Does Work-based Learning Facilitate the School to Work Transition?

Evidence from an Italian Reform

Skills2Capabilities Working Paper
December 2025

Martino Bernardi (Fondazione Agnelli), Marco Bertoni (UniPadova), Giorgio Brunello (UniPadova), Clementina Crocè (UniPadova), Lorenzo Rocco (UniPadova)

ABSTRACT

In 2015, school-work alternation programs became compulsory in all Italian high schools, with the purpose of improving employment opportunities after graduation. A distinctive feature of this policy was that the intensity of school-work alternation programs varied across school tracks. Using a difference-in-differences approach, we show that, in the year following high school graduation, female graduates from the more intensively treated tracks experienced both a decline in the probability of employment – relative to their peers in the less intensively treated tracks – and an increase in the probability of enrolling in full-time higher education.

ACKNOWLEDGEMENTS

We acknowledge comments and suggestions by Didier Fouarge, Andrea Gavosto, Monica Langella, Ken Mayhew, Vincenzo Scoppa, and the audiences at seminars and conferences in Bonn, Genova, Modena, Naples, Calabria, Trento, Maastricht and Bergamo.

Skills2Capabilities, a Horizon Europe study, is about understanding how skills systems need to develop if they are to assist people to make labour market transitions – i.e. between jobs, employers or sectors – and thereby reduce the level of skill mismatch which might otherwise arise.

This Working Paper is part of the Skills2Capabilitiy Work Package entitled 'the supply of skills and lifelong learning among VET graduates over the life course.'

For more information please visit skills2capabilities.eu

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Agency. Neither the European Union nor the granting authority can be held responsible for them.

1. Introduction

Work-based education programs, such as the dual vocational education and training (VET) systems prevailing in many European countries such as Germany, Denmark, Austria, Switzerland, the Netherlands and Norway, are often praised for effectively addressing youth unemployment and skill mismatch, and for expediting the school-to-work transition of high school graduates who choose not to attend college. These programs integrate classroom education with on-the-job training and work experience, often in the form of apprenticeships. Enrolled students gain both transferrable skills from formal education and occupation-specific skills that enhance their employability with the training company or other employers (see Wolter and Ryan, 2011, Eichhorst et al., 2012, Muehlemann, 2016).

In contrast, school-based programs focus mainly on theoretical learning, with limited or non-existent interaction with the world of work. These programs are present in Southern Europe – Greece, Italy, Portugal and Spain – and in the United States. Particularly in the latter, schools have little or no connection with employers (Hoffman, 2011; Alfeld et al., 2013). Vocational education has been largely phased out as a separate track in secondary schools, based on concerns that specific skills become obsolete too quickly (Hanushek et al., 2017). Although interest in work-based learning has grown in recent years, its availability and quality remain inconsistent across the US, and it continues to play a marginal role in American education and workforce development (Ross et al., 2020).[1]

Italy – the focus of this paper – has historically maintained a school-based education system. However, the high youth unemployment rate and slow school-to-work transition (Quintini et al., 2007)[2] have produced over time several attempts to reform the system with interventions aimed at promoting apprenticeships, facilitating the interactions between schools and the labor market, and adding elements of work-based learning in schools as complements to theoretical learning (Cedefop, 2017, D'Agostino and Vaccaro, 2021, Rustico et al., 2020).

With Law 53/2003 and Decree 77/2005, Italy introduced for the first time a dual education model that combines formal education in schools and practical training at the workplace. This scheme – known as "*alternanza scuola lavoro*" (school-work alternation, ASL hereafter) – was designed to promote spells of experience in the world of work (public or private) and the development of practical skills by high school students.

Originally, ASL was voluntary. With the 2015 reform – also known as "*La Buona Scuola*" (the Good School) – ASL became compulsory for all upper secondary school students, irrespective of the school type. During their final three years, students were required to engage in work-based learning for at least 200 hours in academic high schools and 400 hours in technical high schools, which corresponds to about 6 to 12 percent of total school hours. While significant, this intensity was

---

[1] Although most students in the U.S. engage in paid employment part-time while enrolled in secondary or post-secondary education, these after-school jobs are not related to what they are studying in their courses (Stern et al., 1997).
[2] Eurostat statistics for the European Union (EU-27) show that the average time in months for the transition from school to work in 2009 was 5 months for college graduates and 10 months for junior high school graduates. In Italy, the average time was respectively 10 and 14 months.

lower than the one in the German dual system, in which students spend a considerable portion of the school week at the training company.[3]

High school curricula that combine school-based training with practical experience give students early opportunities to interact with the world of work. These interactions are likely to have two effects: on one hand, they can ease the school-to-work transition and the employment prospects after graduation, by equipping students with practical skills and helping them establish connections with potential employers. On the other hand, they can provide valuable insights into labor market prospects for those with a high school diploma vs. a college degree, and influence the decision to pursue further education, thus delaying labor market entry.[4]

Did ASL accelerate the transition from school to work in Italy? While this seems like a natural question, there has been so far no causal evaluation of the policy. Yet such an evaluation is crucial for designing future policies aimed at reducing youth unemployment and skill mismatches. In this paper, we evaluate the effects of ASL by focusing on the intensive margin of the policy. Instead of examining whether ASL affected the school-to-work transition (with respect to a situation without ASL), we use a difference-in-differences (DiD) approach and compare outcomes for graduates belonging to a more intensively treated track – technical high schools - and a less intensively treated track – academic high schools - both before and after the 2015 reform. [5]

A standard DiD assumption is that, in the absence of the policy, the outcomes for treated and control groups would have followed parallel trends. This assumption, however, may not hold in general when comparing technical and academic high school graduates. For example, increased labor demand due to an economic expansion is likely to primarily benefit technical students, whose skills are ready for work, rather than academic students, who need to complete higher education before becoming attractive to employers. Therefore, choosing curricula within the technical and academic track that better approximate the requirement of parallel trends is essential. After a careful examination of the data, we select graduates from technical schools - economic curriculum – as the treated group and graduates from academic schools - foreign language curriculum – as the control group. We also use available school characteristics to implement a DiD approach that relies on the weaker assumption of conditional parallel trends (Sant'Anna and Zhao, 2020; Callaway and Sant'Anna, 2021).

Our empirical results vary by gender. For males, we detect important deviations from the parallel trends assumption and obtain imprecise estimates. For females, we find instead that a more intense treatment reduced the share of graduates employed in the year after graduation by close to 3 percentage points (7 percent of the pre-treatment mean) in the full sample and by 4.6 percentage points (13.7 percent of the pre-treatment mean) in the industrialized Northern and Central regions of the country. The share of graduates enrolled as full-time college students during the same period

---

[3] For a description of the German dual system, see here.

[4] The experience of ASL can also help students to understand what they do not want to do and what type of jobs they are not interested in (Bertoni et al., 2021).

[5] If the relationship between treatment and outcomes is linear, our investigation is also informative of the effects of introducing ASL.

also increased, by 4.3 percentage points (13 percent) in the full sample and by 4.6 percentage points (9.6 percent) in Northern and Central Italy. These effects imply that the residual share of female NEETs in the year after graduation declined by about 1.6 percentage points (roughly 6 percent) in the entire country and did not change in the North and Centre.

Our results indicate that the more intense exposure to work-based learning during high school induced by the reform on treated students did not ease their school-to-work transition after high school (with respect to less intensely treated students) but facilitated instead – for females located in the industrialized part of the country – the enrollment in higher education as fulltime students, with the consequent postponement of labor market entry.

A potential mechanism behind these findings is that a more intensive use of ASL provided female students in technical schools with a more comprehensive information about their labor market prospects as high school graduates. Since these prospects turned out to be, on average, relatively less attractive than those available with a college degree, female students in technical schools decided to delay labor market entry by enrolling in higher education, hoping that a college degree could lead to better job opportunities.

Consistent with this mechanism, we find that a more intensive exposure to ASL reduced the share of female graduates who enrolled in college two years after graduation, following a year of employment. Prior to the introduction of ASL, labor market information for high school graduates was primarily acquired through post-graduation work experience. After the reform, however, more intensive work-based learning could have served as a substitute for post-graduation employment as provider of the relevant information — thereby reducing subsequent transitions from employment to college enrollment. The plausibility of this mechanism is supported by the results of a set of semi-structured interviews conducted with ASL school coordinators, reported in the Appendix.

Our paper is related to two strands of literature. The first strand compares work-based with school-based vocational education, where the former typically includes apprenticeships, and finds that work-based systems improve the school- to-work transition (Alfonsi et al., 2020; Bonnal et al., 2002; Cahuc et al., 2024; Parey, 2016; Riphahn et al., 2016 and Plug et al., 1998). The second strand considers work-based learning in tertiary education, which includes internships. Nunley et al., 2016, use experimental data from the US and find evidence that internships improve employment prospects. Margaryan et al., 2020, use German data to show that graduates who completed a firm internship face a lower risk of unemployment during the first year of their careers. Finally, Bentolila et al., 2023, find that a Spanish reform introducing dual VET at the tertiary level led to a substantial improvement in the school-to-work transition.[6]

Compared to this literature, our results are less optimistic about the short-term effects of work-based learning in high school on the school-to-work transition after high school. We cannot exclude, however, that work-based learning could ease the transition after college. Whether this is

[6] See also Baert et al., 2021.

the case remains an open question that cannot be addressed with the data at hand. In addition, since more intense treatment in high school encourages college enrollment, there might be longer term benefits for recipients, in terms of higher earnings and better job opportunities, and for society at large.

The paper is organized as follows. Section 1 presents the institutional setup. Section 2 describes the introduction of ASL and the 2015 reform. Section 3 introduces the data. Our empirical approach is described in Section 4 and results are shown in Section 5. Conclusions follow.

2. Institutional setup

In Italy, upper secondary education begins upon completion of lower secondary school, typically at age 14. It lasts three to five years and is divided into academic and vocational tracks. The vocational track includes three- and five-year professional schools (*istituti professionali*) and five-year technical schools (*istituti tecnici*). The academic track encompasses five-year high schools with a more general education, emphasizing theoretical knowledge with a focus on artistic classical, linguistic, pedagogical, or scientific studies (*licei*).

Vocational and academic tracks differ not only in orientation but also in learning goals: academic schools specialize in a particular field (humanities, arts, or science), while also incorporating a comprehensive range of general subjects (e.g., mathematics, chemistry, physics and biology, history, geography, Italian language and literature); conversely, vocational schools concentrate more on technical and practical subjects (e.g., technology, informatics, engineering, construction and accounting), with a focus on developing industrial and administrative skills.

