Is Education Becoming a Weaker Determinant of Occupation? Educational Expansion and Occupational Returns to Education in 30 European Countries

Abstract: This article examines the relationship between education and occupation over a course of educational expansion. We analyse European Union Labour Force Survey (EU-LFS) data from 2014, 2015, and 2016 from 30 European countries. We work with 12 graduated cohorts defined by the year in which they left the educational system (2003-2014). We use a multilevel model approach. Education is measured in both absolute and relative terms. The results show that during a time of educational expansion there was no change in the relationship between education and occupation if education is conceptualized in absolute terms. However, there was a change in this relationship if we conceptualize education as a positional good. Many previous studies posing a similar research question did not consider the study fields. Our results show that the role of the study field changed during this time of educational expansion, with natural science, computer, and IT study fields growing stronger than other fields of study. We interpret the strengthening of education as a positional good in terms of the theory of task-biased technological change.

Sociologists working in the field of social stratification agree that the level of education is a strong determinant of labour market position in modern societies (Blau and Duncan, 1967; Erikson and Goldthorpe, 1992; Breen, 2004). Education is considered to be one of the strongest predictors of occupation and income, and also of behaviour, values, attitudes, and opinions. Different levels of education then imply different positions in the labour market and different income levels. From this perspective, education is a good that can be utilized. Returns to education are a topic of interest in sociology. From an economic perspective, a return can be expressed as the ratio between the benefits related to higher education and the costs necessary to obtain it. The returns to education are both individual and social (Dickson and Harmon, 2011; Hout, 2012). The individual returns reflect the fact that different levels of education result in different occupations, incomes, and economic security. The social returns describe the social contributions of education, such as the health of the population, life expectancy, the rates of crime and suicides, and the size of the GDP.

This article focuses on the individual returns to education in 30 European countries. Dickson and Harmon (2011) and Vila (2000) distinguish between monetary and non-monetary individual returns to education. Monetary returns are expressed by income; non-monetary returns include the quality of occupation. This analysis concerns non-monetary returns to education; specifically, we analyse the relationship between education and occupation and talk about occupational returns to education. Our analysis focuses on the period between 2003 and 2014, when European countries experienced educational expansions. We focus on the position in the labour market of the people who left the educational system during this time, and we study whether and how the educational expansion influenced their transitions into the labour market. What is the change in the relationship between educational achievement and occupation in the time of educational expansion in Europe? How strongly does education determine occupation during a period of rising educational levels? Is this effect stronger or weaker? These are our research questions.[1]

[1] The answers to these questions in the context of social stratification research, without relation to educational expansion, cf. Shavit and Müller (1998).

Studies that have recently asked similar questions have shown that one of the consequences of educational expansion is a change in the role of education in the labour market (cf. Rotman, Shavit, and Shavel, 2016; Fujihara and Ishida, 2016; Bol, 2015; Ortiz and Rodriguez-Menés, 2016). Education ceases to be an absolute category (nominal) and becomes a relative category (positional good) that is influenced by time and place. In our analysis, we build on these conclusions, and we conceptualize education in absolute as well as in relative terms. In addition, we take into account the fields of study – i.e. the horizontal differentiation of education, which has not been considered in most previous studies. We start from the assumption that the study fields are as important for the school-to-work connection as the level of education. It is known that educational expansion is not universal, but field-specific. The data we analyse were obtained from the European Union Labour Force Survey (EU-LFS) between 2014 and 2016. As the data contain information on graduated cohorts in 30 European countries, we analyse it using multilevel models.

The results support the theory that education is changing into a positional good. The occupational returns to absolute education did not change dramatically during the period of educational expansion; the occupational returns to relative education increased. For absolute education, the effect of study fields was diminished by the educational expansion; for relative education, this effect was strengthened by educational expansion. The most significant growth is observed in the field of natural science/computer/IT and engineering/construction. We interpret the change of education to a positional good as a function of the deployment of new technologies, computerization, and robotization on the labour market, which increased the demand for employees in these fields, and which provided them with a relative advantage in comparison with other fields (task-biased technological change theory).

Role of education on the labour market

Sociologists and economists conceptualize education most commonly as human capital (Barone and Van de Werfhorst, 2011).[2] In this perspective, education indicates acquired competences that make it possible to work efficiently, i. e. with higher productivity and obtain an appropriate position in the labour market (Mincer, 1958; Becker, 1964). In meritocratic societies, people receive various financial compensations according to their occupation (their different positions in the labour market), and they have different work benefits and social securities. In short, they belong to different social positions (Jackson, Goldthorpe, and Mills, 2005; Goldthorpe, 2014). According to Becker (1964), these differences happen because the modern labour market works on the economic principle of supply and demand. A higher level of education brings better financial compensation, because in the context of ongoing modernization processes there is a higher demand for people with such an education. A lower level of education brings lower financial compensation, because there is not such a demand for people with lower levels of education. In this perspective, the monetary and non-monetary benefits of education are determined by the level of education attainment. These benefits are not influenced by the number of people with the same level of education, and these benefits do not change much over time. Credentials have intrinsic value (Mincer, 1974; Becker, 1985; Kerckhoff, Raudenbush, and Glennie, 2001). This is the absolute (nominal) value of education (Rotman, Shavit, and Shavel, 2015).

Human capital theory originated at a time when the number of tertiary education graduates in the labour market was not changing (Brown, 2001). When sociologists and economists talked about educational expansion, they anticipated two social stratification consequences.

[2] The OECD defines human capital as ‘the knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well-being, as well as that of their countries’ (Keeley 2007).

The first consequence is a decrease in unequal chances for education according to social origin. This anticipated consequence is based on the assumption that in industrial societies, the labour market rewards only skills (proven by attained education), and not ascriptive characteristics (social origin, gender, age, or ethnicity). Education-based meritocracy theory was formulated on this basis. However, this theory was apparently too optimistic: employers do not make hiring decisions strictly based on the qualification of job applicants; employers also consider applicants' social origins and the soft skills that strongly correlate with social origins. Even though this happens implicitly, this effect of social origin is still valid. Therefore, this theory was replaced by the theory of education as a great equalizer, a theory that anticipates that if the accessibility of education increases due to educational expansion, educational inequalities based on social origin will at least partly decrease (Bernardi and Ballarino, 2016).

The second consequence is credential inflation (Berg, 1971; Collins, 1979; Collins, 2002). If we understand education as an achieved variable that people utilize in the labour market, then its value and its monetary and non-monetary benefits are determined by the relationship between the supply and demand for it. If demand is low and supply is high, the value of education decreases, and vice versa. Therefore, if the educational expansion increases the number of people with higher education, while at the same time the number of appropriate job opportunities does not increase, then the monetary and non-monetary benefits of education decrease. Ulrich Beck (2011) stated that a university diploma no longer means automatically getting a good job, but it is a necessary ticket when applying to compete for such a job. Other authors developing the inflation theory have assumed that members of the expanding cohorts of graduates must show additional personal competitive advantages in order to reach similar positions as previous cohorts with identical level of education (Bourdieu and Passeron, 1990; Bourdieu, 1996; Van de Werfhorst and Andersen, 2005). Otherwise, graduates must accept less prestigious occupations, while pushing less educated employees out of the labour market (Burris, 1983; Kivinen and Ahola, 1999; Morrison Paul and Siegel, 2001; Nelson and Phelps, 1966; Welch, 1970).

