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Education, Off-the-Job Vocational Training, and Early Employment Outcomes: Evidence from Italy

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Abstract: Education and training are primary sources of individual human capital. We explored the relationship between education and off-the-job vocational training and the impact of training programmes on youth employment in Italy. We focused on three outcomes: employment probability, use of formal/informal job search channels, and skill matching. We identified programme effects by comparing the outcomes of treatment and control groups using propensity score matching with a robustness check to assess the potential bias due to unobservable characteristics. Individuals with vocational high school degrees are more likely to participate in vocational training programmes, but in southern regions, individuals with technical or generalist high school degrees also attend vocational training programmes. Vocational training programmes have positive effects on youth employment outcomes, reduce the use of informal job search channels, and improve skill matching, especially in the centre-northern regions.

Keywords: off-the job training; education; youth employment; matching estimators

1. Introduction

Italy is the worst-performing country in Europe in terms of young people who are not in employment, education, or training (NEETs) and youth unemployment [1]. These figures call into question the Italian human capital formation policies, together with the school-to-work transition mechanisms [2].

Training is, together with formal education, a primary source of human capital and, thereby, an important area of public intervention. As declared by the Council of the European Union (2001), "Education and training are a structural means by which society can help its citizens to have equitable access to prosperity, democratic decision-making and individual socio-cultural development" [3]. Human capital improvement and accessibility represent crucial issues on the European Union's policy agenda. Vocational training programmes specifically designed to facilitate labour market entry among school-leavers represent a key active labour market policy aimed at improving youth employability. Given the relevance of human capital formation policies, notably in the absence of smooth school-to-work transition mechanisms, it is noteworthy to evaluate policy efficacy focusing on the characteristics of the people involved and on their labour market outcomes.

We investigated the relationship between education, off-the-job vocational training, and early employment outcomes in Italy. Given the age at which we observed our sample (21-year-olds), we considered the initial off-the-job vocational training that is strictly connected to the education system. The education and initial training system in Italy covers early childhood education and care (ECEC) to tertiary education. Education is compulsory from 6 to 16 years of age, although the right/duty to education or training is up to 18 years of age, as established by Law 43/2003. Compulsory education comprises five years of primary education, three years of lower secondary education, and two years of the

second cycle of education. The two compulsory years of the second cycle can be attended either at general and vocational upper secondary schools or within the regional vocational training system, as described in Section 3. It is possible to distinguish between vocational education provided by upper secondary schools that release degrees (diplomi professionali) that enable students to enrol in tertiary education, and vocational training offered by regional training authorities that release qualifications. The latter, i.e., off-school training programmes that do not give access to tertiary education, is the "off-the-job vocational training" to which we refer in the rest of the paper.

We analysed two main issues.

First, we looked at the decision to attend off-the-job vocational training programmes by labour market entrants, paying attention to the role played by previous educational achievements. The aim of this preliminary analysis was to investigate the determinants of vocational training participation among young school leavers and the nature of the relationship between vocational training and school education. The relationship between school education and vocational training is complex and deserves attention. If vocational training and education are substitutes in human capital formation, i.e., if training courses are attended more by less educated individuals, training contributes to filling the skill gaps of low-educated people and reducing labour market inequalities. On the other hand, if vocational training and education are "complement", i.e., more educated individuals are more likely to receive vocational training, existing differences in human capital widen with training, as well as labour market inequalities increase.

Second, we estimated the impact of vocational training on youth employment outcomes from three different perspectives. First, we assessed whether vocational training enhances youth employability. Second, we analysed the relationship between training participation and the use of informal job search channels, such as personal or family networks, to find a job. The efficacy of informal channels in job seeking has been emphasized in many contributions [4–7]. Finally, we evaluated the effect of training on the matching between the skills developed by individuals and the skills demanded in the job place.

We analysed a representative sample of 21-year-old Italian school-leavers. We ran estimates on the whole sample and then on the two sub-samples of young people living in centre-northern region or in the southern region. The economic divide in Italy is a long-standing phenomenon, and it must be taken into consideration in the analysis of employment outcomes [8].

The empirical strategy is based on the propensity score matching estimator, which reduces the bias in the estimation of treatment effects with observational data [9]. This estimator controls for the selection bias in the treatment (i.e., the participation in training courses), assuming that selection depends on observable characteristics. Given this assumption, selection bias can be managed by comparing (matching) individuals who are as similar as possible in these characteristics. Since unobserved heterogeneity can still be a source of selection bias affecting results, we checked to what extent our results were possibly altered by the presence of unobserved heterogeneity among treated and control groups by calculating the Rosembaum bounds [10,11].

We aimed to contribute to the understanding of the relationship between education, vocational training, and employment outcomes in Italy. In that, we investigated who are those who decide to enrol in initial vocational training and which are their early labour market outcomes, distinguishing by different types of training programmes. The availability of a rich set of information for both treated and controls, in particular concerning their education, motivation, and strategies adopted to enter the labour market, allowed us to investigate the crucial moment of the transition to the labour market. Finally, our analysis explicitly considered the potential selection bias depending on both observed and unobserved heterogeneity.

