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The Unequal Opportunity For Skills Acquisition During The Great Recession In Europe — Source link

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Human Capital

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THE UNEQUAL OPPORTUNITY FOR SKILLS ACQUISITION DURING THE GREAT RECESSION IN EUROPE *

Sara Ayllón, Natalia Nollenberger

ABSTRACT: This paper is the first to investigate the extent to which the high levels of jobless-ness resulting from the Great Recession across Europe have translated into higher school attendance among youth. Using cross-sectional and longitudinal data from the EU-SILC for 28 countries, we establish a robust counter-cyclical relationship between rising unemployment rates and school enrolment. The same is true of transitions back to education. Our analysis by subgroups reveals a worrying trend, with youths who have the most disadvantaged backgrounds (measured by low household income) less likely to enrol in tertiary studies when unemployment rises.

JEL Codes: I23, I24, J64, E32
Keywords: Unemployment, school enrolment, transitions back to education, youth, Great Recession, EU-SILC

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1 Introduction

The Great Recession has hit young people particularly hard across Europe (Bell and Blanchflower, 2011). According to data from Eurostat, the unemployment rate for those aged below 25 reached 23.7% in the European Union (28 countries) in 2013, while the corresponding figure for those over 24 was 9.5%. In countries such as Spain or Greece, every second young person who was looking for a job that year could not find one, resulting in a youth unemployment rate in those countries of 55.5% and 58.3%, respectively. Undoubtedly, such levels of joblessness and overall employment insecurity have important consequences for young people's lives in multiple domains: the chances of leaving home (Becker et al., 2010; Matsudaira, 2016); decisions on marriage (De la Rica, 2005), fertility and family formation (Del Bono et al., 2012, 2015; Ayllón, 2018); income mobility (Cantó and Ruiz, 2015), etc.

A poor economy can also affect young people's decisions on investment in education. It is reasonable to expect that when young people observe that there are fewer jobs available (and perhaps more precarious working conditions), pursuing further education can be regarded as a good alternative to joblessness or bad career prospects. The opportunity cost of education is lower when the unemployment rate is high, and so remaining in education or returning to school could be more likely during an economic downturn than in a growing economy (Becker, 1975; Heylen and Pozzi, 2007). Uncertainty about the future can also drive school retention and transitions back to education (Kodde, 1986; Canton, 2002).

On the other hand, it is also true that when the economy enters recession and governments are forced to implement austerity measures, educational budgets can suffer major cuts, jeopardizing young people's chances of remaining in or returning to education — either because of increased tuition fees, a reduced number of scholarships or more expensive student loans (Kane, 1994; Dellas and Sakellaris, 2003).[1] By the same token, in those contexts where non-compulsory education is not fully subsidized, a decline in individual and family income during recession years may also prevent young people from remaining in, or returning to, education because of an increased "inability to pay" (Christian, 2007; Méndez and Sepúlveda, 2012; Sakellaris and Spilimbergo, 2000). A lower availability of part-time jobs to fit in with study may also make enrolment more difficult during bad economic years (Dellas and Sakellaris, 2003).

The main objective of this paper is to assess the extent to which the high levels of joblessness resulting from the Great Recession across Europe have translated into a higher probability among young people of educational enrolment, of getting back into education or of remaining at school. Does the reduced opportunity cost of study override the increased difficulties of educational enrolment brought about by austerity measures and declining income? If so, our results should find a positive association between increasing unemployment rates and the probability that young people are enrolled. But if the (in)ability-to-pay effect is dominant, then there will be a negative association between unemployment and school enrolment.

Empirical evidence on the effect of crises on schooling decisions is scant (particularly

[1] Examples of cutbacks in education are multiple across Europe in the context of the Great Recession. According to the European University Association, public spending on higher education decreased more than 40% in Greece between 2008 and 2014; between 20% and 40% in Ireland, Lithuania and the United Kingdom; and between 10% and 20% in the Czech Republic, Spain, Iceland and Italy (see Public Funding Observatory, 2016). As for tuition fees, possibly, the most extreme case during the period can be found in the United Kingdom, where fees tripled in 2012.

in the case of Europe) and ambiguous (mostly based on single-country case studies). The majority of papers find a counter-cyclical relationship: when the economy enters a period of recession (and the unemployment rate rises), school attendance and enrolment increase (see, among others, Alessandrini et al., 2015; Long, 2015; Méndez and Sepúlveda, 2012; Heylen and Pozzi, 2007; Dellas and Sakellaris, 2003; Dellas and Koubi, 2003; Mattila, 1982; and references therein). Fewer studies find a pro-cyclical relationship (King and Sweetman, 2002; Rucci, 2003; Edwards, 1976); and yet another group of papers finds no association at all (Kane, 1994; Polzin, 1984).[2] So it is unclear at this point what to expect in the context of the Great Recession in Europe.