As shown by Agarwal et al., 2021, students graduating from vocational high schools are much less likely to complete college than those graduating from academic tracks (13.1 versus 53.7 percent in 2016). Although vocational high school graduates generally achieve lower final scores than their academic counterparts (77.1/100 vs. 79.9/100), the selected minority enrolling in college graduate from high school with the same average scores (83.3/100).

3. The introduction of ASL programs

Introduced in Italy in 2003, ASL gave high school students the opportunity to integrate theoretical education with practical learning in real-world settings, such as firms, the public sector and non-profit organizations. Work-based learning was initially optional, and schools were responsible for organizing ASL activities. Therefore, these initiatives were more frequent in vocational than in academic high schools, because the former had already in place a network of connections with local employers.

Although the Decree 87/2010 made ASL compulsory for 12th and 13th graders in professional schools for a total of 132 hours, only a minority of students participated in ASL before the 2015/16 school year. For instance, according to data by the Ministry of Education, in the 2014/15 school year, only 18.5 percent of eligible high school students were involved in these programs.

In 2015, Law 107 (also known as *"La Buona Scuola"*, the Good School) made ASL compulsory for all upper secondary students in grades 11, 12 and 13, irrespective of the track, with the declared purposes of increasing job opportunities after graduation and improving the ability to choose among alternative paths after high school. However, the intensity of the program varied across tracks, with students in vocational and academic high schools required to complete, respectively, at least 400 and 200 ASL hours during their final three years.

In addition to experiences conducted out of school, involving firms, professionals, public institutions and non-profit organizations – ASL activities could be performed also within schools, by participating in virtual enterprise laboratories where teachers and students simulated real-world business operations (*"impresa formativa simulata"*).

The reform was phased in progressively, involving 11th graders in the 2015/16 school year, 11th and 12th graders in 2016/17, and 11th to 13th graders in 2017/18. Therefore, the first cohort fully affected by the reform was the one graduating in 2018. By the end of the 2016/17 school year, 90 percent of all upper secondary schools activated ASL programs, involving about 900 thousand students. Table 1 shows that the percentage of students in grades 11 and 12 involved in the program was close to 90 percent in all school tracks and curricula.

Using data provided by *Alma Diploma* – a non-profit association that collects data and writes periodic reports on a sample of high school graduates – which covers only out-of-school activities, we estimate that the actual number of hours spent in out-of-school ASL during grades 11 to 13 by the cohort graduating in 2017, the last not directly affected by the reform, was 157.2 on average in technical schools and 82.1 in academic schools. For the cohort graduating in 2018, the first directly affected by the reform, the actual number of hours spent in out-of-school ASL was 263.8 on average in technical tracks and 111.4 in academic tracks. Therefore, the increase in ASL hours spent outside the school induced by the 2015 reform was significantly larger for students in technical tracks (≈+100, relative to the average of the previous cohort) than for students in academic tracks (≈+30, relative to the average of the previous cohort).[7]

A key challenge in organizing school-work-alternation programs has been securing the willing participation of employers (Gentili, 2018). Due to existing networks involving local industries, vocational schools, both professional and technical, have been better equipped to address this challenge than academic schools, which, in most cases, had no contact with the world of work beyond the school context (Giancola and Salmieri, 2021).[8]

Table 2 illustrates the distribution of hosting institutions for 11th and 12th grade students in the academic and technical tracks who were involved in ASL during the 2016/17 school year. As expected, the involvement of firms and private sector professionals as hosts was much higher for students in technical schools (59.3 percent) than for those in academic schools (40.7 percent). The

[7] Unfortunately, data on hours of in-school ASL activities are not available. Tables A1 and A2 in the Appendix report, for the cohorts graduating in 2017 and 2018, the average number of out-of-school ASL hours by school curriculum, gender and geographical area.

[8] For academic schools, the reform "...represented a disruptive rupture in the school experience, leading to a crisis within these schools and new and unforeseen pedagogical and organizational dilemmas. The idea of incorporating work experience at an earlier stage was perceived as foreign to this type of school program and was rejected by teachers and families..." (Pinna and Pitzalis, 2024).

public sector and non-profit organizations accounted instead for 21.6 and 35.7 percent of hosts for students in technical and academic tracks, respectively. Finally, about 10 percent of all programs were implemented in schools, with a higher share among students in academic tracks. Many of the features of ASL described here are consistent with the qualitative evidence reported in the Appendix.

In the 2018/19 school year, ASL programs were downsized to cut expenses. The 2019 budgetary law (Law 145/2018) reduced also the required ASL hours, setting a minimum at 210 hours for professional schools, 150 for technical schools and 90 for academic schools. In addition, mainly because of the strong opposition from academic schools, and starting from the 2019/20 school year (Decree 774/2019), ASL was re-designed to emphasize the development of transversal skills and student orientation activities (and the name changed to PCTO – *Percorsi per le Competenze Trasversali e l'Orientamento*), thereby placing less emphasis on work-based learning.

A key implication of these institutional changes is that the first cohort of high school students who was affected by the 2015 reform – the 2018 graduates – was also the last, because younger cohorts of graduates experienced a treatment that was both less intense and with different contents.

4. The data

We evaluate the impact of the 2015 reform by combining three sources of data:

1. Administrative data on the universe of students graduating from academic and technical high schools during the period 2012 to 2018 (source: National Student Registry – *Anagrafe nazionale degli studenti*, Italian Ministry of Education). These data have information both on schools (unique identifying code, school type, private or public status, the municipality where the school is located) and on high school graduates (graduation year, gender, nationality, age, final grade).

2. Administrative data on college enrollment (source: National Registry of University Students and Graduates – *Anagrafe nazionale degli studenti universitari e dei laureati*, Italian Ministry of University and Research).

3. Administrative data on labor contracts (source: Compulsory Employment Notifications – *Comunicazioni obbligatorie*, Italian Ministry of Labor), which contain information on all labor contracts, including the date of start and end, from September of the graduation year to September of the following year.

We compute two outcomes for the year following high school graduation: the probability of being employed and the probability of being enrolled as a full-time student in college. Figures A1 and A2 in the Appendix illustrate the evolution of these outcomes during the years 2012-2018, by gender

Skills2Capabilities

Co-funded by the European Union

and school track. While the share of high school graduates employed one year after graduation exhibits a positive trend, the share enrolled in college is either flat or mildly decreasing.[9]

Our sample includes three groups of cohorts:

1. The cohorts graduating between 2012 and 2015, which were not exposed to the reform implemented in the 2015/16 school year. These are the pre-treatment cohorts.
2. The cohorts graduating between 2016 and 2017, which were not *directly* exposed to the reform but were in school after its introduction and therefore may have been *indirectly* affected by interacting with treated students in lower grades.
3. The cohort graduating in 2018, or post-treatment cohort, the first directly affected by the reform. The students belonging to this cohort were in grade 11 in 2015/16 (when the reform was introduced), in grade 12 in 2016/17 and in grade 13 in 2017/18 (when the reform was extended to the highest grade).

We exclude the cohorts graduating in 2016 and 2017, because they were only indirectly affected by the reform. Therefore, our working sample includes the cohorts from 2012 to 2015 and the 2018 cohort – with only the last one directly affected by ASL.[10] We also exclude from our sample the students enrolled in professional schools, for whom ASL was mandatory before the 2015 reform and who typically have lower academic ability than students in academic and technical schools.

For each year, our data cover four academic school curricula (classical, scientific, foreign languages and human sciences)[11] and two technical school curricula (economic and technological). Table 3 presents, for each curriculum, the percentage of female and foreign graduates, the percentage employed and enrolled as full-time college students in the first year after graduation, and the percentage employed in the first year who enroll in college in the second year.

While the percentage of foreign graduates is generally small, the share of female graduates ranges from 15 percent in the technological curriculum to 91 percent in the human sciences curriculum. The percentage of graduates enrolled as full-time college students ranges from 26.7 percent in the technological curriculum to 81.1 percent in the classic curriculum. On the other hand, the percentage of graduates who were employed in the year after graduation ranges from 9 percent among graduates in the classical curriculum to 39.3 percent for graduates in the technological curriculum. Finally, the share of graduates who were employed in the first year and enrolled in college in the second year is small but generally higher in the technical tracks (close to 2 percent) than in the academic ones (close to 1 percent in the classical and scientific curricula).

[9] Real GDP in Italy declined sharply between 2012 and 2013 and grew between 2015 and 2018. In 2018, its value was close to the value attained in 2011.

[10] We exclude from our sample the small sub-sample of private schools, which are typically smaller than public schools in terms of students enrolled. Unfortunately, our dataset does not include information on the duration of each ASL episode, the type of host and the activities performed.

[11] We exclude the artistic track because its graduates are likely to enroll in non-university higher education institutions (e.g., *Accademia di Belle Arti*, Academy of Fine Arts), for which we lack enrollment data (see also page 7 in the latest Eduscopio report).

5. The empirical strategy

We evaluate the impact of the 2015 reform that made work-based learning compulsory in Italian high schools using difference-in-differences (DID), which compares graduates of technical high schools (*treatment group*) with graduates of academic high schools (*control group*) before and after the reform.

In this setup, the difference between treatment and control is not the presence versus the absence of treatment, but rather the higher intensity (400 versus 200 hours) and different type (higher involvement of firms and professionals) of treatment experienced by students in technical tracks compared to students in academic tracks. We use graduates of the latter as proxies of the counterfactual, under the identifying assumption that, absent the treatment, the outcomes for the treated and control groups would have followed parallel trends.

While schools offering different curricula are a candidate unit of observation, over the sample period spanned by our data only 65.8 percent of schools in our working sample are always present with the same identifier. Several schools are re-organized, either by merging with other schools due to the declining student population or by spinning off new organizations. We overcome this reporting issue by choosing the school municipality as the relevant level of aggregation, and by collapsing the original student-level data by year of graduation, school municipality, gender and curriculum (classical, scientific, foreign languages, and human sciences in the academic track, and economic and technological in the technical track).

This aggregation is appropriate because the treatment varies by track rather than by student and creates a pseudo-panel dataset composed of municipality-by-curriculum units that can be followed over time. This panel structure allows us to better exploit the longitudinal dimension embodied in our data. For instance, we can use municipality-by-curriculum characteristics observed at the beginning of the observation period to support a conditional parallel trends hypothesis – an approach that would not be feasible if the data were analyzed at the student level and treated as repeated cross-sections.

