University dropouts vs high school graduates in the school-to-work transition

Who is doing better?

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Abstract

Purpose – The purpose of this paper is to consider the enrolment at university and the subsequent possible dropout as a piece of the school-to-work transition and ask whether it improves or worsens the labour market outcomes a few years after graduation from the high school.

Design/methodology/approach – The analysis exploits data from the upper secondary graduate survey by ISTAT on a cohort of high school graduates and investigates the effect of dropping out four years after graduation. The labour market outcomes of university dropouts are compared to the outcomes of high school graduates who never enrolled at university. A propensity score matching approach is applied. The model is also estimated on the subsamples of males and females.

Findings – The findings show that spending a period at university and leaving it before completion makes the transition to work substantially more difficult. Both the probability of being NEET and getting a bad job increase in the case of dropout, while no relevant effect is found on earnings. Moreover, the impact of university dropout tends to be more harmful the longer the spell from enrolment to dropping out. Separate estimates by gender point out that females appear to be relatively more affected in the case of dropping out without a fallback plan.

Originality/value – While the existing studies in the literature on the school-to-work transition mostly focus on the determinants of the dropout, this paper investigates whether and how the employment outcomes are affected by dropping out in Italy. Moreover, university dropouts are compared to high school graduates with no university experience, rather than to university graduates. Finally, evidence on the mechanisms driving the effect of dropping out is provided, by considering timing and motivations for dropping out.

Keywords Earnings, Italy, NEET, Propensity score matching, Job quality, University dropout

Paper type Research paper

1. Introduction

Nowadays, a large number of young people choose to enrol at a university after graduating at high school, but a large share of them fails to gain a degree and drops out of university before completion.

The university dropout rate in Italy is at the highest level compared to other European countries (Schnepf, 2017). The proportion of dropouts amounts to one out of four enrolled students three years after enrolment and one out of three, six years after enrolment (ANVUR, 2016).

As a consequence, it raises the question of whether and how dropping out of university affects the youth's transition from school towards the labour market and whether it should represent a major policy concern.

In this study, we consider university enrolment and the subsequent withdrawal as a piece of the school-to-work transition, and ask whether it improves or worsens the chances of entering the labour market and getting a good position a few years after high school graduation.

To investigate these issues, we find it more promising to compare the labour market outcomes of university dropouts with the outcomes of those, within the same cohort of high school graduates, who never enrolled at university. Alternatively, a comparison between university dropouts and university graduates could be carried out. However, in our judgement,

while it can be easily expected that university dropouts perform worse than their university graduates counterparts (Davies and Elias, 2003; Scholten and Tieben, 2017, p. 1), it is much less clear if the same applies when dropouts are compared to the high school graduates who enter the labour market with no university experience at all.

As the evaluation of the success or failure of the school-to-work transition involves a multidimensional assessment, we consider three different outcomes. The first one has to do with labour participation and investment behaviour of the individual, as it is captured by the probability that, four years after graduation, the high school graduate has to be considered not in employment, education or training (NEET) (ILO, 2013). The second outcome, which has to do with the quality of employment, is the probability that, conditional on being employed, he/she got a "bad" job, corresponding to a low specialised occupation in a part-time or temporary employment. Finally, we consider the earnings gained by the employed individuals.

Taking advantage of the information collected by ISTAT (Italian National Statistical Office) through the upper secondary graduate (USG) survey, our analysis considers the cohort of high school graduates in 2007 and investigates if there is any effect of dropping out of university four years after graduation from high school.

To deal with the selection bias threat which affects the comparison between university dropouts and high school graduates without university experience, we first include a number of variables controlling for the personal traits of the students, as well as other variables which capture their educational and family background. Furthermore, as this may not be considered a conclusive solution, we adopt a propensity score matching (PSM from now on) approach. In this approach, the university students who dropped out represent the treatment group, and are matched to the observationally similar high school graduates who never enrolled at university, who represent the control group. To prove the robustness of the obtained results, we carry out the analysis following different matching procedures. The balancing tests support the validity of our PSM estimates. Moreover, as we suspect that the effect of dropping out may differ for males and females, we replicate the estimation for these two separate subsamples. To ascertain further if the results hold for different subgroups, we run the PSM separately also by macroarea and by the type of high school attended.

In a nutshell, we find that spending a period at university and leaving it without attaining a degree makes the transition to work substantially more difficult. Both the probability of being NEET and the probability of getting a "bad" job four years after high school graduation are increased by the withdrawal from university before completion. On the contrary, no significant effect is found on earning levels. Moreover, the results indicate that the university dropout impact on the NEET risk tends to be more harmful if there is longer time spent at university from enrolment to dropping out. Even though other explanations cannot be ruled out, this finding is consistent with the idea of a lock-in effect deriving from the time spent at university. Separate estimates for males and females substantially confirm these findings.

Taking advantage of the information on the motivations for dropping out, we also find that the risk of having a "bad" job and low earnings for females are relatively worse when they drop out without a "fallback plan". Besides, the separate estimates by macroarea and by the type of high school diploma show the substantial negative impact of dropping out on the risk of being NEET and having a "bad" job. It is important to note that all the separate estimates confirm the risk of being NEET is worsened by the lock-in effect.

This study contributes to the existing literature on the school-to-work transition as, to the best of our knowledge, it is the first one to investigate whether and how the employment outcomes of the youths are affected by leaving university before completion in Italy, while the existing studies mostly focus on the determinants of the dropout phenomenon. Moreover, differently from a large part of the previous studies, to detect the effects of

leaving university without attaining a degree we compare university dropouts to high school graduates with no university experience, rather than to university graduates. Finally, we are able to have an insight into the mechanisms driving the effect of dropping out, by considering additional information on the timing and the motivations for dropping out.

The paper is structured as follows. The next section provides a review of the relevant literature and presents the main hypotheses. Section 3 illustrates the data set and descriptive statistics while Section 4 discusses the econometric strategy. In Section 5, empirical results are presented and commented. The last section concludes the paper.

2. Literature review and main hypotheses

University dropouts are a serious concern for policy makers in many countries, and particularly in Italy where they represent an endemic phenomenon. As a matter of fact, dropping out in Italy was expected to decline after the implementation of the "3+2" university reform in 2001. Nevertheless, the reform led to an increase in enrolments far greater than the increase in the number of university graduates (Bratti *et al.*, 2008), and its net outcome was a substantial stability in the aggregate dropout rate (Di Pietro and Cutillo, 2008). A more decisive and lasting reduction of dropouts only occurred during the more recent years, in concomitance with the economic and financial crisis (see Figure A1 in Appendix 1). Despite this recent reduction, Italy is still characterized by the highest dropout rate out of 15 European countries (Schnepf, 2017). Moreover, dropping out is a permanent decision for most students[1].

Concern about university withdrawals before completion depends on a number of reasons. First of all, they represent a clear waste of public and private resources, and are often considered as an evidence of the university system's inefficiency (Aubyn *et al.*, 2009; OECD, 2017). Second, they tend to dampen human capital accumulation, undermining the foundation of economic growth (Hanushek and Wößmann, 2010) and labour productivity (Moretti, 2004) in a knowledge society. Third, when they are clearly driven by socio-economic family background, as it is in the case of Italy (Cingano and Cipollone, 2007; Ghignoni, 2016), they tend to reproduce and to enlarge distribution inequalities. Finally, from an individual point of view, dropping out may increase the risk of becoming NEET (Hauret, 2017) and may be related to negative and persistent effects on labour market outcomes (Davies and Elias, 2003). On the whole, it may further lengthen the school-to-work transition of Italian students, which is already one of the slowest in the world (Pastore, 2017).

Actually, the bulk of economic literature concerning tertiary dropouts focusses on the causes of dropping out (for a comprehensive survey, see Aina *et al.*, 2018), and concentrates on students' individual and family characteristics (Aina, 2013), as well as on regional labour market conditions (Di Pietro, 2006) and universities' organization and structure (Gitto *et al.*, 2016). Less attention has been paid to the consequences of dropping out on the school-to-work transition paths. Even in this framework, most papers analyse the consequences of dropping out by comparing labour market outcomes of university dropouts to those of university graduates (Davies and Elias, 2003; Scholten and Tieben, 2017).

Comparing the labour market outcomes of university dropouts with those of high school graduates who never entered university represents a trickier task. Indeed, from a theoretical point of view, university dropouts can have either better or worse labour market outcomes than high school graduates, according to the theoretical framework of reference, the degree of labour market flexibility and the structure of the educational system.

Human capital theory (Becker, 1993) predicts that each year spent in education fosters the accumulation of human capital and improves labour market outcomes, independent of a successful graduation. In this case, university dropouts should fare better than high school graduates who never entered tertiary education, even though researchers seldom can

control for student's actual course commitment and learning progress (Groot and Oosterbeek, 1994; Rosenbaum, 1986). This theoretical framework should not find full application; however, in countries characterized by low labour market flexibility where employers are prone to choose and promote individuals with clear skill-related qualifications (Schnepf, 2017).