However, empirical studies from the 1980s showed no inflation in tertiary education (c.f. Card and Dinardo, 2002). One explanation was the increasing use of information technologies across all domains of human activity, which requires a qualified workforce. In response, the skill-biased technological change theory was formulated in the 1990s. According to this theory, the labour market gives preference to job applicants with higher education, while employees with lower education are excluded from the labour market because their work is outsourced to other countries or is being done by machines (Ábrahám, 2008; Blinder, 2009; Card and Dinardo, 2002; Morrison Paul and Siegel, 2001; Oesch, 2013). Berman, Somanathan, and Tan (2005) see technology as the main reason for the higher demand for university graduates. Acemoglu (2002) states that technological changes have been taking place since the industrial revolution and divides these changes into two periods. First, the demand for unskilled workers for mass production in factories increased due to Fordism. After the 1950s, thanks mainly to the introduction of information technology, the demand for highly skilled workers started to increase. While some studies challenge the theory of technological change connected with the persistent demand for people with higher education (cf. Aamodt and Arnesen, 1995; Kivinen and Ahola, 1999), according to this theory the labour markets of modern societies are not yet saturated with university graduates to the extent that supply outstrips demand. Educational expansion does not mean decreasing the value of education as human capital. Moreover, the *polarization hypothesis* – emerging at the beginning of the new millennium – provides an empirical evidence that while the income returns to education do indeed increase for workers with tertiary attainment (as expected by the skilled-base technological change theory), they also do so for workers of the lowest

attainment due to growth of the service sector. The labour market becomes polarized (Autor, Levy, Murnare 2003; Manning 2004; Oesch, Rodriguez Menés 2010). In our first hypothesis, we therefore expect that *the value of education as human capital in a time of educational expansion does not change. The occupational return to absolute education remains constant.*

Education as a positional good

The theory of education as a positional good assumes that the value of education is contextually contingent (Thurow, 1975; Hirsch, 1977). The returns to education are determined by the fraction of individuals at a given level of education relative to the fraction of individuals at other levels of education. The sociological literature often presents the example of a car: its benefit as a means of transportation from point A to point B varies for the user according to the number of cars around. If a majority owns a car, traffic jams result and the benefit of a car decreases (Hirsch, 1978; Ultee, 1980). Therefore, owning a car is not a value in itself; rather, the time and place define the value of a car. The value of education as a positional good varies in relation to its scarcity. The value does not come from the level of education alone. In a time of educational expansion, the number of people attaining higher education increases, and the individual return to education can be directly affected by this number. People with the same level of education are in the same position when entering the labour market; however, if their number is larger than the number of relevant job opportunities, the return to higher levels of education can approach that of lower levels of education. Employers start to distinguish among people according to other, 'softer' criteria (Thurow, 1975). According to signalling theory (Arrow, 1973; Spence, 1973), the level of education is then only one of a set of a person's characteristics (albeit the most important one) for taking up a position in the labour market. Other non-directly observable characteristics include the motivation to work; the ability to learn new things; the ability to express one's opinion; the ability to lead and motivate people, to pursue a certain goal over a longer period, and to be loyal to the work and the employer (Weiss, 1995; Jackson, Goldthorpe, and Mills, 2005; Goldthorpe, 2014).

The change of education in a positional good can be conceptualized on a macro as well micro societal level. On the macro level, the benefits of different educational levels change. This can happen 'from the bottom' or 'from the top' of the educational structure. In the first case, lower educational levels become redundant in the labour market, their returns to education decrease, and higher levels of education thus receive a relative advantage over them. In the second case, the demand for higher levels of education grows thanks to technological changes, while the technology does not change for lower levels. In both cases, the positional advantages for some levels of education are created.

On the micro level, employers create job opportunities connected with specific requirements. For these jobs, they do not expect applicants to have specific knowledge obtained in the educational system. On the contrary, they choose candidates who were prepared by the educational system to be able to obtain this knowledge after taking up the position. This is expected to happen in the shortest time possible and using the least financial resources possible. The employer has to bear the time and financial burden connected with the imperfect work of an untrained employee. Therefore, it is not the absolute value of education that guarantees a position in the labour market, but the ability, readiness, and facility of a person to successfully master the requirements connected with a particular work position (Goldthorpe, 2009). Job applicants are then lined up by the employer into an imaginary labour queue not only according to the level of education, but also according to a number of other characteristics (Thurow, 1975).

The change in the value of education from absolute to relative has been tested by a number of sociological studies (e.g. Ultee, 1980; Olneck and Kim, 1989; Bol, 2015; Bukodi and Goldthorpe, 2016; Rotman, Shavit, and Shalev, 2016; Fujihara and Ischida, 2016; Ortiz and Rodriguez-Menés, 2016). Even these studies focused on different social phenomena; in relation to the monetary or the non-monetary benefits of education, they share a common question: to what extent is the change in analysed phenomenon caused by the shift in education from human capital to a positional good? The results show that each concept of education produces different results. While the explanatory potency of education conceptualized in absolute terms decreased, the explanatory power of education as a positional good increased.[3] Following these conclusions, in our second hypothesis we expect that *the value of education, conceptualized as positional good, increases in a time of educational expansion. The occupational returns to relative education increase.*

Educational expansion and horizontal differentiation of study fields

In 1999 the Bologna declaration was signed, which can be seen as jumpstarting the most recent wave of educational expansion in Europe.[4] This declaration recommended that the signatory nations should divide university education into three levels: a widely accessible Bachelor's level, more selective Master's (level 5 of the International Standard Classification of Education ISCED), and a scientific post-graduate (level 6 ISCED).[5] The separation of five-year Master's degrees enabled universities to substantially open the educational system to a wider range of applicants. As another reason for educational expansion, Kogan (2012) cites the establishing of new study fields and new institutions for higher education (private, and particularly smaller regional ones). In the Czech Republic, the number of higher education institutions increased from 23 in 1999 to 67 in 2015. Private universities started to appear after 2000. By 2015, there were 41 private universities.

Figure 1 shows the educational expansion in 30 European countries between 2003 and 2015 for the age group 25 to 34 years.[6] The X axis shows the proportion of people with tertiary education in 2003 in each country. The Y axis shows how much this proportion increased between 2003 and 2015. The expansion is path dependent and is negatively contingent upon the proportion of people with tertiary education (Pearson correlation is 0.55). The increase between 2003 and 2015 is lower in countries where the proportion with tertiary education was already higher in 2003, and vice versa. The average proportion of people with tertiary education across the countries was 26.5 % in 2003, and 40.4 % in 2015. Among the Western European countries that in 2003 fell below the European Union average,

[3] Cf. the monothematic issue of *Research in Social Stratification and Mobility* 43 (2016), which focuses on the change in the value of education as a positional good, and the effects of this change on social stratification outcomes.

[4] The first educational expansion occurred in Western European countries in the 1970s, when the number of university students more than doubled (Throw, 1973). In the socialist countries, the class and political affiliations of the parents, as well as the low capacity of universities, limited access to higher education before 1989. Moreover, in these countries, studying at a university was subject to central planning (similar to other aspects of society). After the fall of the communist regimes in 1989, most of the limits were eased and the number of university students in the former socialist countries began to rise; the Bologna declaration started the massive educational expansion in these countries, together with the countries of Western Europe.

[5] This classification comes from ISCED version 1997, i.e. before the Bologna declaration. A new version, ISCED 2011, makes a distinction between the levels of tertiary education (Bachelor's – ISCED 6, Master's – ISCED 7, Ph.D. – ISCED 8); however, this classification became relevant to empirical research only after 2014.

[6] The analysed countries are (abbreviations in parentheses): Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Cyprus (CY), Czechia (CZ), Denmark (DK), Estonia (EE), Finland (FI), France (FR), Germany (DE), Greece (GR), Hungary (HU), Iceland (IS), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LU), Netherlands (NL), Norway (NO), Poland (PL), Portugal (PT), Romania (RO), Slovakia (SK), Slovenia (SI), Spain (ES), Sweden (SE), Switzerland (CH), and United Kingdom (UK).

Luxembourg and Greece reached parity with the EU average by 2015 (Luxembourg 18.8% + 31.5%, Greece 23.1% + 17%). Among the former socialist countries, which were below average in 2003, Poland (20.3% + 22.9%), Slovenia (23.7% + 17.1%), and Latvia (18.5 % + 21.4 %) reached the EU average. The other former socialist countries did not reach the EU average by 2015, despite intense expansion. The situation was similar in four Western European countries: Austria (20.1% + 18.5 %), Portugal (16.7 % + 16.4 %), Germany (21.8 % + 7.7%), and Italy (13.0 % + 13.2 %). These countries were still below the EU average in 2015.