We provide separate estimates by gender, as post-graduation outcomes vary substantially between female and male graduates. For instance, the share of high school graduates enrolled in college one year after graduation in 2019 was 71.5 percent for females and 61.6 percent for males (Alma Diploma, 2020). In the same year, the employment rate of females and males aged 18-29 with a high school diploma was 34.1 and 48.1 percent respectively (ISTAT, 2019).

Panel a) of Figure 1 shows, by gender and track, the pre-treatment trends between 2012 and 2015 in the share of high school graduates employed in the year after graduation. As expected, there are significant deviations from the parallel trends hypothesis. For instance, in 2014 and 2015, when the Italian economy started recovering from the recession following the government debt crisis of 2011, the share employed one year after graduation increased for technical school graduates but remained roughly constant for academic school graduates. Deviations are more pronounced for males than for females. Within the academic track, only the foreign languages curriculum displays a moderately increasing trend.

Panel b) of Figure 1 reports the evolution of the share of high school graduates enrolled as full-time college students in the year after graduation. In this case, trends are rather flat for both tracks and genders. However, within the academic track we observe a moderate declining trend for the foreign languages curriculum, especially for males, and a sharp increase between 2014 and 2015 for the human sciences curriculum.[12]

We address the problem of divergent trends with a two-fold strategy of sample selection. First, we expect that parallel trends are more likely for curricula in the academic and technical track that share similar observable characteristics. This leads us to exclude the technological curriculum in the technical track, because of its very high share of male graduates (85 percent) – unmatched by other curricula (see Table 3). Therefore, we choose as treated sample the graduates of the economic curriculum in the technical track.

The choice of the control sample is less straightforward. On the one hand, the foreign languages curriculum in the academic track has a share of foreign students which is closest to the one in the treated sample. On the other hand, the scientific curriculum is closed to the latter in the share of female students (see Table 3). We favor the former curriculum because it is often perceived by teachers and parents as less academically demanding than the classical and scientific curricula, and comparable to a good technical school.[13] This choice is supported by the empirical evidence discussed below, showing that the hypothesis of parallel trends is not rejected when the foreign languages curriculum is selected as the control group, but rejected when the scientific curriculum is chosen.

Second, deviations from the common trend can partly be ascribed to variations over time in the composition of the pool of students in the different curricula, and to asymmetries in the economic contexts where schools are located. We facilitate the comparison of trends across treatment and control samples by restricting our analysis to municipalities where both treated and control curricula are present.

While these steps are crucial to obtain internally valid estimates, we are aware that they may limit the generalizability of our findings to other curricula and municipalities. Our final working sample spanning the years 2012 to 2015 and 2018 consists of 282 municipalities for females and 238 municipalities for males observed between 2012 and 2015, and in 2018.

In terms of student counts and considering the year 2012, 172,490 males and 191,458 females graduated from any curriculum in public schools. Of these, 20,624 males and 31,886 females were

---

[12] With the Decree of the President of the Republic of 15 March 2010, No. 89, the distribution of teaching hours across subjects changed slightly in all curricula. Furthermore, the original scientific curriculum of the academic track was split in two, "regular" and "applied sciences". Similarly, the human sciences curriculum of the academic track was divided in two, "regular" and "socio-economic". In both cases, the new curricula were initially selected by a minority of students. For consistency, in our analysis we retain only students enrolled in the regular curricula. Results are however unchanged if we pool the students from the regular and the new curricula.

[13] For instance, the study of Latin in the foreign languages curriculum is limited to the first two years and involves a reduced number of teaching hours compared to the classical and scientific curricula.

enrolled in the economic curriculum of the technical track and 2,716 males and 16,719 females in the foreign languages curriculum of the academic track. Our working sample counts 11,199 males and 18,397 females enrolled in the economic curriculum and 2,185 males and 14,142 females in the foreign languages curriculum – an important share of the graduating population in the two curricula.

Table A3 in the Appendix compares observable characteristics of males and females for the year 2012 in the initial sample and in the working sample – after aggregating the data by gender, municipality, year and curriculum. The table consists of two panels, one for males and one for females, and three columns: (i) column 1 for the initial sample with all municipalities and technical and academic curricula; (ii) column 2 for the sample with all municipalities and the two selected curricula (economic and foreign languages); (iii) our working sample. Sample selection notwithstanding, the working sample is rather like the initial sample in the composition of the student population (age, graduation mark, share of Italian students). There are instead somewhat larger differences in the outcome variables.[14]

Figure 2 shows the pre-treatment trends in the two curricula of choice. For both the foreign languages and the economic curriculum, employment exhibits in most cases a positive trend, reflecting the improvement in the macroeconomic conditions after the debt crisis of 2011 and 2012. Enrollment in college shows instead a negative trend for males and no detectable trend for females, independently of the high school curriculum.

Even in the selected sample the parallel trends assumption is not satisfied, although deviations are now less pronounced. This is confirmed by the evidence reported in Appendix Tables A4 and A5, where we show – separately for males and females – the coefficients from a two-way fixed effects (TWFE) model estimated in the 2012-2015 sample. The model includes cohort and curriculum-by-municipality fixed effects and interaction terms between cohort and treatment status (taking the 2015 cohort as the omitted reference category). The coefficients are statistically different from zero, especially for the share employed in the first year after graduation and for the 2012 and 2013 cohorts.

Because of these findings, we rely on a conditional, rather than unconditional, parallel trends assumption for identification, and assume that trends are parallel only among municipalities where the composition of students in the treated and control curricula are similar (see, for instance, Roth et al., 2023). More in detail, we assume that trends are parallel between the economic curriculum in the technical track and the foreign languages curriculum in the academic track *conditional* on macro-area dummies and a set of observable municipality-by-curriculum covariates measured at

[14] Compared with the initial sample, in the working sample both the average number of male high school graduates per cell, and the share of Italian students are smaller (28.0 versus 46.2 and 95.8 versus 97.2 percent respectively). The percentage of male graduates employed in the year after graduation is higher in the working than in the initial sample (25.1 versus 22.5 percent). On the other hand, the share of graduates enrolled in college during the same period is smaller in the working sample (48.5 versus 52.8 percent). Finally, the initial and the working sample have 1,071 and 238 municipalities. Turning to female high school graduates, the average number per cell is larger in the working (57.4) than in the initial sample (51.4). While the average probability of employment is also larger in the working sample (27.5 versus 20.8 percent in the initial sample), the probability of college enrolment is lower (48.4 versus 56.8 percent). The number of municipalities is 282 in the working sample and 1,051 in the initial sample.

the beginning of the sample period (2012), which include the number of students, the share of native students, the average age at graduation and the average graduation mark.

We implement conditional parallel trends by adopting the Sant'Anna and Zhao (2020, SZ hereafter) doubly robust DID estimator.[15] Since SZ applies to the canonical 2x2 (two groups and two periods) DID, we first split the sample into many two-period subsamples and then apply SZ to each 2x2 portion (see Callaway and Sant'Anna, 2021). The 2012-2015, 2013-2015 and 2014-2015 pairs are used to test the hypothesis of (conditional) parallel trends, while the 2015-2018 pair is used to produce the estimate of the causal effect.

For each pair and outcome, the doubly robust DID estimator is obtained using the following steps:

1. The propensity score of the treatment for each unit is estimated, based on a logistic regression model and using the predetermined conditioning variables listed above.
2. For the control sample (academic track, foreign languages curriculum) the first-differenced outcome is regressed on the set X of conditioning variables, weighting observations by the inverse of the propensity score estimated in step 1). This step estimates the relationship between track characteristics and the change in the outcome, absent the treatment.
3. The average treatment effect on the treated (ATT) is estimated by removing the change in the outcome given X predicted for the treated units by the model estimated in step 2) from the actual change in the outcome given X observed among these same units. In carrying out this step, we satisfy the required assumption of common support by retaining only the levels of propensity score that are associated to both treatment and control units, and compute standard errors of treatment effects that are robust to clustering at the municipality-by-curriculum level using asymptotic formulae (see Callaway and Sant'Anna, 2021).

In unreported estimates, we have also replicated our tests to verify whether the unconditional and the conditional parallel trends hypotheses hold when the control group is the scientific curriculum of the academic track, and reject both hypotheses, further corroborating our choice to use the foreign languages curriculum in the academic track as the control group.

6. Results

Table 4 shows the summary statistics of the outcomes and explanatory variables in the final sample, disaggregated by gender. This sample includes two school types in each municipality: technical schools with an economic curriculum (the treated group) and academic schools with a foreign languages curriculum (the control group). While 21.1 and 37.3 percent of male students graduating from the academic and the technical track are employed in the year after graduation, 56.7 and 34.5 percent are enrolled as full-time students in college. The percentages for females are similar. Most of these students are natives, and the average school size is close to 74 students in

[15] Adding predetermined controls in the canonical TWFE model, possibly interacted with time dummies or time trends, produces biased estimates if the effects of the treatment are heterogenous. If this heterogeneity depends on the controls, the included interactions will absorb part of the true effect of the treatment (see Meyer, 1995, Abadie, 2005, and Roth et al., 2023).

the academic track (62 of which are females) and to 118 students in the technical track (68 of which are females).

6.1 Baseline findings

Tables 5 presents our baseline results, separately for males and females. Each table includes two columns, one for each selected outcome: the share of graduates employed in the first year since graduation and the share of graduates enrolled as full-time college students in the first year since graduation. The rows of the tables report the treatment effects for different cohorts, with the reference pre-treatment cohort being the one graduating in 2015.

The results for males (columns (3) and (4) in the table) show important deviations from the parallel trends assumption. For instance, the interaction between the treatment and the cohort graduating in 2013 attracts a large and statistically significant coefficient (0.068). In addition, the estimates of the treatment effects are severely underpowered. These imprecise results are likely due to the relatively small number of male graduates in the foreign languages curriculum – the control group. For this group, the average number of observations in each cell is 12.2, much smaller than for the treatment group (49.8).

Things look better for females. In this case, the standard errors are generally smaller than those for males, and the coefficients associated with the pre-treatment period are often close to zero, leading us to conclude that the hypothesis of conditional parallel trends is not rejected by the data. There is also evidence – see column (1) in Table 5 – that the differential treatment produced by the 2015 reform has had a statistically significant and *negative* effect on the share of treated females who are employed one year after graduation.

Our estimates indicate that this share decreased after the treatment by 2.7 percentage points, or 7 percent with respect to the pre-treatment mean, a sizeable effect. The estimated negative effect implies that a more intense treatment – both in terms of mandatory ASL hours and in terms of work-based learning in firms and professionals – worsened the school-to-work transition of treated female high school graduates relative to the control group.