This paper contributes to the literature in several important ways. First, to the best of our knowledge, this is essentially the first paper to study the impact of the Great Recession on educational enrolment in a total of 28 European countries (and 113 regions) — the only exception being a brief analysis by Vandenberghe (2010) (commented below). Second, this is the first analysis whose findings are based not solely on cross-sectional data or longitudinal data, but on both. This way, we not only study the association between bad economic conditions and total enrolment, but also try to understand which group (those remaining or those transiting back into education) drives the overall trend. This allows us to draw new conclusions on the extent to which the effect of cyclical fluctuations on human capital decisions is persistent or transitory in the context of Europe. Finally, our in-depth analysis by individual and household characteristics allows us to reveal the great heterogeneity by subgroup that lies behind the overall trend.

Our results are based on the European Union – Statistics on Income and Living Conditions (EU-SILC) for the period between 2004 and 2014. We have matched the EU-SILC with data from Eurostat for the total and the youth unemployment rates (at both country and regional level). Given that the Great Recession impacted very differently on the European countries and regions, we can exploit the large variability in unemployment rates across time and territory to identify a change in the decision by European youth to enrol in, return to or remain in education. All our results are the outcome of logit regressions with fixed effects and clustered standard errors.

Our main findings are consistent with the body of literature that documents counter-cyclical schooling decisions. Specifically, we find that a 1 percentage point increase in the unemployment rate is associated with an increase of between 0.28 and 0.42 percentage points in the probability of being enrolled in education. In the case of transitions back to education, the same estimates are between 0.12 and 0.16 percentage points; in the case of remaining at school, the figure ranges from 0.20 to 0.31 percentage points. Our results are robust to the use of the unemployment rate measured in different geographical areas and for different age groups; to different standard error adjustments; and to different specifications. The analysis by demographic subgroups indicates that young males and people under 25 are more likely to be enrolled in response to labour market conditions. Moreover, those without a college degree and those who were previously employed are also more likely to return to education when the unemployment rate rises. More importantly, we find that household income was a very strong determinant of schooling decisions during the period: those in the lowest part of the income distribution were not as likely to enrol in education as their richer counterparts. Indeed, when we break the results down by level of education, we even find a negative association between rising unemployment rates and enrolment at the university level among those in the poorest income quartile.

Our results have both positive and negative implications. On the plus side, the Great

[2]We review this literature in more detail in the next section.

Recession meant that young Europeans acquired more education; in the future, this can translate (among other things) into higher economic growth and productivity, lower wage inequality and better career prospects (Valero and Van Reenen, 2016). Also, with the decision to enrol in, return to or remain in education, young people can avoid unemployment scarring (Arulampalam et al., 2000, 2001) and its future consequences. On the negative side, our results show that the Great Recession rendered more unequal the possibility of enrolling in education, as students from more disadvantaged economic backgrounds are less likely to enrol in university studies in response to rising unemployment rates. Moreover, in contexts where over-education is a problem, and graduates perform tasks that are below their qualifications, acquiring more education may not pay off, and the accumulation of human capital may not produce the expected returns. Indeed, a recent study by McGuinness et al. (2015) shows that over-education is more important in some of the peripheral countries hardest hit by the Great Recession in Europe, where, moreover, youth over-education tends to be more important than adult over-education. Also, the accumulation of *general* human capital may not be appreciated by firms that are willing to employ individuals with more *specific* human capital. If this is the case, these young graduates can be regarded as less productive and may suffer the consequences in the long run.

After this introduction, the paper continues as follows. The next section reviews the literature on the influence of the business cycle on human capital investment decisions. Section 3 presents the datasets used, defines our dependent variables and details our controls; it also introduces the econometric technique used throughout the paper. Section 4 shows our main results and gives an account of a series of robustness checks. And finally, the conclusions summarize our findings and discuss some policy recommendations stemming from our results.

2 Literature review

The literature on the influence of the business cycle on schooling decisions is not particularly extensive, especially in the case of Europe (Vandenberghe, 2010). Most of the theoretical papers about the cyclicality of schooling find a positive relationship between economic growth and human capital accumulation (Becker, 1975; DeJong and Ingram, 2001; Dellas and Sakellaris, 2003). However, the empirical literature is much more diverse and ambiguous, and mostly based on country case studies.

