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ABSTRACT

Do Tertiary Dropout Students Really Not Succeed in European Labour Markets?*

Tertiary education has been expanding hugely over the last decades, so that tertiary dropout students will constitute a growing distinctive group in future labour markets. University dropout is regularly discussed as a 'negative' indicator in terms of reinforcing socio-economic inequalities and being a sign of university inefficiency. However, research on actual career trajectory of dropout students is virtually non-existent. Using data from the 2011 Programme for the International Assessment of Adult Competencies (PIAAC) this study first validates the uncommon self-reported measure of dropout used and compares the percentage of adults with tertiary dropout experience between OECD countries. Second, we examine whether tertiary dropout is a permanent decision as a considerable part of literature assumes. In a third step, we investigate characteristics of adults with dropout experience. Finally, we estimate the effect of dropout in terms of their employment status and success of entering managerial professions comparing results of logistic regressions and propensity score matching taking individuals' socio-economic and demographic background, work experience and cognitive skills into account. Results indicate that consistently across countries dropout is repeatedly a 'positive' indicator in the labour market. This is first due to the fact that the dropout decision is often not a permanent one as well as that for those adults who do not re-enrol into tertiary education labour market chances are better than for equally educated adults in about half of the countries examined.

JEL Classification: I21

Keywords: tertiary dropout, labour market chances, European countries, propensity score matching

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1 Introduction

Around the world, tertiary education has been expanding hugely over the last decades (Schofer & Meyer 2005). Across OECD countries, enrolment increased by 25 percentage points between 1995 and 2009 (OECD 2013a). Therefore, tertiary dropout students are constituting a growing distinctive group in the labour market.

Higher entry rates into universities are leading to increasing costs of the tertiary education sector so that policy debate is increasingly evolving around issues of efficiency of the tertiary sector (OECD 2013a, Aubyn et al. 2009). While efficiency is difficult to measure, tertiary student dropout rates can serve as an indicator (OECD 2013a).

Besides the potential importance of dropout rates for efficiency rating of tertiary education, they have been discussed in literature focusing on patterns of educational inequalities. This research examining mainly single countries separately generally indicates that educational inequalities get reinforced during tertiary education, since parental background is often associated with tertiary drop out, in some countries even conditional on upper secondary school achievement (i.e. Powdthavee & Vignoles 2009 for the UK).

The discussions of dropout as efficiency measure and as a factor contributing to inequality share one assumption: tertiary dropout students do not benefit from tertiary enrolment. In economics, this assumption is associated with the so called credentialism theory. It stipulates that what matters in order to enter prestigious occupations is a graduation certificate. Credentialism is at odds with the human capital (Becker 1962) and signalling theory. Human capital theory is the backbone of the Mincer equation models (Mincer 1974) predicting that each year spent in education accumulates human capital and therefore increases returns to education independent of a successful graduation. Signalling can also be interpreted in the way that enrolment into tertiary education already constitutes a first positive signal for employers and therefore enhances labour market chances even without degree. (Arrow 1973, Matkovic and Kogan 2012).

Despite the importance of the growing phenomenon of tertiary dropout, literature examining this group of labour markets entrants and their career pathway is rare. Davies and Elias (2003) show that while tertiary dropouts have lower chances of employment than graduates, about half of them move into ‘graduate-track’ type occupations and earn similarly to graduates in the UK. Using data for the US, Flores-

Lagunes and Light (2007) conclude that years since highest grade completed have a higher effect on wages for non-graduates compared to graduates conditional on graduation. Matkovic and Kogan (2012) also reject the credentialism theory for Serbia by concluding that dropout is a better predictor of job entry than not starting tertiary education and time spend in tertiary education increases dropouts' employment choices.

This paper's main objective is to examine labour market success of adults having experienced tertiary education dropout. In contrast to existing literature generally focusing on country specific cohorts of tertiary education entrants, we examine tertiary dropout experience of adults aged 20 to 65 across EU countries.

Using data from the 2011 Programme for the International Assessment of Adult Competencies (PIAAC) this study first compares the percentage of tertiary dropouts across countries. Given the unusual dropout measure applied, PIAAC results are compared to figures published by the OECD.

Since most of existing studies assume that dropout decisions are permanent (Stratton et al. 2007), in a second step we examine whether this is true. In addition, we provide descriptive analysis on gender, socio-economic background and cognitive skills by dropout status.

Results indicate that across countries it is rather a common pattern that dropouts attain tertiary education later in their life. As a consequence, we split dropouts into two groups: dropouts with and dropouts without graduation. Dropouts with graduation are compared to tertiary educated and dropouts without graduation to individuals who did not enrol into tertiary education but were eligible due to having completed upper secondary education. These groups are compared in terms of their employment chances and professional positions attained within the labour market. Since dropout students are systematically selected on the basis of individual background and cognitive skills known to be also associated with labour market outcomes, we need to control for these variables to obtain a meaningful estimate of dropout effects. We employ logistic regression analysis and propensity score matching and compare results between both methods.

The paper is structured as follows: Section 2 provides a literature review. Section 3 discusses the data and methodology used. In Section 4 we compare dropout rates between countries and measures. The focus of Section 5 is on

characteristics of dropout students while Section 6 scrutinises on labour market success of adults with tertiary dropout experience and Section 7 concludes.

2 Literature review

Dropout is generally[1] discussed as sub-optima outcome at three levels, the society, the tertiary education systems where the dropout took place and the individual level. Within the society attrition is discussed to bear a negative connotation due to a waste of educational resources which coincides with the notion of dropout being a sign of tertiary education inefficiency (Aubyn et al. 2009, OECD 2013a). At university level some countries like the UK implemented a performance based rating of tertiary education, so that high dropout rates are penalised. For the individual, dropout often might be interpreted as individual failure and waste of resources.

Literature stating that withdrawal patterns reinforce educational inequalities equally assumes no gain through enrolment. These studies generally employ longitudinal data of student cohorts over a short time window to examine dropout decision. Thereby, it is generally assumed that dropout decisions are permanent even though this is not tested for (Stratton et al. 2007).

This purely negative view of tertiary dropout is surprising, given that there is only very limited literature available (Stratton at al 2007, Matkovic and Kogan 2012) on the relationship of tertiary dropout and labour market success.

From a theoretical point of view, individuals' reasons for dropout decisions are likely to be related to their future labour market chances especially if labour market institutions, education systems and student characteristics are considered, which are the main factors[2] regularly associated with dropout.

In a cross-national context differences in labour market flexibility and education systems are likely to impact on dropouts' career pathways. Focusing on labour market regulations, mechanisms for dropouts' entry into employment might be quite different to mechanisms for their career development. Applying the

[1] Manski (1989) discusses dropout as a neutral result of a natural experiment.

[2] Educational institutions are a third main reason discussed for dropout decision but not primarily important for the discussion of labour market success. If students' expectations are poorly matched by the institution and social integration within universities is weak students drop out (Tinto 1975). The focus on the importance of institutions for withdrawal has been developed further by examining the impact of peers (Johnes & Nabb 2004) and available resources within the institute (Bound and Turner 2007).

‘credentialist model’ only an attained degree matters for a successful entry in the labour market; years of schooling are not important. This theory cannot predict career progression and is best placed in an ‘occupational labour market’ that is highly regulated by matching jobs with educational credentials. (Brown 2001) In such a labour market setting, dropouts would not be in an advantage to individuals eligible for but never having attended tertiary education. In contrast, the signalling theory can be attributed to internal labour markets in which once inside the firm promotions to higher level jobs can be achieved by on the job training. Assuming university entry as a ‘signal’ dropouts would again fare better access to work than equally educated counterparts (Matkovic and Kogan 2012) while it is not quite clear whether signalling helps in terms of career progression. The human capital theory stipulates that every year in education contributes to a gain in labour market chances for both, entry and promotion. Given this theory dropouts would fare better than upper secondary educated adults depending on how long they stayed at university. Matkovic and Kogan (2012) attribute this theory to flexible labour markets where job matching is determined purely by market mechanisms.

Besides focusing on the labour market, also the upper secondary education system might be of importance for explaining dropouts’ chances compared to those of upper secondary educated. In the past it has been hypothesised, that the more vocational the school education system is, the lower is the value of vocational education and consequently the lower the chance to reach managerial professions for upper secondary educated school leavers (Wolbers 2007). We could therefore assume that tertiary dropouts have an advantage to other upper secondary educated in countries where school-based vocational pathways are common.

In the light of the labour market and education system structures and their impact on dropouts’ career chances, the common negative interpretation of tertiary dropout is likely to occur only in occupational labour markets where credentials of a graduation certificate alone give access to professional jobs. However, the limited literature available on career pathways of tertiary dropouts generally indicates that tertiary dropouts do gain to some extent from university enrolment (Davies and Elias (2003) for the UK, Flores-Lagunes and Light (2007) for US, Matkovic and Kogan (2012) for Croatia and Serbia).

This study therefore examines whether dropouts indeed do not benefit from tertiary enrolment in terms of their career pathways in European labour markets. We

thereby try to investigate whether *common country patterns* exist in terms of dropouts' employment chances and access to professional and managerial careers. It is beyond the aim of this study to *explain* country differences in mechanisms driving the results since this would need to discuss in-depth each country's labour market institution in terms of flexibility and its interplay with the educational system.