As a placebo experiment, we replicate our estimates using as control group female graduates from the technological curriculum of the technical track. Since the intensity of ASL (400 hours) does not vary within the technical track and the importance of firms and professionals is comparable, we should find no statistically significant effect of the treatment. In line with our expectations, we estimate that this effect is 1.5 percentage points (standard error: 3.2 percentage points) on the share employed.[16]

Since Italy is characterized by important regional imbalances in economic development, with an industrialized North and Centre and a less developed South, we replicate the estimates in Table 5 separately by macro-area – Table 6 for the North and Centre and Table A6 for the South. We find that

[16] Our results are also robust to the inclusion of years 2016 and 2017 as (indirectly) treated years.

most of the violations of the parallel trends assumption occurs in the South, both for males and females.

We also find that, in the North and Centre, the effect of the treatment on employment is negative for both males and females, but statistically significant only for the latter. Furthermore, the estimated effect for females is much larger than in the full sample: -4.6 percentage points, or -13.7 percent. There is also evidence that the share of graduates who enrolled in college one year after graduation increased for both genders, although the estimated effect is statistically significant only for females (+4.6 percentage points, or a 9.6 percent increase).

For the less developed South, our estimates are either imprecise – as in the case of female employment – or affected by deviations from the parallel trends assumption or characterized by implausibly large and often imprecise coefficients – as in the case of male college enrollment.

A candidate explanation behind the uncovered negative effects of the reform on the share of females employed after graduation is that the higher number of hours spent outside schools and in the world of work during high school could have induced many female graduates of technical schools to delay labor market entry and enroll in full time higher education, especially in the industrialized North and Central areas of the country. The time spent in ASL activities during high school could have substituted employment after graduation as the standard way of sampling and learning about labor market options. A key contribution of spending longer hours – mainly in private institutions – doing work-based learning could have been to enrich the information set available to female students, providing them with a better understanding of labor market prospects for high school graduates, even without entering employment after graduation.

To verify this view, we estimate the effects of the treatment on the share of females who were employed in the first year after graduation but enrolled in college in the second year. This share includes those unsatisfied with their employment experience and those who wish to improve their labor market prospects by investing in college. If a more intense ASL experience acts as a substitute for employment as a way of collecting information about labor market prospects, we should find that the exposure to treatment reduced the percentage of females employed in the first year who enroll in college in the second year after graduation.

In line with our expectations, we find that the differential treatment reduced this share for female graduates of technical high schools relative to graduates in the control group by 33.1 percent in the full sample and by 52 percent in the Northern and Central areas of the country.[17] This interpretation of our results is also corroborated by the semi-structured interviews we carried out with ASL coordinators – see the Appendix.

We have shown that the negative effects on employment and positive effects on college enrollment concentrate in the more industrialized areas of the country. One possible explanation is that in these areas, with their higher density of private firms, the probability that ASL involves these firms

[17] The estimated change in percentage points is -0.78 (standard error: 0.57) in the full sample and -1.3 (standard error 0.06) in the Northern and Central regions.

is higher than in less developed areas. Therefore, the information collected during ASL is more salient about future labor market prospects than the one gained in activities carried out in schools ("*impresa formativa simulata*", i.e. simulation of real-world business operations).

In support of this view, data from *Alma Diploma* indicate that in 2018 the share of out-of-school ASL activities involving firms rather than schools was close to 92 percent in the Northern and Central areas and 73 percent in the South. Moreover, the Italian National Institute of Statistics, 2018, reports that, in 2015, the average number of agreements with ASL hosts per high school was much higher in the North and Center (around 50) than in the South (around 15), where the percentage of schools without any agreements was also higher.

The observed differential decline in the share enrolling in college during the second year is unlikely to be driven by the COVID-19 pandemic, that led instead to extensive lockdowns in 2020 and to an increase in college enrolment (according to the Italian Ministry of University and Research, the academic year 2020/21 is the one recording the highest number of enrollments over the last 20 years).

An implication of our estimates is that the differential ASL treatment induced by the 2015 reform reduced the share of female NEETs among high school graduates with an economic curriculum in the technical track by 5.9 percent in the full sample (percentage effect: -1.64; standard error: 2.58) and by close to zero in the Northern and Central areas of the country (percentage effect: 0.04; standard error: 1.46) – relative to their peers graduating in the foreign languages curriculum in the academic track.[18]

We stress that our results are informative about the effects of treating students in technical schools with 400 hours of ASL with respect to treating them with only 200 hours (the counterfactual). They could inform us of the effects of treating the same students with 200 hours of ASL with respect to treating them with no ASL only if the relationship between the intensity of the treatment and outcomes is linear. Failing linearity, and in the absence of a counterfactual with zero exposure to ASL, our paper is silent about the effects of introducing ASL with respect to a situation without ASL.

[18] In our data, high school graduates who are neither employed nor in fulltime college education can be in one of the following three states: a) NEET (not in education, employment or training); b) enrolled in post-secondary non-tertiary education; c) employed or enrolled in higher education abroad. Option b) applies in Italy to a tiny minority of high school graduates: according to UNESCO Statistics, 2.9 million Italian students were enrolled in high school in 2021, slightly more than 2 million were enrolled in tertiary education and only 2,576 students were enrolled in post-secondary education. Regarding option c), it is difficult to obtain reliable estimates of the number of young Italians migrating abroad to study or work. According to the Italian Statistical Institute (as reported by the newspaper Il Sole24Ore on March 20, 2023), in 2022 close to 35 thousand Italians aged 25 to 34 migrated abroad, about half of which with a college degree. Assuming that the annual number of high school graduates is close to half a million and that the migrants without a college degree have a high school degree, the estimated percentage of high school graduates migrating abroad is small – about 3.5 percent. Therefore, option a) covers most graduates.

7. Conclusions

Programs that promote work-based learning are often expected to ease the school-to-work transition. However, by conveying useful information on labor market prospects, these programs could also affect the choice of pursuing tertiary education, therefore delaying labor market entry.

In 2015, school-work alternation programs were made compulsory in all Italian high schools, with the view that students needed to combine learning at school with work-based learning. A distinctive feature of this reform was that the intensity and type of treatment varied across school tracks. In particular, the intensity was higher, and the programs involved firms and professionals to a higher extent in technical than in academic high schools.

In this paper, we have exploited this feature to evaluate whether differences in the intensity and type of treatment influenced employment and enrollment in tertiary education in the year after high school graduation. Using a difference-in-differences approach, we have shown that exposure to more intense programs of school-work alternation, involving especially firms and professionals, reduced the probability of employment in the year after high school graduation for female graduates of technical high schools (economic curriculum), compared to graduates of academic high schools (foreign languages curriculum). The estimated negative differential effect is sizeable (-7 percent).

For treated male graduates, our results are unfortunately imprecise and plagued by deviations from the parallel trends assumption. For treated female graduates, especially those living in the Northern and Central areas of the country, the estimated reduction in the probability of employment was more than compensated by the estimated increase in the probability of enrolling in full-time college education. Because of this, their probability of being neither in employment nor in college decreased, albeit marginally.

We have interpreted our findings by arguing that a key contribution of spending longer hours – mainly in private institutions – doing work-based learning could have been to enrich the information set available to female students in technical schools, providing them with a better understanding of labor market opportunities both with a high school diploma and with higher education. We have shown that this broader understanding could have substituted the learning gained by employment during the first year after graduation, thus reducing the share of female graduates employed in the first year and enrolled in college in the second year.

Our study points out that work-based learning during high school is not only an opportunity to learn practical skills and to establish useful connections with the labor market, but also plays an important orientation role, giving students the opportunity to understand what they like and they do not like, and to realize whether they want to start working right after high school or to postpone work after completing college.

References

Abadie, A. (2005), Semiparametric difference-in-differences estimators. *Review of Economic Studies*, 72(1), 1–19.

Agarwal, L., Brunello, G., & Rocco, L. (2021), The pathways to college. *Journal of Human Capital*, 15(4), 554–595.

Alfeld, C., Charner, I., Johnson, L., & Watts, E. (2013), *Work-based learning opportunities for high school students*. National Institute for Work and Learning.

AlmaDiploma. (2020) *XIV Indagine, Esiti a distanza dei diplomati – a uno e tre anni dal diploma*.

Alfonsi, L., O. Bandiera, V. Bassi, R. Burgess, I. Rasul, M. Sulaiman, and A. Vitali, (2020), Tackling youth unemployment: evidence from a labor market experiment in Uganda, *Econometrica* 88: 2369-2414

Baert, S., Brecht, N., Siedler, T., Tobback, I., & Verhaest, D. (2021). Student internships and employment opportunities after graduation: A field experiment. *Economics of Education Review*, 83, 121–141.

Bentolila, S., Cabrales, A., & Jansen, M. (2023). *Does dual vocational education and training pay off?* IZA Discussion Paper, No. 16688.

Bertoni, F., Cuzzocrea, V., & Mandich, G. (2021). Orientare al lavoro o riorientare alla scuola? Vissuti di Alternanza Scuola-Lavoro in un'area metropolitana. *Scuola Democratica*, 2, 333–351.

Bonnal, L., Mendes, S., & Sofer, C. (2002). School-to-work transition: Apprenticeship versus vocational schools in France. *International Journal of Manpower*, 23, 426–442.

Cahuc, P., & Hervelin, J. (2024). The effect of workplace vs school-based vocational education on youth unemployment: Evidence from France. *European Economic Review*, 354–389.

Callaway, B., & Sant'Anna, P. H. (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics*, 225(2), 200–230.

Cedefop. (2017). *Apprenticeship review: Italy. Building education and training opportunities through apprenticeships*. Publications Office of the European Union.

D'Agostino, S., & Vaccaro, S. (2021). *Apprenticeship in evolution: Trajectories and prospects of dual system in Europe and in Italy.* INAPP Working Paper, No. 76.

Eichhorst, W., Rodríguez-Planas, N., Schmidl, R., & Zimmermann, K. (2012). *A roadmap to vocational education and training systems around the world*. IZA Discussion Paper, No. 7110.

Hanushek, E., Schwerdt, G., Woessmann, L., & Zhang, L. (2017). General education, vocational education and labour market outcomes over the lifecycle. *Journal of Human Resources*, 52(1), 48–87.

Hoffman, N. (2011). *Schooling in the workplace: How six of the world's best vocational education systems prepare young people for jobs and life*. Harvard Education Press.

Gentili, C. (2018). Alternanza scuola-lavoro. Un bilancio. *Scuola Democratica*, 2.

Giancola, O., & Salmieri, L. (2021). Alternanza scuola-lavoro. *Scuola Democratica*.

