given by:

$$
\begin{aligned}
performance_{cygsr} = {} & b_0 + b_1 Female_{cygsr} + b_2 STW_{ysr} + b_3 SA_{ygsr} \\
& + b_4 \left(Female_{cygsr} \times STW_{ysr} \right) + b_5 \left(Female_{cygsr} \times SA_{ygsr} \right) \\
& + g_r Region_r + d_y Year_y + t_y \left(Year_y \times Female_{cygsr} \right) \\
& + l_1 T\_BookRateW_{ysr} + l_2 Type_s \\
& + z_c Cohort_c + e_{yc} \left(Year_y \times Cohort_c \right) \\
& + b_6 ST_{.s.} + b_7 \left(Female_{cygsr} \times ST_{.s.} \right) \\
& + l_3 T\_BookRate_{.s.} \\
& + u_{0s} + u_{1s} Female_{cygsr} + \varepsilon^{(g)}_{cygsr}
\end{aligned}
\tag{6}
$$

The school-specific mean share of female teachers is $ST_{.s.} = \frac{1}{3}\sum_{y=1}^{3} \frac{1}{18} \sum_{r=1}^{18} ST_{ysr}$, and the school-level mean of the teachers' book lending rate is $T\_BookRate_{.s.} = \frac{1}{3}\sum_{y=1}^{3} \frac{1}{18} \sum_{r=1}^{18} T\_BookRate_{ysr}$. The within-school deviations are $STW_{ysr} = ST_{ysr} - ST_{.s.}$ and $T\_BookRateW_{ysr} = T\_BookRate_{ysr} - T\_BookRate_{.s.}$. In this specification, coefficients b_2, b_4, and l_1 capture *within-school* effects, identifying how changes over time in the share of female teachers and book lending within a given school affect performance. In contrast, the coefficients on the school-level means—b_6, b_7, and l_3—capture *between-school* effects, reflecting systematic differences in outcomes across schools with different average characteristics.

Testing the null hypotheses $b_2 = b_6$, $b_4 = b_7$, and $l_1 = l_3$—that is, equality between within- and between-school effects—provides a Hausman-type test of whether the school-level random effects are correlated with the regressors. Rejection of these equalities would indicate that the random-effects assumption is violated, while failure to reject supports the consistency of the mixed-effects specification in equation (5).

6 Results

Estimated results for equation 5 are reported in Table 3. The reference categories are year 1926, the Piemonte region, cohort 5, governmental schools, and schools without teachers' libraries. We allow the relationship between performance and gender to vary across years by including year-by-gender interactions.

Contextual (role-model) effects are captured by the share of female teachers, ST, which is grand-mean centred at its sample average (0.37). Compositional (peer) effects are captured by the share of female students, SA, centred at 0.5, so that the associated coefficients can be interpreted as changes in performance when moving away from a gender-balanced environment toward one in which girls are more numerous. Hence, in the reference categories, $ST = 0.37$ and $SA = 0.5$.

Estimated results for the Mundlak (1978) specification in equation 6 are reported in Table 4. Here we instead use the original (uncentred) share of female teachers together with its school-specific mean, grand-mean centred, in order to decompose within-school and between-school variation. The share of female students remains centred at 0.5 in this specification as well. This parameterisation allows us to test for correlation between school-level random effects and teacher composition while preserving a consistent interpretation of peer effects across specifications.[5]

Table 3: Effects of School Gender Composition on Student Performance estimated from equation 5

	Excellent		**Poor**	
	M	F	M	F
Baseline fitted shares	.03798***	.04750***	.32819***	.20666***
	(.00746)	(.01589)	(.01765)	(.03171)
Fitted shares in 1931–32	.02680***	.06132***	.34279***	.19099***
	(.00715)	(.01234)	(.01666)	(.03207)
Fitted shares in 1936–37	.03060***	.05133***	.33042***	.22989***
	(.00752)	(.01257)	(.01777)	(.03261)
Fitted shares from 1926–27 to 1936–37	.01942**	.06515***	.34501***	.21422***
	(.00984)	(.01397)	(.02478)	(.03601)
Female teacher composition effect	-.01037	.10839***	.47953***	.02369
(ST centred on 37.03%)	(.01180)	(.02216)	(.03210)	(.05303)
Female student composition effect	.01349	.10300***	.40610***	-.00141
(SA centred on 50%)	(.01044)	(.02906)	(.02465)	(.06450)
Joint female composition effects	-.03486**	.16389***	.55743***	-.18438***
(teacher and student)	(.01589)	(.03251)	(.04424)	(.07815)
Obs.	3432	3432	3432	3432
LL	4850.92	4850.92	1834.61	1834.61
AIC	-9601.84	-9601.84	-3559.226	-3559.226
BIC	-9294.80	-9294.80	-3221.48	-3221.48

Note: *** 1%, ** 5%, * 10% statistical significance. Baseline fitted shares are evaluated for Piemonte, 1926, fifth cohort, governmental schools, no teacher libraries, and average values of ST and SA, as ST and SA are centred shares of female teachers and female students. Coefficients represent marginal effects per unit increase relative to their centring points (37.03% for teachers and 50% for students).

Results for the control variables, not reported in the tables but available upon request, indicate several patterns. Relative to Piemonte, excellent performance is higher in Venezia Tridentina and Venezia Giulia e Zara, and lower in Campania, Sardegna, Umbria, and Calabrie. The estimates for poor performance are broadly symmetric: poor grades are less frequent in Venezia Tridentina and Venezia Giulia e Zara, and more frequent in Calabrie, Campania, Sicilia, Sardegna, Basilicata, Toscana, and, to a lesser extent, in Emilia, Liguria, and Umbria. Regional differences likely reflect both long-standing institutional legacies and contemporane-

[5]The same within–between decomposition is applied to the rate of books lent in teachers' libraries, which is treated as a time-varying school-level covariate potentially correlated with unobserved school characteristics.