While descriptive results will be presented, the study design must control for skills and socio-economic background which are associated with labour market success (Buchner et al. 2012) as well as with dropout decision: [3] retention literature reveals a negative association of ability (i.e. Araque et al. 2009, Smith & Naylor 2001, Montmarquette et al. 2001, Stinebricknen & Stinebrickner 2013, Powdthavee & Vignoles 2009)[4] and socio-economic background (Cingano and Cipollone 2007,Jones & McNabb 2004, Smith & Naylor 2001, Powdthavee & Vignoles 2009) with tertiary withdrawal rate.

3 Data and methodology

Data

PIAAC[5] was organised by the OECD in 2011 measuring adults' development and use of cognitive literacy, numeracy and problem solving skills in 26 countries. The survey covers a variety of characteristics related to skills, like for example formal education, work experience, employment and professional status as well as dropout from formal education and other background variables like gender, family structure and socio-economic status. While the survey organisers had skills as outcome variable in their mind, future researchers will as well be tempted to use skills as an explanatory variable (in line with this paper). A general problem of this approach relates to the direction of the impact of skill formation on the dependent variable. In this paper we assume that cognitive skills reflect ability relevant to labour market success and condition on skills for examining dropouts' professional progression. Nevertheless, it is equally likely that professional success increases skill levels.

[3] Bennett (2003) discusses self-reported financial hardship in the UK as driving factor for university attrition. In addition, dropout differs by subject area studied (Heublein et al. 2012, Stinebricken & Stinebricken 2013).
[4] However, Johnes and McNabb (2004) discuss that peer effects are important in the UK by presenting results indicating that academically able males enrolled in a program with low ability peers are more likely to dropout.
[5] PIAAC is the successor of the International Adult Literacy Survey (IALS) and the Adult Literacy and Lifeskills Survey (ALL); however in contrast to previous studies its country cover is considerably higher, data are collected during the same time interval to ensure comparability, and more background information are available as well as different skill measures were used.

The OECD uses different strategies for the questionnaire design aiming at making survey instruments comparable (see OECD 2013b).[6] Country survey organisers decided about the sample design which included single stage (for those countries having national population registries as sampling frames) to multistage designs. Skill questions were administered via computer under supervision of the interviewer and background information was collected via computer-assisted personal interviewing (CAPI). Response rates to the survey were below 50 per cent in Sweden (45 %) and Spain (48 %) and below 60 per cent in Japan (50), the Netherlands (51), Italy (56), Poland (56) and England (59). Countries with higher response rates were Korea (75), Cyprus (73) and Ireland (72). The provision of survey weights, which were constructed differently depending on countries' available sampling frame and population information, aims at adjusting for non-response and coverage bias.

Definition of tertiary dropout

Retention and dropout studies examining characteristics of students withdrawing form tertiary education are employing cross-sectional or panel data and focus on two time points: entry to tertiary studies and 'i' years after entry. This coincides with the definition used by OECD (2013a).

Completion rate C is defined as number of students having graduated successfully (G) at time point *x*+*i* expressed as percentage of students who enrolled (E) in year *x*. As a consequence, completion rates are highly sensitive to the choice of '*i*'. The OECD defines '*i*' as the number of full-time study years required completing a degree in the country being under investigation.

(1) $C = \frac{G_{year\ x+i}}{E_{year\ x}}$

(2) $DO = 1 - C$

Individuals not completing within the years required and students having left tertiary education are equally counted as dropouts (DO). This measure is problematic since students interrupting their studies, students never having intended to complete a degree and part-time students are generally count as dropouts. For different countries, study interruption, so-called 'no-shows' and part-time study as well as prolonged study beyond the years required for completing a degree varies.

[6] For more details on the survey implementation and any other technical information see OECD 2013b.

This questions cross-national comparability of the data using a small country specific 'i'. For the calculation of OECD dropout rates cross-sectional instead of longitudinal data are employed for some countries. This method assumes constant student flows for year x and year x+i, which might be problematic especially in times of education reform and economic recession. [7]

In contrast, this paper focuses on the experience of tertiary education dropout among adults aged 20 to 65. Tertiary dropout rates can be derived from two questions asked at the beginning of the PIAAC questionnaire to those respondents who report not being studying for any kind of formal qualification during the time of the interview:

> *'Did you ever start studying for any formal qualification, but leave before completing it?'*

Interviewer instructions state: *'This question refers to programmes as a whole (for example a bachelors programme at university). 2. If the respondent had a temporary break, but continued the programme later, this should not be counted as 'leaving before completing'.*[8]

Individuals answering yes were then asked:

> *'What was the level of the qualification you started studying for? If there was more than one, please report the one with the highest level.'* (OECD 2013c)

In order to be able to compare national programs in terms of qualification level, national educational attainment information is coded into categories of the International Standard Classification of Education 1997 (ISCED-97, for how national educational programmes are classified, see OECD 1999). ISCED levels 5a, 5b and 6 cover tertiary education. ISCED 5a and 6 refer to Bachelor, Master and PhD programmes and therefore to the more classical university education. ISCED 5b programmes are shorter, provide less theoretical foundations and prepare for skills needed for entry into specific professions in the labour market.

While this self-reported dropout statement might be subject to measurement error (for example, it is left to the respondent to decide whether change of the subject of the program should count as withdrawal or not), in contrast to the OECD measure part-time students, students interrupting their studies, students studying longer and

[7] I.e. using OECD (2013), dropout rates for countries Belgium, Denmark, Finland, France, Netherlands, Norway and Sweden are based on longitudinal data, but for countries Czech Republic, Japan, Korea (OECD 2010), Poland, Slovak Republic and United Kingdom only on cross-sectional data.

[8] This question is asked *after* the question on highest qualification obtained. See Appendix.

students not having enrolled to complete a degree will not be counted wrongly as dropouts.

For the purpose of the following study tertiary dropout is defined as anyone not currently in formal education who reports having dropped out of tertiary education (ISCED 5a, 5b or 6) independent of their actual final formal qualification attained. We compare this group with adults who are not in formal education and did not report having withdrawn from tertiary education. [9] While descriptive information will be provided for all 16 OECD countries for which data are available, results on labour market success will be limited to nine European countries for that sufficient information on all explanatory variables are available.[10]

Exclusions

In most countries tertiary education does not start before the age of 19. If university dropout happens within the first year, it will be at age 20. As a consequence we restrict our sample to adults age 20 to 65 who are currently not in education.[11] Individuals who have completed their highest education in another country are not included in the analysis[12]. The tertiary dropout variable needed cleaning which is described in detail in Appendix. Item non-response for the variables used in our models is generally negligible.[13] Complex sample design was taken into account for

[9] The share of adults in formal education is 12 per cent (unweighted) in the entire sample but differs between countries. In Japan and Korea formal education participation among adults is low with 5 and 7 per cent respectively. Norway (14), Finland (15) and Poland (28) have the highest share of adults studying. Given that the question was not administered for these adults, they should not be treated as non-tertiary dropouts. However, later on reported results change only slightly if also adults being in formal education are included in our comparison group.

[10] While Germany, Austria and the US were participating in PIAAC information on formal qualification dropout were not collected in these countries. We could compared dropout rate for Belgium, Cyprus, Czech Republic, Denmark, Finland, France, Ireland, Italy, the Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden and the United Kingdom. Belgium is represented by the Flemish subsample and United Kingdom by England and Northern Ireland only.

[11] Taking all countries together, 16 to 19 year old tertiary dropouts represent 0.46 % of all dropouts (sample size 35 individuals). 20 year olds instead represent 0.83 % of all dropouts (unweighted).

[12] Exclusion of individuals having received their highest qualification abroad covers 0.76 per cent of the total sample (unweighted; 723 observations)

[13] Given the entire sample of adults in countries used in this paper, only 1.2 per cent do not report their education level and 2 per cent lack information on their employment status (the latter question has a high item non-response figure of 14 per cent in Cyprus though). Less than 1 per cent of employed individuals did not report the number of years work experience and their current job occupation (a variable not administered in Finland, Sweden and Ireland). In some countries however item non-response on parental education was high: in France 17 and in the UK 16 % reported not knowing their parental education. We keep these individuals in the regression analysis and use a dummy controlling for non-response. In Belgium about 9 and in Cyprus about 14 per cent of respondents were lacking information on several items (like employment status

the calculation of standard errors for regression results.[14] Bootstrapping with 500 replications was used to estimate standard errors for results of propensity score matching.

Methodology

We measure the effect of tertiary dropout on labour market chances, defining labour market success with two binary variables: first, a variable called 'employed' that is equal to 1 if the person is employed and 0 if the person is unemployed or economically inactive and second a variable called 'manager' which applies only to the subset of individuals who are employed and is coded as 1 if the person is in a managerial profession and 0 otherwise. We assume that upper secondary education is the entry qualification allowing entry to tertiary education.

We use two methodologies for estimating the counterfactual effect: regression analysis and propensity score matching (PSM). Both methods rely on the assumption, that all relevant differences between adults with and without tertiary dropout experience can be captured with observable variables covered in the data set. The PIAAC data set contains a rich set of covariates, given that it includes information on ability, socio-economic, demographic background and education, which, as discussed above, are important determinants of dropout but also of labour market success. Nevertheless, even with a rich set of controls we cannot discard the possibility of an impact of unobservables we cannot account for, which would lead to a bias of our estimated effect.

Assumptions of the regression analysis for retrieving the counterfactual estimate are more restrictive than those for PSM, given that a linear effect on potential outcomes and common support, an availability of possible combinations of covariates similar to both dropout and other adults, is supposed. We present logistic regression results for coefficients of two explanatory binary variables, dropout with tertiary education and dropout with upper secondary education, for both outcome

and education level and parental education). Focusing on the entire sample, the 'isco' variable from which we derived information on 'managerial status' was missing for 9 per cent of employed adults. The share was highest in Spain with 19 and Poland with 15 per cent and lowest in Denmark (6 per cent) and the Netherlands (4 per cent).