INDIRE. (2013). *Alternanza scuola lavoro: Lo stato dell'arte*. Florence.

Italian National Institute of Statistics – ISTAT. (2018). Rapporto annuale 2018. La situazione del Paese. Doi.org/10.1481/Istat.Rapportoannuale.2018

Italian National Institute of Statistics – ISTAT. (2019). *Employment rate, by education and age – data for 2019*. IstatData.

Italian Ministry of Universities and Research, (2018), *Focus "Alternanza scuola Lavoro"*, Statistica e Studi, May 2018.

Margaryan, S., Santer, N., Schumann, M., & Siedler, T. (2020). Do internships pay off? The effects of student internships on earnings. *Journal of Human Resources*, 57(4), 1242–1273.

Meyer, B. D. (1995). Natural and quasi-experiments in economics. *Journal of Business & Economic Statistics*, 13(2), 151–161.

Muehlemann, S. (2016). *The costs and benefits of work-based learning*. OECD Education Working Paper, No. 143.

Nunley, J., Pugha, A., Romero, N., & Seals, A. (2016). College major, internship experience and employment opportunities. *Labour Economics*, 38, 37–46.

Parey, M. (2016). Vocational schooling versus apprenticeship training: Evidence from vacancy data. *VfS Annual Conference 2016 (Augsburg): Demographic Change*, 145655.

Pinna, G., & Pitzalis, M. (2024). Field effects and work based learning: The case of school-work alternance in Italy. *European Journal of Education*. In print.

Plug, E., & Groot, W. (1998). *Apprenticeship versus vocational education: Exemplified by the Dutch situation*. Mimeo, University of Amsterdam.

Quintini, G., Martin, J., & Martin, S. (2007). *The changing nature of the school to work transition in OECD countries*. IZA Discussion Paper, No. 2582.

Riphahn, R. T., & Zibrowius, W. (2016). Apprenticeship, vocational training, and early labor market outcomes: Evidence from East and West Germany. *Education Economics*, 24, 33–57.

Ross, M., Kazis, R., Bateman, N., & Statelar, L. (2020). *Work-based learning can advance equity and opportunities for America's young people*. Brookings Institution, Metropolitan Policy Program.

Roth, J., Sant'Anna, P. H., Bilinski, A., & Poe, J. (2023). What's trending in difference-in-differences? A synthesis of the recent econometric literature. *Journal of Econometrics*, 235(2), 2218–2244.

Rustico, L., Ramona, D., & Ranieri, A. (2020). Apprenticeship in the Italian approach to the dual system. *European Review of Labor and Research*, 26(1), 91–103.

Sant'Anna, P. H., & Zhao, J. (2020). Doubly robust difference-in-differences estimators. *Journal of Econometrics*, 219(1), 101–122.

Savorani, C. (2021), *Il valore dell'esperienza nei progetti di Alternanza Scuola Lavoro. Le testimonianze di giovani studentesse e studenti della scuola secondaria di secondo grado del territorio di Cesena e Forlì*, Bologna University, 10.6092/unibo/amsacta/6734.

Stern, D., Finkelstein, N., Urquiola, M. and Cagampang, H. (1997), What difference does it make if school and work are connected? Evidence on co-operative education in the United States, *Economics of Education Review*, 16(3) 213-229.

Wolter, S., & Ryan, P. (2011). *Apprenticeship*. In E. Hanushek, S. Machin, & L. Woessmann (Eds.), Handbook of the Economics of Education. Elsevier.

Tables and Figures

Table 1. Percentage of students who participated in school-to-work alternation programs (ASL) during grades 11 and 12. 2016/17 school year.

	Grade 11	Grade 12
Academic track		
Classical curriculum	91.6	90.4
Scientific curriculum	92.1	91.2
Foreign languages	90.3	88.7
curriculum	87.3	88.1
Artistic curriculum	91.7	90.8
Human sciences		
curriculum		
	91.5	91.4
Technical track		
Economic curriculum		
Technological curriculum	88.7	90.0
Professional track		
Industry	84.5	83.4
Services	85.9	84.1

Source: Italian Ministry of Universities and Research, 2018.

Table 2. School-work alternation programs (ASL) in the 2016/17 school year, by type of host. Only students in the grades 11 and 12. Academic and technical tracks.

Host	Academic Track	Technical Track
Firms and professionals	40.7	59.3
Schools	10.5	8.2
Public sector and non-profit organizations	35.7	21.6
Other	13.1	10.9
Total	100.0	100.0

Source: Italian Ministry of Universities and Research, 2018.

Table 3. Share of female and foreign students and share employed or enrolled in college. High school graduates in 2012-15 and 2018. By school curriculum.

	Share females	Share foreign students	Share employed in the year after graduation	Share full time students in the year after graduation	Share enrolled in college two years after graduation and employment in the first year
Academic tracks					
Classic	0.713	0.011	0.090	0.812	0.008
Foreign languages	0.857	0.044	0.194	0.610	0.019
Scientific	0.500	0.020	0.120	0.772	0.010
Human sciences	0.910	0.025	0.212	0.542	0.023
Technical tracks					
Technological	0.144	0.042	0.398	0.264	0.019
Economic	0.591	0.058	0.372	0.313	0.021
Total	0.572	0.035	0.244	0.514	0.017

Table 4. Means and standard deviations of the variables in the working sample. By gender and curriculum in technical and academic schools. Cohorts graduating in 2012-15 and 2018.

	Academic-foreign languages. Males	Technical-economic. Males	Academic-foreign languages. Females	Technical-economic. Females
Share employed in the year after graduation	0.210	0.373	0.194	0.384
	(0.200)	(0.152)	(0.115)	(0.158)
Share enrolled as full-time college students in the year after graduation	0.567	0.345	0.621	0.337
	(0.234)	(0.132)	(0.128)	(0.122)
Average number of students	12.227	49.850	61.927	68.541
	(24.578)	(60.730)	(101.041)	(83.934)
Share of Italian students	0.964	0.945	0.954	0.926
	(0.081)	(0.065)	(0.044)	(0.072)
Average age	18.845	18.997	18.736	18.896
	(0.327)	(0.221)	(0.145)	(0.195)
Average graduation final mark	77.434	73.462	80.464	76.536
	(6.019)	(3.220)	(3.570)	(3.295)
Share of students in the South	0.330	0.336	0.340	0.336
	(0.470)	(0.472)	(0.474)	(0.472)
Share of students in the Centre	0.223	0.227	0.217	0.216
	(0.416)	(0.419)	(0.412)	(0.411)
Share of students in the Northeast	0.197	0.193	0.206	0.202
	(0.398)	(0.395)	(0.404)	(0.401)

Note: graduation marks in Italian high schools range between 60 and 100. Standard deviations within parentheses.

Table 5. Doubly-robust difference–in–differences estimate of the effect of ASL on employment and college enrollment. Treatment (technical high school graduates – economic curriculum) versus control (academic high school graduates – foreign languages curriculum). Females and males.

Dependent variable	Share employed one year after graduation. Females	Share enrolled in college full-time one year after graduation. Females	Share employed one year after graduation. Males	Share enrolled in college full-time one year after graduation. Males
Pre-trend testing				
Treated x cohort 2012	-0.004	0.025	0.010	0.002
	(0.026)	(0.031)	(0.047)	(0.079)
Treated x cohort 2013	0.001	0.032	0.068***	-0.080*
	(0.034)	(0.032)	(0.026)	(0.045)
Treated x cohort 2014	0.001	-0.010	0.039	-0.057*
	(0.018)	(0.030)	(0.027)	(0.031)
Treatment effect estimation				
Treated x cohort 2018	-0.027**	0.043	0.018	-0.009
	(0.013)	(0.029)	(0.043)	(0.034)
Observations	2,790	2,790	2,355	2,355
Percent effect of treatment	-0.070	0.130	0.048	-0.026
Pre-treatment mean for the treated	0.385	0.337	0.373	0.345

Notes: each cell reports the doubly robust SZ difference-in-differences estimate obtained by comparing the cohort reported in the first column with the 2015 cohort. Standard errors robust to clustering at the school-by-municipality level are reported in parenthesis. Pre-treatment controls included in the estimation are the school track-by-municipality share of Italian students, the average age at graduation, the average score at graduation, the number of students, and dummies for the macro area where the municipality is located (Northeast, Centre, and South – Northwest is the omitted reference category). Regressions are weighted by the number of students in each track-by-municipality cell. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence

Table 6. Doubly-robust difference–in–differences estimate of the effect of ASL on employment and college enrollment. Treatment (technical high school graduates – economic curriculum) versus control (academic high school graduates – foreign languages curriculum). Females and males. Northern and Central regions of Italy.

Dependent variable	Share employed one year after graduation. Females	Share enrolled in college full-time one year after graduation. Females	Share employed one year after graduation. Males	Share enrolled in college full-time one year after graduation. Males
Pre-trend testing				
Treated x cohort 2012	0.009	0.028	-0.085	0.083
	(0.044)	(0.047)	(0.080)	(0.174)
Treated x cohort 2013	-0.007	0.059	0.021	0.002
	(0.055)	(0.044)	(0.050)	(0.115)
Treated x cohort 2014	-0.012	0.032	0.004	-0.073*
	(0.303)	(0.040)	(0.039)	(0.041)
Treatment effect estimation				
Treated x cohort 2018	-0.046**	0.046***	-0.022	0.043
	(0.018)	(0.015)	(0.080)	(0.047)
Observations	1,845	1,845	1,570	1,570
Percent effect of treatment	-0.137	0.096	-0.067	0.092
Pre-treatment mean for the treated	0.336	0.469	0.325	0.466

Notes: each cell reports the doubly robust SZ difference-in-differences estimate obtained by comparing the cohort reported in the first column with the 2015 cohort. Standard errors robust to clustering at the school-by-municipality level are reported in parenthesis. Pre-treatment controls included in the estimation are the school track-by-municipality share of Italian students, the average age at graduation, the average score at graduation, the number of students, and dummies for the macro area where the municipality is located (Northeast and Centre – Northwest is the omitted reference category). Regressions are weighted by the number of students in each track-by-municipality cell. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Figure 1. Outcome trends, by gender and track. Full sample.

Panel a. Share employed in the year after graduation, by gender and track.