Table 4: Effects of School Gender Composition on Student Performance estimated from equation 6

	Excellent		**Poor**	
	M	F	M	F
Baseline fitted shares	.03988***	.04861***	.32780***	.21410***
	(.00738)	(.01012)	(.01856)	(.02320)
Fitted shares in 1931–32	.02879***	.06283***	.34237***	.19560***
	(.00702)	(.01009)	(.01743)	(.02411)
Fitted shares in 1936–37	.03174***	.05416***	.33315***	.23302***
	(.00744)	(.01026)	(.01860)	(.02469)
Fitted shares from 1926–27 to 1936–37	.02065**	.06838***	.34773***	.21453***
	(.00973)	(.01207)	(.02521)	(.02933)
Female teacher composition effect	.00375	.09233***	.45098***	.03995
(within-school ST effect)	(.01263)	(.02398)	(.03638)	(.05267)
Female teacher composition effect	-.05935***	.07575*	.62314***	.21844**
(between-school ST effect)	(.02187)	(.03951)	(.05390)	(.10172)
Female student composition effect	.00722	.11061***	.42785***	-.03884
(SA centred on 50%)	(.01097)	(.02982)	(.02815)	(.06099)
Joint female composition effects	-.02891*	.15423***	.55103***	-.21299***
(within-school ST effect +SA)	(.01551)	(.03641)	(.04347)	(.07647)
Joint female composition effects	-.09202***	.13774***	.72319***	-.03450
(between-school ST effect +SA)	(.02891)	(.03613)	(.07425)	(.10085)
Overall joint female composition effects	-.12815***	.18146***	.84637***	-.20865*
(within- and between-school ST effects +SA)	(.03161)	(.04318)	(.08340)	(.11452)
Obs.	3432	3432	3432	3432
LL	4856.73	4856.73	1839.98	1839.98
AIC	-9597.46	-9597.46	-3563.96	-3563.96
BIC	-9241.29	-9241.29	-3207.78	-3207.78
Hausman p-val. (M)	0.000		0.000	
Hausman p-val. (F)		0.496		0.966
Hausman p-val. (Books)	0.277	0.277	0.496	0.496

Note: *** 1%, ** 5%, * 10% statistical significance. Baseline fitted shares are evaluated for Piemonte, 1926, fifth cohort, governmental schools, no teacher libraries, and average value of ST and SA. ST enters the model both as within-school deviation and school-specific mean (between variation, grand-mean centred). Associated coefficients represent marginal effects per unit increase relative to their centring points (37.03% for teachers and 50% for students). Hausman tests assess the equality of within- and between-school effects. Endogeneity due to unobserved heterogeneity is detected only for male students.

ous differences in economic development. Pre-unification differences between the Kingdom of Sardinia and Lombardy-Venetia on the one hand, and the Papal States and the Kingdom of the Two Sicilies on the other, are well known. However, the regional heterogeneity documented here cannot be attributed solely to pre-unification legacies; it also likely reflects regional variation in industrialization, urbanization, and the development of local school systems.[6]

Compared with governmental schools, accredited independent schools exhibit a lower share of excellent performance, while the effect on poor performance is not statistically significant. The presence of teachers' libraries is positively associated with excellent performance and has no statistically significant association with poor performance. Relative to cohort 5, excellent performance increases in cohorts 6 and 7 and decreases in cohort 4. Conversely, poor performance decreases in cohort 4 and increases in cohorts 6 and 7, consistent with changes in performance associated with the transition from middle school to secondary school.

The first row of Tables 3 and 4 reports fitted probabilities at the reference categories: Piemonte, 1926, fifth cohort, governmental schools, no teacher libraries, and average values of ST and SA. For males, the fitted share of excellent performance is 3.80%. For females, it is 4.75%. However, the underlying female coefficient is not statistically different from zero, indicating that at average levels of female teacher and student representation, girls and boys display similar probabilities of excellent performance.

The fitted shares by year indicate that female performance remains at least comparable to, and often higher than, male performance across the period. The female advantage is particularly visible in 1931–32.

The key results concern the association between student performance and school gender composition: the share of female teachers, ST, and the gender composition of the student body, SA. Table 3 shows that the female teacher composition effect is small and statistically insignificant for excellent performance among boys, but large and statistically significant for girls. The female student composition effect follows a similar pattern: it is not statistically significant for boys, while it is positive and significant for girls. Considering both margins jointly, the probability of excellent performance increases substantially for girls and decreases for boys.

This pattern is difficult to reconcile with a purely self-selection mechanism. If discriminatory barriers merely selected a smaller group of highly able women into secondary schooling, female advantages should weaken as female participation expanded. Instead, the estimates suggest that institutional context shaped educational outcomes conditional on enrolment, consistent with compensatory effort responses and a reduction in gender-specific barriers within schools.[7]

The estimates for poor performance provide complementary evidence. Female teacher and student composition are associated not only with higher rates of excellent performance among girls, but also with lower probabilities of poor performance, especially when both margins are considered jointly. By contrast, the same compositional margins are associated with higher probabilities of poor performance among boys. Thus, school gender composition appears to affect the entire performance distribution rather than only its upper tail.