[14] PIAAC does not contain information on primary sampling units (PSU) and strata; instead jackknife replication weights are available. The OECD provides a Stata program called 'piaactools' which conducts the jackknife estimation method and which we used for the estimation of standard errors for descriptive results. For the logistic regression results, we used svy command in Stata and the 'jackknife' option.

variables. We include a rich set of covariates covering socio-economic background, cognitive ability and work experience.

In contrast, PSM matches those adults with dropout experience to similar adults without dropout experience based on a propensity score. In detail, we apply matching for tertiary and upper secondary educated separately. For both groups, we calculate propensity scores of being a tertiary dropout using probit regression and conditioning on the same rich set of covariates used in the regression design. We then match adults with dropout experience with other adults on basis of their propensity score using nearest neighbour matching with replacement and a caliper and kernel matching thereby excluding off-support individuals. The effect of dropout is then the difference in the outcome measure between both groups. As a consequence, PSM is non-parametric and therefore relaxes the linearity assumption as well as common support is taken into account. Given that it compares dropouts with matched other adults, it measures the so-called 'average treatment effect of the treated' (ATT): i.e. how does dropout experience change labour market chances of dropouts compared to what they would have experienced had they not dropped out.[15]

4 How do dropout rates compare between countries?

Table 1 provides self-reported tertiary dropout rates by education type and European country whereby Korea and Japan were included as comparators.

For interpreting the table it is helpful to bear in mind that across OECD countries, about one third of all young people are likely to complete theoretical tertiary type A education in contrast to about one tenth completing more practical type B education. (OECD 2011).

Focusing first on both tertiary education levels together (column 3), in Japan and Korea only about every tenth person has experienced tertiary dropout. This is far less than in any European country. Among those, Cyprus, the UK and Norway fare well with dropout being around 16 per cent. In countries like France, Sweden, Ireland and Belgium every fourth to fifth person having enrolled in tertiary education withdrew. Highest attrition of up to every third person are found in the Czech

[15] In contrast, the average treatment effect (ATE) is an average partial effect for a binary variable for a randomly drawn person from the *population*.

Republic, Spain, the Netherlands and Italy. As a consequence, the variation in dropout rates is huge between countries.

In the predominant part of countries, tertiary dropout students have mainly studied on the academic tracks of ISCED 5a and 6 compared to the more practical and shorter ISCED 5b programmes. As a consequence, if we were to reorder Table 1 by percentage of dropout rate for ISCED 5a and 6 programmes only, just 5 countries would change position (Denmark, Belgium, Ireland, Finland and Norway). Only in Belgium and Ireland more students drop out of ISCED 5b than ISCED 5a and 6. In Denmark, the UK and Cyprus, ISCED 5b dropout students constitute about 50 per cent of total dropout.

How does this self-reported PIAAC measure compare to the OECD measure described above? Figure 1 provides a scatter plot of both measures for 13 countries covered in both sources. It is important to bear in mind that the dropout estimate used in this paper spans over experience during adults' lifetime compared to the OECD estimate of student non-completion within a small number of years after tertiary education enrolment. As a result, it might therefore surprise that for eight out of 13 countries the rank order and size of measure are fairly similar. However, the correlation coefficient between measures for all countries is small with about 0.32. Nevertheless, if we exclude the three countries with the highest OECD dropout rate (Poland, Norway and Sweden) the correlation coefficient between OECD and self-reported measure used increases to a significant 0.73 ($p=0.02$).

The OECD measure itself changes for some countries considerably between years[16]. I.e. in the 2013 OECD report the UK measure is 7 percentage points (20 per cent) lower than in the 2010 report while for the Slovak Republic it increased by 8 percentage points. For both countries, cross-sectional data were used. For Sweden the OECD (2013) reports states that tertiary students who do not intend to graduate are counted as dropouts. Figure 1 shows that 10 out of the 13 countries are positioned below the diagonal line, indicating that the OECD dropout estimate is greater than the PIAAC measure. This is not surprising given that the OECD estimate counts all those students as dropouts who did not complete within a short time interval '*i*'.

[16] OECD tertiary dropout rates for the 16 countries covered in both Education at a Glance reports (2010 and 2013) are correlated with 0.93.

While this paper does not aim at explaining high tertiary dropout figures there are several explanations that could be employed (more detail on this can be found in Kupfer et al. 2014) depending on how countries tertiary education systems and labour markets are classified.

A differentiation of countries by the extent of *fees* students need to pay for entry into tertiary education has shown not to be helpful in explaining dropout figures (OECD 2013a).

As discussed above, labour market flexibility and credentialism are likely to explain some of the pattern.

Differentiating countries with high and low number of student intake, it could be argued that education systems are just more efficient if they have high student intake, so that dropout rates are smaller. At the same time, those countries with higher university admission deal on average also with students coming from higher parental background compared to countries with low tertiary completion. Since at the individual level higher parental background is associated with lower student drop we might assume so similarly at the macro level of countries: the higher tertiary completion in a country, the higher students' background and the hence the lower a countries student dropout. Whether it is the mechanism of established education system or parental background impact, Figure 2 indicates indeed a negative correlation (-0.61) between per cent of the population having attained tertiary education and student drop out.

Another classification of education systems could be on the basis of how flexible entry and exit is. The decision of withdrawal from tertiary education is easier, if re-entry is possible. Figure 3 shows some association between percentage of dropout students in a country and the per cent among those who later on in their life re-enter and attained tertiary education (the latter will be discussed in greater detail later on). Italy however is an outlier. In this country the tertiary dropout decision is for most students final.

Most successful in explaining variation between countries regarding dropout rate seems to be differences in admission policies. In some European Countries like Italy, Netherlands and Belgium a school leaving certificate is generally sufficient for being admitted to study at university (NCIHE 1997). The student population within these countries includes a spectrum of high and low ability students. This is quite different to Japan and Korea. In both countries students do need to pass nationally

organised admission tests in order to attend university. Within Europe, also the UK has a highly selective system with fixed quotas and varying admission policies based on achievement for different courses. Given that upper secondary school achievement is highly correlated with university dropout, dropout rates are lower in countries that use a numerus clausus system of ability selectivity.

Small sample sizes of dropouts make it difficult to separate out different cohorts; however it is possible to divide the sample into two age groups: 24 to 44 and 45 to 64 year olds. Figure 4 sorts countries by changes in dropout rates over time. In seven out of 16 countries differences for both age groups are significant. In Italy, Denmark and Spain dropout decreased for the younger age cohort while it increased in the Czech Republic, Belgium, Finland and Norway. For the latter countries some of the rise might be due to relatively young adults included in the data set. In most other countries changes in dropout rates are relatively small in size.[17]

It is a common feature of most research on tertiary dropout students to investigate dropout behaviour only to the time point the student actually drops out: the predominant part of research does not examine whether tertiary dropout students re-enter tertiary education and complete a degree. This is very different to research on school attainment studies, where generally dropout students are defined as only those who did not postpone completion of their school degree but permanently decided to drop out.

For judging about the efficiency of the tertiary system as well as on reinforcement of educational inequalities, there is a clear rational to define also tertiary dropout only on the basis of permanent dropout. How does the country ranking discussed above change with this definition? Table 2 orders countries by the first column giving percentage of tertiary dropouts who did not complete a tertiary degree.

There are several interesting results to note. First, on average across all countries, 38 per cent of tertiary dropouts attain a tertiary education degree (last column, weighted by countries). This goes in line with Stratton et al. (2007) who show that 40 % of all first year attrition is temporary in the US. For many adults tertiary dropout is therefore *not* a permanent decision. While on average across

[17] The highest not significant percentage point difference between both age groups is 4.2 in the Slovak Republic followed by Ireland (3.8).

countries 21 per cent of adults experienced drop out, only 13 per cent of adults did so without having completed a degree.

Remarkable is the huge variation of the percentage of dropouts completing tertiary education ranging from just 8 per cent in Italy to 59 per cent in Denmark (last column). Italy having both highest percentage of dropouts paired with their lowest chances of attaining tertiary education ranks isolated at the top.

It is also remarkable that all three Scandinavian countries improve their ranking considerably. These results indicate that it is sensible to differentiate between tertiary and upper secondary educated dropouts.

5 Who are dropout students?

As discussed above, literature having focused on tertiary dropout students revealed that tertiary students with lower socio-economic background have a higher probability of dropout. PIAAC information on adults' family background is mainly limited to parental education.[18] Table 3 provides the share of individuals having at least one parent with tertiary education for adults who completed successfully tertiary education without dropout experience (1st column) and who experienced dropout (2nd column). Percentage point differences between both groups are given in column 3. Bold printed figures are significant at the 5 per cent level. In twelve out of 16 countries, parental education is higher for successful tertiary graduates compared to dropouts confirming results of previous literature highlighting the importance of socio-background on dropout risk. The high variety between countries in terms of parental background differences is notable. At one end of the spectrum are Italy, Slovak Republic, Poland and the UK where differences between tertiary educated and dropout students in terms of having a highly educated parent are greater than 10 percentage points. At the other extreme are the Scandinavian countries Sweden, Finland and Denmark where socio-economic background does not differ between

[18] Information is also available on immigrant status, i.e. whether both parents and individual were born abroad. However, taking into account that tertiary drop out students are on average about 7 per cent of the sample and immigrant students 8.5 %, the sample size is small for investigating a significant 'effect' of immigrant status on drop out. Results indicate that in Spain immigrant students are more likely to drop out. In other countries the per cent point differences are similar, but sample sizes too small to claim that differences are significant.

both groups.[19] In Norway, adults who withdrew form tertiary education have higher educated parents than their successful counterparts. Column 4 of Table 3 shows not surprisingly that in all countries dropouts have considerably higher parental background than non-dropouts who hold upper secondary education.