University dropouts should fare better than high school graduates even in the imperfect information framework analysed by Arrow (1973). According to this author, the mere enrolment in tertiary education can be considered as a positive signal by employers and enhances applicants' labour market chances even if they did not eventually graduate. However, it has been argued (Schnepf, 2017) that the positive signalling power of enrolment in higher education would be more likely to operate in countries where the graduation rate from (and the enrolment rate in) university is low, and in countries with a high share of vocational orientation among upper secondary school graduates (where university enrolment is likely to signal a higher employability of dropouts given their more general education). Moreover, dropping out would be more likely to represent a good signal in countries where vocational education is not school- and work-based and is not strongly linked to the labour market. Finally, in flexible labour markets, where job matching is determined purely by market mechanisms, dropouts, despite having less clean-cut formal skills, should signal to employers a higher level of knowledge than high school graduates.

By contrast, in highly regulated occupational labour markets, what matters in order to have good labour market outcomes is a graduation certificate (Collins, 1979). If this is the case, tertiary dropout students do not benefit from enrolment, and their performances on the labour markets are exactly the same as high school graduates.

On the other hand, university dropouts can perform worse than high school graduates if dropping out is interpreted by employers as a negative signal for a lack of non-cognitive skills like perseverance and goal commitment (Heckman and Rubinstein, 2001). In this case, future employers might perceive hiring dropouts as a risky investment, as they might be likely to show these characteristics in the job as well as during their schooling path (Scholten and Tieben, 2017). Thus, the negative signal stemming from dropping out might outpace the positive signal of having enrolled in tertiary education put in evidence by Arrow (1973), especially in countries, like Italy, where the admission to higher education does not act as a strong filter.

Worse labour market performances of dropouts, compared to high school graduates, can also depend on the significant negative and persistent effect of dropping out on self-esteem[2] (which is an important labour market skill affecting wages and careers) put in evidence by Hoeschler and Backes-Gellner (2014).

A further negative effect of dropping out, compared to high school graduates who never entered university, can be due to a lock-in mechanism. During the school-to-work transition period, new high school graduates choose how to allocate their time between different options (enrolling into university, attending training or non-academic education, looking for a job), whose economic returns are uncertain (Abbiati and Barone, 2016; Hartog and Diaz-Serrano, 2014). Enrolling in university implies allocating time in an alternative way than searching for a job or searching and enrolling in training or other non-academic education. Therefore, university enrolment has indirect costs resulting not only from losing wages, but also from putting off the job search process (or searching for alternative training or education). For this reason dropouts, in their early careers, can attain worse labour market outcomes than high school graduates who never enrolled at university. Indeed, a shorter duration of the job search process involves a lower probability of employment and a lower quality of the job possibly attained. It also involves a higher risk of being NEET, as NEET includes unemployed, people looking for a first job, those who are unemployed after the expiration of a precarious contract, and inactive people not in education.

Moreover, if the lock-in hypothesis matters, dropouts' labour market outcomes should depend on the timing of dropping out. As a matter of fact, the longer is the period spent at university before dropping out, the shorter is the time spent for the search of a job or an alternative education. In this case, we expect to observe less serious consequences for university students who dropped out at an earlier stage of their tertiary studies than for those who persisted longer, but in the end did not graduate (Matković and Kogan, 2012).

Furthermore, the motivation for withdrawing without a degree may have implications on its consequences. As to the reasons why university students decide to withdraw before completion, some authors (Campolieti *et al.*, 2010) distinguish between "rational" and "irrational" reasons for dropping out, arguing that, if students lack the ability or motivation to complete school, it may be perfectly sensible for them to concentrate on acquiring labour market experience or additional skills through on-the-job training.

In our analysis, we prefer disentangling the various motivations from a different perspective. With regard to the outcomes of the school-to-work transition what matters the most is dropping out with or without a "fallback plan", since the students who withdraw from university in order to accept an available job or to attend a different educational/training course should fare better than other dropouts.

Empirical literature comparing employment performances of university dropouts and high school graduates is quite scarce, it concentrates on a small number of countries and takes into account only few labour market outcomes.

Schnepf (2017) carries out a cross-country comparison by applying PSM to a sample of 25–64 aged individuals, who either attained a high school diploma and never entered university or became university dropouts during their lives. Contrary to other countries, in Italy adult dropouts turn out to be more frequently in employment than USGs, even though they are characterized by a probability of having gained a prestigious job in their adulthood not significantly higher than individuals who never enrolled in tertiary education. The author interprets this result as a consequence of the wide diffusion of internal labour markets in Italy, in which signalling theory predicts an employment advantage for dropouts over high school graduates, and where a considerable part of training takes place on the workplace, so that knowledge acquired during tertiary education attendance does not improve progression chances.

As to early career returns, Reisel (2013) uses quantile regressions to compare the earnings of dropouts and high school graduates in a social–democratic, "decommodifying" regime (Esping Andersen, 1990) like Norway, and a "residual" welfare state country like the USA. This author finds that in Norway, but not in the USA, students who choose the vocational track in high school earn more than students who enrol into university without graduating. These results suggest that high school graduation has a lower value than academic attendance in the flexible institutional framework of the USA, whereas, it has appreciable effects on wages in the segmented Norwegian labour market, where the most relevant skills are taught on the job (Thurow, 1975).

Finally, Matković and Kogan (2012) compare the speed of entry into the labour market and the quality of early employment of tertiary dropouts and high school graduates who never entered university in Croatia and Serbia. They found that dropouts are quicker in entering employment than USGs in Serbia, and that this advantage is stable over time. By contrast, the initial advantage of dropouts on non-starters is cancelled one year after leaving education in Croatia. This would be due to the flexibility of Serbian labour markets, in which human capital theory applies, in contrast with the prevalence of internal labour markets in the Croatian institutional framework, in which enrolment can represent a "good" signal, but progression in career is based on workplace training. As a further explanation of the quick entry into the labour markets of Serbian dropouts, it has been observed (Arandarenko, 2007) that in Serbia, youths often enrol in tertiary education as an affordable "parking", and that almost half of the dropouts leave tertiary education because they find a suitable job[3].

To the best of our knowledge, this is the only paper that concentrates on Italy by comparing a variety of early labour market outcomes of tertiary dropouts to those of high school graduates who never entered university. As already said, from a theoretical point of view it is difficult to hypothesize, *a priori*, which of these two groups fares better in their early career. Indeed, human capital theory, as well as Arrow's signalling theory, foresees an advantage for university dropouts over high school graduates with no university experience. By contrast, both the Heckman signalling theory and the lock-in hypothesis predict that high school graduates would fare better than university dropouts. Therefore, we try to verify, first of all, whether the effect of dropping out on early labour market outcomes of Italian students is positive or negative.

If we were to discover a negative effect, taking into account the timing of dropping out will allow us to test the lock-in hypothesis vs the "bad" signal hypothesis. In fact, the lock-in explanation implies that dropping out after several years of university attendance has more serious consequences than leaving early after enrolment. By contrast, we have no reasons to believe that the possible "bad" signal stemming from dropping out would worsen with the length of time spent at university.

Finally, we test if having or not a fallback plan when withdrawing from university affects the school-to-work transition of dropout students.

3. Data and descriptive statistics
The data are drawn from the fifth wave of the USG survey, conducted by ISTAT in 2011. The sample is composed by nearly 26,000 high school students who graduated in 2007 and were interviewed in 2011.

The main purpose of this survey is to collect information on the occupational and educational conditions of high school graduates four years after graduation in order to monitor the path and outcomes of their transition to work. The data set provides very detailed information on the personal traits of students and a comprehensive description of their school and university performance, as well as their position in the labour market[4]. We exclude from the original sample the students who started working before high school graduation and those who were already working at the time of university enrolment.

The data are particularly suitable to our purpose since they allow us to identify students who drop out from university. This group is composed by all those who fit the following criteria:

(1) have enrolled at university after high school but get out from it without obtaining a degree;

(2) are not currently enrolled in any university; and

(3) have decided to not sign up in any kind of post high school courses.

In order to consider a more homogeneous group, we pick up only those students who left a bachelor's degree (*laurea triennale*). We do not consider all those who dropout from a master degree or from a supplementary bachelor degree. Indeed, the inclusion of these individuals in the dropout group would hinder a correct identification of the effect of dropping out as they already hold a first level university degree.

As the ISTAT survey reports only individual conditions four years after graduation, the evidence is not informative on longer term implications of dropping out. Nevertheless, this length of time fits well the purpose of our analysis, which aims at investigating the effects of dropping out from university on the school-to-work transition.

The wave of the survey we use is quite peculiar[5], as students who got their high school diploma in 2007 were going to face the economic crisis that in Italy had its sharp effects on employment since 2009 (ISTAT, 2010). For this reason, as explained below, we do not consider students who dropout after their second year, that corresponds to 2009 or after.