The paper is organized as follows: Section 2 presents a review of the empirical literature on the relationship between education and training and on the effect of training on employment outcomes. Section 3 provides a short description of the Italian vocational

training system. Section 4 summarizes the dataset and the empirical strategy used to identify the effect of training. Section 5 describes the results of the analysis of the relationship between education and training and the effect of training on employment. Finally, Section 6 discusses the main findings.

2. Literature Review

The empirical evidence on the relationship between vocational training and school education is rather scant. Although there is consensus on the existence of some complementarity between them, the relationship depends on the type of training received and on the characteristics of both the education system and the labour market. Brunello [12] found that the nature of the relationship varies across countries, cohorts, and education systems. van Smoorenburg and van der Velden [13], analysing the decision to participate in firm training programmes by a sample of Dutch school leavers, did not achieve straightforward evidence: according to their results, education and firm training are both substitutes and complements depending on the type of education attained at school. On the other hand, Ariga and Brunello [14] argued that only off-the-job training is a complement to school education, whereas more educated workers are less likely to be involved in firm-provided training activities.

Regarding the impact of vocational training on employment outcomes, the empirical evidence is abundant, but the nature of the relationship remains uncertain. Among the contributions focusing on the whole population see, for instance, [15,16] and more recently, [17] for the UK, [18–20] for Germany, and [21] for Sweden. For a systematic review, see [22]. According to Bolli et al. [23], the effectiveness of vocational education and training (VET) depends on the quality of interactions between the actors involved in the education and employment systems; these interactions improve the correspondence of the skills supply and demand.

Regarding young people, non-experimental studies generally found positive impacts of training on employment outcomes, although no robust once selection bias is controlled for. Based on a survey of Scottish young people, Main and Shelley [24] evidenced a slight positive impact of training schemes on the probability of employment. In particular, according to their estimates, the effect is greater in absolute terms for youth who achieved a school-leaving certificate, but it is greater in relative terms for those who did not obtain any school qualification. Adopting a duration perspective, it was found that the Youth Training Scheme (YTS) introduced in the United Kingdom during the 1980s does not significantly reduce the time needed to find a job, even when the period spent in training is considered [25]. Their results, however, suggest that training increases the probability of quickly finding a "good" job, especially for women. Using data for school leavers in Ireland, Denny and Harmon [26] showed that the effect of training depends on the education level achieved before attending the program, especially for women. Using a longitudinal dataset Magnac [27] offered an analysis of the dynamics of labour market transitions for young people in France in the early 1990s found a great deal of state dependence. According to his estimates, trainees and unemployed people are very similar in terms of unobservable characteristics, and training schemes have no effect on the relative probability of getting a stable job. Participation in vocational training programs in Madeira, Portugal, was positively associated with employment outcomes only for educated males [28]. Moreover, the effect of training depends on its duration and on the specific area of the training program. Adopting a comparative perspective, Zimmerman et al. [29] argued in favor of a vocational education and training system combining work experience and general education as the more effective policy to smooth the school-to-work transition. A systematic review of different interventions aimed at improving the labour market opportunities of youth emphasizes that skills training programmes are more effective than employment services and subsidized employment [30]. Celume and Korda [31] widened the perspective by reviewing training programmes over the last thirty years according to three outcomes: psychological, technical, and (re)employment. They emphasize the difficulty in reaching

consistent results about training effectiveness due to the diversity of policies and contexts to which they apply.

In Italy, two recent papers focused on the impact of off-the-job training programs on education outcomes. Duranti et al. [32] conducted an impact evaluation of training activities carried out in Tuscany. Findings showed that training courses have heterogeneous effects depending on the type of programme and the type of unemployment. Pastore and Pompoli [33] focused on a further regional programme carried out by the Friuli Venezia Giulia region; they found that the most effective training programmes are those combining an internship and providing a qualification. Our paper shares with the two cited studies the methodological approach (propensity score matching) but differs on two main issues. First, we have a national sample, which allows us to evaluate the effect of training programs in regions with different labour market conditions (centre-north vs. south). Second, we assessed the impact of training on several different labour market outcomes: employment probability, job-search channels, and job-matching quality.

3. The Italian Vocational Training System: A Brief Description

In Italy, vocational training is characterised by a high level of fragmentation. We refer to "vocational training" according to the definition provided in Section 1, i.e., to programmes offered off-school and which provide qualifications that do not allow enrollment in tertiary education. The vocational training system consists of several programs and institutional actors (at national and local levels), which refer to a complex legislative framework. Following the European guidelines, the provision of vocational training in Italy is organised along two main lines [34–36]: initial and continuing/lifelong learning vocational training.

Initial vocational training consists of programs mainly enabling the fulfilment of the right/duty to education and/or training up to the age of 18 (minimum) established by Law 43/2003. Regions, which are the first-level administrative level (i.e., the second NUTS administrative level) of the country, play a key role in the provision of initial vocational training. Publicly funded vocational education and training courses are offered by agencies or authorities accredited by the regions on the basis of general criteria that set minimum quality standards at a national level. Regions may also plan activities with state schools (technical and professional) or universities, if necessary. Further, regions decide which training courses to implement based on the different needs of their territories. Every year, the Minister of Labour and Social Policies transfers to the regions the financial resources necessary for the fulfilment of the right/duty to education and vocational training by the local population. The minister then carries out the monitoring activity on regional initiatives.