Insert Figure 1

Martin Trow (1973) makes a distinction among three types of massification of higher education, which differ in their social functions and goals: elite, mass, and universal. The transition between the elite and mass phases takes place when more than 15 % of a birth cohort enters the given educational phase. The mass system becomes universal when at least 50 % of a birth cohort enters higher education.[7] In terms of the goals tertiary education is supposed to move from building narrow elites (in the elite phase), through the training for new and demanding types of occupations (in the mass phase), to increasing the adaptability of wide strata of the population to conditions that are constantly changing (in the universal phase).

From the perspective of this typology, no country in this analysis can be described as elite. The lowest proportions of the population as students in higher education in 2015 were found in Italy (25.2 %), Romania (25.5 %), and Germany (29.6 %). The group of universal countries, where the proportion of higher education students in the age group 25-34 is higher than 50 %, comprised four countries: Lithuania (54.8 %), Cyprus (54.7 %), Ireland (52 %), and Luxembourg (50.3 %).

Previous research concerned with the changing role of education in the labour market (cf. Ultee, 1980; Olneck and Kim, 1989; Bol, 2015; Bukodi and Goldthorpe, 2016; Rotman, Shavit, and Shalev, 2016; Fujihara and Ischida, 2016) did not take into account the fields of study. People with different fields of study have been seen as competing for the same positions in the labour market. It was supposed that they stand in one labour queue (Thurow 1975). However, if we assume that graduates of different study fields compete for different jobs, as recently suggested by Ortiz and Rodriguez-Menés (2016), we also have to assume that they stand in different labour queues. In his typology of educational expansion, Trow (1973) assumed that the gradual massification also means a differentiation among schools. Tertiary education, which was originally offered by a limited number of elite universities, strictly separated from the influences of the labour market, is, in a time of educational expansion, also obtained at institutions of higher education that are not of the university type. These institutions do not share the academic values of elite universities, and often they focus primarily on developing skills that can be used in the labour market. The consequence is that there are differences among study fields; these differences are not affected by the expansion to the same extent. According to Thurnow (1975), there is a job queue in the labour market wherein job applicants distinguish among types of jobs, ranking the jobs according to their technical complexity. Engineers with technical training apply for jobs that are different from those sought by dentists with medical training or journalists and sociologists with education in the humanities. Heckman et al. (2006) confirm this when they show that the benefits of education in American society are contingent primarily upon the chosen field. According to

[7] The massification of the tertiary level is associated with progressive secularization and the simultaneous dismantling of social elites (Trow, 1973).

their findings, more important than the diploma is the field of study in which the diploma has been obtained.[8]

When considering the occupational returns to education in a time of educational expansion, it is therefore necessary to consider not only the level of education (empirically measured in absolute and relative terms), but also the field of study. Following this argument, we expect that educational expansion changes both the relationship between level of education and occupation and the relationship between study field and occupation. If this occurs, then the identification of the study fields that gain a relative advantage in the labour market compared to other study fields during an educational expansion should contribute to the interpretation of the increase in educational positionality, as we assume in hypothesis 2.

Data and variables

We analyse data from the European Union Labour Force Survey (EU-LFS) from 2014, 2015, and 2016 (EU Labour Force Survey…, 2017).[9] The data come from 30 European countries (Figure 1). Because we are interested in the school-work connection, which is conceptualized as a non-monetary benefit of education (Vila, 2000), we constrain our analysis to the age group of 25-34. These are the individuals who had already left the educational system and who are working.. Within this group, we distinguish 12 graduated cohorts (defined by the year in which they left school). The first cohort graduated in 2003, the second in 2004, and so on, until the final cohort of 2014. The total number of analyzed respondents is 991,922 (Table A1 in Appendix shows the number of analyzed respondents for each country and year).

The dependent variable is current occupation, indicated in the data as ISCO08 (International Standard Classification of Occupations) (cf. ILO, 2008). From this variable, we constructed the International Socio-Economic Index of Occupational Status (ISEI) (Ganzeboom, De Graff, and Treiman, 1992; Ganzeboom and Treiman, 1996; 2003). The 'philosophy' of ISEI is that occupation transforms education into income. ISEI is a continuous scale in which the higher the value, the higher the socio-economic position in the labour market. ISEI is typically constructed from a 4-digit ISCO, which, however, is not present in the EU-LFS data. A 3-digit ISCO is available instead. We multiplied it by 10, thereby extending it to a 4-digit ISCO. It is possible to carry out such an operation, since ISCO is hierarchically collapsible at the expense of losing accuracy (ILO, 2008).[10]

Education is indicated by ISCED11 categories (0, 100, 200… 800).[11] We have transformed these categories into an interval variable of years in the educational system: 12,

[8] The structural changes in labour markets also speak for the consideration of the fields of study. If, for instance, the number of job opportunities in agriculture dramatically decreases due to a transition from being a primary to a secondary industry, as described by Breen et al. (2004), it will be more difficult for graduates in agriculture to find relevant jobs (it is known that the labour markets of developed countries first shift from agricultural to industrial production, and then from industrial production to social services).

[9] EU-LFS is a survey carried out by European Union member states, which is harmonised by Eurostat, so that the results are comparable among countries and time periods. The sample represents all people living in households who are older than 15 years at the time of the survey. The respondents living in 'institutional households', i.e. army barracks, hospitals, or prisons, are not included. For instance in year 2016, data on 1.5 million respondents was available from 28 European Union members plus Iceland, Norway, and Switzerland.

[10] For instance, transforming the four-digit ISCO code 2211 to 221 means alternation from the group 'general practitioners' to the more general group, 'medical doctors'. The comparison of ISEI as calculated from a 4-digit ISCO, with ISEI calculated from a 3-digit ISCO shows that the average deviation caused by using a 3-digit ISCO is 2.05 ISEI scores. The errors for individual ISCO codes range from 0 to 21.96 ISEI scores, with more than half of the codes showing an error less than 1 ISEI score.

[11] International Standard Classification of Education (ISCED) is indicated according to the ISCED97 standard in the EU-LFS data until 2013, which does not enable a distinction between levels of tertiary education (BA, MA). After 2014, the ISCED11 is incorporated in the data, and it is possible to distinguish between graduates of secondary education, as well as BA, MA, and doctoral programmes of tertiary education. Since the ISCED97

14, 16, 18 and 20 years (for this transformation, see the Appendix). In this way we operationalize education in absolute terms that remain unadjusted across graduated cohorts and countries. As our goal is to compare the effects of absolute and relative educations, we created standardized value for this variable: z-scores (mean = 0, SD = 1), and work with it.

We indicate the relative education by proportion measure (percentile scores of education from 0 to 100) for cohorts and countries. A number of previous studies dealing with the relative concept of education have used identical indications (cf. Ultee, 1980; Olneck and Kim, 1989; Bol, 2015; Ortiz and Rodriguez-Menés, 2016). When constructing the percentile scores for education, we first connected the ISCED11 categories with years spent in the educational system (see the Appendix for this transformation) and then converted these into a ranked variable. In this way, we determined the position of each respondent relative to others in the graduated cohort and country. These positions are influenced by the number of years in the educational system of other respondents, i.e. by the composition of each graduated cohort. To analyse absolute education, we also created standardized values for this variable (z-scores, mean = 0, SD = 1) and work with them.

Studies that have posed similar questions in the past have assumed that the effect of educational expansion is not horizontally (by study fields) differentiated (cf. Ultee, 1980; Bol, 2015), with one exception (cf. Ortiz and Rodriguez-Menés, 2016). In our analysis, we reject the assumption of one-dimensionality, and we explicitly control the results for the fields of study. In the data, the highest fields of educational attainment are indicated by the ISCED97 and ISCED11 codes. We have recoded these into six categories: 1) unspecified and general; 2) education, social, and services; 3) natural, computers, and IT; 4) engineering, construction; 5) agriculture, forestry, and veterinary; 6) health and welfare (for more on this, see the Appendix).