The control variables provided by the survey and used in the estimations are gender, type of high school attended[6], grade obtained at the end of lower-secondary school, number of years taken to complete high school, high school graduation grade, geographical macroarea where the individual got the degree and the year of birth (see Table AI in Appendix 1 for details).

In addition, the data set contains information about parents' education achievement and parents' status in the labour market when the individual was 14 years old. In order to control for the influence of the family background, a synthetic social class indicator (Cobalti and Schizzerotto, 1994; Triventi and Trivellato, 2009; Ghignoni, 2016) might be used. However, we prefer to keep aside the information related to the educational degree from the occupational status (employed/unemployed) of the parents[7], since these covariates may be useful in our matching procedure, in order to reduce the heterogeneity among high school graduates before the treatment, and to make the econometric strategy robust.

Besides high school grades and lower secondary school grades, which are usually exploited as proxies for personal abilities, we include in the model other variables related to salient events which may have occurred in the student's educational career, namely, if he/she changed the high school curriculum, if he/she failed or was in debt for some educational credits[8], and if he/she took part in a traineeships as part of the high school curriculum. As put in evidence by Hauret (2017) and Heckman and Rubinstein (2001), measures of the individual soft skills would be valuable variables when dropouts are considered, however surveys seldom provide them.

As we can see from Table AII (see Appendix 1), 15.9 per cent of our sample dropped out of university, 17 per cent are NEET four years after the high school diploma and 36 per cent have a "bad" job. The largest part of their parents had an intermediate level of education, whereas the percentage of those who have both parents employed is around 52 per cent.

The distribution of the high school graduates by macroarea is quite homogenous with a slightly lower percentage for Central regions and for the Islands. The USG survey provides information about the timing and the motivations for dropping out, which are helpful in order to take into account some relevant differences in the treatment. We take advantage of this information to distinguish different groups of dropouts. First, since we suspect heterogeneous effects depending on the dropout year, we divide them, as reported by Table AIII (see Appendix 1), according to the year when the dropout occurred. The first group is composed by those who enrol at university in the academic year 2007/2008 and get out from tertiary education within one year after enrolment (first-year dropouts). The second one is composed by those who enrol at university in the same academic year and get out after two years (second-year dropouts). As we are interested in investigating the effect of the dropout timing, we prefer to leave aside the residual group of those who left university after the second year (after 2009) since they presumably entered the labour market when the employment effects of the Great Recession were already active in Italy, making it more difficult to disentangle the proper effect of the dropout timing from the effect of the crisis[9]. However, the number of dropouts after the second year is very low (see Table AIII) and this selection does not affect the sample size and the sample composition.

In addition, we consider that dropping out may have a heterogeneous impact on individual labour market outcomes according to its motivations. In this regard, we find useful to distinguish, on the one hand, students who dropout from university having an employment or educational alternative option (namely, we group together those who left university to attend a different post-high school educational course, after finding the job they were searching for, because they were unable to balance studying and working or because they were dissatisfied about university structures and organization or about job opportunities offered by the course) and, on the other hand, those who dropout owing to some constraints (namely, students who left before completion because university was too difficult, too expensive or due to personal or family reasons).

In the following analysis, we refer to these two groups as dropouts with and without a "fallback plan," respectively. Table AIV (see Appendix 1) shows the percentage distribution of dropouts according to the motivations, both for the full sample of dropouts and for the subsample of dropouts without a fallback plan.

As already mentioned, to evaluate the effects of dropping out, we consider three different outcomes: the probability of being NEET, the probability of getting a "bad" job and monthly earnings four years after high school graduation. According to the established definition, we consider NEET the individuals in the sample who are neither in education nor in employment, no matter whether they are actively looking for a job or not and define a dummy equal to 1 if individuals belong to this group and 0 otherwise.

The second outcome variable refers to the quality of the job. This variable is built on three different job characteristics: full time/part time, permanent/temporary and the level of specialization. The last information is defined according to the International Standard Classification of Occupations (ISCO08). We distinguish most jobs as high and low specialised ones according to the two-digit classification. For some occupations, whose degree of specialization was unclear at the two-digit level, we consider the three-digit classification. Hence, a dummy "bad" job is defined, where a job is considered "bad" if it is: low specialised and part time, or low specialised and temporary or low specialised, part time and temporary.

The third outcome is the logarithm of monthly earnings. The survey only reports the annual earnings in classes. Since the classes are very narrow[10], we can consider this variable as a continuous one by taking the mean value of each class. For the self-employed workers we derive the monthly earnings by dividing the yearly amount by 12, whereas for the employees we take into account also the possible presence of year-end and other additional payments.

As explained in the next section, in the PSM approach, the students who dropped out correspond to the treatment group. Following the previous discussion, we focus on four treatment groups, namely:

(1) all dropouts;

(2) first-year dropouts;

(3) second-year dropouts; and

(4) first-year dropouts without a fallback plan.

Each of these groups has to be compared with the control group, which is composed by high school students who graduated in 2007, never enrolled in university and in any post-high school specialization course.

The parameters of the distribution of the variables characterising the control and the treatment groups are reported in Table AV (see Appendix 1). The percentage of NEETs among the high school graduates, which amounts to almost 22 per cent, is notably lower than in the samples of dropouts, where it reaches 44 per cent among the second-year dropouts. Similarly, the share of high school graduates employed in a "bad" job is lower than the percentage of dropouts in a similar job. On the contrary, only narrower differences can be appreciated with respect to earnings.

It is worth noticing that the control group is characterized by less favourable features, which are usually associated to a penalty in the labour market. On average, their school career is more uneven and they are more likely to have a poorer family background. Indeed, a larger portion of the high school graduates have failed one or more years at high school, the grades they obtained at the end of lower secondary school as well as at the end of high school are, on average, lower, compared to the grades obtained by dropouts. Finally, both the educational level and occupational status of their parents are lower.

4. Econometric strategy

Our aim is to estimate the effects of dropping out on the outcome variables for the four treatment groups defined above.

In the first step of this analysis, we estimate two probit models which we shall specify as follow:

$$P(NEET_i = 1 | R_i) = \phi(\alpha' R_i),$$

$$P(Bad\ job_i = 1 | Z_i) = \phi(\beta' Z_i),$$

where α and β are ($K \times 1$) vectors of unknown parameters, R_i and Z_i are ($K \times 1$) vectors of control variables for the observation i, included the treatment dummy variable indicating the dropout event, while ϕ is the standard normal cumulative distribution function. The dependent variables refer to the probability of being NEET and to the probability of getting a "bad" job.

For the third labour market outcome that we are interested in, we estimate an OLS regression specified as follow:

$$(log)\ Monthly\ Earnings_i = \gamma' X_i + \delta\ Treatment_i + \epsilon_i.$$

Here, the dependent variable is continuous and ϵ_i represents the error term.

To estimate the effect of dropping out on the outcomes we use a PSM approach (Rosenbaum and Rubin, 1983), which provides a way to balance observable covariates across the sample of the dropouts (our treatment group), and the sample of the high school graduates, which corresponds to the control group[11]. This means that the values of the outcome variables will be compared between dropouts and high school graduates who are more similar, conditional to the control variables added in the model.

Unfortunately, the selection of individuals into the treatment group (dropouts) and the control group (high school graduates) is not random, and some unobservable factors correlated with both selection and the outcomes variables can bias the estimation. For this reason, caution is required in interpreting our results as a conclusive proof of a causal effect.

To associate observations, this strategy uses the propensity score, i.e. the probability of being treated conditional to a set of variables affecting treatment and outcome. In the case of monthly earnings outcome, the propensity score can be defined as follows:

$$p(X) = Pr(Treatment = 1 | X) = E(Treatment | X).$$

If we define with Y_i, one of the possible outcomes and $T_i = \{0, 1\}$ indicates the exposure to treatment, we calculate the average effect of treatment on the treated (ATT) defined as follows:

$$ATT = E\{Y_{1i} - Y_{0i} | T_i = 1\},$$

where Y_{1i} and Y_{0i} are, respectively, the potential outcomes for unit i belonging to the group of treated (dropouts) in case of treatment or otherwise.

Among the different procedures generally used to match treatment and control (Becker and Ichino, 2002; Caliendo and Kopeinig, 2008; Martini and Sisti, 2008), we apply the Kernel matching with a caliper[12] and common support option[13].

Since the propensity score is estimated in a separate step, we adjust the standard errors by a bootstrap method (Garrido et al., 2014).

In the econometric literature, there are several discussions about what is the best matching procedure (Zhao, 2004). Therefore, as a robustness check, we applied different

methods, looking for the most suitable to our data. The results and the significance tests remained substantially unchanged[14].