Continuing and lifelong training activities are devoted to the adult population. "Continuing training" (i.e., Formazione continua) concerns interventions aimed at employed workers who need to retrain, specialize, and update their competences and skills. Training activities are planned and managed directly by companies or by accredited agencies that may operate for several companies. Lifelong training, on the other hand, concerns activities aimed at people of working age (employed or non-employed) who need technical, professional, or cultural updating. Such activities are organized within the "European Community Lifelong Learning Programme—LLP". This type of training aims at enabling the population in the adult age, regardless of their employment status, to acquire a qualification, skills useful for increasing employability, or a professional qualification.

Although not explicitly stated in the survey questionnaire, given the age of the population under consideration in our study (21 years old at the time of the interview), we argued that the publicly funded courses mainly belong to the first type of vocational training provision, i.e., the initial vocational training.

4. Materials and Methods

The data used in this paper were drawn from a section dedicated to young people of the Survey on Labour Participation and Unemployment (PLUS) administered by Isfol,

the Italian Institute for the Development of Vocational Training and Workers. "Young People Education and Employment Survey (YPEES)", a section of the ISFOL PLUS survey collecting information on a sample of 6532 individuals aged 21 (3456) and 31 (2896), is representative of these two cohorts of the Italian population. The questionnaire provides a wide set of information on individuals' household characteristics, educational careers, employment conditions, and job features. A section of the questionnaire specifically devoted to training collects information on the number, duration, and type of training programmes attended.

In order to investigate the impact of training on employment outcomes, we considered an YPEES sub-sample defined as follows:

First, we considered only the youngest cohort, namely the 21-year-olds. This sample cut allowed us to exclude the effect of other forms of human capital arising, for instance, from labour experiences and to focus on the school-to-work transition phase;

Second, we restricted the analysis to the respondents declaring that their prevailing condition was: employed, in a redundancy fund (CIG) or in mobility, unemployed, or seeking their first job. Since we are interested in school-to-work transitions, we excluded all full-time students, homemakers, and other "non active", i.e., students, well-off persons, people who were preparing for competitive examinations, or people who were attending a training course at the time of the interview.

The section of the questionnaire dedicated to training distinguishes between two main types of vocational training: on-the-job and off-the-job. As the main purpose of this paper is to investigate the effect of vocational training on employment outcomes, we restricted our analysis to off-the-job training. The questionnaire distinguishes two types of off-the-job training programmes: publicly funded (free of charge) and private (paid) programmes. Since only public programmes are relevant from a policy point of view, we excluded private courses as well. Publicly funded vocational training programmes are set up, regulated, and offered by regional authorities as described in Sections 1 and 3. They generally have specific targets (such as low-educated young people, women, and the unemployed) and are free of charge, and participation generally depends on a selection procedure.

The final sample comprised 1873 individuals. Table 1 reports descriptive statistics about youth characteristics and their outcomes in the labour market, distinguishing between those who received vocational training (i.e., the treated) and those who did not receive training (i.e., the controls).Sample weights have been used to calculate descriptive statistics.

Table 1. Summary statistics (percentage).

	Controls	Treated
Observations	1539 (71.2)	334 (16.9)
Female	45.4%	51.3%
Male	54.6%	49.7%
Lower sec. school	29.5%	23.1%
Three-year vocational school	8.6%	18.4%
Higher sec. school	61.8%	58.4%
High school track: Academic oriented (licei)	22.4%	17.9%
High school track: Technical	23.6%	22.4%
High school track: Vocational	8.2%	11.3%
High school track: Others	7.6%	0.6%
Employed	54.4%	60.4%
Use of informal channels *	48.1%	35.7%
Skills matching *	58.8%	66.3%

We also control for macro-region of residence, size of the municipality of residence, lower secondary school final grade, failures at school, and importance attributed to work. * "Use of informal channel" and "Skills matching" outcomes are calculated over the sample of the employed.

Our analysis addressed four main research questions.

The first research question (RQ1) is preliminary to the other ones. Participation in a vocational training programme is not a random event; therefore, we aimed at assessing to what extent controls and treated differed in terms of observed characteristics, particularly for education level. Given the age of our sample (21 years), the maximum education degree corresponds to upper secondary school, which is generally achieved at 19 years of age. We distinguished across three educational levels: lower secondary education, which is achieved after eight years of schooling; three years vocational degree, achieved after 11 years of schooling; and higher secondary education, achieved after 13 years of schooling. Five-year higher secondary education has several tracks that can be ranked into three main types: generalist and academic-oriented tracks (lyceums), technical tracks, and vocational tracks. Vocational education at school can have a duration of three or five years. After the three-year degrees, students can further their studies by attending the last two years of specialization. Youth who received vocational training (treated) were, on average, more educated and had more technical vocational school degrees.