Again a variety of mechanisms might interact leading to these country differences. Most important is probably the provision of equal educational opportunities during primary and secondary education and the extent to which *numerous clausus* is used for selection of students given that lower ability is correlated with lower parental education.

Given that girls' upper secondary educational achievement is generally higher than that of boys and the existing correlation of ability with university drop out, it is not surprising that more men than women drop out of tertiary education. Indeed, OECD (2008) discusses the pattern of increasingly higher female tertiary completion rates even though gender differences vary by subject area studied. However, the consistency of this gender pattern in dropout rates across countries and the extent is astonishing. Table 4 shows that in Poland almost twice as many men than women withdraw from tertiary education (12 percentage points). About a third more men than women drop out in Spain, Finland and Norway. In twelve out of the 16 countries, dropout rates for men are at least 5 percentage points higher than that of women.

What can we say about cognitive skill differences between adults with dropout experience and tertiary and upper secondary educated individuals? As discussed in the data section, skills are measured at the time of the interview and can therefore reflect both abilities acquired through formal education as well as during later life i.e. by on the job training. Table 5 shows that adults with dropout experience generally do not have significant lower skills than tertiary educated adults. Exceptions are only Cyprus, Finland, France, Korea, Poland and Spain for a minority of measures. On the other hand, almost for all countries and skill measures, dropout students fair significantly better than upper secondary educated adults.

[19] It is important to note that PIAAC country sample sizes of adults get very small once focusing on subgroups (here tertiary dropouts with high parental education), so that even sizable percentage point differences (8 for Japan) are not significant at the 5 per cent level.

6 Labour market success of adults with tertiary dropout experience

Table 6 provides the percentage of total adult population in employment by dropout experience, educational background and country. Comparing tertiary educated adults by dropout status (last three columns) results indicate that tertiary dropout adults actually have a significantly higher employment chances compared to their counterparts in seven out of the 16 countries. Once we focus on upper secondary educated by dropout status we find again for most of the countries that dropouts fare better.

How do employed tertiary dropouts compare with other adults in terms of access to managerial positions? Again we find that differences between tertiary educated with and without dropout experiences differences are generally quite small given results presented in Table 7. Exemptions are Belgium and the Slovak Republic where tertiary educated dropouts fare more than 10 percentage points worse than their equally educated counterparts (significant only for Belgium). Dropout experience matters though for the upper secondary educated. Those who did enrol unsuccessfully into tertiary education have significantly higher chances to be employed in managerial positions in half of the countries.

In sum, unconditional on background characteristics drop out experience does not penalise tertiary educated in terms of labour market chances but increases chances for the upper secondary educated. However, as discussed above, we can assume that a considerable part of the differences we find between adults with and without dropout experience is due to a non-random selection of adults into dropout status. Dropouts are more likely than other adults to exhibit those individual characteristics that are positively linked to labour market chances.

In order to take selection into account, we first apply logistic regression analysis. We include an explanatory variable that is equal to 1 if the person has dropout experience and tertiary education (otherwise 0) and a variable that is equal to 1 if the person has dropout experience and just upper secondary education.[20] These both variables are used in order to calculate predicted probabilities of being a manager or being employed separately conditioning on other factors which are set to the mean of the country sample. The percent point difference of the predicted

[20] We would have received the same results if we had used a binary variable on dropout, an interaction of the dropout variable with tertiary education and an interaction of dropout with upper secondary education. Our choice of two binary variables however facilitates the interpretation of regression results.

probabilities between adults with and without dropout experience but with the same level of education is provided in Table 8 columns 1 (for managerial professions) and 4 (for employment). We include the main covariates associated with dropout status which are gender, migrant status, child under age 6 living in the household, whether the adult has a partner and whether the partner is employed, highest parental education, age and age square, literacy, numeracy skills and work experience in years. Table A2 in the Appendix provides a selection of logistic regression coefficients for the two dummy variables capturing dropout status. (Full regression results can be obtained from the author.)

Second, we use PSM as described in Section 3 on two separate samples: tertiary educated and upper secondary educated (we do not include anyone below upper secondary education in our PSM analysis). We calculated the propensity score of dropout by taking the same covariates used for the logistic regression design into account. While, as expected, the propensity score for dropouts is higher than for non-dropouts, we generally find that common support is given, so that only for some countries a handful of people are excluded from the matching process. Matching quality was for all countries and with both matching method, nearest-neighbour matching with caliper and Kernel Epanechnikov matching, high; differences of covariates between dropout adults and matched adults were generally not significant at the 1 percent level.[21] Table 8 presents percent point differences between dropouts and equally educated individuals by dependent variable (managerial position and being in employment) and matching methods in columns 2, 3, 5 and 6.

In contrast to the previous descriptive analysis, Korea, Japan, Slovakia and Finland, Ireland, Sweden and Belgium were excluded from the analysis, since these countries either missed information on managerial status or had high non-response on educational status. The analysis is conducted for each outcome variable and country separately.

Regarding logistic regression results coefficients of covariates (not presented) were in the expected direction. The higher the education the lower was the risk of

[21] Altogether we match groups on 12 variables separately for 9 countries. For upper secondary educated for whom employment information was available, only 2 of these 108 variables were significantly different between dropouts and matched individuals (for Spain and Netherlands for caliper matching only). For upper secondary educated with available manager information, 8 out of 108 differences between groups were significant across countries.

being not employed and the higher the chance of holding a managerial position. Only in France and the Netherlands, being a migrant significantly increased the risk of being not in employment and lowered chances of being a manager. For all countries, having a child at 6 years old or below decreased the chance of being in employment sizably and significantly. Conditional on having a partner, having an employed partner either reduced the risk of not being employed or increased the probability of being a manager or both significantly in all countries with the exception of the Czech Republic. Conditional on other factors, individuals with a parent holding tertiary education were often significantly more likely to be a manager and sometimes more likely to be not employed. Older age and higher number of years work experience were associated with a higher probability of not being in employment. Higher cognitive abilities were generally related to higher probability of being a manager and lower probability of not working. While for all countries women had a higher probability of not working conditional on the factors discussed above, the probability of being a manager differed. In Poland and the Slovak Republic women had a higher, in France, the Netherlands and the UK women had a lower chance of being a manger and in the other countries the coefficient was not significant.

Table 8 presents percent point differences between dropouts and equally educated adults and standard errors in parenthesis. Shaded figures are significant at the 5 percent level.

Just focusing on dropouts with secondary education (second row for each country) and comparing unconditional with conditional results, we find that for managerial positions (comparing first three columns of Table 8 with Table 7), the percent point difference between dropouts and other adults halves at least in size for the UK, Italy and France, while it decreased by about one third for the Czech Republic and Denmark. Depending on which method is used, conditioning on background factors does not impact greatly on the estimate of dropout advantage in the Netherlands and Poland. With the exception of Spain, percent point differences between adults with and without dropout experience in employment status decline considerably for all countries conditional on background factors (comparing last three columns of Table 8 with Table 6). This confirms the importance of taking selection into dropout into account for estimating dropout advantage.

Are tertiary educated with tertiary dropout experience penalised in terms of labour market success? Percent point differences in employment and managerial

status between tertiary educated adults with and without dropout experience are generally not significant for the countries examined. This is true for both, logistic regression and PSM results. For Poland, only the result of one methodology, PSM with kernel matching, shows that 5.8 percentage points more tertiary educated dropouts than other tertiary educated are employed. The general country pattern is therefore, that tertiary dropout for adults who completed tertiary education has no negative impact on their labour market chances in terms of achieving managerial positions or employment. However, it is noteworthy that even though not significant, we find that in 8 out of the 9 countries tertiary dropout coefficients regarding managerial positions are negative but still relatively small in size.

Do tertiary dropouts who never completed tertiary education gain from tertiary enrolment? In terms of employment, upper secondary dropout adults have an about 6 to 7 percentage point higher probability being employed in Italy consistently for both methodologies. The PSM using Kernel Epanechnikov matching shows also a significant advantage for upper secondary educated dropouts in the Czech Republic, France, Poland and Spain. However, this result is not consistent with PSM using caliper and logistic regression results. However, there is a general trend that the percent point differences are positive across countries indicating an advantage for dropouts.

In four out of nine countries adults having withdrawn from tertiary education are more likely to get into managerial positions compared to other upper secondary educated counterparts. Given that sample sizes are small for dropouts, effects need to be big in size to be significant. In the Netherlands, 10 to 15 percent points more dropouts than other equally educated are in managerial positions. In the Czech Republic the percent point difference is between 10 and 14, in Denmark between 10 and 13 and in Poland between 6 and 9 depending on which methodology was used. For Norway we find a similar, but not significant direction of the effect.