Taken together, these findings are consistent with role-model and peer mechanisms operating through the school environment. Female relative performance improves in educational settings characterised by higher

[6] Controlling for regional effects is essential to avoid overstating the role of schools in explaining student performance. Part of the observed variation likely reflects long-standing institutional and policy differences rooted in Italy's pre-unification fragmentation, as depicted in Section 2.

[7] The residual variance is also substantially larger for girls than for boys. While only suggestive, this pattern is difficult to reconcile with a simple positive-selection mechanism in which female enrolment is restricted to a narrow group of uniformly high-performing students.

shares of female teachers and female students, whereas male outcomes exhibit either weak or opposite responses. In terms of the conceptual framework developed in Section 4, the estimates for excellent performance are consistent with lower effort costs for girls, that is, with $\alpha_F < 0$ and $\beta_F < 0$, while the corresponding parameters for boys appear close to zero, $\alpha_M, \beta_M \approx 0^+$. The estimates for poor performance are not a separate mapping of the theoretical parameters, since the model is formulated in terms of achievement rather than failure. They should therefore be interpreted by reversing the sign of the outcome: lower poor performance among girls is consistent with the same reduction in effort costs implied by the excellent-performance results, whereas higher poor performance among boys points to an increase in effort costs, consistent with $\alpha_M > 0$ and $\beta_M > 0$.

More generally, the estimated effects of school gender composition are not symmetric across genders. This asymmetry is difficult to reconcile with a simple school-quality explanation, under which both boys and girls would be expected to benefit from better educational environments. Instead, the results point to gender-specific responses to institutional and peer composition within schools.

The estimates reported in Table 4 provide further insight into the gender differences documented in Table 3 by decomposing the effects of school composition into within-school and between-school components. For female students, excellent performance is positively associated with both the share of female teachers and the share of female students. In particular, the within-school effect of female teachers is large and statistically significant for females, while it is not statistically significant for males. Considering both margins jointly, increases in female teacher and student representation are associated with higher probabilities of excellent performance and lower probabilities of poor performance among girls.

By contrast, the estimated effects for boys are either statistically insignificant or opposite in sign. For excellent performance, the within-school effect of female teacher composition is close to zero, while the joint effects become negative once between-school variation is taken into account. Similarly, the probability of poor performance increases with both the share of female teachers and the share of female students. These asymmetric responses again suggest that the same educational environment affected boys and girls differently. As noted above, such asymmetries are not consistent with a school-quality interpretation, under which improvements in the educational environment should benefit students of both genders. As in Table 3, these estimates are consistent with mechanisms operating through the gender composition of the educational environment, including role-model and peer effects.

The Mundlak (1978) decomposition in Table 4 shows that, for male students, the association between female teacher composition and performance is driven primarily by between-school variation, as reflected in the large and statistically significant coefficients on school-level means. This suggests that male performance is mainly associated with persistent differences across schools, such as those related to school tracks, long-standing institutional characteristics, or stable patterns of student sorting. By contrast, for female students, the estimated relationship is driven predominantly by within-school variation over time. Changes in teacher composition during the period 1926–1936 therefore appear to be more strongly associated with female than male performance.[8]

The Hausman tests reported in Table 4 reinforce this interpretation. Endogeneity arising from unobserved school-level heterogeneity is detected for male students but not for females. This asymmetry suggests that the mechanisms linking school composition to performance differ systematically by gender. In particular, the

[8] According to Table 1, the increase in the share of female teachers was particularly pronounced in Technical schools and Classical Lyceum.

results for females are less likely to be driven by persistent differences across schools and appear instead to reflect changes occurring within schools over time.

One possible interpretation of the between-school results for male students is related to the so-called frog-pond effect (Enders and Tofighi, 2007), according to which outcomes depend not only on absolute ability but also on students' relative position within their educational environment. In this context, persistent differences in school composition may influence male performance through relative standing and competitive dynamics across schools. While this interpretation remains suggestive, it is consistent with the stronger role of between-school effects observed for males relative to females.

Taken together, the evidence points to different dominant mechanisms across genders. For female students, performance appears to respond primarily to within-school changes in gender composition, consistent with lower effort costs generated by role-model and peer effects operating through the educational environment. For male students, performance is more strongly associated with persistent between-school differences, suggesting a larger role for stable institutional characteristics and relative positioning within schools. The fact that the estimated effects are not only weaker but often opposite in sign for boys further supports the view that school gender composition affected the incentives and behaviour of male and female students differently.

These findings are also consistent with historical accounts of gendered competition norms in interwar education, where academic ranking and competitive performance were generally more salient for male students. This historical context provides a plausible interpretation for the stronger between-school dynamics observed among males compared with the predominantly within-school patterns estimated for females (see the discussion in Subsection 6.1).

To complement the random-slope analysis reported in Table 3 and aid the interpretation of the interaction terms, the combined effects of female teachers and female students are visualized using predictive margins of the marginal effect of being female. These margins are computed to show how role-model (teachers) and peer (students) effects interact in practice, together with their associated confidence intervals. Marginal effect of being female are evaluated at representative points of the empirical distributions of the shares of female teachers and female students, separately for the four school types: Classical Lyceum, Scientific Lyceum, Technical schools, and Normal schools. Overall, the share of female teachers ranges from 0 (minimum) to 0.97 (maximum), with values at the 5^{th} (0.09), 25^{th} (0.24), 50^{th} (0.34), 75^{th} (0.45), and 95^{th} (0.80) percentiles. The share of female students ranges from 0 (minimum) to 1 (maximum), with values at the 5^{th} (0.05), 25^{th} (0.17), 50^{th} (0.50), 75^{th} (0.83), and 95^{th} (0.95) percentiles. In the Figures below, percentiles are school-specific.