The following three research questions, which are the core of the analysis, concern the impact of vocational training on a range of labour market outcomes. The bottom part of Table 1 provides descriptive statistics about such outcomes.

The second research question (RQ2) is whether vocational training programmes increase the employment chances of young people. To respond to RQ2, we considered individuals who are in the labour market, excluding the inactive. For the sake of simplicity, we distinguished two main conditions: employed—also including those in redundancy funds (CIG) or in mobility—or unemployed, including those seeking their first job. On average, those treated had a higher probability of being employed (60.4% vs. 54.4%). Even if descriptive statistics evidence differences in the employment outcomes among treated and controls, it is not possible to argue that public training increases youth employment probability: youth who attend a public training programme could be more motivated or could have better unobserved skills, independently from the treatment. The proposed analysis aimed at disentangling the effect of training from the effect of observable and possible unobservable characteristics.

The third research question (RQ3) is whether vocational training programmes affect the type of channel used to search for jobs. The fourth research question (R4) is whether vocational training programmes affect the quality of the matching between the skills of the employees and the skills demanded in the job. To respond to RQ3 and RQ4, we considered only individuals who were employed at the time of the interview.

As for the job search channel (RQ3), we distinguished between "formal" and "informal" channels. Formal channels include ads in newspapers or on the internet, CVs sent to employers, competitive examinations, services offered by training centres, public or private jobcentres, stages, or other work experiences. Informal channels are personal or household networks that allow direct contact with potential employers. Controls are more likely to use informal channels than treated (48% vs. 36%), and, again, there are significant differences between the two treated sub-groups.

As for the quality of the job matching (RQ4), the variable is defined according to the following question: "With respect to the duties you are currently carrying out in your job, do you think the skills you acquired are: too high, adequate, too low?" We defined a variable that takes the value one when the answer is "Adequate", i.e., when the skills acquired by the employee during the entire education and training process match those required by the job. Too-high and too-low skills have different implications. In the former case, training courses do not succeed in filling workers' skill gaps; in the latter case, they do not help workers access more qualified jobs. Controls are more likely to experience a good match between their skills and the skills demanded in the job.

Table 2 reports the distribution of the courses attended by the analyzed sample.

Table 2. Types of publicly funded vocational training programmes.

Courses to obtain a qualification for low-educated youth	22.2%
Courses to obtain a higher qualification/specialization for educated youth	29.0%
Technical education and training courses	2.1%
Other courses for the unemployed	3.0%
Courses for women	0.9%
Courses to achieve specific licences	9.6%
Other publicly funded courses	33.2%

The table reports the distribution of the 334 participants to publicly funded training programmes in the selected sample of 21-year-old youth within the different types of programmes.

To respond to RQ1, we estimated a linear probability model specification where the dependent variable is 1 if the individual attended training programmes and 0 otherwise. The adopted specification exploits the wide set of information available at individual level and includes gender and area of residence, size of the municipality of residence, education degree achieved, a proxy for ability represented by the final grade received at the end of compulsory schooling (lower secondary degree), and a proxy for motivation to work. We defined a dummy variable, which is one for individuals who responded "Much" to the question "How important is work for you?" and zero otherwise.

To respond to RQ2, RQ3, and RQ4, we estimated the average treatment effect on the treated (ATT), where treatment is participation in training programmes. The applied methodology is based on the propensity score matching estimator [37–42]. To estimate the propensity scores, i.e., the probability to attend training programmes, we used the same specification as in the linear probability model. We ran separate estimates of the propensity scores for each analyzed outcome and each sample. The key assumption at the base of the matching estimator is that, once observable characteristics are controlled for, treatment is independent from the outcome (conditional independence assumption, CIA). This assumption cannot be verified directly. However, the probability that CIA holds strongly depends on the choice of the appropriate variables to be included in the propensity score estimation. The specification adopted in the following estimates fulfils a number of conditions that, according to [41,43], raise the probability of satisfying the above-mentioned assumption. First, regressors are unaffected by the participation decision since they are either fixed or measured before the participation decision. Second, they simultaneously influence the participation decision and the analysed outcome. Third, for both treated and controls, observable characteristics are drawn from the same dataset, ensuring comparability. Finally, the adopted specification satisfies the balancing hypothesis, namely that observations with the same propensity score have the same distribution of the observable characteristics, independent of the treatment status. The second assumption to be verified is that the conditional probability of receiving the treatment is different from zero and one. This assumption excludes the possibility that participation in a treatment is subject to the fulfilment of specific conditions (gender, age, educational level, etc.).

We adopted three different matching estimators to check the robustness of the results. The first one is the Nearest Neighbour (NN) estimator, where each treatment is matched with the most similar control in terms of propensity score. The two other matching strategies exploit the entire available information. The Kernel estimator strategy matches each treated with a "virtual" control that is a weighted average of all controls, where the weight is inversely proportional to the distance between the propensity scores of the control and of the treated. Finally, the Radius estimator matches each treatment with all the controls whose propensity scores lie within a fixed radius of the treated group. For all matching strategies, we imposed a caliper of 0.01 to test the sensitivity of estimates. We also ran estimates with a caliper of 0.05. The results are very similar and available upon request.