By the Kernel approach, every treated unit is matched with untreated units with a weight inversely proportional to the distance between the propensities. Through this method all the treated units are matched with the untreated ones exploiting all the available information. We preferred this approach since our data set includes mostly discrete or dummy variables and, in this particular case, the neighbour matching does not guarantee the right coupling between treatment and control[15]. However, the results obtained with the two different methods are very similar in terms of sign and significance, whereas coefficients are slightly smaller in the kernel approach.

Following Caliendo and Kopeinig (2008) and Garrido et al. (2014), we use only pre-treatment variables (unaffected by dropout decisions). This is a necessary condition to ensure that the outcome variables are independent from treatment, conditional on the propensity score. This excludes the possibility of using some variables (as job experience) highly correlated with the dependent variables described above.

Among the variables at our disposal, all those simultaneously influencing outcome variables and dropout probability are included in the estimated models (Brookhart et al., 2006)[16].

Finally, we suspect that the effect of dropping out may be different between males and females. Indeed, Italy is still characterized by a low female participation rate in the labour market (Verashchagina and Capparucci, 2013) partly due to persistent cultural factors (Camussi, 2013). Moreover, economic literature points out that women are more sensible to educational failures (Rask and Tiefenthaler, 2008). In this case, the negative effect of dropping out on self-esteem may be worse for females than for males, and it can represent a factor of deeper discouragement influencing subsequent labour market choices. For this reason, we carry out the analysis separately for each sub-group. Moreover, separate estimations are carried out also for macroareas and for the type of high school attended in order to prove the robustness of the results.

5. The effects of dropping out of university
To begin with, we run preliminary estimations of three models, one for each selected employment outcome, in order to have a first look at the relationships between our key variables.

To this purpose, we first estimate a probit model of the likelihood of being NEET four years after graduating from high school, on the sample of high school students who graduated in 2007. The results reported in Table I (Column 1) show that dropouts suffer from a higher risk of being out of employment, education and training, compared to high school graduates who did not enrol at university. It is worth noticing that the estimated marginal effect for the dropout variable is one of the largest estimated effects in the NEET equation, and it is highly statistically significant, meaning that those leaving university without a degree are much more exposed to the risk of failing the transition from school to work within the observed period.

The probit model of the probability of being employed in a "bad" job gives similar results (Table I, col. 2). When employed, the dropouts are more likely to be in a low specialised position and to have a part time or temporary employment than their high school graduates counterparts. Finally, OLS estimation of the earnings equation (Table I, column 3) points out that those who left university without attaining a degree suffer a penalty, though not statistically significant, in terms of earnings.

According to these preliminary results, all the outcomes we consider are negatively correlated to dropping out from university. This suggests that dropping out is not a harmless event in the school-to-work transition.

As a further step in the analysis, we apply the PSM methodology which allows us to compare observationally similar treatment and control groups. To begin with, we consider all the dropouts and compare them to high school graduates. Results (Table II, first row)

Variables	(Probit) NEET probability (1)		(Probit) Bad job probability (2)		(OLS) (log) Monthly earnings (3)	
Dropout	0.125***	(0.0125)	0.0612***	(0.0199)	−0.0414	(0.0265)
High school change	0.0244	(0.0157)	−0.00475	(0.0232)	0.00847	(0.0267)
High school type = art, languages and socio-psychological schools	0.0496**	(0.0236)	0.00539	(0.0367)	−0.0539	(0.0517)
High school type = Lyceums	−0.0158	(0.0160)	−0.0606**	(0.0240)	0.0326	(0.0337)
Failure during HS	−0.0177	(0.0172)	−0.0108	(0.0250)	−0.0150	(0.0321)
Male	−0.0921***	(0.0096)	−0.207***	(0.0135)	0.207***	(0.0174)
Educational debt	−0.0235**	(0.0102)	−0.00235	(0.0145)	−0.0321*	(0.0179)
High school grade	−0.00138***	(0.0005)	−0.00197***	(0.0007)	0.000583	(0.0008)
Training	−0.0345***	(0.0100)	0.0256*	(0.0146)	−0.0549***	(0.0180)
Family educational level = 2	−0.00337	(0.0097)	−0.00355	(0.0135)	0.0430***	(0.0166)
Family educational level = 3	0.0686***	(0.0208)	−0.0186	(0.0320)	0.0396	(0.0403)
Parents' occupational status = 0	−0.112***	(0.0297)	−0.0660	(0.0560)	0.0762	(0.0751)
Parents' occupational status = 1	−0.140***	(0.0304)	−0.0718	(0.0566)	0.0700	(0.0755)
High school macroarea (North East)	−0.0160	(0.0154)	−0.0419**	(0.0181)	0.0824***	(0.0197)
High school macroarea (Centro)	0.0789***	(0.0152)	0.0543***	(0.0196)	−0.0572**	(0.0231)
High school macroarea (South)	0.216***	(0.0142)	0.128***	(0.0200)	−0.162***	(0.0262)
High school macroarea (Islands)	0.230***	(0.0155)	0.113***	(0.0232)	−0.188***	(0.0311)
Lower secondary grade (high)	−0.0366***	(0.0115)	−0.0416***	(0.0158)	0.0502***	(0.0194)
Year of birth (1987)	−0.0597***	(0.0166)	0.0444*	(0.0253)	−0.0342	(0.0296)
Year of birth (1988)	−0.0867***	(0.0197)	0.0245	(0.0298)	−0.0602	(0.0374)
Year of birth (1989–1990)	−0.0512	(0.0351)	0.104*	(0.0559)	0.0388	(0.0840)
Constant					7.007***	(0.112)
n	8,608		5,596		6,383	
Wald $\chi^2(19)$	844.79		385.48		$F(19,6363)$	14.44
Prob > χ^2	0.0000		0.0000		Prob > F	0.0000
Pseudo R^2	0.0969		0.0553		R^2	0.0524

Notes: Robust standard errors are shown in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.010$

Table I.
Effect of dropping out on labour market outcomes: explorative analysis, marginal effects for probit models

Males and Females	NEET Coeff.	n	Bad job Coeff.	n	(log) Monthly earnings Coeff.	n
All dropouts/HS graduates	0.131***	8,608	0.050***	5,596	−0.046	6,383
First-year dropouts/HS graduates	0.096***	8,035	0.033	5,324	−0.016	6,062
Second-year dropouts/HS graduates	0.238***	7,468	0.083*	4,969	−0.077	5,651
First year dropouts without fallback plan/HS graduates	0.136***	7,649	0.087**	5,086	−0.003	5,787
Males						
All dropouts/HS graduates	0.124***	4,573	0.078***	3,076	−0.044	3,529
First-year dropouts/HS graduates	0.090***	4,282	0.062*	2,927	0.004	3,357
Second-year dropouts/HS graduates	0.233***	4,010	0.093*	2,745	−0.146	3,149
First-year dropouts without fallback plan/HS graduates	0.123***	4,106	0.076	2,812	0.097	3,227
Females						
All dropouts/HS graduates	0.129***	4,035	0.036	2,520	−0.057	2,854
First-year dropouts/HS graduates	0.097***	3,753	0.016	2,397	−0.054	2,705
Second-year dropouts/HS graduates	0.239***	3,458	0.066	2,224	0.007	2,502
First year dropouts without fallback plan/HS graduates	0.147***	3,543	0.110*	2,274	−0.116*	2,560

Notes: Kernel matching algorithm with caliper set to 0.2 and common support option with a level of significance of 0.005. Standard errors are bootstrapped. *$p < 0.10$; **$p < 0.05$; ***$p < 0.010$
Source: Elaborations on USG Survey

Table II.
Estimates of the average-treatment-on-the-treated (PSM)

confirm that dropping out from university has serious consequences on the school-to-work transition as it increases by 13 percentage points the risk of being NEET and by 5 points the likelihood of getting a "bad" job four years after leaving high school. The effect on earnings is negative but not statistically significant. This is not surprising since the earning levels of youths at the beginning of their career tend to be low and quite compressed.

Such results point out that spending a period at university and leaving it before completion represents an experience that makes the transition to work more difficult. Both the probability of being employed or engaged in training or education, and the probability of getting a good job are lowered by withdrawing from university without a degree. Overall, these findings are consistent with the hypothesis of a lock-in effect, which considers the dropout experience as a waste of time, as well as with the hypotheses that leaving university without graduating conveys a "bad" signal to the prospective employer or brings about a loss of self-esteem.

As for the results concerning the risk of NEET, one could argue that dropouts are more likely to be NEET since they search for better employment or have a higher reservation wage, as this would imply a higher risk of being unemployed. However, our findings do not support this explanation, as they show that, when employed, dropouts are more likely to accept "bad" jobs and do not get higher earnings.

To disentangle the different effects at work, we make a step forward by distinguishing dropouts according to the year in which they dropout. Namely, we run separate estimates for those who leave university within the first year after enrolment and those who leave in their second year. This way we are able to test the hypothesis that the adverse consequences of dropping out worsen with the time spent at university. The comparison of the results of propensity scores for the two groups clearly confirms this hypothesis (Table II, second and third rows). Dropping out of university after two years affects the employment prospects much more severely than dropping out after just one year. More precisely, the risk of being NEET increases on average by almost 10 percentage points if dropping out occurs in the first-year and by almost 24 points in the second-year. Both these estimated effects are highly statistically significant.