In Figures 4 and 5 the central line represents the predicted marginal effect of being female, while the outer lines depict the 95% confidence intervals. Across school types, excellent performance increases as the share of female students rises, as indicated by the upward-sloping profiles. This positive peer effect is particularly pronounced at higher levels of teacher feminisation. Around the median share of female students, the peer effect is reinforced and the slopes become steeper, suggesting a complementarity between peer composition and the gender composition of the teaching staff.

The widening of confidence intervals at higher values of the covariates is most evident in the Scientific Lyceum—characterised by fewer observations due to its introduction in 1926—and in the Normal schools, reflecting greater uncertainty in these settings.

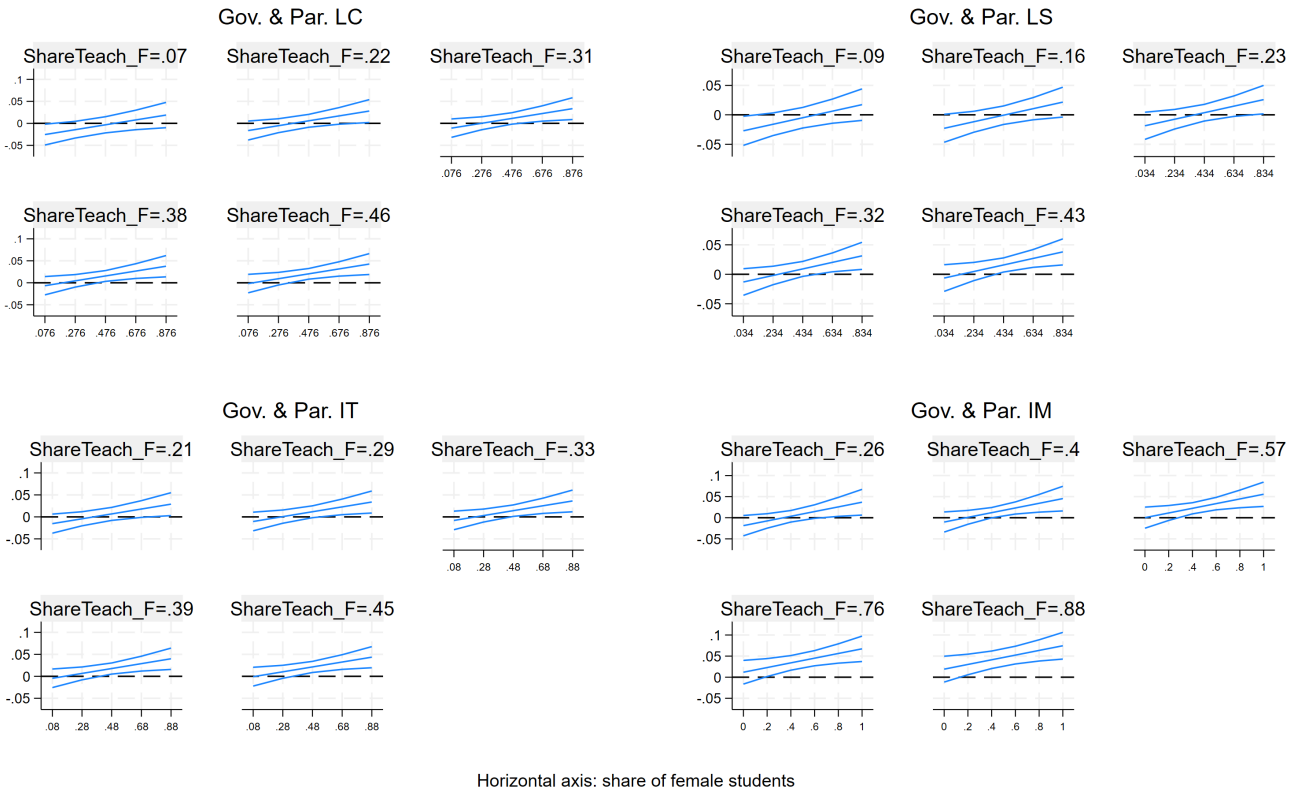


Figure 4: Contextual/role-model (teacher) and peer (student) effects on excellent performance

The plots also reveal that the peer effect emerges only once the environment becomes sufficiently less male-dominated. A share of female students of approximately 61% is required for the peer effect to become clearly positive. In the Classical Lyceum and Technical schools, this threshold is reached only above the 50^{th} and 75^{th} percentiles of the female-student distribution, respectively, whereas in Normal schools it is attained well before the median.

Similarly, the contextual (role-model) effect of female teachers appears to operate only beyond a critical mass. The effect becomes clearly positive at shares of female teachers of about 34%, corresponding to the third quartile in Classical Lyceum and Technical schools. In Normal schools, where female teachers are more prevalent, this threshold is already exceeded at the 25^{th} percentile of the distribution.

All this is in line with the *school-specific* parameters $\overline{S}_s^F$ and $\overline{T}_s^F$ introduced in the conceptual framework of Section 4 and representing thresholds beyond which gender composition of students and teachers, respectively, becomes socially salient.