Notwithstanding the choice of the appropriate regressors, unobserved heterogeneity can still be a source of selection bias, affecting results in two opposite senses. If there is a positive unobserved selection, namely if individuals participating in training also

have better outcomes in the labour market, the estimated ATT is upward biased. This occurs, for example, when motivated individuals are more likely to be involved in training and are also more likely to be employed because they enforce better strategies to find a job. On the contrary, if there is a negative unobserved selection, the estimated ATT is downwardly biased.

To check the robustness of our results, we add, after results, the Rosembaum bounds [10,11] for ATT in the presence of unobserved heterogeneity. (These results were obtained by using the mhbounds routine developed by [44]). The Rosenbaum bounding approach does not test the conditional independence assumption directly, but it allowed us to establish to what extent significant results depend on this untestable assumption [44].

5. Results

5.1. Education and Vocational Training

RQ1 aims at understanding which individual characteristics are associated with the decision to attend vocational training programmes, with a focus on previous educational achievements. Selection into the treatment (i.e., the participation in training programmes) is not a random event, and investigation of the determinants of such a decision is key to better disentangling the effect of training from other confounding factors. Table 3 reports the result of a linear probability model, where the analysed outcome is participation in a publicly funded training programme. We report the estimates for the whole population and then for the sub-samples of the centre-northern and southern regions.

Table 3. Linear probability estimates of participating in publicly funded vocational training (and corresponding standard errors).

	All	Centre-North	South
Female	0.0143	0.00227	0.0245
	(0.00879)	(0.00840)	(0.0179)
3-year vocational education degree	0.0794 ***	0.0675 ***	0.0906 **
	(0.0230)	(0.0244)	(0.0408)
Generalist academic-oriented high school degree	0.0127	−0.0230 **	0.0632 **
	(0.0137)	(0.0101)	(0.0301)
5-year vocational education degree	0.0406 **	0.0273	0.0615 *
	(0.0172)	(0.0171)	(0.0327)
Technical high school degree	0.0232 **	0.00821	0.0393 *
	(0.0115)	(0.0113)	(0.0215)
Other high school degrees	0.0123	0.0227	−0.0167
	(0.0179)	(0.0230)	(0.0306)
Lower secondary school leaving grade "Good"	−0.00795	−0.00714	0.00139
	(0.0102)	(0.0103)	(0.0190)
Lower secondary school leaving grade "V. Good or Excellent"	−0.0221 **	−0.00298	−0.0478 **
	(0.0109)	(0.0119)	(0.0227)
Failures at school (one or more)	−0.0306 ***	−0.0185 *	−0.0485 **
	(0.0105)	(0.0101)	(0.0218)
Importance attributed to work (high)	0.0132	0.0178 **	−0.00582
	(0.00870)	(0.00864)	(0.0198)
Observations	1873	1293	580

Standard errors in are in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Other controls: region of residence, size of the municipality of residence (small-medium-large). Reference categories: male, low secondary school graduates, low secondary leaving grade 1 (pass), or no answer.

Graduates from vocational schools, especially those enrolled in three-year degrees, are more likely to receive training compared with the base category represented by individuals with compulsory schooling (lower secondary school). High school general tracks are negatively associated with the probability of receiving training in the centre-northern area,

while the coefficient is positive for southern area. Individuals who received a high leaving grade at lower secondary school (very good or excellent) have a lower probability of attending vocational training. Finally, failures at any school level are negatively associated with training participation. Overall, findings on the whole sample seem to partially support the complementarity hypothesis, as students with vocational or technical education are more likely to attend vocational training programmes than students with only compulsory schooling. In the southern area, the complementarity mechanism seems to be in action, as the coefficients of all education degrees after compulsory schooling are positive and two are statistically significant (at a significance level of five).

5.2. Training and Employment Outcomes

We report the average treatment effects on treated (ATT) of the analysed programmes on a range of labour market outcomes, therefore responding to RQ2, RQ3, and RQ4. (The reported estimates are obtained from the psmatch2 routine developed by [45]). Table 4 reports estimates obtained defining as "treated" those who attended a publicly funded training programme of whatever duration. Previous empirical literature emphasizes the positive correlation between training duration and training effectiveness [29]. We then ran a robustness exercise by restricting our analysis to long training programmes, defined as programmes of at least 100 h (Table 5). (Results are robust to different definitions of "long duration" training programmes (i.e., from 75 to 150 h). Estimations are available upon request). Since we do not have information about the quality of the programmes, we used their duration as a proxy for it, therefore dropping from the analysis those who attended a short programme. According to our definition, long training programmes represent 58.2% of all publicly funded programmes.

Table 4. Average treatment effect on treated—publicly funded training programmes.