Further variables for which we control the effect of absolute and relative education on occupation are gender, family status, and full time/part time job. We consider the effect of these three variables because it is known that the occupational returns to education are different for men and women (Manning and Saidi, 2010; Peet, Fink and Fawzi, 2015), for single and married people (DiPrete and Buchman, 2006; Hout, 2012) and for the case of full and part time job positions (Bol, 2015).

The dataset is characterized by a hierarchical structure: at the first (micro) level, individuals are settled. These individuals are nested in the cohorts that constitute the second (macro) level of analysis. The cohorts are nested in the countries that constitute the third (macro) level of analysis. Because of this structure, multilevel modelling is employed to estimate the effect of the predictors on ISEI (for details on this method, see Gelman and Hill, 2006; Rabe-Hesketh and Skrondal, 2012). The major advantage of multilevel models is their ability to combine characteristics from the micro level with those from the macro levels, assuming that the variation in the dependent variable comprises two parts, within- and between-group components.

At the contextual levels, we are interested in the effect of educational expansion on the effect of education on occupation. Educational expansion is a macro variable. The effect of this variable should therefore be qualitatively different from the effects of individual variables. We have operationalized the educational expansion as the proportion of people with tertiary education (indicated by ISCED11, 5-8 levels) aged 25-34 in each country and cohort (together, 360 numbers given by 12 cohorts in 30 countries). This variable defines our 360 analytical macro contexts and enables us to change the 3-level hierarchical structure of the data (individuals in cohorts and cohorts in countries) into a 2-level hierarchical structure (individuals in cohorts by countries). With this transformation, we lose one level in the data

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and the ISCED11 categories are not unambiguously transformable, we analysed only data from 2014, 2015, and 2016.

but increase the number of contexts in the second level. The estimation of the effect of educational expansion should then be more reliable (cf. Bryan and Jenkins, 2016). Table 1 presents the descriptive statistics of all variables (a detailed description is available in Table A2 in the Appendix).

Insert Table 1

Methods and statistical analysis

In order to identify the trends in the effect of education on occupation and test our hypotheses, we estimated two sets of models. The first set includes five two-level random effect models for absolute education and study fields. The second set includes five two-level random effect models for relative education and study fields. The models are identical; they differ only in the standardized variable of education. The general equation for these models is:

$$y_{ic} = X_{ic}\beta + Z_c\gamma + \mu_c + e_{ic}$$

where y_{ic} is the ISEI score for each respondent i and context c; X_{ic} are observed individual variables with estimated parameters β; and Z_c is observed contextual variable of educational expansion (that does not vary on an individual level) with estimated parameter γ. The unobserved individual effect is e_{ic} and the contextual effect u_c (both assumed to be normally distributed and uncorrelated with observed individual and contextual variables). We start with the null random intercept model (in which no covariates are taken into account) and continue by adding relevant covariates and adding random-slope models for education and study fields with and without a cross-level interaction term.

Estimated models are reported in Table 2 for absolute education and in Table 3 for relative education. The interclass coefficient (ICC) in Model 0 reveals the degree of variance in the dependent variable (ISEI) that is attributable to the context level. While the model has no explanatory variables, it suggests that occupation status is likely shaped by variation at the individual level (not much variance in the ISEI stems from the context level: 10.18%).

When individual-level factors are added to the null model (Model 1 in Table 2 and Table 3), we see a decrease in ICC for absolute education, but an increase in ICC for relative education.[12] This confirms that ISEI is mostly determined by micro-level factors (at the individual level). We can also see a considerable improvement in the LL statistic, meaning that these variables markedly increase model fit. We evaluated the significance of the change by using a likelihood-ratio test, the value of which can easily be derived from the difference in the LL criteria of the compared models.

All the individual-level variables are statistically significant.[13] Compared to men, women have a slightly higher average ISEI (by 0.74 in absolute education, by 0.88 in relative education). Similarly, those who are married have a slightly higher average ISEI than others (by 0.15 in absolute education, by 0.22 in relative education). A distinctly higher average ISEI can be found in the comparison of full-time jobs with part-time jobs (by 4.43 in absolute education, by 4.54 in relative education). Both variables on education are standardized (z-

[12] An increase in ICC happens in cases 'if the estimated level-1 variance decreases more than the level-2 variance does when covariates are added' (Rabe-Hesketh and Skrondal 2012:137).

[13] In the models, we report significance because we understand it within multilevel models as 'model-based'. In this case, the statistical model can be understood as a 'data-generating mechanism', and the randomness of the parameters results from a distribution of responses and not from sampling units of a finite population (for more on this, cf. Rabe-Hesketh and Skrondal 2012).

scores), and they increase the average ISEI. Specifically: if absolute education increases by 1 SD, the average ISEI increases by 13.34. If relative education increases by 1 SD, the average ISEI increases by 11.52.

In absolute education, natural/computer/IT, and health/welfare fields increase the average ISEI when compared to unspecified/general fields (by 2.32 and 3.51, respectively). The other fields decrease the average ISEI when compared to the reference category (the strongest negative effect is in the agriculture/forestry/veterinary field). The same conclusions apply also for relative education; only the effects are slightly different. The effects of all individual variables remain almost identical across the other more complex models (Models 2 to 4) for absolute as well as relative education. We therefore consider them to be robust across the models.

Model 1 for both absolute and relative education assumes a fixed effect for the education and study fields. But because it cannot be ruled out that these variables influence ISEI differently by countries and cohorts (cf. Shavit and Müller, 1998), in the next step we allowed the slopes of education and study fields to vary randomly across contexts. As reported for Model 2 in Tables 2 and 3, we found that the effects are random. In the case of absolute education, the fixed effect is 13.46 and its random effect is 3.81. In the case of relative education, the fixed effect of education is 12.11 and the random effect is 8.43.[14] This corresponds with the findings of Shavit and Müller (1998), who showed that the association between education and occupation is influenced by the institutional context. They talk about stratification and standardization of educational systems, the occupational specificity of vocational education, and the relative size of the tertiary sector. Countries that differ in these characteristics also differ in the effect of education on occupation (cf. Shavit and Müller 1998). The variance in relative education in Model 2 is significantly higher than in absolute education. This indicates that relative education reacts to changes due to educational expansions more sensitively than absolute education. The downside of using the random effect model is that it is not possible to calculate the interclass correlation (c.f. Kreft and De Leeuw, 1998). This is too minor a downside to require considering a better specified model.

Insert Table 2

Insert Table 3

In Model 3 in Tables 2 and 3, we added a context-level variable to the previous model: educational expansion. This variable would play a role in the relationship between education and occupational achievement. Its effect is significant only for relative education. Moreover, in the first case it is zero; in the second case it is positive. This means that in absolute education, educational expansion does not have an effect on average ISEI; in relative education, it works in favour of higher average ISEI. Furthermore, while the LL criterion improved after including the context-level variable, the change is rather small compared to the shift in this criterion from Model 0 to Model 1. This again confirms that ISEI is mostly determined by micro-level variables.

Model 4 (in Tables 2 and 3) includes cross-level interactions that expresses the joint effect of education and educational expansion and joint effect of study fields and educational expansion. Hypotheses 1 and 2 predicted that educational expansion should influence the

[14] It can be assumed that the effect of education is normally distributed around the fixed effect. This means that 95% of its values lie in the range of $\pm 2\sigma$ around the mean.

absolute and the relative effects of education on occupation in different ways. Educational expansion does not change the effect of absolute education, while it strengthens the effect of relative education. Figure 2 shows the effects of absolute and relative education on ISEI (Y axis) in relation to the rate of educational expansion (X axis). These are the margins from Model 4, presented in Tables 2 and 3. The educational expansion does not change the effect of absolute education on ISEI; it strengthened the effect of relative education. When the proportion of people with tertiary education (aged 25-34) is low (10%), the effect of absolute education is a little bit stronger than the effect of relative education. When the proportion of educated people is 50%, relative education is the stronger determinant of occupation. Both variables are standardized (z-scores), and their effects are therefore comparable to each other. Based on Model 4, we do not reject hypotheses 1 and 2, and conclude: education changes its role in the labour market from absolute to relative as a result of educational expansion.