In sum, once employment and managerial positions are concerned tertiary educated dropouts are not penalised in comparison to other tertiary educated. Upper secondary educated dropouts have no significant advantage to equally educated in gaining managerial positions in the three Southern countries France, Italy and Spain and the UK and Norway but benefit from a sizable advantage in the two Eastern European countries Poland and the Czech Republic as well as in the Northern countries Denmark and the Netherlands. We checked whether this advantage could

be related to the number of years spent in tertiary education, which we proxied probably relatively well for about 75 % of dropouts[22] by taking the difference between age of dropping out of tertiary education and age having completed the highest degree. For the Netherlands and employing logistic regression, this variable was highly significant and indicated a 10 percentage point increase of being a manager for each year in tertiary education. In the other countries, this variable was not of importance.

Results therefore indicate that the generally negative connotation of tertiary dropout within literature is not justified once labour market chances are concerned. On average across countries examined, around 40 percent of tertiary dropouts achieve tertiary education and fare similar to other graduates. For 4 out of 9 countries we find that dropouts with just upper secondary education fare better than equally educated in terms of achieving professional positions. In addition depending on the method applied to condition on individual characteristics, also employment chances are higher for dropouts in one to five out of nine countries.

It is difficult to explain country position without engaging in detail into the linkage between labour market regulations and educational system of each country, which is not the aim of this paper. Nevertheless, as discussed above, signalling theory predicts an employment advantage for dropouts in internal labour markets like Italy, Spain and France. Indeed, for Italy we find this result consistently for both methods applied, for France and Spain only when using PSM with kernel matching. At the same time, progression within the labour market is not better for dropouts in these three countries. This might be explained by the fact that a considerable part of training takes place within a firm in internal labour markets, so that knowledge acquired during tertiary education attendance does not improve progression chances. For the relative flexible labour market of the UK for which human capital theory would predict an advantage of dropouts in terms of labour market entry and progression dropouts actually do not better in any of those.

Labour market structures cannot help explain the positive impact of dropout on career progression in the Czech Republic, Poland, the Netherlands and Denmark, especially given that in Norway dropouts are not in an advantage. Instead of focusing on labour markets alone, it might well be assumed that the vocational

[22] For 75 percent of dropouts the difference between age of dropout and age receiving highest degree is 6 years or less.

structure of the education system is of importance. We hypothesised above that dropouts outperform other upper secondary educated in countries with a high vocational pathway within the school systems. This is indeed the case in the Netherlands, the Czech Republic and Poland where tertiary dropouts fare so much better in reaching managerial positions. However, we would equally suspect to find a similar advantage for dropouts in Italy as another country with a school-based vocational pathway. In addition, Denmark, where dropouts fare better too, is relatively similar to the UK in its distribution of upper secondary students to general and vocational pathways (OECD 2000, Table 2.2), but differs considerably in terms of dropouts' career advantages.

Very often, studies focusing on labour market success proxy skills with education. It is therefore of interest, whether cognitive skills add explanatory power in addition to education for understanding labour market success of dropout adults. While the coefficients for cognitive skills were generally significant in explaining employment and holding managerial positions for all countries conditional on other factors, adding skills as final variable to our model did only change the coefficient from significance into insignificance for Italy once managerial position was the dependent variable (see Table B1). Unconditional on skills, in Italy tertiary dropouts with upper secondary education had a 13 % chance compared to 10 % of equally educated to gain managerial positions (using the logistic regression model, as shown in Table 8 this difference dropped then to 2 percent points once skills was controlled for).

Given the great importance of the gender dummy in the models as well as the clearly lower dropout rate for females, we also used female dropout interaction variables within our logistic regression modelling. In France and Poland the risk of not being in employment was higher for female upper secondary educated dropouts compared to males. For all other countries, the female interaction coefficient was not significant.

7 Conclusion

Tertiary dropout is generally discussed as a negative outcome in terms of wasting educational resources at the level of society. Research concluding that tertiary dropout reinforces educational inequalities equally marks dropout as a pure negative individual experience. However, this interpretation contradicts economic theories: i.e.

the human capital theory predicts that with or without degree every year in tertiary education is a gain for labour market chances. The signalling theory suggests that even without degree dropouts are better off than equally educated. Only credentialism predicts, that tertiary dropouts do not gain from enrolment. Once the focus is on education systems, we also hypothesised that dropout experience might improve labour market chances in these countries, where vocational pathways are overrepresented during upper secondary schooling thereby decreasing their value compared to general education. Hence, from a theoretical point of view hypotheses predicting an advantage of adults with dropout experience prevail.

Surprisingly however, there is a lack of literature that examines tertiary dropouts' career prospects. Using PIAAC data on adults' self-reported withdrawal from tertiary education this paper therefore examined whether dropout is indeed just a negative experience without any beneficial impact on employment chances and professional status in an international context.

The self-reported measure in this paper yields similar results to published OECD dropout figures based on student cohorts for 10 out of 13 countries.

In contrast to a considerable part of literature treating dropout to be a permanent decision, the paper shows that on average across countries about 40 per cent of tertiary dropouts acquire tertiary education later in their life.

We confirm existing results in showing that dropout is highest in Italy. Countries with a structured and selective tertiary education system like Korea, Japan and the UK have lowest student withdrawal. Scandinavian countries display also low dropout once we focus only on those tertiary dropouts who did not attain tertiary education later in their life.

For almost all OECD countries examined women drop out less than men whereby percentage point differences are great between genders in the countries Poland, Spain, Czech Republic, Italy and Finland. Lower socio-economic background is also associated with higher dropout rate. Adults with dropout experience have similar skill levels to tertiary educated and higher skills than upper secondary educated for most of the countries. However, unconditional results mask that dropouts differ in their characteristics to other adults.

Employing logistic regression analysis and propensity score matching the paper compared the probability of being employed or in managerial position between dropouts and equally educated adults conditional on socio-economic and

demographic background and cognitive skills. We found interesting common country patterns. Among tertiary educated, dropouts have similar chances of employment and progressing to managerial positions as non-dropouts. As a consequence, previous tertiary dropout does not impose any penalties on the career pathway.

Once we focused on adults with upper secondary education only, logistic regression and propensity score matching results showed consistently that dropouts are in more favourable positions than their counterparts in terms of holding managerial positions in four out of nine countries. Using PSM with kernel matching, in five countries dropouts have higher chances of employment, whereby based on logistic regression and PSM caliper matching this number reduces to one country. In countries with internal labour markets like France, Italy and Spain, dropouts tend to have higher employment chances, which could be due to the 'signal' of having attended university, while dropouts do not benefit in terms of career progression, probably since progression via firm internal training does not consider theoretical knowledge acquired during tertiary education. However, in general country patterns are difficult to explain.

In sum and in contrast to the negative connotation attached to tertiary dropout in retention studies results presented here show generally that dropout can very well be a 'positive' indicator in the labour market. This is first due to the fact that dropout decision is in many cases not a permanent one which is largely not taken into account in existing research. Those dropout adults who obtained their degree later fare similar to tertiary educated who never experienced dropout. Second conditional on demographic, socio-economic background and cognitive skills those people for whom dropout is permanent do still fare better than individuals having attained the same level of upper secondary education in half of the countries examined.

Future research could link countries' labour market regulations with their educational systems in order to unveil mechanisms for dropouts' success and use a multi-dimensional measure of career pathways.

Tables and Figures

Table 1: Students who dropped out of tertiary education as per cent of students ever enrolled in tertiary education by tertiary education level

	ISCED 5a and 6	ISCED 5B	**Total tertiary drop out**	Standard error total tertiary
Italy	32.6	0.3	**33.0**	1.25
Netherlands	27.3	3.3	**30.5**	1.12
Spain	21.2	7.1	**28.3**	1.02
Czech Republic	24.2	3.9	**28.0**	1.43
Denmark	14.9	9.5	**24.4**	0.86
Belgium	10.1	13.1	**23.3**	1.00
Ireland	10.5	11.2	**21.7**	1.10
Finland	15.6	5.4	**21.0**	0.84
Poland*	19.8	0.0	**19.8**	0.98
Slovak Republic	19.3	0.0	**19.3**	1.34
Sweden	16.1	3.1	**19.2**	1.09
France	13.4	5.6	**19.1**	0.70
Norway	14.8	2.0	**16.8**	0.87
United Kingdom	10.3	5.6	**15.9**	0.80
Korea	7.1	4.4	**11.4**	0.67
Japan	4.2	2.4	**6.6**	0.52

Note: ISCED 5a, 5b and 6 are all tertiary education programmes. ISCED 5a programmes are mainly theoretical and aim at entry into profession with high skill requirements. ISCED 6 refers to PhD programmes. ISCED 5b programmes are shorter, provide less theoretical foundations and prepare for skills needed for entry into specific professions in the labour market.

Table 2: Students who dropped out of tertiary education as per cent of students ever enrolled in tertiary education by attainment of tertiary education later on in life

	Without tertiary degree		With tertiary degree		Total	Share
	%	Se	%	Se	%	%
Italy	**30.2**	1.22	2.7	0.57	33.0	8.2
Czech Republic	**18.3**	1.23	9.8	0.98	28.1	34.9
Netherlands	**17.0**	0.98	13.5	0.91	30.5	44.3
Spain	**16.6**	0.83	11.7	0.80	28.3	41.3
Slovak Republic	**16.0**	1.30	3.3	0.62	19.3	17.1
Belgium	**13.2**	0.92	10.0	0.70	23.3	42.9
Ireland	**13.1**	0.90	8.6	0.61	21.7	39.6
Poland	**12.1**	0.87	7.8	0.76	19.8	39.4
France	**10.3**	0.62	8.8	0.49	19.1	46.1
Finland	**10.2**	0.56	10.8	0.66	21.0	51.4
Denmark	**9.9**	0.67	14.5	0.69	24.4	59.4
United Kingdom	**9.8**	0.77	6.1	0.58	15.9	38.4
Korea	**9.0**	0.60	2.5	0.33	11.4	21.9
Sweden	**8.6**	0.80	10.6	0.84	19.2	55.2
Norway	**7.9**	0.71	8.9	0.63	16.8	53.0
Japan	**5.2**	0.47	1.4	0.25	6.6	21.2
Total	13.0	1.40	8.2	0.95	21.2	38.4

Note: countries are ordered by percent of dropout adults not having attained tertiary education later in life.