	All				Centre-North				South			
	ATT	s.e.	C	T	ATT	s.e	C	T	ATT	s.e	C	T
Employment												
NN with repl. (cal. 0.01)	0.1196 ***	0.0510	1539	326(8)	0.0343	0.0553	1055	233(5)	0.1808 **	0.0911	484	94(2)
Kernel (cal. 0.01)	0.0370	0.0296	1539	331(3)	0.0189	0.0333	1055	237(1)	0.1504 *** 0.1504 ***	0.0579	484	94(2)
Radius (cal. 0.01)	0.0299	0.0305	1539	326(8)	−0.0050	0.0340	1055	233(5)	0.1540 ***	0.0623	484	94(2)
Informal channels												
NN with repl. (cal. 0.01)	−0.1181 *	0.0628	904	220(3)	−0.2 ***	0.0694	727	170(10)	0.4411 ***	0.1495	177	34(9)
Kernel (cal. 0.01)	−0.1017 ***	0.0382	904	223	−0.1427 ***	0.0399	727	170(10)	0.0138	0.1052	177	40(3)
Radius (cal. 0.01)	−0.0954 **	0.0394	852	220(3)	−0.1417 ***	0.0417	727	170(10)	0.2764 **	0.1305	177	34(9)
Skill matching												
NN with repl. (cal. 0.01)	0.0909	0.0052	904	220(3)	0.1941 ***	0.0703	727	170(10)	0.0882	0.1549	177	34(9)
Kernel (cal. 0.01)	0.0932 ***	0.0375	904	223	0.1179 ***	0.0407	727	170(10)	0.0475	0.1028	177	40(3)
Radius (cal. 0.01)	0.0857 **	0.0387	904	220(3)	0.1327 ***	0.0429	727	170(10)	0.0713	0.1304	177	34(9)

ATT is the average treatment on the treated, s.e. is the corresponding standard error. C and T are the numbers of controls and treated used in each estimation (within parenthesis, the number of treated out of the common support not considered in estimates). Centre-north and south regions are identified according to the Italian Official Statistical Institute (ISTAT). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In all estimates, we controlled for the same list of variables included in the estimations in Table 3. Since we estimate the ATT over different sub-samples, the reported results arise from the estimation of as many propensity scores as the number of sub-samples. The common support condition is verified for all estimates.

Table 5. Average treatment effect on treated—long duration publicly funded training programmes.

	All				Centre-North				South			
	ATT	s.e.	C	T	ATT	s.e	C	T	ATT	s.e	C	T
Employment												
NN with repl. (cal. 0.01)	0.0659	0.0602	1539	197(1)	0.1153 *	0.0672	1055	134(4)	0.1587	0.1091	484	63(1)
Kernel (cal. 0.01)	0.1124 ***	0.0345	1539	197(1)	0.1013 ***	0.0358	1055	134	0.2079 ***	0.0694	484	63(1)
Radius (cal. 0.01)	0.1250 ***	0.0353	1539	198(1)	0.0909 ***	0.0371	1055	134	0.2308 ***	0.072	484	63(1)
Informal channels												
NN with repl. (cal. 0.01)	−0.0962	0.0753	904	135(10)	−0.2 ***	0.0801	727	105(8)	0.4090 **	0.1779	151	22(10)
Kernel (cal. 0.01)	−0.0848 *	0.0456	904	145	−0.1552 ***	0.0464	727	105(8)	0.0549	0.1151	151	30(2)
Radius (cal. 0.01)	−0.0832 *	0.0476	904	135(10)	−0.1511 ***	0.0472	727	105(8)	0.3181 ***	0.1298	151	22(10)
Skill matching												
NN with repl. (cal. 0.01)	0.1703 **	0.0743	904	135(10)	0.1714 **	0.0820	727	105(8)	−0.0909	0.1521	151	22(10)
Kernel (cal. 0.01)	0.0874 *	0.0447	904	145	0.1145 **	0.0494	727	105(8)	0.0415	0.1121	151	30(2)
Radius (cal. 0.01)	0.1066 **	0.0461	904	135(10)	0.1145 **	0.0497	727	105(8)	0.0181	0.1301	151	22(10)

ATT is the average treatment on the treated, s.e. is the corresponding standard error. C and T are the numbers of controls and treated used in each estimation (within parenthesis, the number of treated out of the common support not considered in estimates). Centre-north and south regions are identified according to the Italian Official Statistical Institute (ISTAT). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We found positive effects of publicly funding institutional training on employment probability in all estimates, but the effect is statistically significant only for the Southern area sub-sample (Table 4). Youth living in the south who received vocational public training are more likely to be employed by 15 to 18%, depending on the matching estimator. When we limited the analysis to long training programmes, we still found a positive and statistically significant effect (except for NN with a replacement estimator) from 16% to 23% in southern Italy. Long-duration public programmes have positive effects (ranging from 9% to 11%) on the employment probability of youth residing in the northern area. After the analysis of the impact of training on early employment conditions, we ran our estimates on a sub-sample of the employed. We aimed to investigate whether participation in vocational training affects the strategy used to find jobs. The dependent variable is equal to one if the employee found the job through "informal channels" and zero if through formal channels. The ATT is negative and statistically significant at the 1% level in centre-northern regions and positive and statistically significant with two estimators out of three in the southern regions. Results indicate that having received public vocational training decreases the probability of using informal job-search channels by 14 to 20%, but only in centre-northern regions. Findings are very similar if we narrow the analysis to long-duration training programmes.