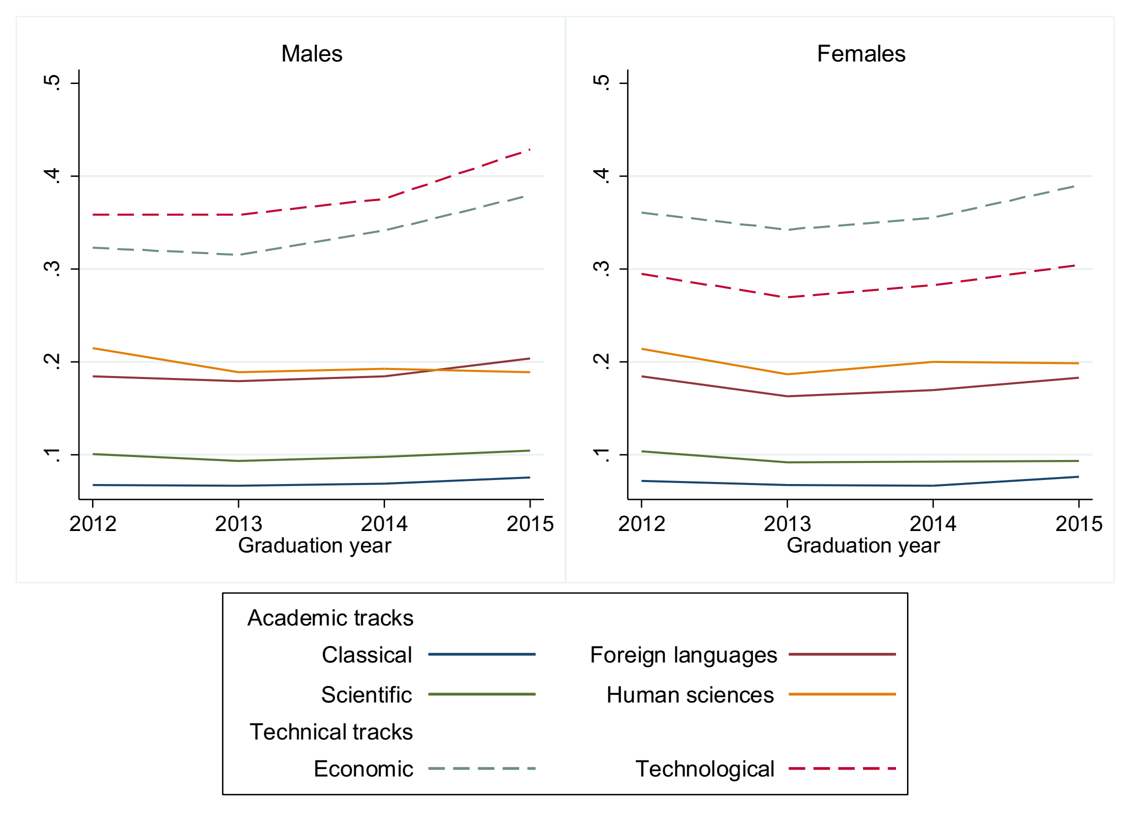


Figure 1. Outcome trends, by gender and track. Full sample.

Panel b. Share enrolled in college full time in the year after graduation.

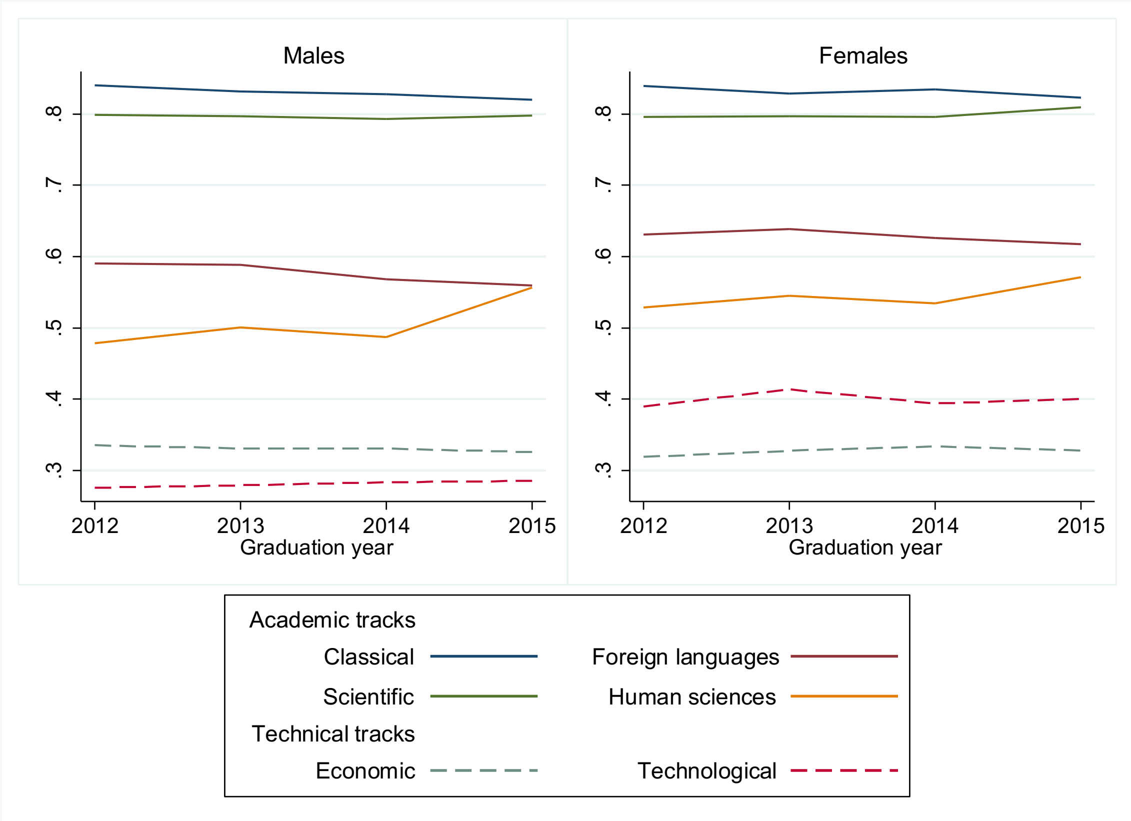


Figure 2. Outcome trends, by gender and track. Academic (foreign languages curriculum) and technical (economic curriculum). Only municipalities with both tracks.

Panel a. Share employed in the year after graduation, by gender and track.

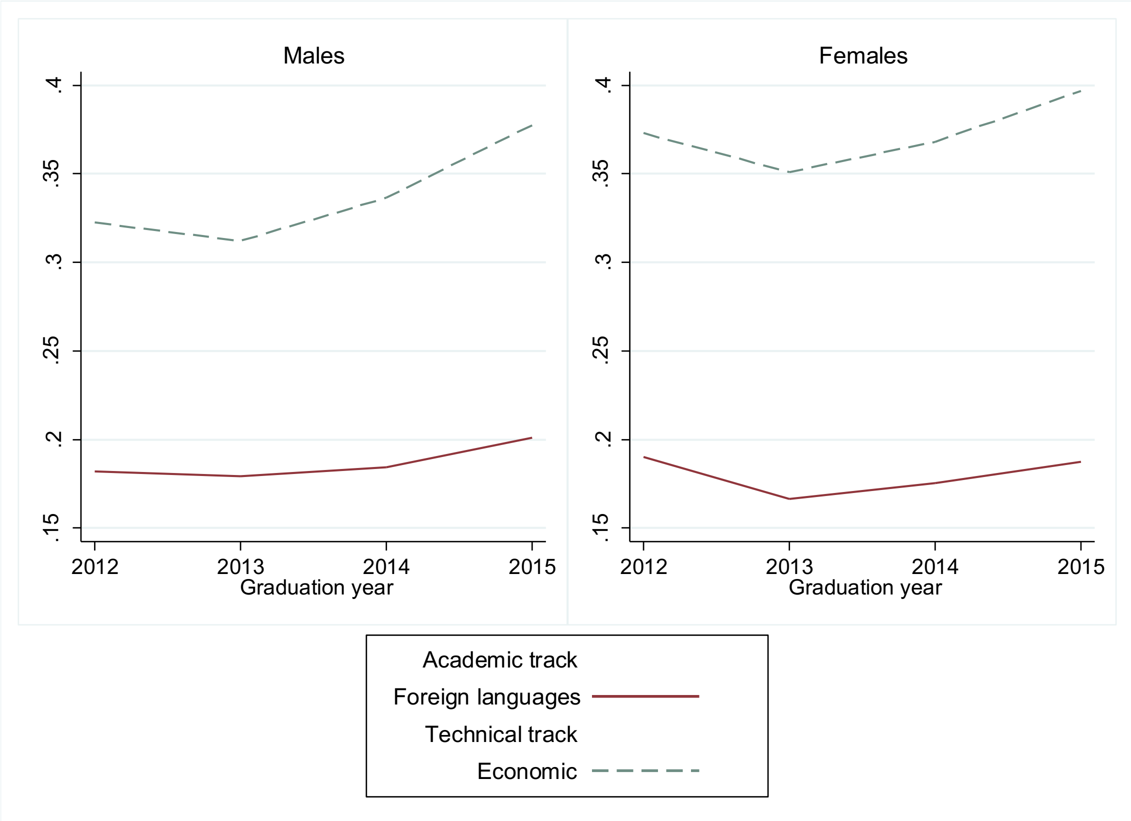
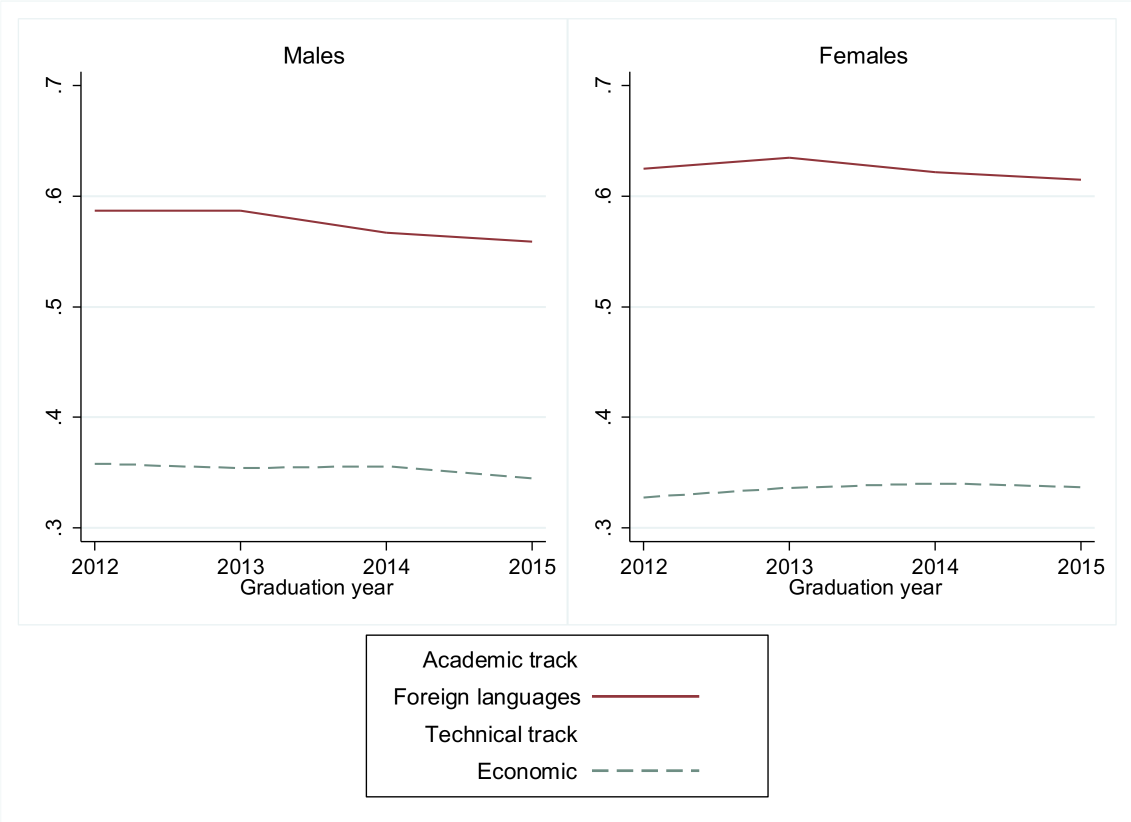