To further investigate heterogeneity across schools, we analyse the school-specific random effects obtained from the mixed-effects models. In equations (5) and (6), both the random intercepts and random slopes are treated as latent variables of substantive interest. Their values are predicted using empirical Bayes methods, yielding the best linear unbiased predictors (BLUPs) of the school-specific random effects. These predictions combine school-specific information with the estimated population distribution of the random effects and are shrunk toward the grand mean, with the degree of shrinkage depending on the precision of the school-level

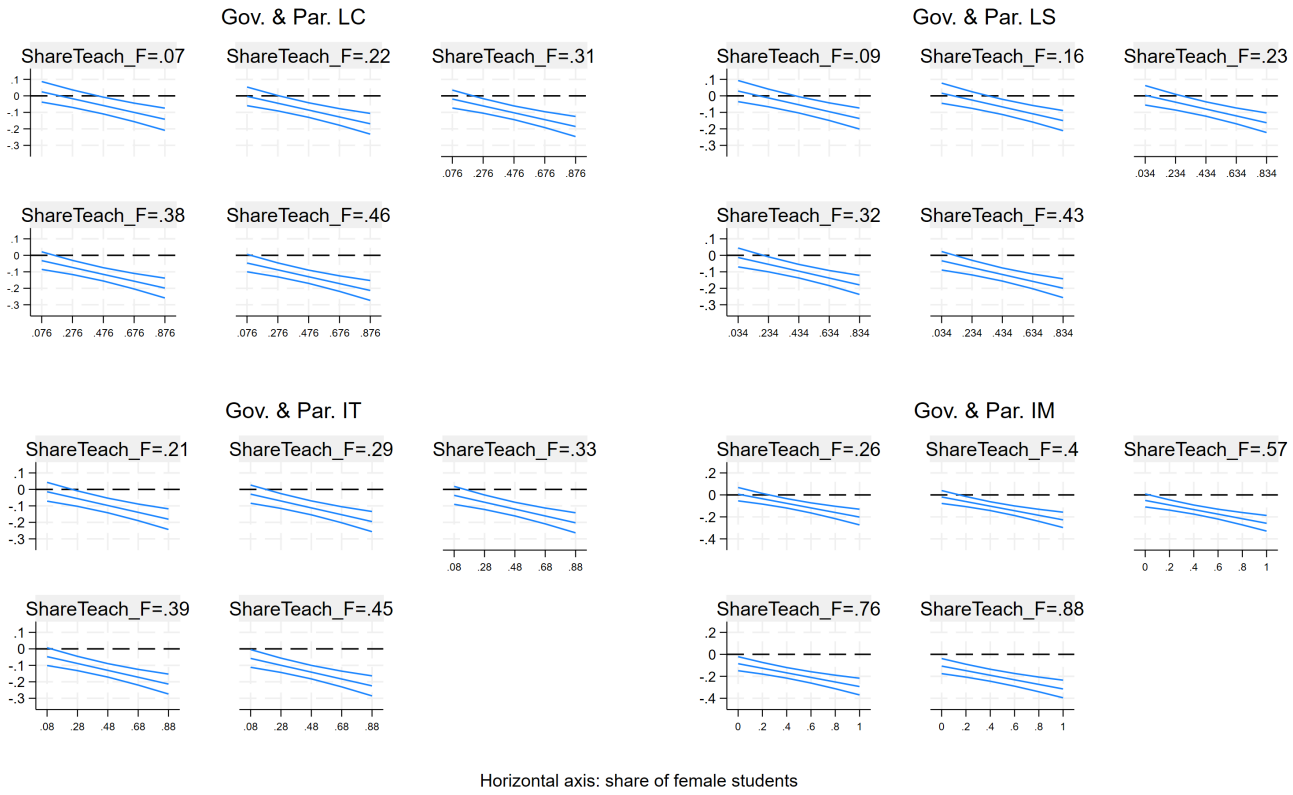
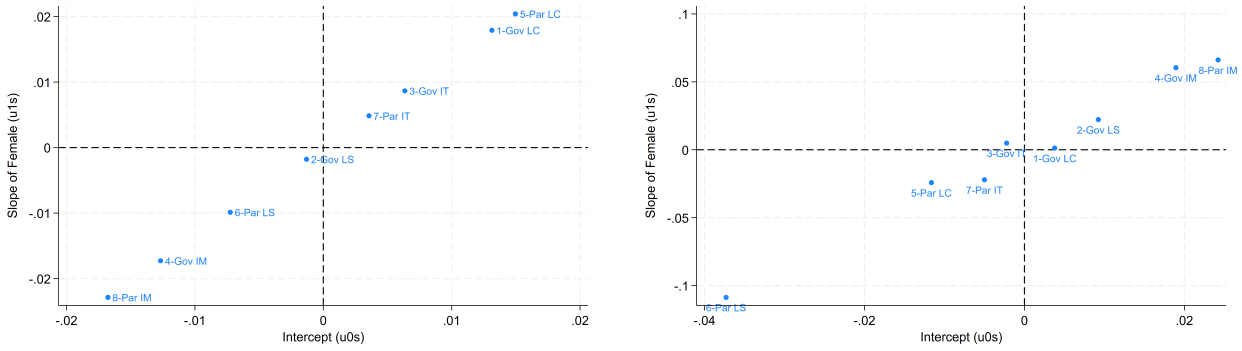


Figure 5: Contextual/role-model (teacher) and peer (student) effects on poor performance

information.