We finally looked at the last outcome, the matching between the skills acquired during the educational/training path and the skills necessary to carry out the job. The dependent variable is equal to one if the employee considers the skills acquired "adequate" for the job and zero otherwise. Estimates evidence a positive impact of publicly funded courses, ranging from 9% to 19% in the whole sample and in centre-northern regions. No effect is found for participants in training programs in southern regions. The quality of the skill match is not affected by the duration of the training programmes.

5.3. Robustness Check

The propensity score matching strategy relies on the assumption that selection for treatment depends on observable characteristics. In this section, we test whether inferences about the effects of training programmes may be altered by the presence of unobserved heterogeneity among treated and controls. Tables 6 and 7 report the results of the sensitivity analysis for the estimates in Tables 4 and 5. The sensitivity analysis is based on the

Rosenbaum bounding approach. (For a detailed illustration of the methodology and an application to training, see [11]). We report the results of the Mantel and Haenszel test statistic [46], in the absence of hidden bias ($\Gamma = 1$). We then show the critical values of Γ for which the unobserved heterogeneity upward biases the estimated ATT. When the estimated ATT is not significant, we do not report the Mantel and Haenszel test statistic.

Table 6. Unobserved heterogeneity analysis—publicly funded training programmes.

	All			Centre-North			South		
	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ
Employment									
NN with repl. (cal. 0.01)	0.1196 ***	2.139 ***	1.2–1.9	0.0343	n.s.	n.s.	0.1808 **	1.298 *	1.1–2.8
Kernel (cal. 0.01)	0.0370	n.s.	n.s.	0.0189	n.s.	n.s.	0.1504 ***	1.558 *	1.1–2
Radius (cal. 0.01)	0.0299	n.s.	n.s.	−0.0050	n.s.	n.s.	0.1540 ***	1.614 *	1.1–2
Informal channels									
NN with repl. (cal. 0.01)	−0.1181 *	n.s.	n.s.	−0.2 ***	2.552 ***	-	0.4411 ***	2.222 **	1.8–
Kernel (cal. 0.01)	−0.1017 ***	2.885 ***	-	−0.1427 ***	3.179 ***	-	0.0138	n.s.	n.s.
Radius (cal. 0.01)	−0.0954 **	2.766 ***	-	−0.1417 ***	3.297 ***	-	0.2764 **	n.s.	n.s.
Skill matching									
NN with repl. (cal. 0.01)	0.0909	2.289 ***	1.3–2.4	0.1941 ***	3.088 ***	1.6–3.3	0.0882	n.s.	n.s.
Kernel (cal. 0.01)	0.0932 ***	2.573 ***	1.3–1.8	0.1179 ***	2.795 ***	1.4–2.1	0.0475	n.s.	n.s.
Radius (cal. 0.01)	0.0857 **	2.401 ***	1.3–1.8	0.1327 ***	2.790 ***	1.4–2.1	0.0713	n.s.	n.s.

Q_mh+: Mantel-Haenszel statistic (assumption: overestimation of treatment effect). The critical value for which the unobserved heterogeneity upward biases the estimated ATT. n.s.: not significant. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7. Unobserved heterogeneity analysis—long-duration publicly funded training programmes.

	All			Centre-North			South		
	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ	Effect	Qmh+ Test Stat. for $\Gamma = 1$	Critical Value for Γ
Employment									
NN with repl. (cal. 0.01)	0.0659	n.s.	n.s.	0.1153 *	2.096 **	1.4–3.5	0.1587 *	1.464 *	1.1–
Kernel (cal. 0.01)	0.1124 ***	3.800 ***	1.6–2.4	0.1013 ***	3.589 ***	1.8–3.4	0.2079 ***	2.02 **	1.3–2.6
Radius (cal. 0.01)	0.1250 ***	3.871 ***	1.6–2.4	0.0909 ***	3.421 ***	1.7–3.4	0.2308 ***	2.139 **	1.3–2.7
Informal channels									
NN with repl. (cal. 0.01)	−0.0962	n.s.	n.s.	−0.2 ***	2.032 ***	-	0.4090 **	1.9062 **	1.6–
Kernel (cal. 0.01)	−0.0848 *	2.343 ***	-	−0.1552 ***	3.003 ***	-	0.0549	n.s	n.s
Radius (cal. 0.01)	−0.0832 *	2.258 **	-	−0.1511 ***	3.023 ***	-	0.3181 ***	1.733 **	1.3–
Skill matching									
NN with repl. (cal. 0.01)	0.1703 **	1.767 **	1.2–2.6	0.1714 **	1.395 *	1.1–2.6	−0.0909	n.s.	n.s.
Kernel (cal. 0.01)	0.0874 *	2.096 **	1.2–1.9	0.1145 **	2.028 **	1.2–2.2	0.0415	n.s.	n.s.
Radius (cal. 0.01)	0.1066 **	2.358 ***	1.3–2.1	0.1155 **	2.056 **	1.2–2.2	0.0181	n.s.	n.s.