Figure 2. Outcome trends, by gender and track. Academic (foreign languages curriculum) and technical (economic curriculum). Only municipalities with both tracks.

Panel b. Share enrolled in college full time in the year after graduation.



Appendix

Tables and figures.

Table A1. Average hours spent in out-of-school ASL activities, by graduation cohort, gender and curriculum in technical and academic tracks.

	2017 Males	2017 Females	2018 Required ASL hours, any activity	2018 Males	2018 Females
Technical track					
Economic	140.21	149.64	400	245.91	258.13
Technological	171.59	164.09	400	276.24	267.61
Academic track					
Classical	73.47	74.26	200	95.50	95.29
Scientific	90.46	85.05	200	100.14	100.50
Foreign languages	96.56	92.28	200	115.36	116.44
Artistic	78.17	73.05	200	126.22	130.55
Human Sciences	78.18	83.99	200	143.10	134.53

Source: our elaborations on Alma Diploma data.

Table A2. Average hours spent in out-of-school ASL activities, by graduation cohort, area and curriculum in technical and academic tracks.

	2017 Centre-North	2017 South	2018 Required ASL hours, any activity	2018 Centre-North	2018 South
Technical track					
Economic	149.19	112.37	400	250.60	281.55
Technological	174.25	109.45	400	275.06	271.30
Academic track					
Classical	74.72	62.38	200	93.81	108.80
Scientific	88.51	80.17	200	100.79	96.43
Foreign languages	93.69	63.07	200	118.20	99.62
Artistic	72.20	89.10	200	125.50	156.37
Human Sciences	78.44	125.61	200	133.99	152.75

Source: our elaborations on Alma Diploma data.

Table A3. Summary statistics by sample. By gender, 2012.

	All municipalities and curricula	All municipalities two curricula	Selected municipalities two curricula
Females			
Share employed in the year after graduation	0.208	0.288	0.275
Share enrolled as full-time college students in the year after graduation	0.568	0.421	0.484
Average number of students in the cell	51.440	44.556	57.427
Share of Italian students	0.965	0.947	0.945
Average age	18.831	18.872	18.844
Average graduation final mark	77.855	76.567	77.199
Number of municipalities	1,051	767	282
Number of observations	2,939	1,049	564
Males			
Share employed in the year after graduation	0.225	0.292	0.251
Share enrolled as full-time college students in the year after graduation	0.528	0.400	0.485
Average number of students in the cell	46.248	22.840	28.037
Share of Italian students	0.972	0.960	0.958
Average age	18.935	18.977	18.937
Average graduation final mark	75.137	73.908	74.991
Number of municipalities	1,071	738	238
Number of observations	2,898	976	476

Skills2Capabilities

Co-funded by the European Union

Table A4. Unconditional parallel trends test - males.

Dependent variable	Share employed one year after graduation	Share enrolled in college fulltime one year after graduation
Pre-trend testing		
Treated x cohort 2012	0.025*	0.013
	(0.015)	(0.016)
Treated x cohort 2013	0.037***	0.016
	(0.013)	(0.017)
Treated x cohort 2014	0.021*	0.003
	(0.012)	(0.017)
Observations	1,884	1,884

Note: one, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Standard errors robust to clustering at the school-by-municipality level are reported in parentheses.

Skills2Capabilities

Co-funded by the European Union

Table A5. Unconditional parallel trends test - females.

Dependent variable	Share employed one year after graduation	Share enrolled in college fulltime one year after graduation
Pre-trend testing		
Treated x cohort 2012	0.026***	0.018*
	(0.008)	(0.009)
Treated x cohort 2013	0.023***	0.020**
	(0.007)	(0.009)
Treated x cohort 2014	0.016**	0.008
	(0.006)	(0.008)
Observations	2,232	2,232

Note: one, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence. Standard errors robust to clustering at the school-by-municipality level are reported in parentheses.

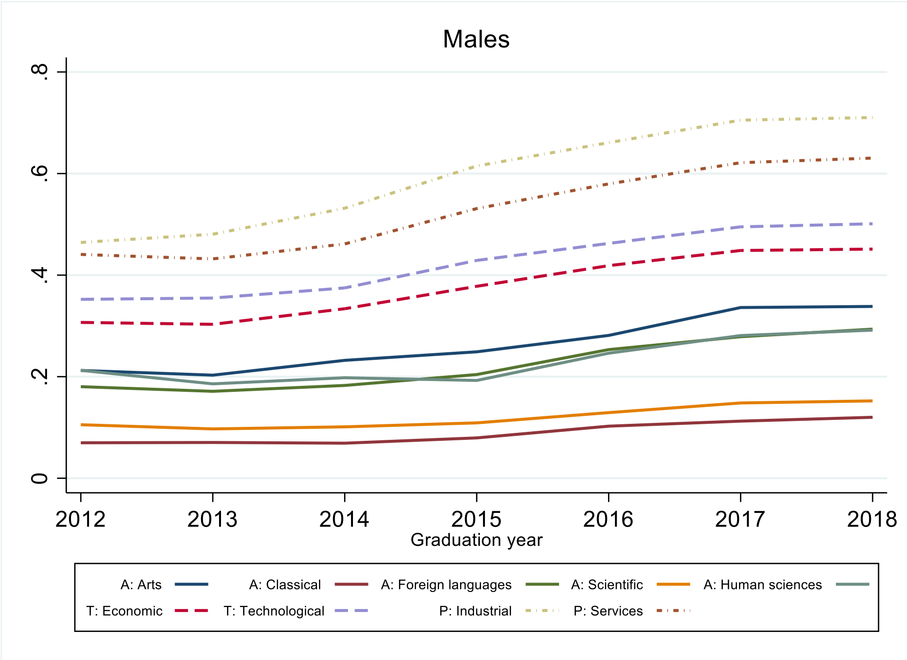
Table A6. Doubly-robust difference–in–differences estimate of the effect of ASL on employment and college enrollment. Treatment (technical high school graduates – economic curriculum) versus control (academic high school graduates – foreign languages curriculum). Females and males. South.

Dependent variable	Employed in the year after graduation. Females.	Full-time college student in the year after graduation. Females.	Employed in the year after graduation. Males.	Full-time college student in the year after graduation. Males.
Pre-trend testing				
Treated x cohort 2012	-0.036	0.035	0.074**	0.004
	(0.078)	(0.049)	(0.031)	(0.057)
Treated x cohort 2013	0.021	-0.015	0.139**	-0.111
	(0.043)	(0.028)	(0.056)	(0.089)
Treated x cohort 2014	0.012	-0.078***	0.039	-0.012
	(0.019)	(0.030)	(0.043)	(0.064)
Treatment effect estimation				
Treated x cohort 2018	0.008	0.050	0.041	-0.169***
	(0.026)	(0.107)	(0.039)	(0.055)
Observations	945	945	785	785
Percent effect of treatment	-0.039	0.102	0.179	-0.388
Pre-treatment mean for the treated	0.202	0.489	0.228	0.435

Notes: each cell reports the doubly robust SZ difference-in-differences estimate obtained by comparing the cohort reported in the first column with the 2015 cohort. Standard errors robust to clustering at the school-by-municipality level are reported in parenthesis. Pre-treatment controls included in the estimation are the school track-by-municipality share of Italian students, the average age at graduation, the average score at graduation, the number of students, and dummies for the macro area where the municipality is located. Regressions are weighted by the number of students in each track-by-municipality cell. One, two and three stars for statistical significance at the 10, 5 and 1 percent level of confidence.

Figure A1. Share of high school graduates employed in the first year after graduation. By school curriculum.