In addition, first-year dropouts face a 3.3 per cent increase in the likelihood of getting a "bad" job, while the second-year dropouts face an increase of 8.3 per cent, where only the latter effect is statistically significant (at 10 per cent confidence level). At the same time, as in the full sample estimation, in both cases no significant effects are found on the earnings levels, even though the estimated effect for those who dropout two years after enrolment is considerably larger.

According to our theoretical framework, this evidence clearly supports the lock-in hypothesis, predicting that the longer is the time spent at university before leaving without achieving a degree, the more adverse is the effect on the outcomes of the school-to-work transition.

A drawback with these results is that the choice of dropping out early, in the first year, or later, in the second one, might depend on different motivations. It can be argued that those leaving university in the first year are more likely to be students who entered university to have a better evaluation of its costs and benefits and, after leaving it, find it less difficult to access employment or another training opportunity. Conversely, students who dropout in the second year or later have made a greater investment in university and are more likely to drop out because of binding constraints or unexpected events so that it is unlikely for them to have alternative employment or educational options at disposal.

To deal with this issue, we exploit the information about the motivations for leaving university, by distinguishing between dropouts who have or do not have a fallback plan. So, we consider as a treatment group in the PSM only the first-year dropouts without a fallback plan. The results show that the risk of being NEET increases by almost 14 percentage points for this group compared to the control group of high school graduates

(Table II, fourth row), an effect which is considerably lower than that found for the second-year dropouts. Conversely, dropping out in the first year without a fallback plan has just a slightly larger effect than dropping out in the second year on the probability of getting a "bad" job. The effect on the monthly earnings remains not statistically different from 0.

On the one hand, these findings indicate that the motivation for dropping out matters, as individuals who drop out without a fallback plan are those most heavily affected among those leaving university during the first year. On the other hand, as far as the risk of being NEET is concerned, this effect is well below that suffered by those who drop out in the second year, meaning that the time spent at university represents a more important driver of the negative consequence of dropping out. At the same time, when the risk of getting a "bad" job is considered, the effect of leaving university in the first year without other options at their disposal is as harmful as leaving one year later.

It is worth noticing that a portion of dropouts in our sample (between 23 and 20 per cent for males and females, respectively, Table AIV) withdrew from university because they found a suitable job, i.e., with a very clear fallback plan, and we cannot exclude that they did it thanks to the human capital accumulated by attending university. However, by comparing the results on the first row of Table II (all dropouts vs high school graduates) with those on the fourth row of the same table (first year dropouts without a fallback plan vs high school graduates), we perceive that this possible positive effect of dropping out is not very influential.

In order to verify if the differences on covariates between treatment and control groups have been eliminated (or at least substantially reduced) through the PSM, we implemented a series of "balancing" tests (Rosenbaum and Rubin, 1985; Sianesi, 2004) whose results are not presented here in order to save space[17]. The results of the tests suggest that the PSM worked well and the differences on covariates have been substantially reduced or eliminated[18].

To sum up, the PSM estimates show that dropouts' outcomes in the labour market are worse than high school graduates. This evidence suggests that dropping out from university exerts an adverse effect on the school-to-work transition. This conclusion is reinforced if we consider that, as shown in Section 3, high school graduates are characterized on an average by less favourable school careers and family background before the matching procedures. Furthermore, the risk of being NEET increases markedly with the time spent at university before dropping out, a result that is consistent with the idea of the lock-in effect.

However, as noted in Section 4 these results may be affected by the selection bias. Even though a number of covariates related to gender, career at school, economic and educational family background and macroarea, are included in the estimated models to control for individual heterogeneity, unobserved factors may bias the effect of dropping out because people who choose to enrol at university and then leave it without attaining a degree are likely to have different motivations and abilities compared to those who never enrolled at university after their high school diploma. Thus, caution is required in asserting an effective causal impact of dropping out on the selected outcomes.

To prove the robustness of our results, we replicate the analysis by running separate estimates for different subgroups. This allows us to collect evidence for subgroups that most likely follow somewhat different career paths, and enter labour markets that may be thought as almost distinct.

First, we apply the PSM estimation separately for males and females. As we said before, we have a reason to believe that the effects of dropping out of university may be different for these two groups, given the well-known differences among them in educational careers, attachment to the labour market and family roles in the Italian society (Nicodemo and Waldmann, 2009). As reported in Table II, regarding the risk of being NEET, males and females are affected in very similar ways. On the contrary, the findings reveal some

differences between males and females with regard to the other outcomes. Females suffer a more adverse effect both on the likelihood of getting a "bad" job and on earnings when they drop out in the first year without a fallback plan than when they leave one year later.

The probability of getting a "bad" job in case of dropping out in the first year without a fallback plan increases by 11 percentage points for females compared to the control group, whereas males are more heavily affected by dropping out in the second year. The same applies to earnings. Young females' earnings suffer a substantial and statistically significant reduction only if they drop out without a fallback plan, whereas males' earnings are lowered only if dropping out occurs after the first year.

This suggests that the motivation for leaving university is more relevant for women and that their employment prospects are more heavily affected when dropping out is motivated by causes forcing them to interrupt their educational career. On the one hand, when women drop out because "studying was too difficult" (a motivation concerning more than one out of four female dropouts, Table AIV in Appendix 1), they may be more prone than men to interpret the failure as a sign that they lack ability (Rask and Tiefenthaler, 2008). On the other hand, women are in general more vulnerable than men due to their different family roles. Indeed, unpaid work in Italy is very unevenly distributed by gender, with women bearing the main responsibility of child and elderly care and housework even when they are employed (Addabbo, 2003), which can prevent them from searching better employment and training opportunities.

As a further step, we apply the PSM method separately for North-Central and Southern regions (Table III)[19]. The comparison between all dropouts and high school graduates confirms that students leaving university without graduation face worse outcomes. This is especially true in the North–Centre, while in the South the estimates are statistically significant only for the risk of being NEET. Most importantly, the lock-in hypothesis holds both in the North–Centre and in the South with respect to the NEET risk. With regard to this, the magnitude and the statistical significance of the estimated effects suggest that the negative impact of dropping out on the school-to-work transition is substantial. On the contrary, the results for the other outcomes are only weakly indicative of a lock-in effect both in the North-Centre and in the South.

Finally, we separately consider students coming from technical and vocational high schools and those who attended lyceums, which are schools providing more general, academic education. The main difference between these two types of high schools is that students from technical or vocational schools typically enter the labour market after achieving the diploma, whereas students from lyceums more often enrol at university.

Males and females	NEET[a] Coeff.	n	Bad Job[b] Coeff.	n	(log) Monthly earnings[b] Coeff.	n
Northern and Central regions						
All dropouts/HS graduates	0.132***	5,320	0.057***	4,041	−0.046*	4,499
First-year dropouts /HS graduates	0.084***	4,979	0.052*	3,845	−0.034	4,281
Second-year dropouts /HS graduates	0.250***	4,612	0.079	3,578	−0.061	3,979
First year dropouts without fallback plan /HS graduates	0.084***	4,979	0.097**	3,660	−0.020	4,074
Southern regions						
All dropouts/HS graduates	0.122***	3,288	0.032	1,501	−0.042	1,828
First-year dropouts /HS graduates	0.116***	3,056	−0.034	1,428	0.064	1,728
Second-year dropouts /HS graduates	0.219***	2,856	0.113	1,342	−0.120	1,621
First-year dropouts without fallback plan/HS graduates	0.115***	3,056	0.054	1,375	0.091	1,660

Table III.
Estimates of the average-treatment-on-the-treated (PSM), by macroarea

Notes: [a]Macroarea of high school diploma; [b]macroarea of work.*$p < 0.10$; **$p < 0.05$, ***$p < 0.010$

Once more, we find that, regardless the type of school attended, dropping out from university exerts an adverse influence by increasing the risk of being NEET and that of being in a bad job if employed (Table IV). When the risk of NEET is considered, the results clearly support the lock-in hypothesis. The estimates suggest that the lock-in effect is particularly severe for students who attended a lyceum, but it affects students from technical and vocational schools as well. The lock-in hypothesis applies also for the risk of "bad" jobs concerning students from lyceums even though the estimates are not statistically significant in this case. The estimated effects on the monthly earnings are never statistically significant.

Summing up, our results show, first, that leaving university without attaining a degree makes the school-to-work transition more uncertain and, second, that the negative impact on the risk of becoming NEET increases markedly with the time spent at university. According to our theoretical framework, these findings clearly support the lock-in hypothesis, as the worsening of the effects of dropping out with the time elapsed from enrolment can hardly be explained by the impact on self-esteem or by the negative signal to the prospective employers. However, our data do not allow to exclude, in addition to the lock-in effect, further effects that contribute to the disadvantage of dropping out.