Insert Figure 2

Why did this happen? Figures 3 and 4 show the average ISEI (Y axis) by study field in relation to the educational expansion with regard to absolute and relative education (respectively). These are again margins from Model 4, presented in Tables 2 and 3. In both cases, study fields differentiate positions in the labour market. At the beginning of the expansion (10 % of people with tertiary education), the effect of study field on ISEI for absolute education was significantly higher than the effect of study field for relative education. For instance, agriculture/forestry/veterinary in the absolute model is about 42 ISEI scores; in the relative model, it is about 32 ISEI scores. The educational expansion decreases the average ISEI in agriculture/forestry/veterinary and health/welfare fields in the absolute model. In the relative model, the effect of study fields strengthens. The fields that rose the most in the relative model are natural/computer/IT and engineering/construction. Agriculture/forestry/veterinary strengthened only a little bit. The distances between the effects of other fields remains constant.

These findings suggest that the shift of education should be interpreted as shifting into a positional good during educational expansion as a consequence of the deployment of new technologies in production, computerization, and robotization in the labour market. Such changes increase the demand for employees in the computing and IT fields, and give individuals with education in these fields a relative advantage over those who study other fields. This is probably a period effect that would correspond to skill-biased technological change theory (Bernardi and Ballarino, 2014). According to this theory, people at the other end of the spectrum of the educational structure should be at a disadvantage when compared to other fields. However, this was not observed in our data. In Figure 4, we see this with the category ‘unspecified/general’; the effect of this field on occupation was rather strong at the beginning of the expansion, and the educational expansion made it even stronger. Therefore, Goos, Manning, and Salomons (2014) speak of a task-biased technological change theory. According to this theory, the positionality of education is not in some advanced *skills*; the occupational returns depends on the tasks an employee can carry out as a result of those skills and how *routine* these tasks are.

Insert Figure 3

Insert Figure 4

Conclusion

A number of sociological analyses (cf. Ross and Wu, 1995; Pallas, 2006; Hout, 2012) show that more highly educated people tend to be healthier, to have higher life expectancy, and to experience better well-being. They see their occupation as a form of self-fulfilment, not as a routine activity necessary to obtain financial resources for living. They differ in patterns of assortative mating; their political votes are rather stable, without swings to extremist political parties; and subjectively these people are also happier than people with lower education.

We explored the relationship between education and occupation during a period of educational expansion in 30 European countries. In the introduction, we posed a question: how does educational expansion influence the effect of education on occupation? We conceptualized education as an individual variable in absolute as well as in relative terms (as a nominal and positional good). We started with the assumption that occupational returns to education are not absolute, as was long expected in the social sciences, but rather that they are contingent upon time and place. We therefore expected that they change according to social context. In contrast to previous studies focused on similar topics, we additionally included the effect of study fields in the analysis. The identification of this effect means a multidimensionality of the education-occupation relationship, and also contributes to the interpretation of the findings.

We suggest interpreting the change from absolute education to relative education on the basis of study fields using the task-biased technological change theory. According to the original skill-biased technological change theory, those in possession of university diplomas are rewarded by the labour market for their higher qualification, which enables them to take advantage of the quickly evolving sophisticated technologies. People with lower education should be pushed out of the labour market, and their work should be taken over by machines or employees in countries with lower labour costs (Bernardi and Ballarino, 2014). However, the empirical findings contradict this theory. They show that the occupational returns to education also increase at the lowest end of the educational spectrum during the educational expansion. Lower-educated employees are able to obtain well-paid work in the developing services sector, in jobs that cannot be outsourced to other countries. In contrast, a number of relatively qualified workers with routine tasks lose jobs due to computers taking over their tasks. In this respect, Goos, Manning, and Salomons (2014) formulated the task-biased technological change theory. According to this theory, the tasks are more important than the skills, and the distinguishing criterion of the occupational return to education is the level of routine (c. f. Autor, Levy, Murnare 2003; Manning 2004; Oesch, Rodriguez Menés 2010). Employees with more routine jobs are more easily replaceable by computers even when having relatively high educational level obtained. In our data, this specifically means that the effect of the computer and IT study field on occupation grew stronger, the health and welfare study field weakened, and the effect of the general and unspecified study field did not weaken.

The positional change of education should be understood as a period effect. In times of technological decline or economic crisis, these changes would be probably different. It is possible that under different economic circumstances educational expansion could lead to a decline in the labour-market value of tertiary diplomas as described by the theory of inflation (Berg, 1971; Collins, 1979; Bourdieu and Passeron, 1990). It is also possible that the role of education would shift in a way not yet described by social sciences. All of this leads to the conclusion that the merit of education with respect to one’s labour market performance should not be seen as fixed but rather as context-dependent.

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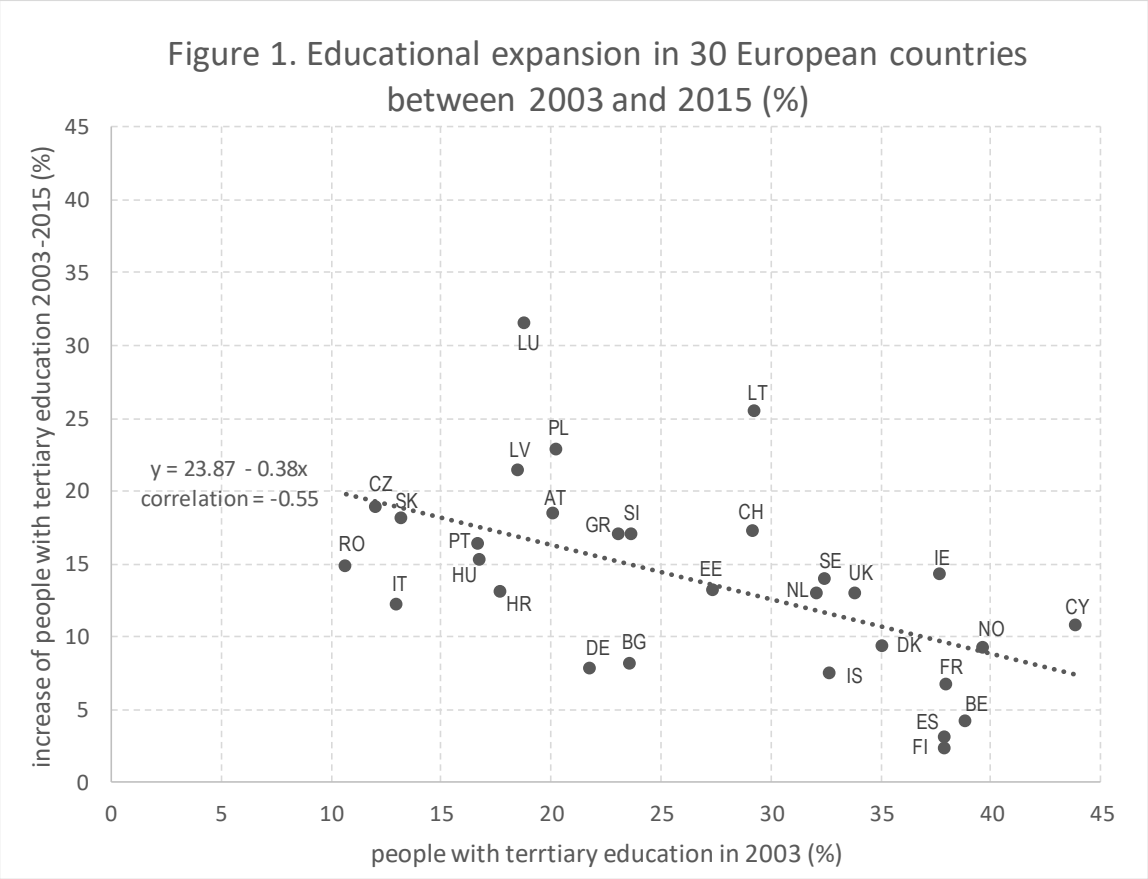


Note: Tertiary education indicated by ISCED 2011 (5-8 levels) for age group 25-34.
Source: OECD (2019), Population with tertiary education (indicator). doi: 10.1787/0b8f90e9-en.