Panel a. Males



Panel b. Females

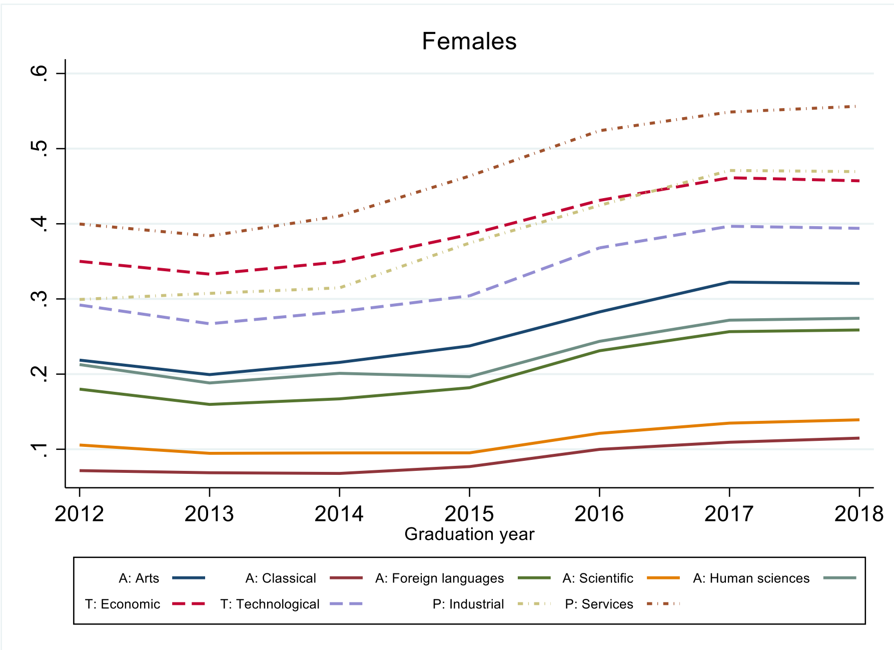
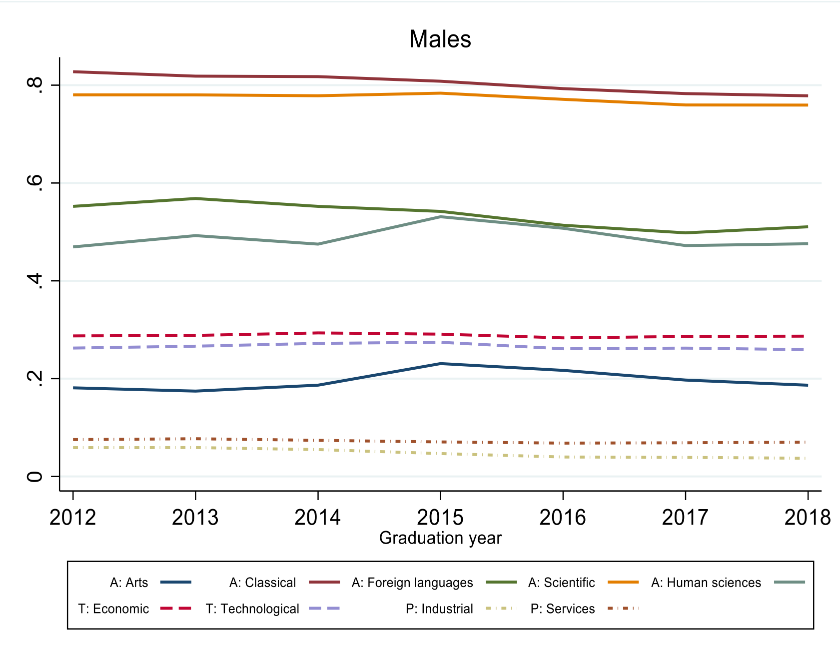
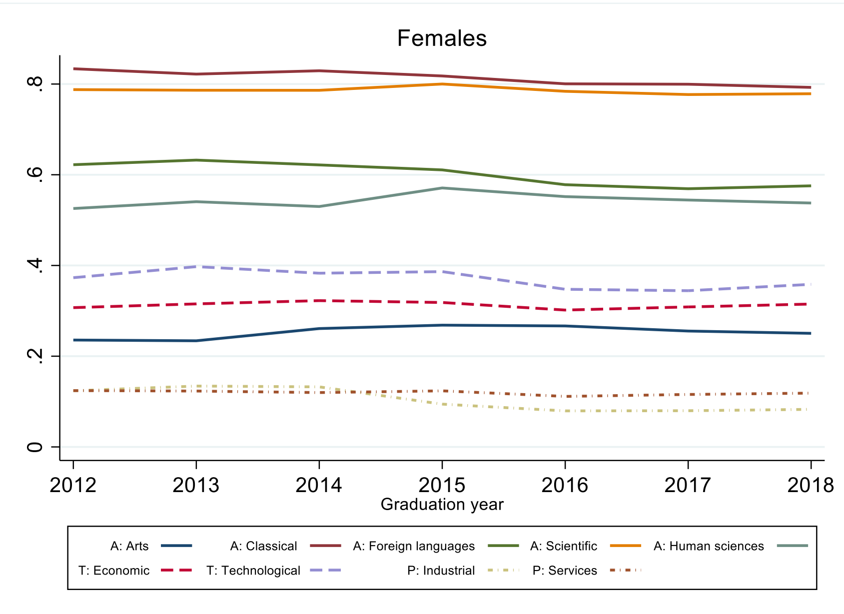


Figure A2. Share of high school graduates enrolled in college in the first year after graduation. By school curriculum.

Panel a. Males



Panel b. Females



Interviews with ASL experts

We conducted five semi-structured interviews exploring ASL experiences in technical schools with an economic curriculum (our treatment group) and academic schools with a foreign languages curriculum (our control group) to further understand the context and the mechanisms behind our results.

We targeted school staff involved in ASL management during the period 2015-18. The interviewees worked in three different regions: Emilia-Romagna, Trentino-Alto Adige and Veneto. The interviews involved: 1) the ASL coordinator of a technical school; 2) the deputy principal of an academic school, who was active during both ASL and PCTO periods, along with the current PCTO coordinator; 3) and 4) two individuals responsible for both ASL and PCTO operating in institutes offering multiple tracks; 5) the PCTO coordinator of an academic school, who had an active role in the final school year of the ASL scheme.

We asked all interviewees about how work-based learning was carried out in their school, specifically during the ASL period (2015-18). The interviews revealed that, for the technical track, all ASL activities took place outside the school. For the academic track, activities outside the school covered at most 50 percent of the required hours.

The ASL hosts that interviewees collaborated with were diverse in type: firms, professionals, public and private organizations. While technical school respondents reported a sufficient supply of ASL opportunities from potential hosts, academic school respondents mentioned difficulties in securing placements – especially during the first year after the reform.

Schools played a larger role than hosts in defining each ASL project. Hosts, however, had to approve projects by signing a collaboration agreement. All but one interviewee stated that it was primarily the school that identified potential hosts, with only a marginal role played by suggestions from students (a role that has gained importance over time, particularly since the transition from ASL to PCTO).

The single exception was an interviewee who observed that, even during the ASL period, host suggestions could also come from families, due to concerns about the potential distance between the host's premises and the student's home – considering that students are, in most cases, minors.

The cooperation between schools and hosts was generally good. Two interviewees indicated that, in very rare cases, they decided not to proceed with certain collaborations.

We also asked why hosts would offer ASL opportunities, given that there was no obligation to do so. There was general agreement on one motive: hosts may view ASL as a way to establish connections with and screen potential future employees. Most respondents also pointed out an interest in networking with the schools, with one interviewee describing a sense of solidarity among local entities – schools and hosts – around an activity that, in many schools, had not been common before the reform. Two interviewees also mentioned awareness-raising actions, which one of them specifically attributed to local education authorities. One respondent referred to the existence of funds that hosts offering ASL placements could obtain.

To understand the types of activities that students performed during firm-based ASL, we explored whether students were more likely to participate in ASL within certain industries. All foreign language academic school respondents, while not identifying a specific sector, reported that students typically gained experience in firms or within firm departments with international ties. Similarly, economic technical school interviewees did not point to specific industries; however, all of them underscored collaborations with accounting and tax professionals, which align particularly well with the focus of the curriculum.

After the completion of ASL experiences, hosts generally evaluated students positively. Two respondents noted that, in rare cases, hosts expressed dissatisfaction, which one of the interviewees specifically referred to as reporting aspects that students can improve (for instance, in a case involving the tourism sector – which usually requires frequent direct contacts with clients – the host suggested the development of better interpersonal skills).

In contrast to the generally positive feedback from hosts, high school teachers expressed discontent about the changes brought by the reform. This was the case especially at the very beginning of the new regime. Surprisingly, this initial discontent was reported not only in interviews about academic schools – where ASL had been much rarer before the reform – but also in those about technical schools (although the latter indicated a greater acceptance from teachers over time).

What about students? Three interviewees explicitly mentioned the orientation value of ASL as the aspect that students found most useful. The idea that students can assess whether they like the type of activity they experienced during ASL when deciding about their future careers is very much in line with our findings. The following excerpts from different interviews provide interesting insights on this point:

« *An important thing they learned is: "I do not like to be an employee; I cannot stay in an office for eight hours. I understood that this is not my thing". This is really important. I said: "Anyway, this was your experience, and it was positive regardless, because you understood what you do not want to do – you understood it before starting to work … that's better!"* »

« *According to me, this is the most formative aspect of all; students become aware "before it is too late" – pardon the expression, because it is never really too late – that they had a distorted idea of their dream, and so they can reset and think of something else.* »

« *Students return either satisfied or unsatisfied – it can happen in all tracks. The discontent does not come from how they were welcomed by the firm but from the realization that they do not like to do that kind of activity*. »

A fourth interview also seems to support this perspective – although less explicitly – noting that students found the chance to experience the world beyond the school most valuable. A fifth interview instead mentioned the opportunity to apply the skills they learned at school as the most useful aspect.

The interviews then shifted focus on the findings of the paper. Respondents were generally surprised by the results on employment, and at the same time two interviewees suggested that, if ASL led treated students to continue their education, this is a good result.

When we presented our findings about female students, there was broad agreement around the idea that females are generally more diligent in studying than males. Interestingly, all respondents who were asked about the gender-specific aspect of our results highlighted a perceived greater propensity among women to continue studying. One interviewee added that females are more forward-looking and determined; another noted that females may be more likely to pursue higher education to feel more confident when entering the labor market – doing so with greater knowledge and higher qualifications. Another respondent also referred to the possibility that females may be willing to continue studying to achieve greater economic independence in the future.

To rule out the possibility that a differential treatment of female and male students by hosts was driving the estimated effects, we then inquired whether it was primarily female students who expressed discontent about how they were treated during their ASL experience; in particular, we asked whether they reported feeling undervalued, experiencing a lack of trust towards them, struggling to be taken seriously, or – more broadly – facing gender-based discrimination. While this did not appear to be the case in general, one respondent reported that complaints about uninteresting tasks came mostly from female students. Another interviewee, referring to the post-diploma period, recalled female graduates who were willing to leave their jobs and enroll in university – but not male ones.

Overall, the idea that ASL experience may have helped students gain a better understanding of the world of work and make more informed decisions about their next steps clearly emerged from the interviews, reinforcing our confidence in the plausibility of the mechanisms we proposed.

This working paper was authored for Skills2Capabilities by Martino Bernardi (Fondazione Agnelli), Marco Bertoni (UniPadova), Giorgio Brunello (UniPadova), Clementina Crocè (UniPadova), Lorenzo Rocco (UniPadova).

This paper is a deliverable from the work package entitled the supply of skills and lifelong learning among VET graduates over the life course', led by the Research Centre for Education and the Labour Market, Maastricht University.

This working paper represents the views of the authors based on the available research. It is not intended to represent the views of all Skills2Capabilities affiliates.

www.skills2capabilities.eu

Skills2Capabilities Partner Institutions:

Skills2Capabilities

Co-funded by the European Union