6. Conclusions

This study analyses the consequences of dropping out from tertiary education, compared to never enrolling at university after attaining a high school diploma, in terms of three different early labour market outcomes, namely the probability of being NEET, the probability of getting a "bad" job and the entry-level earnings.

To this aim, we apply PSM procedures to data on the labour market condition of a cohort of Italian students four years after their high school degree.

Our findings show that university dropouts face a higher risk of being NEET and of a lower job quality compared to high school graduates without university experience, whereas the negative effect of dropping out on entry-level earnings is never statistically significant.

Therefore, dropping out from university has to be considered a harmful experience for new entrants in the labour market, which entails individual and social costs and significantly worsens the school-to-work transition paths of young people.

By distinguishing dropout students according to the timing of dropping out, we found that the negative effect of withdrawal on the risk of being NEET is far worse for those students who spend longer time in university before withdrawing. This is clearly consistent

Males and females	NEET Coeff.	n	Bad job Coeff.	n	(log) Monthly earnings Coeff.	n
Vocational and technical; art, languages and socio-psychological						
All dropouts/HS graduates	0.141***	857	0.080*	486	−0.055	569
First-year dropouts/HS graduates	0.105***	704	0.093*	418	−0.105	489
Second-year dropouts/HS graduates	0.167**	550	0.070	331	0.002	389
First year dropouts without fallback plan/HS graduates	0.153***	589	0.197**	353	−0.145	411
Classical and scientific lyceums						
All dropouts/HS graduates	0.132***	7,751	0.040*	5,110	−0.039	5,814
First year dropouts/HS graduates	0.093***	7,331	0.008	4,906	0.024	5,573
Second-year dropouts/HS graduates	0.271***	6,918	0.085	4,638	−0.099	5,262
First year dropouts without fallback plan/HS graduates	0.128***	7,060	0.044	4,733	0.069	5,376

Notes: *$p < 0.10$; **$p < 0.05$; ***$p < 0.010$

Table IV.
Estimates of the average-treatment-on-the-treated (PSM), by type of high school diploma

with the "lock-in" hypothesis. However, we cannot exclude that also other effects are at work in addition to this.

As dropout university students represent a very heterogeneous group of individuals, we also tried to take into account the reasons for dropping out. Interestingly, we found that students who withdraw without a fallback plan fare generally worse than other dropouts. When distinguishing by gender we find that the risk of having a "bad" job and low earnings are relatively worse for female students when they drop out without a fallback plan. Separate estimates by macroarea and type of high school confirm that the risk of being NEET is affected by the lock-in effect.

On the whole, the labour market outcomes of Italian university dropouts are adversely affected compared to those of high school graduates who choose not to enter university. Our analysis shows that spending a few years at the university and leaving it without graduating cannot be regarded as an investment that may yield a positive return through human capital accumulation or positive signalling. On the contrary, it must raise concern as it hinders the school-to-work transition and represents a major driver of the NEET phenomenon.

Notes

1. Actually, high and persistent dropout rates are one of the causes of the low proportion of university graduates among the Italian population.

2. It is worth noticing, however, that self-esteem can be either the cause or the effect of dropping out (Heckman and Rubinstein, 2001).

3. The same would have applied in Italy, at least before the recent crisis (see, Becker, 2006; Di Pietro, 2006).

4. For a complete description of the sampling procedure, see www.istat.it/it/archivio/78617.

5. We were forced to use this wave since the last survey, conducted in 2015, does not provide two fundamental pieces of information: the academic year of dropouts and the geographical macroarea where students attended high school.

6. We group the observations in three categories: vocational and technical schools; art, languages and socio-psychological schools; and classical and scientific lyceums.

7. However, we tested also a different model specification including the social class indicator, and we obtained very similar results in terms of sign and magnitude.

8. The Italian upper secondary education system allows the students who did not achieve the required standard during the year, to repair before the admission to the subsequent curricular year.

9. Furthermore, for this group the exact year for dropping out is not specified in the survey.

10. For self-employed individuals we have 34 classes, while for the employees we have 53 classes. All the classes are equal in size (the only two exceptions are the first class, which is larger for both type of workers, and the last one, which is open to the right).

11. Another possible solution could be to use an instrumental variables approach. Nevertheless, we decline to use it in consideration of the simultaneous presence of different processes of self-selection and endogeneity in our study and the difficulty of finding appropriate instruments. Moreover, the robustness of IV procedures in educational studies has been somehow questioned in recent papers (Gary-Bobo *et al.*, 2016).

12. We set its value to 0.2. A wider caliper allows the inclusion of more observations, but with a trade-off in terms of covariates' balancing power between groups. We replicated the estimation with a caliper of 0.1 obtaining equal results. For a debate on this issue, see Wang *et al.* (2013).

13. The STATA command used is PSMATCH 2 (Leuven and Sianesi, 2017).

14. Results are available upon request.

15. Furthermore, the neighbour matching is considered as a limit case of the kernel matching where the weights are set to 1 for the closer untreated unit, and 0 for the others untreated units (Martini and Sisti, 2008).

16. Even if most researchers rely only on economic theory, Black and Smith (2004) discuss the possibility to use statistical methods to choose relevant variables.

17. All the tests are available upon request.

18. The variables less affected by this reduction (e.g. macroarea of high school diploma) show very similar values for the treatment and control groups even before the application of the matching procedure.

19. In the estimates concerning the NEET probability, we use the macroarea of high school diploma, while for the other two outcomes we refer to the macroarea of work.

References

Abbiati, G. and Barone, C. (2016), "Is university education worth the investment? The expectations of upper secondary school seniors and the role of family background", *Rationality and Society*, Vol. 29 No. 2, pp. 113-159.

Addabbo, T. (2003), "Unpaid work by gender in Italy", in Picchio, A. (Ed.), *Unpaid Work and the Economy*, Routledge, London, pp. 32-62.

Aina, C. (2013), "Parental background and university dropout in Italy", *Higher Education*, Vol. 65 No. 4, pp. 437-456.

Aina, C., Baici, E., Casalone, G. and Pastore, F. (2018), "The economics of university dropouts and delayed graduation: a survey", GLO Discussion Paper No. 189.

ANVUR (2016), *Rapporto biennale sullo stato del sistema universitario e della ricerca*, ANVUR, Rome.

Arandarenko, M. (2007), "Transition from education to work. Serbia country report", European Training Foundation, Torino.

Arrow, K.J. (1973), "Higher education as a filter", *Journal of Public Economics*, Vol. 2 No. 3, pp. 193-216.

Aubyn, M., Pina, A., Garcia, F. and Pais, J. (2009), "Study on the efficiency and effectiveness of public spending on tertiary education", European Commission Economic Papers No. 390, Brussels.

Becker, G.S. (1993), *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, University of Chicago Press, Chicago, IL.

Becker, S.O. (2006), "Introducing time-to-educate in a job search model", *Bulletin of Economic Research*, Vol. 58 No. 1, pp. 61-72.

Becker, S.O. and Ichino, A. (2002), "Estimation of average treatment effects based on propensity scores", *The Stata Journal*, Vol. 2 No. 4, pp. 358-377.

Black, D.A. and Smith, J.A. (2004), "How robust is the evidence on the effects of college quality? Evidence from matching", *Journal of Econometrics*, Vol. 121 Nos 1/2, pp. 99-124.

Bratti, M., Checchi, D. and de Blasio, G. (2008), "Does the expansion of higher education increase the equality of educational opportunities? Evidence from Italy", *Labour*, Vol. 22 No. S1, pp. 53-88.

Brookhart, M.A., Schneeweiss, S., Rothman, K.J., Glynn, R.J., Avorn, J. and Stürmer, T. (2006), "Variable selection for propensity score models", *American Journal of Epidemiology*, Vol. 163 No. 12, pp. 1149-1156.

Caliendo, M. and Kopeinig, S. (2008), "Some practical guidance for the implementation of propensity score matching", *Journal of Economic Surveys*, Vol. 22 No. 1, pp. 31-72.

Campolieti, M., Fang, T. and Gunderson, M. (2010), "Labour market outcomes and skill acquisition of high-school dropouts", *Journal of Labor Research*, Vol. 31 No. 1, pp. 39-52.

Camussi, S.A.M. (2013), "Female labour market participation and cultural variables", Questioni di Economia e Finanza, No. 178, Bank of Italy, Rome.

Cingano, F. and Cipollone, P. (2007), "University drop-out: the case of Italy", Temi di discussione Banca d'Italia No. 626, Bank of Italy, Rome.

Cobalti, A. and Schizzerotto, A. (1994), *La mobilità sociale in Italia*, il Mulino, Bologna.

Collins, R. (1979), *The Credential Society: An Historical Sociology of Education and Stratification*, New York Academic Press, New York, NY.