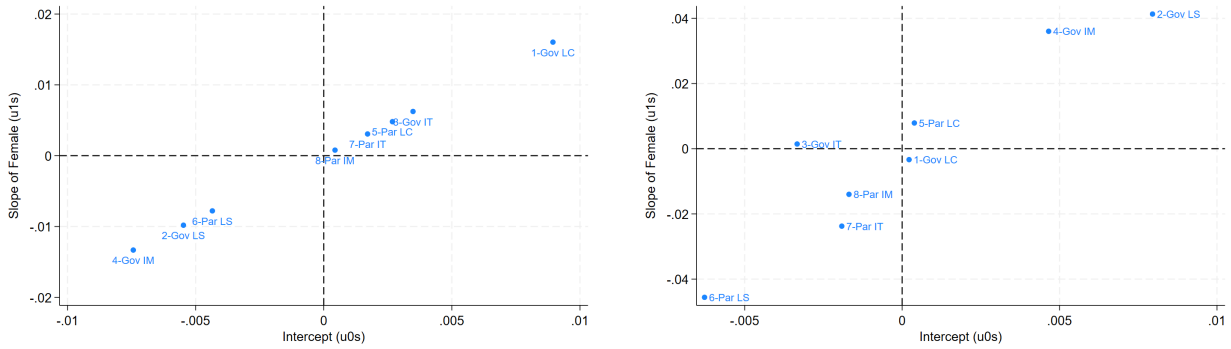


(a) *Relation between intercepts and slopes for excellent performance.*

(b) *Relation between intercepts and slopes for poor performance.*

Figure 6: Equation 5 model

Figures 6 and 7 present scatterplots of the predicted school-specific random intercepts (u_{0s}) and random slopes for the female indicator (u_{1s}), obtained respectively from the baseline specification in equation (5) and from the Mundlak-augmented model in equation (6). These figures provide a compact visual representation of



(a) *Relation between intercepts and slopes for excellent performance.*

(b) *Relation between intercepts and slopes for poor performance.*

Figure 7: Mundlak (1978) equation 6 model

heterogeneity across schools in both average performance and the gender performance gap.

The horizontal axis reports the deviation of each school's intercept from the overall mean, while the vertical axis reports the deviation of the school-specific gender slope from the average gender effect. Schools located in the bottom-right quadrant combine a below-average mean performance for males with a stronger-than-average improvement for females. Conversely, schools in the top-right quadrant exhibit both above-average mean performance and above-average female advantages.

Schools located near the intersection of $u_{0s} = 0$ and $u_{1s} = 0$—such as the governmental Scientific Lyceum—display prediction lines close to the overall average. This pattern is consistent with the presence of fewer observations in these institutions, which leads to stronger shrinkage of the BLUPs toward the grand mean. In contrast, schools in the top-right quadrant, notably Classical Lyceums and Technical schools, exhibit both above-average intercepts and steeper-than-average positive slopes, indicating high overall performance together with a strong positive association between performance and feminisation. Schools in the bottom-left quadrant, particularly Normal schools, display below-average intercepts and flatter-than-average slopes.

For excellent performance, the BLUPs reveal a strong positive correlation between the random intercepts and random slopes. This implies that schools with higher-than-average intercept residuals (u_{0s}) also tend to have higher-than-average slope residuals (u_{1s}). When both u_{0s} and u_{1s} are positive, a positive covariance between intercepts and slopes indicates that schools with higher baseline performance also exhibit steeper gender gradients, while schools with lower baseline performance tend to display flatter-than-average gender slopes. This pattern is particularly evident for Technical schools—especially accredited independent ones—and for Classical Lyceums, especially governmental institutions. These schools combine high average performance with a strong positive relationship between performance and feminisation.

The corresponding plots for poor performance display greater dispersion across schools but confirm the particularly weak outcomes observed in Normal schools. This reinforces the interpretation that institutional context plays a central role in shaping both average performance levels and gender-specific performance dynamics.

Importantly, the qualitative patterns observed in the BLUPs are broadly consistent across the baseline and the Mundlak-augmented specifications. This stability suggests that the heterogeneity captured by the random effects primarily reflects persistent institutional differences across schools, rather than artefacts of correlation between regressors and unobserved school-level heterogeneity.

The final issue concerns the potential endogeneity of the share of female teachers. Teacher composition may be correlated with unobserved school-level characteristics of a cultural or political nature, including politically driven hiring practices. In addition, school reputation and student composition may themselves influence teacher assignment, with more prestigious or more female-oriented schools attracting larger shares of female teachers.

This concern is especially relevant for Normal schools, which historically exhibited a high share of female teachers that was substantially reduced by the Gentile reform. This institutional change raises an identification question: whether the relatively poorer performance observed in Normal schools reflects the decline in the share of female teachers, or whether pre-existing weaker performance motivated reforms aimed at reducing female teacher employment.

To address these concerns, we implement a control-function approach exploiting historical variation in school feminisation prior to the reform period. Specifically, we instrument the contemporary share of female teachers using the average share of female teachers over 1917–1925 and the average share of female enrolled students over 1909–1925. The identifying assumption is that these pre-reform measures capture persistent institutional patterns in school feminisation while remaining predetermined with respect to educational outcomes observed in 1926, 1931, and 1936. Given the slow-moving nature of staffing structures and gendered educational trajectories, these historical shares strongly predict subsequent teacher composition. The first-stage estimates confirm the strength of the instruments.[9]

Importantly, the identification strategy is applied only to teacher composition. The share of female students captures contemporaneous peer composition conditional on student gender: for female students, higher values imply greater exposure to female peers, whereas for male students they imply a lower share of male classmates. Unlike teacher composition, this variable primarily reflects current enrolment patterns and school sorting dynamics, making a credible instrumental strategy substantially more difficult. We therefore treat student composition as an observed characteristic of the school environment rather than as an endogenous institutional input.