Table 1. Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.	Categories
Individual variables					
ISEI	49.40	21.28	11.01	88.70	
Education in years (standardized)	0.00	1.00	-1.07	2.16	
Education in percentiles (standardized)	0.00	1.00	-1.25	2.10	
Study fields	2.92	1.48	1	6	1 - unspecified/general; 2 - education/social/services; 3 - natural/computer/IT; 4 - engineering/construction; 5 - agriculture/forestry/veterinary; 6 -health/welfare
Gender	1.50	0.50	1	2	1 – man; 2 – woman
Marriage	1.31	0.46	1	2	1 – other; 2 – married
Full-time job	1.84	0.36	1	2	1 – part-time; 2 – full-time job
Contextual level					
Country by Cohort	-	-	1	360	
Contextual variable					
Educational expansion by countries and cohorts	31.62	10.21	10.70	54.00	360 numbers for 12 cohorts in 30 countries

Source: Labour Force Survey (LFS) from years 2014, 2015 and 2016; contextual variable comes from OECD (2019), Population with tertiary education (indicator). doi: 10.1787/0b8f90e9-en. There were 991,922 respondents.

Table 2. Multilevel models for occupational status attainment in age group 25-34 - education is measured as absolute variable

	Model 0		Model 1		Model 2		Model 3		Model 4	
	β	SE	β	SE	β	SE	β	SE	β	SE
Individual variables										
Gender										
man			*ref.*		*ref.*		*ref.*		*ref.*	
woman			0.743 ***	(0.035)	0.753 ***	(0.035)	0.753 ***	(0.035)	0.757 ***	(0.035)
Marriage										
other			*ref.*		*ref.*		*ref.*		*ref.*	
married			0.150 ***	(0.040)	0.127 ***	(0.040)	0.127 ***	(0.040)	0.129 ***	(0.040)
Full-time job										
part-time			*ref.*		*ref.*		*ref.*		*ref.*	
full-time			4.430 ***	(0.042)	4.335 ***	(0.042)	4.335 ***	(0.042)	4.316 ***	(0.042)
Education in years (z-scores)			13.341 ***	(0.017)	13.458 ***	(0.088)	13.456 ***	(0.088)	11.190 ***	(0.305)
Study fields										
unspecified/general			*ref.*		*ref.*		*ref.*		*ref.*	
education/social/services			-3.242 ***	(0.052)	-3.236 ***	(0.053)	-3.236 ***	(0.053)	-3.876 ***	(0.184)
natural/computer/IT			2.320 ***	(0.081)	2.351 ***	(0.082)	2.351 ***	(0.082)	0.123	(0.285)
engineering/construction			-4.623 ***	(0.057)	-4.630 ***	(0.058)	-4.629 ***	(0.058)	-6.091 ***	(0.190)
ag./forestry/veterinary			-11.470 ***	(0.105)	-11.526 ***	(0.106)	-11.525 ***	(0.106)	-9.315 ***	(0.347)
health/welfare			3.512 ***	(0.069)	3.524 ***	(0.069)	3.524 ***	(0.069)	7.848 ***	(0.256)
Constant	50.796 ***	(0.225)	47.819 ***	(0.192)	47.916 ***	(0.194)	47.156 ***	(0.647)	47.716 ***	(0.667)
Contextual variable										
Educational expansion							0.002	(0.018)	-0.035	(0.168)
Interaction										
Edu expansion*Edu in years (z-scores)									0.035 ***	(0.009)
Edu expansion*Study fields										
education/social/services									0.022 ***	(0.005)
natural/computer/IT									0.033 ***	(0.008)
engineering/construction									0.050 ***	(0.005)
ag./forestry/veterinary									-0.073	(0.010)
health/welfare									-0.124 ***	(0.007)
Random effects parameters										
Variance constant	46.818		13.605		29.095		29.069		29.210	
Variance education in years (z-scores)					3.811		3.810		3.657	
Variance study fields					0.873		0.873		0.890	
ICC	10.18%		5.08%							
LL	-3240371.5		-3062316.9		-3058942.6		-3058941.9		-3058598.4	
N / Groups	731099 / 360		731099 / 360		731099 / 360		731099 / 360		731099 / 360	

Note: Dependent variable is ISEI (11,01-88,70); standard errors are in parentheses; 360 contexts = 12 cohorts by 30 countries; xtmixed command in Stata 15 used to obtain this table; * p ≤ ,10, ** p ≤ ,05, *** p ≤ ,01.

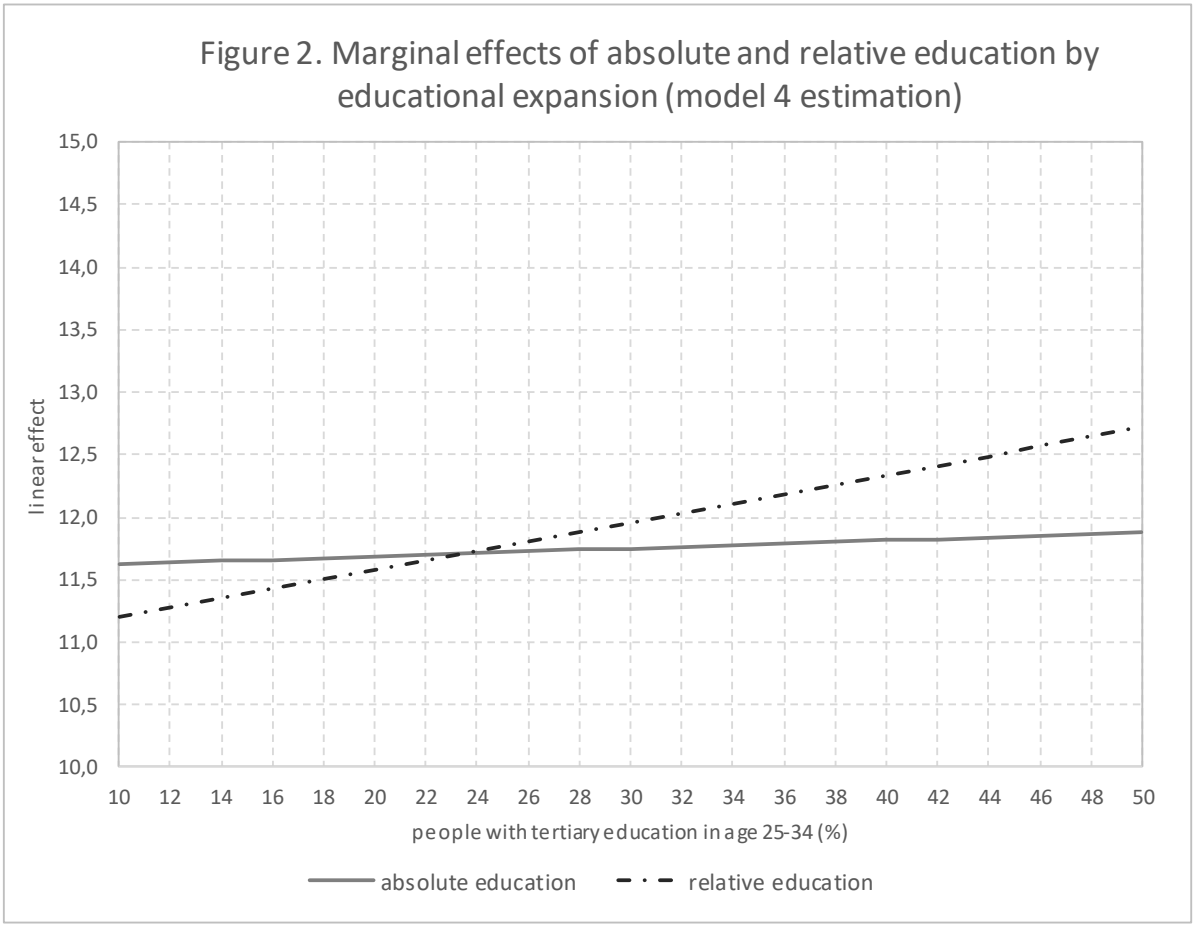
Sources: Labour Force Survey (LFS) from years 2014, 2015 and 2016.