Davies, R. and Elias, P. (2003), "Dropping out: a study of early leavers from higher education", Research Report No. 386, Department for Education and Skills, London.

Di Pietro, G. (2006), "Regional labour market conditions and university dropout rates: evidence from Italy", *Regional Studies*, Vol. 40 No. 6, pp. 617-630.

Di Pietro, G. and Cutillo, A. (2008), "Degree flexibility and university drop-out", *Economics of Education Review*, Vol. 27 No. 5, pp. 546-555.

Esping Andersen, G. (1990), *The Three Worlds of Welfare Capitalism*, Polity Press, Cambridge.

Garrido, M.M., Kelley, A.S., Paris, J., Roza, K., Meier, D.E., Morrison, R.S. and Aldridge, M.D. (2014), "Methods for constructing and assessing propensity scores", *Health Services Research*, Vol. 49 No. 5, pp. 1701-1720.

Gary-Bobo, G., Goussé, M. and Robin, J.M. (2016), "Grade retention and unobserved heterogeneity", *Quantitative Economics*, Vol. 7 No. 3, pp. 781-820.

Ghignoni, E. (2016), "Family background and university dropouts during the crisis: the case of Italy", *Higher Education*, Vol. 71 No. 4, pp. 1-25.

Gitto, L., Minervini, L.F. and Monaco, L. (2016), "University dropouts in Italy: are supply side characteristics part of the problem?", *Economic Analysis and Policy*, Vol. 49, March, pp. 108-116.

Groot, W. and Oosterbeek, H. (1994), "Earnings effects of different components of schooling – human-capital versus screening", *The Review of Economics and Statistics*, Vol. 76 No. 2, pp. 317-321.

Hanushek, E.A. and Wößmann, L. (2010), "Education and economic growth", in Peterson, P., Baker, E. and McGaw, B. (Eds), *International Encyclopedia of Education*, Elsevier, New York, NY, pp. 245-252.

Hartog, J. and Diaz-Serrano, L. (2014), "Why do we ignore the risk in schooling decisions?", IZA Discussion Paper No. 8110, IZA, Bonn.

Hauret, L. (2017), "Study on the link between dropping out of school and NEET status", research report, Luxembourg Institute of Socio-Economic Research (LISER), Luxembourg.

Heckman, J.J. and Rubinstein, Y. (2001), "The importance of noncognitive skills: lessons from the GED testing program", *American Economic Review*, Vol. 91 No. 2, pp. 145-149.

Hoeschler, P. and Backes-Gellner, U. (2014), "College dropout and self-esteem", Economics of Education Working Paper Series No. 100, University of Zurich, Zurich.

ILO (2013), *Global Employment Trends for Youth 2012*, International Labour Organization, Geneva.

ISTAT (2010), "Occupati e disoccupati – IV trimestre 2009", ISTAT, Rome.

Leuven, E. and Sianesi, B. (2017), "PSMATCH2: Stata module to perform full Mahalanobis and propensity score matching, common support graphing, and covariate imbalance testing", available at: https://EconPapers.repec.org/RePEc:boc:bocode:s432001 (accessed 15 April 2018).

Martini, A. and Sisti, M. (2009), *Valutare il successo delle politiche pubbliche*, Il Mulino, Bologna.

Matković, T. and Kogan, I. (2012), "All or nothing? The consequences of tertiary education non-completion in Croatia and Serbia", *European Sociological Review*, Vol. 28 No. 6, pp. 755-770.

Moretti, E. (2004), "Workers' education, spillovers, and productivity: evidence from plant-level production functions", *American Economic Review*, Vol. 94 No. 3, pp. 656-690.

Nicodemo, C. and Waldmann, R. (2009), "Child-care and participation in the labor market for married women in Mediterranean countries", IZA Discussion Paper No. 3983, IZA, Bonn.

OECD (2017), *Education at a Glance 2013: OECD Indicators*, OECD Publishing, Paris.

Pastore, F. (2017), "Why so slow? The school-to-work transition in Italy", IZA discussion paper No. 10767, Bonn.

Rask, K. and Tiefenthaler, J. (2008), "The role of grade sensitivity in explaining the gender imbalance in undergraduate economics", *Economics of Education Review*, Vol. 27 No. 6, pp. 676-687.

Reisel, L. (2013), "Is more always better? Early career returns to education in the United States and Norway", *Research in Social Stratification and Mobility*, Vol. 31, March, pp. 49-68.

Rosenbaum, J.E. (1986), "Institutional career structures and the social construction of ability", in Richardson, J.G. (Ed.), *Handbook of Theory and Research for the Sociology of Education*, Greenwood, New York, NY, pp. 139-171.

Rosenbaum, P.R. and Rubin, D.B. (1983), "The central role of the propensity score in observational studies for causal effects", *Biometrika*, Vol. 70 No. 1, pp. 41-55.

Rosenbaum, P.R. and Rubin, D.B. (1985), "Constructing a control group using multivariate matched sampling methods that incorporate the propensity score", *The American Statistician*, Vol. 39 No. 1, pp. 33-38.

Schnepf, S.V. (2017), "How do tertiary dropouts fare in the labour market? A comparison between EU countries", *Higher Education Quarterly*, Vol. 71 No. 1, pp. 75-96.

Scholten, M. and Tieben, N. (2017), "Vocational qualification as safety-net? Education-to-work transitions of higher education dropouts in Germany", *Empirical Research in Vocational Education and Training*, Vol. 9 No. 7, pp. 1-17, available at: https://doi.org/10.1186/s40461-017-0050-7

Sianesi, B. (2004), "An evaluation of the Swedish system of active labor market programs in the 1990s", *Review of Economics and Statistics*, Vol. 86 No. 1, pp. 133-155.

Thurow, L. (1975), *Generating Inequality: Mechanisms of Distribution in the US Economy*, Basic Books, New York, NY.

Triventi, M. and Trivellato, P. (2009), "Participation, performance and inequality in Italian higher education in the 20th century", *Higher Education*, Vol. 57 No. 6, pp. 681-702.

Verashchagina, A. and Capparucci, M. (2013), "Living through the crisis in Italy: labour market experience of men and women", in Rubery, J. and Karamessini, M. (Eds), *Women and Austerity. The Economic Crisis and the Future for Gender Equality*, Routledge, Oxford, pp. 248-270.

Wang, Y., Cai, H., Li, C., Jiang, Z., Wang, L., Song, J. and Xia, J. (2013), "Optimal caliper width for propensity score matching of three treatment groups: a Monte Carlo study", *PloS One*, Vol. 8 No. 12, pp. 1-7, available at: https://doi.org/10.1371/journal.pone.0081045

Zhao, Z. (2004), "Using matching to estimate treatment effects: data requirements, matching metrics, and Monte Carlo evidence", *Review of Economics and Statistics*, Vol. 86 No. 1, pp. 91-107.
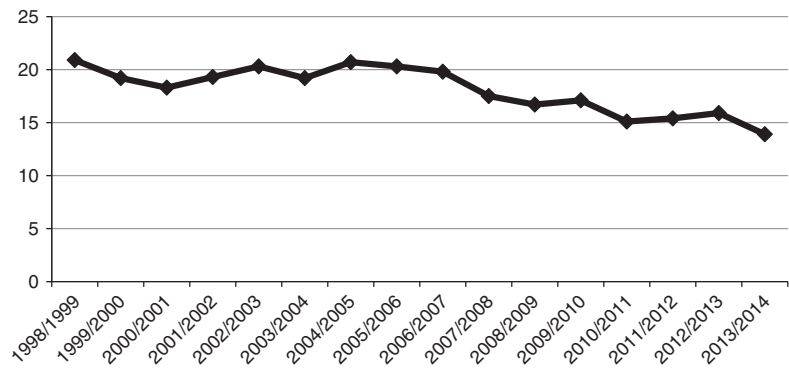
Further reading

ISTAT (2012), "Percorsi di studio e di lavoro dei diplomati. Indagine 2011", Rome.

(The Appendix follows overleaf.)