The resulting control-function estimates, obtained by bootstrapping the full two-stage procedure at the school level, do not provide evidence of substantial endogeneity in teacher composition. The estimates remain qualitatively similar to those obtained in the baseline and Mundlak (1978) specifications. Taken together, these findings suggest that the positive association between feminisation in the educational environments and female students' school performance is unlikely to be driven solely by reverse causality or omitted school-level heterogeneity.

6.1 On Normal Schools: the historical perspective

Two findings deserve attention: the poorer academic performance of students of both genders in Normal schools compared to other types of schools (as outlined in Figures 6 and 7) and the negative impact of teachers' and students' feminisation on the performance of male students (particularly the between-school variation outlined in Table 4). The historical context is useful to understand both.

Regarding the first aspect, the Gentile Reform radically transformed the training path of future teachers. First of all, training had to begin at the age of 10, at the end of primary school. To this end, a four-year lower

[9] The first-stage F-statistics exceed conventional thresholds for weak-instrument concerns. Given the use of heteroskedasticity-robust standard errors, we evaluate instrument strength using robust first-stage diagnostics following Olea and Pflueger (2013) and interpret them in line with Andrews et al. (2019).

secondary school was established, upon completion of which students were expected to progress to a three-year upper secondary school. This led to a sharp reduction in the number of institutes, from 153 to 87, and to a consequent decline in enrolment (at the time predominantly female).

The reform also changed the content of the Normal School. Gentile's plan was to create a class of teachers trained in idealist philosophy and anti-realist pedagogy (Salustri, 2023). As is well known, this approach was based on the axiom between knowing and knowing how to teach and drew attention to the need to train teachers who were cultured rather than methodologically prepared. To this end, Latin and philosophy-centred pedagogy were introduced into teacher training schools. In addition, practical training in the nursery or elementary section, which had been annexed to Normal schools to enable the learning of a method and the teaching profession, was abolished. The reform was part of a twenty-year debate in which pedagogues also participated on the advisability of abandoning the vocational school model followed until then (De Fort, 1987).

In essence, the years analysed were characterised by a structural break in the content and teaching methods of the Normal School, which was no longer conceived as a vocational school but as a school of cultural education, like secondary schools. This certainly caused confusion among students who found themselves having to study subjects such as Latin and philosophy, which they had previously avoided by enrolling in the Normal School. The poor academic performance of those years could therefore be due to the change in the school's purpose, a change that was not always understood by the students. It should also be noted that the sharp decline in enrolment caused by the Gentile Reform was not accompanied by good academic results on the part of those who did enrol.

Concerning the second aspect, the impact of feminisation, it is important to remember that the Normal School was mainly attended by girls and had a higher proportion of female teachers than other schools. In this context, the issue of gender balance not only in schools but also among future teachers was widely debated, albeit in terms very different from contemporary sensibilities. Indeed, the central question debated by pedagogues and academics was not the gender balance, but whether women were capable of teaching boys, particularly adolescents (Covato, 1996). For this reason, during the 1920s and 1930s, the presence of men in schools that trained secondary school teachers and instructors was encouraged in various ways. One of the most important measures was Law No. 1272 of 2 July 1929, Provisions for Education, according to which: "Male students in the upper classes of state teacher training institutes are exempt (...) from paying enrolment, attendance and certification fees, provided that they do not repeat the year and that in the previous year they have obtained no less than eight tenths in conduct (Article 6)". In addition, Article 7 established 100 annual scholarships of 1,200 lire each and 200 of 2,500 lire each, to be awarded to male students attending state teacher training colleges, with one third allocated to those enrolled in the lower course and two thirds to those enrolled in the upper course. Finally, the Ministry of Education's budget allocated an annual fund of 380,000 lire for free places in boarding schools run by provinces, municipalities or legal entities, to be awarded to male students at local teacher training institutes. Overall, the gender imbalance – among both students and teaching staff – was very high in teacher-training colleges, and these legislative measures highlight the attention being paid at a political level to the issue of increasing the number of male students and teachers.

This suggests that, in classes that were heavily skewed in terms of gender, the further increase in the number of female students and teachers ended up penalising the minority, i.e. male students.

It should also be noted that the poor performance of male students had always been one of the problems of the Normal School. As early as 1878, in volume III of the documents on elementary education published by

the Ministry, it was noted that in all provinces there was a “difference in discipline, attendance and academic performance between males and females. Although (...) in some areas poorly prepared by interrupted or inadequate elementary education, women, who are by nature more patient, more docile and more orderly, devote themselves with true love, (...) with passion, to their studies (...) they do their homework punctually and accurately, reading with curiosity and a desire to learn. (...) Women (...) find in the teaching profession fruits and rewards that are not sufficient for men. While a hundred different paths open up for the latter (...), school offers women, in addition to income, a rather flattering position for their self-esteem. (...) With few and certainly not rare exceptions, men are people who have been forced to interrupt their studies due to the financial ruin of their families, or because of reluctance, impatience, or poor and slow intelligence, and who then resume their studies after several years of interruption, devoting themselves to teaching for lack of anything better to do. They are usually distracted, inert, inept or discontented young men, for whom study is a burden, discipline and order a burden, and the teaching profession, for which they must prepare themselves, a condemnation. Women, on the other hand, continuing without regret the only path open to them to rise to a position that enhances their dignity and social importance, represent the best choice. In addition, women often come from fairly wealthy families and have refined manners" (Statistical Report, 1878, pp. 69-71).