Table 3. Multilevel models for occupational status attainment in age group 25-34 - education is measured as relative variable

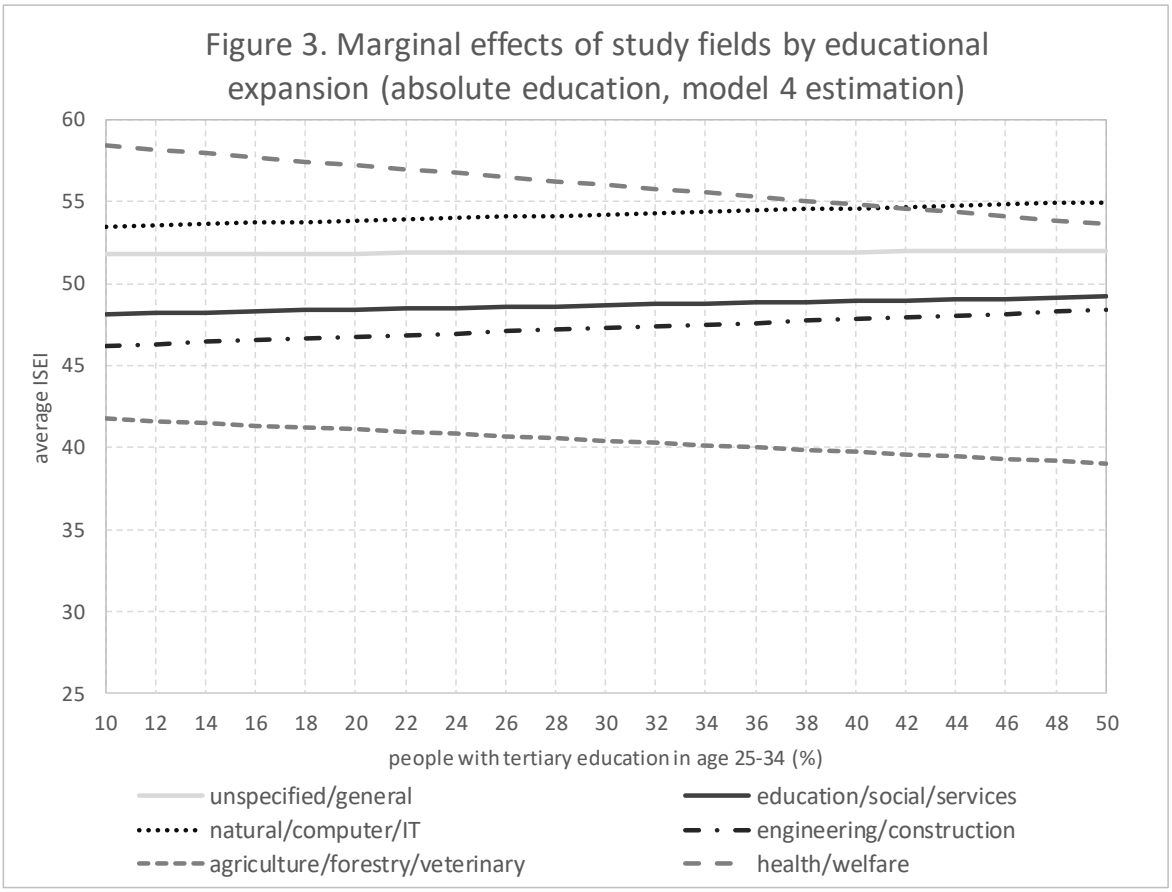
	Model 0		Model 1		Model 2		Model 3		Model 4	
	β	SE	β	SE	β	SE	β	SE	β	SE
Individual variables										
Gender										
man			*ref.*		*ref.*		*ref.*		*ref.*	
woman			0.881 ***	(0.036)	0.839 ***	(0.035)	0.840 ***	(0.035)	0.843 ***	(0.035)
Marriage										
other			*ref.*		*ref.*		*ref.*		*ref.*	
married			0.215 ***	(0.041)	0.162 ***	(0.041)	0.162 ***	(0.041)	0.168 ***	(0.040)
Full-time job										
part-time			*ref.*		*ref.*		*ref.*		*ref.*	
full-time			4.536 ***	(0.043)	4.349 ***	(0.043)	4.350 ***	(0.043)	4.347 ***	(0.043)
Education in percentiles (z-scores)			11.517 ***	(0.018)	12.107 ***	(0.144)	12.104 ***	(0.144)	10.784 ***	(0.487)
Study fields										
unspecified/general			*ref.*		*ref.*		*ref.*		*ref.*	
education/social/services			-2.204 ***	(0.054)	-2.795 ***	(0.055)	-2.796 ***	(0.055)	-4.923 ***	(0.186)
natural/computer/IT			3.566 ***	(0.083)	2.902 ***	(0.084)	2.902 ***	(0.084)	-0.695	(0.288)
engineering/construction			-3.774 ***	(0.058)	-4.271 ***	(0.059)	-4.270 ***	(0.059)	-7.153 ***	(0.192)
ag./forestry/veterinary			-10.926 ***	(0.108)	-11.296 ***	(0.108)	-11.295 ***	(0.108)	-10.155 ***	(0.352)
health/welfare			3.779 ***	(0.070)	3.454 ***	(0.071)	3.453 ***	(0.071)	4.182 ***	(0.262)
Constant	50.796 ***	(0.225)	47.919 ***	(0.226)	48.182 ***	(0.255)	40.504 ***	(0.842)	42.763 ***	(0.835)
Contextual variable										
Educational expansion							0.233 ***	(0.024)	0.160 ***	(0.024)
Interaction										
Edu expansion*Edu in percen. (z-scores)									0.039 ***	(0.014)
Edu expansion*Study fields										
education/social/services									0.070 ***	(0.005)
natural/computer/IT									0.086 ***	(0.008)
engineering/construction									0.096 ***	(0.006)
ag./forestry/veterinary									-0.004	(0.010)
health/welfare									0.015	(0.007)
Random effects parameters										
Variance constant	46.818		49.585		50.645		54.206		45.693	
Variance education in percentiles (z-scores)					8.428		8.434		8.287	
Variance study fields					0.913		0.914		0.957	
ICC	10.18%		15.71%							
LL	-3240371.5		-3079324.7		-3070730.4		-3070712.2		-3070494.4	
N / Groups	731099 / 360		731099 / 360		731099 / 360		731099 / 360		731099 / 360	

Note: Dependent variable is ISEI (11,01-88,70); standard errors are in parentheses; 360 contexts = 12 cohorts by 30 countries; xtmixed command in Stata 15 used to obtain this table; * p ≤ ,10, ** p ≤ ,05, *** p ≤ ,01.