Appendix

Source: Elaborations on ANVUR and MIUR data

Variables	Description	Code
Dropout	Treatment variable	0 = no; 1 = yes
NEET	Outcome variable	0 = no; 1 = yes
Bad Job	Outcome variable	0 = no; 1 = yes
Monthly earning	Outcome variable	Log of monthly earnings
Male	Gender	0 = female; 1 = male
Type of high school diploma	Secondary school track	1 = Vocational and technical; 2 = art, languages and socio-psychological; 3 = classical and scientific lyceums
High school change	If the individual changes type of course during HS	0 = no change; 1 = change
Failure at HS	If the individual fails some years during HS	0 = no failure; 1 = if (at least) one year failed
Educational debt	If the individual does not achieve the standard required during the curricular year	0 = admitted without debt; 1 = admitted with debt
High school grade	Final high school grade	60–100
Training	If the individual took part in curricula training during HS	0 = no training; 1 = training
Family educational level	Parents' max level of education when the individual was 14	1 = illiterate or elementary school; 2 = high school diploma; 3 = university degree or post university degree
Parents' occupational status	Parents' employment condition when the individual was 14	0 = both parents unemployed; 1 = at least one parent employed; 2 = both parents employed
Macroarea of high school diploma	Geographical macroarea where the individual got HS diploma	1 = North West; 2 = North East; 3 = Centre; 4 = South; 5 = Island
Lower secondary grade	Final lower secondary school grade	0 = low; 1 = high
Year of birth	Classes	1 = 1978 or before; 2 = 1987; 3 = 1988; 4 = 1989–1990

Variables	n	Mean	SD	Min	Max
Dropouts	9,103	0.1589586	0.3656575	0	1
NEET	21,765	0.1716058	0.3770461	0	1
Bad job	8,491	0.3613238	0.4804124	0	1
(log) Monthly earnings	10,046	7.072708	0.7499414	4.518159	8.740336
Male	21,765	0.451826	0.497685	0	1
Type of high school diploma	21,765	2.264645	0.9262366	1	3
HS type: vocational and technical	21,765	0.3316334	0.4708109	0	1
HS type: art, languages and socio-psychological	21,765	0.0720882	0.2586399	0	1
HS type: classical and scientific	21,765	0.5962784	0.4906542	0	1
High School change	21,765	0.091156	0.287837	0	1
Failure at HS	21,765	0.17689	0.381584	0	1
Educational debt	21,765	0.468872	0.499042	0	1
High school grade	21,765	76.71748	12.45199	60	100
Training	20,951	0.520118	0.499607	0	1
Family educational level	21,765	1.774868	0.681457	1	3
Family educational level (low)	21,765	0.3700896	0.4828395	–	–
Family educational level (medium)	21,765	0.4849529	0.499785	–	–
Family educational level (high)	21,765	0.1449575	0.3520661	–	–
Parents' occupational status	21,712	1.505619	0.528202	0	2
Parents' occupational status (Unemployed)	21,712	0.0145081	0.1195754	–	–
Parents' occupational status (1 Employed)	21,712	0.4653648	0.4988104	–	–
Parents' occupational status (2 Employed)	21,712	0.5201271	0.4996062	–	–
High school macroarea	21,765	2.844153	0.1355138	1	5
High school macroarea (North Ovest)	21,765	0.2131404	0.4095354	–	–
High school macroarea (North East)	21,765	0.2351941	0.4241298	–	–
High school macroarea (Centre)	21,765	0.1796462	0.3839013	–	–
High school macroarea (South)	21,765	0.2384103	0.4261211	–	–
High school macroarea (Islands)	21,765	0.133609	0.3402396	–	–
Lower secondary grade	21,765	0.433448	0.495562	0	1
Year of birth	21,765	2.737101	0.645546	1	4
Year of birth (before 1987)	21,765	0.0726855	0.2596255	–	–
Year of birth (1987)	21,765	0.156306	0.3631535	–	–
Year of birth (1988)	21,765	0.7322306	0.4428069	–	–
Year of birth (1989–1990)	21,765	0.0387779	0.1930695	–	–

Source: Elaborations on USG Survey

Table AII.
Distribution of
covariates: full sample

Year of dropout	Males	Females	Total
First year	72.76	72.08	72.37
Second year	20.50	19.86	20.24
Third year (or later)	6.74	8.06	7.39

Note: Elaborations on USG Survey

Table AIII.
Timing of dropping
out by gender (%)

Motivations	All dropouts		Only first-year dropouts without fallback plan	
	Males	Females	Males	Females
Studying was too difficult	33.19	26.69	64.36	56.39
Studying was too costly	4.17	6.05	8.00	9.40
Personal and family reasons (health, childcare, civil service)	15.00	17.47	27.64	34.21
Dissatisfaction about job opportunities offered by the course	14.03	19.39	–	–
Dissatisfaction about university structure/organization	3.61	5.78	–	–
To get a post diploma non-academic qualification	1.67	1.51	–	–
Found a satisfactory job	23.06	19.94	–	–
Impossibility to balance study and work	5.28	3.16	–	–
Total	100	100	100	100

Note: Elaborations on USG Survey

Variables	HS graduates		All dropouts		First-year dropouts		Second-year dropouts		First-year dropouts without fallback plan	
	n	Mean	*n*	Mean	*n*	Mean	*n*	Mean	*n*	Mean
Outcome: NEET										
NEET	7,656	0.219	1,447	0.344	841	0.304	243	0.448	435	0.344
Change school	7,656	0.111	1,447	0.127	841	0.127	243	0.123	435	0.124
Male	7,656	0.542	1,447	0.497	841	0.485	243	0.485	435	0.505
Failure at HS	7,656	0.271	1,447	0.201	841	0.189	243	0.218	435	0.191
Educational debt	7,656	0.565	1,447	0.544	841	0.527	243	0.543	435	0.528
High school grade	7,656	71.475	1,447	75.042	841	75.493	243	74.777	435	74.540
Training	7,271	0.672	1,376	0.535	802	0.539	235	0.527	415	0.546
Family educational level	7,656	1.495	1,447	1.787	841	1.787	243	1.843	435	1.802
Parents' occupational status	7,615	1.399	1,445	1.520	840	1.542	242	1.500	435	1.549
Macroarea HS diploma	7,656	2.912	1,447	2.903	841	2.845	243	2.909	435	2.901
Lower secondary grade	7,656	0.223	1,447	0.350	841	0.360	243	0.378	435	0.337
Year of birth	7,656	2.536	1,447	2.733	841	2.747	243	2.711	435	2.744
High school type	7,656	2.812	1,447	2.363	841	2.365	243	2.296	435	2.383
n	7,656		1,447		841		243		435	
Outcome: bad job										
Bad jobs	5,100	0.324	768	0.384	479	0.373	107	0.420	231	0.415
Self-employed	5,415	0.098	838	0.138	528	0.130	117	0.188	254	0.137
Permanent contract	5,243	0.521	794	0.425	496	0.437	107	0.448	239	0.372
Full-time contract	5,543	0.914	856	0.880	536	0.888	122	0.868	259	0.888
Job level	5,779	1.447	910	1.464	565	1.470	129	1.387	274	1.456
Change school	7,458	0.111	1,408	0.126	821	0.125	238	0.126	424	0.120
Male	7,458	0.543	1,408	0.497	821	0.488	238	0.483	424	0.507
Failure at HS	7,458	0.269	1,408	0.203	821	0.190	238	0.218	424	0.191
Educational debt	7,458	0.562	1,408	0.545	821	0.528	238	0.546	424	0.528
High school grade	7,458	71.537	1,408	74.999	821	75.422	238	74.735	424	74.471
Training	7,083	0.673	1,338	0.538	782	0.546	230	0.534	404	0.554
Family educational level	7,458	1.495	1,408	1.788	821	1.786	238	1.852	424	1.801
Parents' occupational status	7,417	1.402	1,406	1.524	820	1.547	237	1.502	424	1.554
Macroarea HS diploma	7,458	2.898	1,408	2.887	821	2.828	238	2.894	424	2.891
Lower secondary grade	7,458	0.224	1,408	0.352	821	0.362	238	0.373	424	0.344
Year of birth	7,458	2.537	1,408	2.734	821	2.745	238	2.710	424	2.742
High school type	7,458	2.813	1,408	2.360	821	2.367	238	2.289	424	2.384
n	7,458		1,408		821		238		424	
Outcome: earnings										
Monthly income (log)	5,810	7.150	903	7.115	562	7.152	126	7.071	272	7.177
Change school	7,656	0.111	1,447	0.127	841	0.127	243	0.123	435	0.124
Male	7,656	0.542	1,447	0.497	841	0.485	243	0.485	435	0.505
Failure at HS	7,656	0.271	1,447	0.201	841	0.189	243	0.218	435	0.190
Educational debt	7,656	0.565	1,447	0.544	841	0.527	243	0.543	435	0.528
High school grade	7,656	71.475	1,447	75.042	841	75.493	243	74.777	435	74.540
Training	7,271	0.672	1,376	0.535	802	0.539	235	0.527	415	0.546
Family educational level	7,656	1.495	1,447	1.787	841	1.787	243	1.843	435	1.802
Parents' occupational status	7,615	1.399	1,445	1.520	840	1.542	242	1.500	435	1.549
Macroarea HS diploma	7,656	2.912	1,447	2.903	841	2.845	243	2.909	435	2.901
Lower secondary grade	7,656	0.223	1,447	0.350	841	0.360	243	0.378	435	0.337
Year of birth	7,656	2.536	1,447	2.733	841	2.747	243	2.711	435	2.744
High school type	7,656	2.812	1,447	2.363	841	2.365	243	2.296	435	2.383
n	7,656		1,447		841		243		435	

Table AV.
Distribution of
covariates by each
group of individuals

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