Table 3: Per cent individuals having at least one parent with tertiary education for tertiary educated (excluding dropouts), adults experiencing tertiary education dropout and upper secondary educated adults

	Tertiary educated	Drop out students	Per cent point difference	Upper secondary educated
Italy	**22.3**	**8.8**	**13.6**	5.8
Slovak Republic	**32.8**	**20.6**	**12.2**	7.6
Poland	**29.1**	**18.2**	**10.9**	7.3
United Kingdom	**40.6**	**30.1**	**10.6**	15.4
Korea	**25.7**	**17.2**	**8.5**	14.1
Japan	47.3	38.8	8.4	19.3
Spain	**24.4**	**18.7**	**5.7**	13.5
Netherlands	**39.4**	**34.0**	**5.4**	20.6
Czech Republic	34.3	30.4	3.9	9.8
France	36.0	32.4	3.6	9.7
Ireland	36.6	34.2	2.3	16.5
Denmark	44.4	42.4	2.0	23.5
Belgium	39.6	40.7	-1.1	16.4
Finland	22.0	24.6	-2.6	18.6
Sweden	48.5	53.8	-5.4	30.7
Norway	**45.3**	**54.5**	**-9.3**	26.7

Note: significant differences between tertiary educated and dropouts at the 5 per cent level are printed bold. Countries are ranked by highest different between percentage of individuals with tertiary educated parents for tertiary educated and dropout students. Tertiary educated students refer only to those who never dropped out of tertiary education. Dropout students include those who received tertiary education at a later point in their lives.

Table 4: Students dropping out of tertiary education expressed as percentage of students ever enrolled in tertiary education by gender

	Women	Men	Gender difference
Poland	14.5	26.8	**12.3**
Spain	23.2	33.8	**10.6**
Czech Republic	23.4	32.4	**9.0**
Italy	28.7	37.6	**8.9**
Finland	17.2	25.8	**8.7**
Denmark	21.1	28.6	**7.5**
Norway	13.5	20.5	**7.0**
Netherlands	27.1	33.7	**6.7**
Slovak Republic	16.3	22.6	**6.3**
Sweden	16.5	22.5	**6.0**
Ireland	19.1	25.0	**5.9**
Belgium	20.6	26.1	**5.5**
Korea	10.7	12.1	1.4
Japan	5.9	7.3	1.4
France	18.8	19.4	0.6
UK	15.8	16.0	0.3

Note: bold printed figures indicate a significant difference in dropout rates between women and men at the 1 per cent level.

Table 5: Cognitive skill differences between dropout students and tertiary and upper secondary educated individuals

	Sign and significance of achievement differences between tertiary dropouts and					
	Tertiary educated			Upper secondary educated		
	Problem solving	Numeracy	Literacy	Problem solving	Numeracy	Literacy
Czech Republic	**(+) *** **	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Denmark	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Finland	ns	**(-) ** **	ns	**(+)*** **	**(+) *** **	**(+)*** **
France	na	**(-) ** **	ns	na	**(+) *** **	**(+)*** **
Ireland	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Italy	na	ns	ns	na	**(+) *** **	**(+)*** **
Japan	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Korea	ns	**(-) ** **	**(-) * **	**(+)*** **	**(+) *** **	**(+)*** **
Netherlands	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Belgium	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Norway	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Poland	ns	**(-) ** **	**(-) *** **	**(+)*** **	**(+) *** **	**(+)*** **
Slovak Republic	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
Spain	na	**(-) *** **	**(-) *** **	na	**(+) *** **	**(+)*** **
Sweden	ns	ns	ns	**(+)*** **	**(+) *** **	**(+)*** **
United Kingdom	ns	ns	ns	**(+)*** **	**(+) *** **	ns

Note: (-) means that achievement of dropouts is lower than that of education comparison group; (=) denotes that dropouts achieve lower than comparison group. * denotes significance at 10 per cent level, ** at 5 per cent and *** at 1 per cent level.

Table 6: Per cent of working age adults being in employment by tertiary dropout status, tertiary and upper secondary education and per cent point differences

	Upper secondary educated			Tertiary educated		
	Never enrolled tertiary	Dropout	Difference	Never dropped out	Dropout	Difference
Belgium	74.2	88.2	**14.0**	86.7	93.6	**7.0**
Italy	73.6	87.0	**13.4**	85.8	75.3	-10.5
Czech Republic	73.8	87.0	**13.2**	81.8	85.7	3.9
Sweden	83.1	95.9	**12.8**	90.0	96.2	**6.2**
Ireland	73.4	84.9	**11.5**	84.8	90.5	**5.6**
Finland	75.1	86.1	**11.0**	89.1	91.5	2.4
Poland	67.1	77.9	**10.8**	87.9	94.5	**6.6**
France	76.3	87.1	**10.8**	86.0	88.3	2.3
Slovak Republic	73.0	83.7	**10.7**	85.5	88.6	**3.2**
Spain	74.4	81.8	**7.4**	86.3	92.0	**5.7**
Korea	72.1	79.0	**6.9**	82.1	77.6	-4.6
Norway	82.8	87.2	4.3	92.9	93.6	0.7
Japan	75.7	77.8	2.1	80.8	97.2	**16.4**
UK	79.3	81.1	1.9	85.6	86.2	0.6
Denmark	78.9	80.6	1.8	89.3	90.0	0.7
Netherlands	83.5	85.0	1.5	89.4	89.1	-0.3

Note: Bold figures for percentage point differences are significant at the 1 per cent level. Countries are ordered by the size of the per cent point differences of employment between upper secondary educated with and without tertiary dropout experience.

Table 7: Per cent employed working in managerial positions by tertiary dropout status, tertiary and upper secondary education and per cent point differences

	Upper secondary educated			Tertiary educated		
	Not enrolled tertiary	Dropout	Difference	Never dropped out	Dropout	Difference
Netherlands	20.3	37.0	**16.7**	69.3	69.9	0.6
Czech Republic	8.5	25.0	**16.5**	58.0	60.5	2.6
Denmark	13.4	28.8	**15.5**	66.2	66.7	0.5
Slovak Republic	13.6	26.6	**13.0**	66.1	52.5	-13.6
Belgium	10.9	23.8	**13.0**	63.2	52.8	**-10.5**
Japan	7.6	14.3	6.7	35.9	37.7	1.9
UK	14.7	21.3	6.5	48.3	46.8	-1.5
Poland	7.9	14.4	6.5	61.7	57.8	-3.9
France	6.3	12.1	**5.9**	51.9	48.0	-3.9
Italy	9.8	15.1	**5.4**	57.1	57.9	0.9
Norway	13.0	14.5	1.5	60.3	61.3	1.0
Korea	5.2	6.4	1.2	34.9	35.9	1.0
Spain	13.6	11.5	-2.1	48.2	52.6	4.4

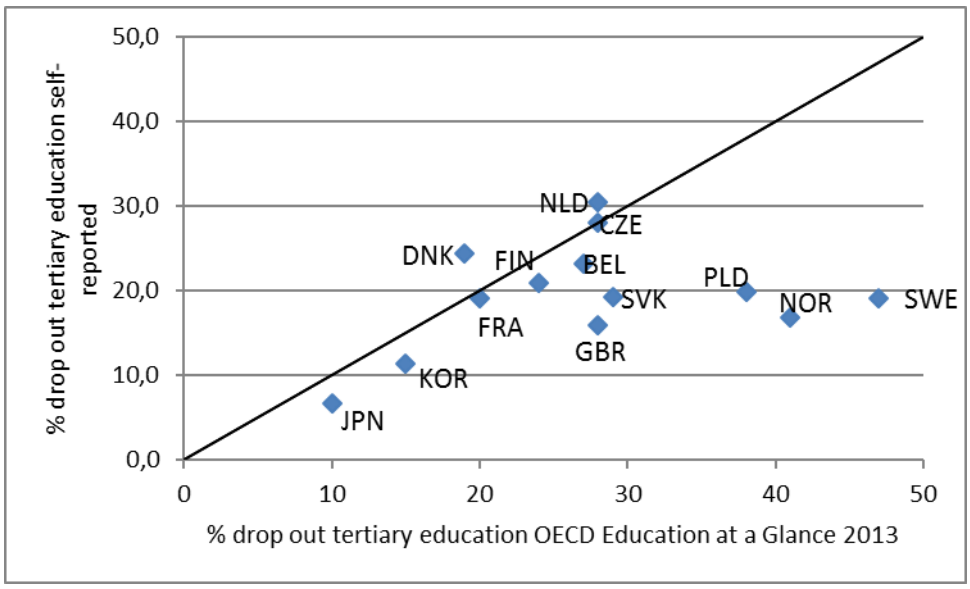
Note: Bold figures for percentage point differences are significant at the 1 per cent level. Managerial positions refer to individuals' current work, as a consequence unemployed or people out of the labour force are excluded. Countries are ordered by the size of the per cent point differences of managerial position between upper secondary educated with and without tertiary dropout experience.