Q_mh+: Mantel-Haenszel statistic (assumption: overestimation of treatment effect). The critical value for which the unobserved heterogeneity upward biases the estimated ATT. n.s.: not significant. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Regarding the first outcome, results confirm the positive effect of publicly funded training programmes in southern regions (Table 6). However, the effect becomes insignificant already for $\Gamma = 1.1$. This means that the confidence interval of the effect would include zero if an unobservable variable made the odds of participating in training of treated and controls with the same observable characteristics different by 10%. As argued by [44], this result does not mean that training has no effect on employment. It is evidence that the estimated ATT is sensitive to possible deviations from the conditional independence assumption, since even a small extent of hidden bias would alter the inference assumption. Therefore, these results must be interpreted with particular caution. When we looked at the effect of longer-duration publicly funded programmes on employment (Table 7), we observed that the positive coefficient for centre-northern area Γ critical value starts from 1.4 to 1.8 depending on the estimator. In this case, we can be more confident about our findings since only a great extent of hidden bias (from 40% to 80%) would alter the estimates.

Results are similar for the skill matching outcome since the critical region starts at Γ equal to 1.3, i.e., estimates are robust to a small hidden bias. Quite interestingly, results for long-duration training programmes are less robust. However, we must consider that the dependent variable is one only if the skills acquired by the employees perfectly match the skills demanded on the job. If employees are over-skilled, which is more likely if they attended a challenging training programme, the dependent variable is zero, and the effect of this training is more difficult to interpret. Indeed, on the one hand, training provided individuals with skills that they considered "high", but on the other hand, training did not allow them to move up in employment.

Finally, in regard to informal channels, the results are clear-cut since, for every Γ, the effects are significant in most cases. This means that the negative effect of training on the use of informal channels is not sensitive to possible deviation from the hypothesis that participation in training is a random event once controlled for observables, and the presence of unobserved heterogeneity would not alter the results.

6. Discussion and Conclusions

The efficacy of vocational training programmes is a matter of debate. This paper investigates the efficacy of publicly funded vocational training programmes for early labour market entrants in Italy. After an analysis of the determinants of the decision to participate in off-the-job training programmes—particularly the role played by previous education—we focused on the effects of training on youth employment outcomes.

Concerning the characteristics of individuals who decided to attend vocational training courses, we found that the relationship between education and training is not straightforward, as emerged in previous empirical results [13]. The probability of participating in publicly funded vocational training is higher among individuals who have already achieved vocational degrees at school than for individuals with very low education levels or with more generalist backgrounds. In the southern area, all education degrees after compulsory are positively associated, although not always statistically significantly, with participation in training programmes, a finding similar to [14]. The positive relationship emerging in the whole sample between vocational schooling degrees and the probability of attending vocational training programmes may have two explanations. On the one hand, individuals with a vocational educational background may assess the skills and competences developed at school as too poor to enter the labour market and decide to top them off with some off-school vocational training. On the other hand, these graduates might be more able to identify and exploit useful training programmes as they develop specific competences at school.

Regarding the second issue, namely the effect of training on youth labour market outcomes, we found a positive effect of publicly funded vocational training programmes on youth employment probability in the southern sub-sample, regardless of the duration of the courses, while in the centre-northern sample, the impact is significant only for long-duration programmes. Findings suggest that where labour market conditions are poor, also

brief vocational training programmes can "make the difference", while in more developed areas only long-duration courses can improve the (already high) employment chances. The positive impact for youth residing in southern regions must be interpreted with caution since the robustness check shows that estimates could be altered by a small amount of unobserved heterogeneity. Findings are more robust for long-duration training courses offered in centre-northern regions. Public vocational training increases the probability of a good match between workers' skills and skills demanded by employers, but only in centre-northern area. Findings also suggest that individuals who attended a public vocational training programme are less likely to use informal channels, such as family and social relationships, to seek a job, but again, not in southern regions. The efficacy of training programmes may be related to two different mechanisms. On the one hand, public training could provide youth with skills that increase their attractiveness for employers, thus allowing them to overcome the disadvantages arising from their poor social networks. On the other hand, these programmes could help to establish relationships with potential employers by means of formal or informal agreements signed by the institution providing the courses. Since institutional public programmes seem to improve employment probabilities, we could argue that both mechanisms are in action. In southern Italy, however, informal channels maintain their efficacy as a job-seeking strategy, even for trainees. Our results suggest that in poor labour markets, training does not fully compensate personnel and family networks for finding a job.

All in all, findings suggest that public vocational training programmes are more effective where the labour market already offers good employment opportunities. This can be due to a better capacity of the centre-northern labour market to receive skilled youth or to a better capacity of the regional authorities to set up vocational training programmes that match the needs of employers. In the first case, policymakers at the national or regional level have little room for improving the effectiveness of training programs, as trained workers would still find it difficult to enter the labour market. In the second case, there is the possibility to better design training programs, provided that regional policymakers are able to set up courses that meet the skill needs of their territories. Our findings are not easily comparable with recent studies on Italy, which generally focus on single regional policies. Further investigation at the national level with comparison across regions is necessary to understand the reasons why training courses can be more or less effective within a country. Further, it is always necessary to assess training programs beyond their impact on employment probabilities, namely in terms of their capability to empower workers in terms of skills and relationships with potential employers.

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