In essence, since the Unification of the country, restrictions on women’s entry into the labour market had made the teaching profession one of the few available, directing many talented female students towards Normal schools. At the same time, the prevalence of low wages kept the best male students away, attracted by better-paid professions. It is conceivable that, where the share of women was higher, these mechanisms were more intense. Nevertheless, the Italian state was committed to ensuring the training of teachers and instructors even beyond secondary schools. After completing teacher training college, a competitive examination allowed access to the Higher Institute of Education, which, although not equivalent to university, shared many aspects with it. Created in 1882 as girls’ schools, they responded to the need to train women to teach in secondary schools for girls (Pironi, 2021). They were criticised above all for the absence of Latin language teaching, which was therefore made compulsory in 1919 (Royal Decree No. 1968 of 9 October 1919). The Gentile reform also affected these institutions, reorganising them into three courses: a) teaching Italian, Latin, history and geography in lower secondary schools and teacher training colleges; b) teaching pedagogy in teacher training colleges and for qualification to teach in primary schools; c) qualification for school administration. In addition, it opened access to this school to male students. Finally, it created the conditions for subsequent equivalence with the University, introduced with the consolidated law of 1933. Thus, starting from the academic year 1935-36, the Higher Institutes of Higher Education were transformed into faculties. This obviously generated competition with the faculties of arts and philosophy, to which they were similar in many respects.

Although extremely interesting, these aspects can be interpreted from the perspective of historical events, given that differences between schools likely reflect a combination of institutional practices, selection mechanisms, and long-standing gender composition patterns that cannot be fully disentangled in historical administrative data.

Overall, our data suggest that feminisation has strengthened women’s performance through role models and peer mechanisms, while men’s underperformance in highly feminised contexts reflects deeper structural incentives and historical selection patterns. Rather than indicating a zero-sum dynamic, the results point to asymmetric responses to institutional constraints.

7 Conclusions

We study school performance in a system that formally restricted women's educational and professional opportunities. The central finding is that, despite this hostile institutional environment, female students systematically outperformed male students and school feminisation positively contributed to it. This advantage was not uniform across schools, but was stronger in educational environments where the gender composition of peers and teachers made female presence more salient.

The results are empirically robust and historically meaningful. They reveal a pattern that runs counter to the spirit of the Gentile Reform and to the broader Fascist ideology concerning women's social roles. Despite the restrictive institutional framework introduced in the 1920s, feminisation in teaching did not stop. Although it slowed after 1923, it remained structurally embedded in the school system. Similarly, the feminisation of the student body experienced a temporary decline following the reform of teacher training schools, but recovered in subsequent years.

Female students systematically outperformed their male peers. Their performance is positively associated both with the feminisation of the teaching staff, consistent with evidence that teacher-student gender congruence affects achievement and engagement (Dee, 2007; Porter and Serra, 2020), and with the increasing presence of female classmates, possibly through a peer mechanism (Lavy and Schlosser, 2011). These estimates suggest that female teachers and female peers may have lowered the identity-related cost of effort for girls, particularly in schools where female academic participation was less institutionally expected.

In the conceptual framework, female teachers and female classmates affect performance through an identity-based channel whose strength depends on the gender identity attached to each school track. In male-typed institutions, such as Classical Lyceums, Scientific Lyceums, and Technical Schools, academic achievement was closely associated with male educational and professional trajectories. There, a higher share of female teachers or students may have made female participation less exceptional and more legitimate, lowering the identity-related cost of effort for girls once female representation became sufficiently salient. By contrast, in female-typed institutions, where women's presence was already part of the school's identity, further feminisation should be less likely to change the perceived compatibility between gender identity and academic effort. The results are therefore best interpreted as evidence of school-specific peer and role-model effects operating through local gender norms, rather than as a homogeneous effect of female exposure.

The predictive margins reinforce this interpretation. The female advantage becomes stronger when female peers and female teachers jointly reach levels at which their presence is socially salient. This threshold pattern is consistent with the school-specific parameters introduced in the conceptual framework: gender composition matters not mechanically, but because it changes the local norm about who belongs in a given educational environment and, consequently, the perceived cost of academic effort.

This interpretation is related to evidence showing that exposure to women outside the family can shape gender-role identity and later outcomes. Olivetti et al. (2020), for example, show that exposure to economically active women beyond one's own mother—such as peers' mothers—can affect women's later labour-market outcomes. Our setting highlights a more specific channel: female exposure within schools mattered because it interacted with the historically gendered identity of different school tracks.

Our findings are also consistent with evidence that girls often display greater educational resilience than boys in adverse environments. Conditional on attendance, girls achieved better academic outcomes in an institutional

setting designed to limit their educational and professional prospects. Autor et al. (2019) show that family disadvantage disproportionately impedes boys' educational and behavioural development, while Bertrand and Pan (2013) document that boys' disruptive behaviour is especially responsive to adverse family environments. This literature points to girls' relative resilience in difficult contexts and supports an interpretation of our results as strong female performance under adverse institutional conditions.

As for gender gaps in education, it is well established that girls tend to outperform their male peers in secondary education and college in many countries (OECD, 2023), including Italy (Piazzalunga, 2018; Bovini et al., 2024). Our findings show that this pattern was already present in Fascist Italy, despite reforms explicitly aimed at restricting women's access to education and reasserting their roles as wives and mothers. Female students entered secondary schools traditionally designed for male elites—most notably the Classical Lyceum—and achieved excellent results. In a school system conceived primarily for male students, and in an institutional environment in which girls were often unwelcome, they nevertheless displayed strong academic ability and achievement.

Finally, as regards the historical processes through which the narrowing of gender gaps takes shape, this paper highlights the central role played by schools.

Acknowledgements

We are grateful to participants at the 30^{th} Annual International Panel Data Conference, University of Montpellier, and to seminar participants at the University of Bologna for helpful comments and suggestions.

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