Table 8: Effect of dropout on labour market chances by method applied

		In managerial position			In employment		
		Logistic regression	PSM caliper	PSM kernel	Logistic regression	PSM caliper	PSM kernel
Czech	Dropout tertiary	-0.001	-0.052	-0.013	-0.050	0.000	0.025
		(0.088)	(0.079)	(0.052)	(0.068)	(0.044)	(0.030)
	Dropout secondary	0.144***	0.098**	0.111***	0.051	0.062	0.078***
		(0.052)	(0.043)	(0.031)	(0.047)	(0.038)	(0.023)
Denmark	Dropout tertiary	-0.022	-0.017	-0.030	-0.019	0.014	-0.001
		(0.037)	(0.042)	(0.028)	(0.0172)	(0.026)	(0.017)
	Dropout secondary	0.128***	0.006	0.096***	-0.047	-0.013	0.019
		(0.041)	(0.0516)	(0.034)	(0.031)	(0.041)	(0.028)
France	Dropout tertiary	-0.049	-0.039	-0.055	-0.006	0.021	0.011
		(0.200)	(0.064)	(0.044)	(0.031)	(0.040)	(0.026)
	Dropout secondary	0.033	0.029	0.031	0.037	0.050	0.093***
		(0.023)	(0.041)	(0.028)	(0.031))	(0.046)	(0.027)
Italy	Dropout tertiary	-0.019	-0.083	-0.019	-0.257	-0.069	-0.059
		(0.146)	(0.163)	(0.101)	(0.180)	(0.100)	(0.069)
	Dropout secondary	0.021	0.014	0.025	0.073***	0.065**	0.062***
		(0.022)	(0.038)	(0.026)	(0.0295)	(0.033)	(0.020)
Netherlands	Dropout tertiary	-0.018	-0.066	-0.019	-0.025	-0.043	-0.021
		(0.045)	(0.051)	(0.034)	(0.025)	(0.030)	(0.023)
	Dropout secondary	0.144***	0.099***	0.152***	-0.028	0.012	0.021
		(0.036)	(0.052)	(0.036)	(0.028)	(0.033)	(0.024)
Norway	Dropout tertiary	-0.022	-0.043	-0.001	-0.028	-0.035	-0.009
		(0.052)	(0.067)	(0.044)	(0.022)	(0.025)	(0.020)
	Dropout secondary	0.008	0.041	0.011	-0.030	0.016	0.024
		(0.036)	(0.053)	(0.039)	(0.031)	(0.051)	(0.031)
Poland	Dropout tertiary	-0.023	0.051	-0.030	0.020	0.029	0.058**
		(0.068)	(0.074)	(0.048)	(0.109)	(0.037)	(0.023)
	Dropout secondary	0.092***	0.079**	0.057**	-0.009	0.053	0.095***
		(0.037)	(0.031)	(0.024)	(0.049)	(0.035)	(0.020)
Spain	Dropout tertiary	-0.002	0.028	0.003	0.045	0.045	0.036
		(0.068)	(0.060)	(0.039)	(0.026)	(0.035)	(0.020)
	Dropout secondary	-0.027	-0.034	-0.021	0.035	0.018	0.077**
		(0.032)	(0.049)	(0.033)	(0.033)	(0.047)	(0.032)
UK	Dropout tertiary	-0.044	-0.074	-0.051	0.002	0.030	0.009
		(0.064)	(0.063)	(0.042)	(0.035)	(0.043)	(0.025)
	Dropout secondary	0.010	0.000	0.000	0.005	0.032	0.034
		(0.034)	(0.046)	(0.029)	(0.028)	(0.038)	(0.025)

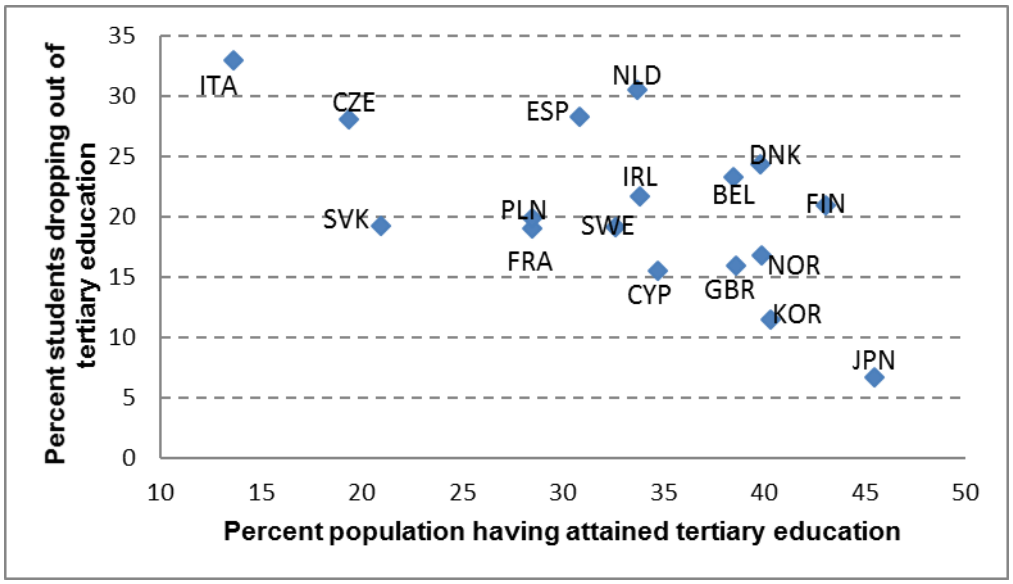
Note: This table presents percent point differences in holding managerial positions (column 1 to 3) and being employed (column 4 to 6) between upper secondary educated adults with and without dropout experience (second row each country) and tertiary educated adults with and without dropout experience (first row each country) by method used. Standard errors are presented in parenthesis, shaded figures are significant. All results are conditioned on socio-economic and demographic background, work experience and skills.

Figure 1: Self-reported dropout rates by working-age adults from PIAAC and dropout rates from student population cross-cohorts and panel data



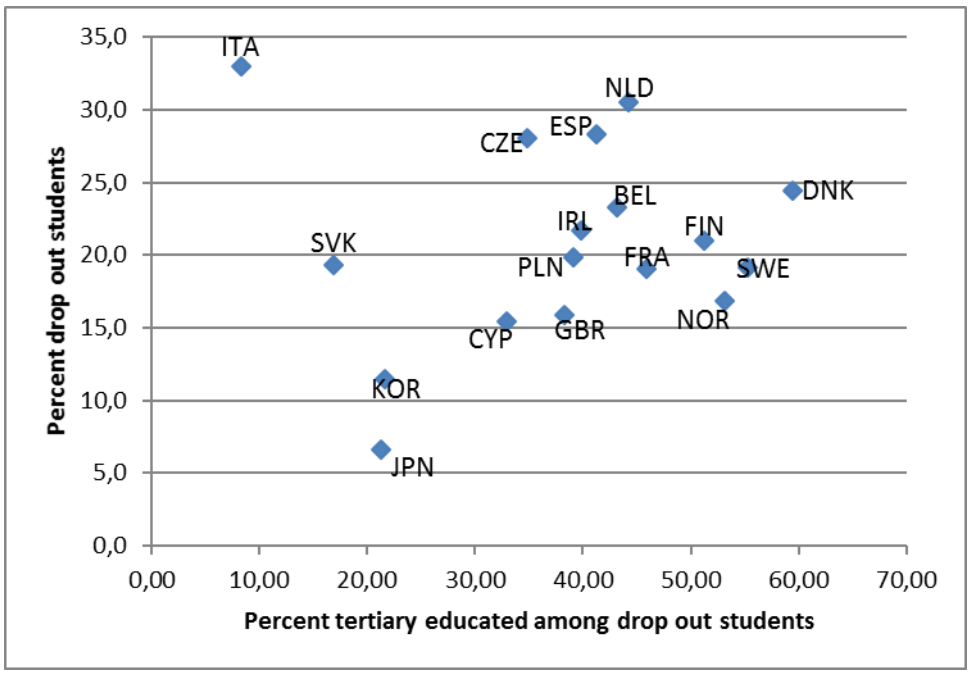
Note: Belgium refers to the Flemish speaking part only for both measures. Correlation coefficient is 0.32. If the three countries with highest dropout rates using the OECD measure are excluded (Poland, Norway and Sweden), the coefficient is 0.72.
Source: OECD 2013, for Korea OECD 2010, author's calculations.