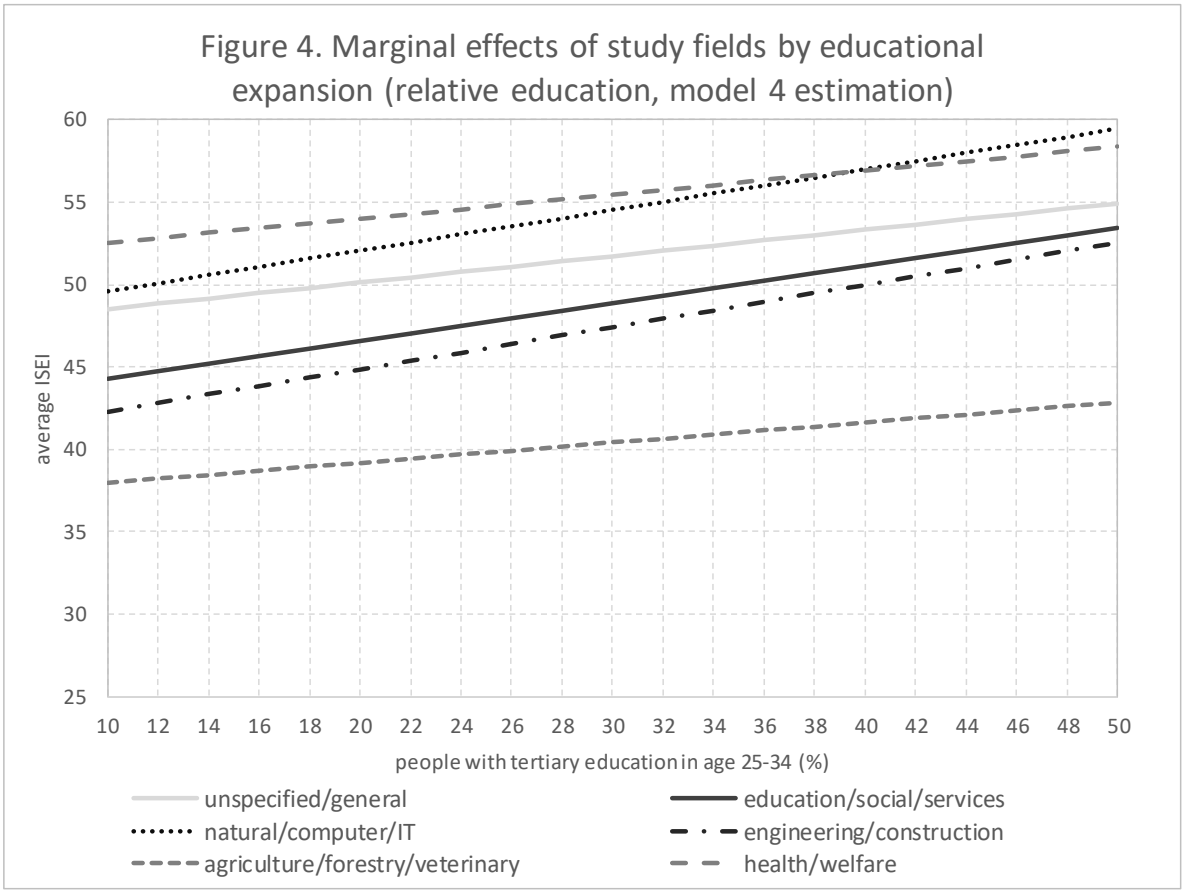
Sources: Labour Force Survey (LFS) from years 2014, 2015 and 2016.



Note: Absolute education effect is estimated from Model 4 in Table 2, relative education effect is estimated from Model 4 in Table 3.



Note: Education effect is estimated from Model 4 in Table 2.



Note: Education effect is estimated from Model 4 in Table 3.

Table A1. The numbers of analyzed respondents from individual countries and years.

	Year			
Country	2014	2015	2016	*Total*
Austria (AT)	13 193	13 645	14 680	*41 518*
Belgium (BE)	8 319	8 600	8 983	*25 902*
Bulgaria (BG)	1 775	1 702	2 211	*5 688*
Croatia (HR)	6 189	6 252	5 591	*18 032*
Cyprus (CY)	3 694	3 861	3 919	*11 474*
Czechia (CZ)	2 792	3 007	3 164	*8 963*
Denmark (DK)	42 427	44 940	48 553	*135 920*
Estonia (EE)	8 904	9 022	7 214	*25 140*
Finland (FI)	2 168	2 322	2 389	*6 879*
France (FR)	6 475	7 054	6 428	*19 957*
Germany (DE)	4 258	4 398	4 190	*12 846*
Greece (GR)	33 586	35 666	37 930	*107 182*
Hungary (HU)	2 455	2 732	2 260	*7 447*
Iceland (IS)	16 300	17 270	17 100	*50 670*
Ireland (IE)	17 610	15 840	13 706	*47 156*
Italy (IT)	1 649	1 658	1 296	*4 603*
Latvia (LV)	27 705	30 586	31 807	*90 098*
Lithuania (LT)	3 912	3 998	4 204	*12 114*
Luxembourg (LU)	1 044	2 926	2 381	*6 351*
Netherlands (NL)	2 974	3 023	3 217	*9 214*
Norway (NO)	1 654	1 788	1 869	*5 311*
Poland (PL)	6 433	5 895	5 537	*17 865*
Portugal (PT)	2 357	2 412	2 491	*7 260*
Romania (RO)	32 104	30 835	29 314	*92 253*
Slovakia (SK)	9 425	9 766	9 422	*28 613*
Slovenia (SI)	13 007	16 893	17 178	*47 078*
Spain (ES)	30 856	30 147	25 712	*86 715*
Sweden (SE)	5 809	5 690	5 636	*17 135*
Switzerland (CH)	7 174	7 771	8 005	*22 950*
United Kingdom (UK)	6 567	6 414	6 607	*19 588*
Total	*322 815*	*336 113*	*332 994*	*991 922*

Source: Labour Force Survey (LFS)

Table A2. Variables included in the analysis

Variable	EU LFS item	Question wording / description	Values after transformation
Individual level			
ISEI	ISCO3D	Occupation coded on 3 digits ISCO-08	Transformation into ISEI codes (range: 11,01 - 88.70).
Gender	SEX		1 – man; 2 – woman
Marriage	MARSTAT		1 – other; 2 – married
Full-time job	FTPT	Full time / part-time distinction	1 – part-time; 2 – full-time job
Education in years (standardized)	HATLEVEL	Highest educational attainment level: ISCED 11 codes (0, 100, 200, 300… 800).	Transformation ISCED 11 codes into years in educational system (0-304=12; 400-500=14; 600=16; 700=18; 800=20); standardization of variable (mean = 0; SD = 1)
Education in percentiles (standardized)	HATLEVEL	Highest educational attainment level: ISCED 11 codes (0, 100, 200, 300… 800).	Transformation ISCED 11 codes into years in educational system (0=1; 100=7; 200=9; 302=12; 300, 303, 304=13; 400=14; 500=15; 600=16; 700=18; 800=22); transformation into proportional scores (percentiles) for each country-cohort combination; standardization of proportion variable (mean = 0; SD = 1)
Study fields	HATFIELD	Highest educational attainment field: ISCED 97 and ISCED 11 codes (0, 10, 20... 100, 200, 300… 888).	Recode into 6 categories: (0 888 900 . = 1, unspecified/general); (10/40 100/300 301/399 800 801/863 = 2, education/social/services); (50/60 400/482 = 3, natural/computer/IT); (70 500 501/599 = 4, engineering/construction); (80 600 601/699 = 5, agriculture/forestry/veterinary); (90 700 701/799 = 6, health/welfare)
Contextual level			
Educational expansion by cohorts	--	Proportion of people with tertiary education for each country and cohort (defined by year of leaving educational system) indicated by ISCED 2011 (5-8 levels) for age group 25-34; data come from Eurostat.	Proportion of people with tertiary education in analyzed 30 countries and 12 graduated cohorts 2003-2014 indicated by ISCED 2011 (5-8 levels) for age group 25-34.