Figure 2: Percentage of population having attained tertiary education and percentage of students having ever been enrolled in tertiary education who dropped out of tertiary education



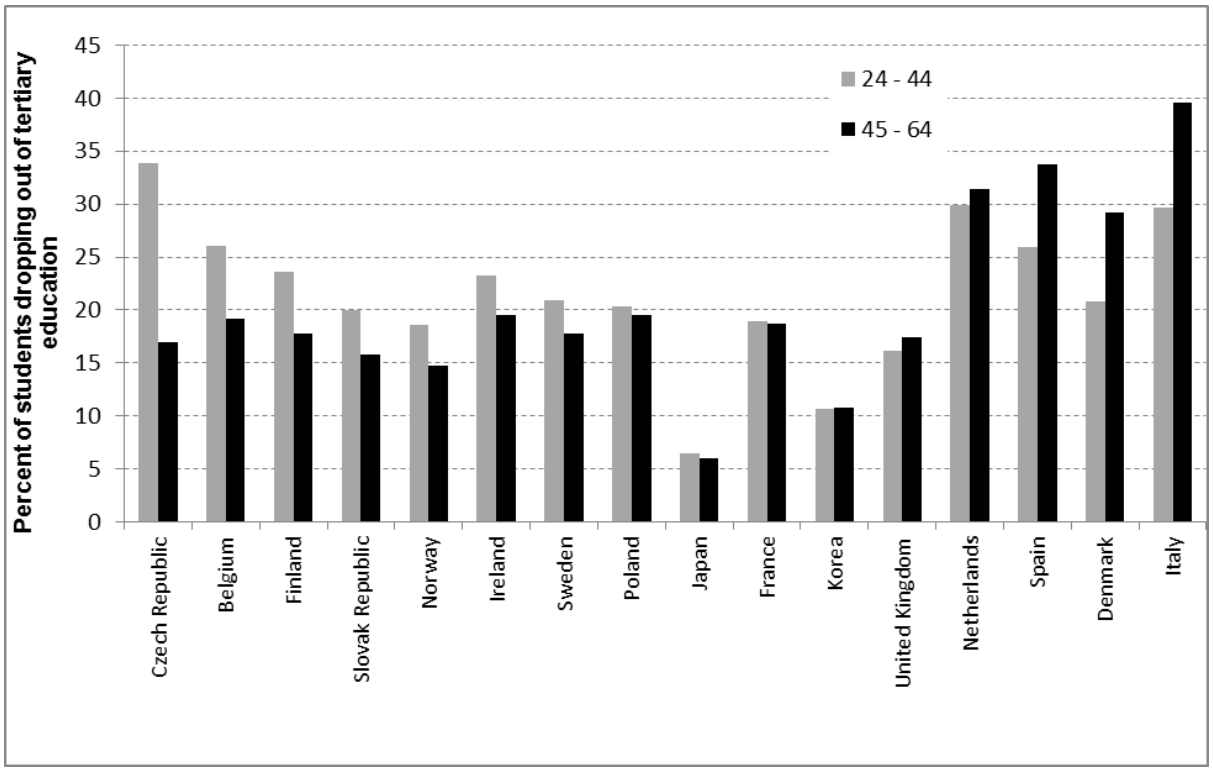
Note: The correlation coefficient is -0.61 including all countries given in the figure. Excluding Italy from the correlation increases the coefficient to -0.48.

Figure 3: Percentage of tertiary enrolled students dropping out of education and percentage of dropout students having attained tertiary education after drop out



Note: correlation coefficient is 0.09. Excluding Italy form the calculation increases the correlation coefficient to 0.45.

Figure 4: Students dropping out of tertiary education expressed as percentage of total students every enrolled in tertiary education by age group



Note: Differences between age groups are significant at the 5 per cent level for the following countries: Czech Republic, Italy, Belgium, Spain, Finland, Denmark and Norway. Countries are ordered by percentage point difference in dropout between age groups.

Appendix A: Exclusions and data cleaning

For adults reporting dropping out of education the data set provides information on the age of dropout. In addition, for all people the data contain information on individuals' age at which they attained their highest educational degree.
As discussed in the main text, a considerable part of students who dropped out of tertiary education completed a tertiary degree. For most of these adults we would assume that at the time of their tertiary dropout they were younger than at the time they received the final tertiary degree. This fits with the assumption that adults dropout of tertiary education but enrol again at a later point in life to complete tertiary studies.

There are three reasons why age of dropout can bigger than the age of completion tertiary education: first, the tertiary degree the student aimed for was **at a higher level** than the tertiary degree the student had attained before. Second, the student was holding already a tertiary degree and wanted to achieve a second tertiary degree at **the same or lower level** as the first one. Third, the person reported educational attainment wrongly. Given the question order in the survey, individuals are first asked about completed education ("Which of the qualifications on this card is the highest you have obtained?"). Individuals might mistakenly report enrolment in education instead of completion. Only later in the questionnaire individuals are asked about dropout.

Table A1 presents a cross-tabulation of completed and not completed tertiary education levels for adults experiencing tertiary dropout whose tertiary dropout age is higher than the age they received a tertiary education level. This group of adults comprise 1,687 out of 7,474 tertiary dropout adults. Bold printed number of students represent those, where the age of dropout is bigger than that of attaining tertiary education but the education level completed and uncompleted is the **same**. There is a high probability that these individuals wrongly reported their highest degree of education to be completed so that we exclude these individuals from the analysis (which reflects as many as 9.7 % of the tertiary dropout sample). Figures in bold and italics represent those individuals who held a higher tertiary educational level at the point they dropped out from a lower level tertiary degree. While these students might

have aimed for a second tertiary degree, they clearly differ from the students this paper focuses on: primary tertiary dropout students. As a consequence, also these individuals will not be included in the analysis (representing a further 1.1 per cent of adults reporting dropout).

Table A1: Reported completed highest level of tertiary education and terminated level of tertiary education for adults whose reported termination of tertiary study has taken part after completion of tertiary education

		Reported completed highest level of tertiary education					Total
		ISCED 5b	ISCED 5A (B)	ISCED 5A (M)	ISCED 6	No distinction between 5a, 6	
Terminated level of tertiary education	ISCED 5b	**214**	***57***	***17***	***1***	*21*	310
	ISCED 5a	220	**215**	***60***	***1***	1	497
	ISCED 5aM	83	306	**182**	***4***	0	575
	ISCED 6	4	10	119	**8**	0	141
	No dist	55	0	0	0	**109**	164
	Total	576	588	378	14	131	1,687

Note: ISCED level 5 A programmes are tertiary programmes that are largely theoretical based, while level 5B programmes focus on occupationally specific skills aimed to facility entry into the labour market.

Appendix B: Selection of logistic regression coefficients

Table B1: Selection of logistic regression coefficients for dropout students with and without tertiary education for different nested models

		Dependent variable: n employment			Dependent variable: in managerial position		
	Variables	(1)	(2)	(3)	(1)	(2)	(3)
Czech	Dropout tertiary	0.101	-0.407	-0.445	0.106	0.0994	-0.00628
		(0.394)	(0.562)	(0.567)	(0.312)	(0.319)	(0.322)
	Dropout secondary	0.711**	0.545	0.438	1.279***	1.424***	1.159***
		(0.293)	(0.455)	(0.450)	(0.275)	(0.256)	(0.257)
Denmark	Dropout tertiary	-0.0681	-0.0696	-0.257	0.0242	-0.0429	-0.0923
		(0.184)	(0.211)	(0.217)	(0.130)	(0.138)	(0.143)
	Dropout secondary	0.0157	-0.160	-0.412	0.990***	0.981***	0.812***
		(0.217)	(0.238)	(0.252)	(0.228)	(0.232)	(0.236)
France	Dropout tertiary	-0.0608	-0.0528	-0.0551	-0.155	-0.208	-0.208
		(0.195)	(0.221)	(0.229)	(0.146)	(0.154)	(0.161)
	Dropout secondary	0.644***	0.471**	0.289	0.742***	0.838***	0.485**
		(0.193)	(0.219)	(0.222)	(0.196)	(0.214)	(0.215)
Italy	Dropout tertiary	-0.999*	-1.489**	-1.702**	0.0356	-0.0388	-0.0751
		(0.576)	(0.736)	(0.801)	(0.479)	(0.595)	(0.596)
	Dropout secondary	0.625***	0.653***	0.549**	0.501**	0.354*	0.228
		(0.201)	(0.210)	(0.223)	(0.208)	(0.212)	(0.213)
Netherlands	Dropout tertiary	-0.0396	-0.259	-0.297	0.0276	0.0117	-0.0768
		(0.217)	(0.221)	(0.222)	(0.205)	(0.209)	(0.209)
	Dropout secondary	0.133	-0.113	-0.223	0.881***	0.933***	0.732***
		(0.190)	(0.228)	(0.229)	(0.157)	(0.156)	(0.164)
Norway	Dropout tertiary	-0.0365	-0.391	-0.445	0.0427	-0.00583	-0.0869
		(0.329)	(0.320)	(0.315)	(0.179)	(0.194)	(0.205)
	Dropout secondary	0.274	-0.235	-0.308	0.141	0.276	0.0709
		(0.286)	(0.292)	(0.293)	(0.330)	(0.329)	(0.326)
Poland	Dropout tertiary	0.608	0.279	0.271	-0.164	-0.0706	-0.0941
		(0.451)	(0.495)	(0.503)	(0.223)	(0.247)	(0.250)
	Dropout secondary	0.490**	0.147	-0.0486	0.676**	1.058***	0.918***
		(0.233)	(0.272)	(0.279)	(0.258)	(0.257)	(0.267)
Spain	Dropout tertiary	0.529**	0.464*	0.474*	0.174	0.0895	-0.00626
		(0.248)	(0.276)	(0.280)	(0.180)	(0.196)	(0.192)
	Dropout secondary	0.437***	0.266	0.185	-0.0427	-0.148	-0.259
		(0.147)	(0.162)	(0.166)	(0.313)	(0.325)	(0.328)
UK	Dropout tertiary	0.00796	0.0245	0.0143	-0.0614	-0.113	-0.185
		(0.265)	(0.290)	(0.301)	(0.215)	(0.232)	(0.260)
	Dropout secondary	0.147	0.171	0.0434	0.466*	0.417	0.0772
		(0.190)	(0.221)	(0.218)	(0.259)	(0.262)	(0.261)

Note: Model 1 controls only for educational background, Model 2 controls for gender, migration background, young child living in household, whether individual lives in a partnership, whether the partner is employed, highest parental education, age and age square. Model 3 takes work experience measured in years and cognitive ability into account. Standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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