The great majority of analyses (devoted to the United States) find a counter-cyclical relationship: school attendance and enrolment decline as the economy grows, while the number of students increases when the unemployment rate rises. The study by Long (2015), the closest to our work, assesses the impact of the Great Recession on college enrolment in the United States and finds that the attendance level increased during the recession, particularly in those states most affected by the economic downturn (measured by state unemployment rates and an indicator for change in home values, as many families rely on home equity to finance college). However, she finds that the trend is driven by part-time enrolment (full-time enrolment actually declines) and such change favoured particularly minority students, while whites reduced their enrolment in those states most affected by the crisis. Long (2015) also shows that the number of less-than-one-year certificates increased, and suggests that this may be related to an increased likelihood of upper-level students being more likely to stay to finish their degrees after the recession. Barr and Turner (2014) find a similar counter-cyclical trend (also in the United States),

but they attribute it to an increase in the availability of financial aid and the extensions to unemployment insurance benefits introduced during the Great Recession.

Furthermore, Alessandrini et al. (2015) — also using data for the United States for the period 1986–2012 — find that a 1% increase in GDP above its trend increases the probability of young people enrolling in post-secondary education by 1.37 percentage points. Moreover, in an analysis by subgroups, the authors show that low-skilled individuals (proxied by parental education) are more responsive to macroeconomic conditions. In turn, Méndez and Sepúlveda (2012) study not only schooling episodes, but also training, using quarterly data from the National Longitudinal Survey of Youth (NLSY79) for a period of 19 years. They find that aggregate schooling and time devoted to schooling in the United States are clearly counter-cyclical, while training is pro-cyclical (mainly because firm-financed training is so; only self-financed training is found to be counter-cyclical). They conclude that skills acquisition investment also depends on the educational level and the employment status of the individual, with an increased probability of enrolment higher for the unskilled.

Continuing on evidence from the United States, Dellas and Sakellaris (2003) find once more a counter-cyclical relationship: a 1 percentage point increase in the unemployment rate is associated with a 2% increase in college enrolment among 18–22-year-old high-school graduates for the period between 1968 and 1988. Importantly, the authors indicate that "youths that substitute away from college education in a boom year are less likely to go to college later on when economic activity falls. The increase in college enrolment during a subsequent recession seems to come from increased participation of new cohorts of high school graduates" (Dellas and Sakellaris, 2003: 164). This way, they establish a persistent effect of cyclical fluctuations in enrolment decisions.[3] In similar fashion, Dellas and Koubi (2003) study the schooling behaviour of different age groups and find a general counter-cyclical trend that is stronger for teenagers and those in the 25–29 age group. They also show that the expected real interest rate is negatively associated with enrolment, but there is no evidence of a link with other credit market variables.

There are other studies with similar evidence for the United States. DeJong and Ingram (2001) estimate a business cycle model in which a representative individual allocates time across skills acquisition, leisure and labour. Using data from 1948 to 1995 to estimate the parameters of the model, they find that skills acquisition is counter-cyclical, having a correlation with total output of -0.36. Betts and McFarland (1995), using information from the 1960s up to the mid 1980s, find that a 1 percentage point increase in the unemployment rate of recent college graduates is associated with a rise of 0.5% in full-time college attendance. When considering the unemployment rate of all adults, the same effect rises to 4%. Mattila (1982) shows that school enrolment between 1956 and 1979 increased during recessions among young males (but not older ones) — a result that he interprets as evidence of a "discouragement effect". And Card and Lemieux (2001) also find a counter-cyclical relationship in the United States to explain enrolment trends in the 1970s, though the effect is weak and depends on age.

As for evidence outside the United States[4], we can highlight the work of Heylen and

[3] As we will see below, our results for Europe in the context of the Great Recession differ from those of Dellas and Sakellaris (2003), as we find that decisions to leave education are not persistent over time.

[4] Part of the literature has been devoted to the analysis of low and middle-income countries but, in this case, the analyses usually refer to children of school age. For example, Schady (2004) finds no effect on attendance rates from the macroeconomic crisis that Peru suffered between 1988 and 1992, but he does find higher mean educational attainment. Skoufias and Parker (2006) show that the 1995 peso crisis in Mexico had no effect on school attendance of teenage boys (12 to 19 years of age), but did have a negative

Pozzi (2007), who find a positive relationship between economic crises (measured by large increases in the inflation rate) and schooling (measured by a change in the average number of years of schooling for the population aged 15 between t and $t-5$) in a macro-data panel of 86 countries for the period between 1970 and 2000. They find that a crisis translates on average into 0.3 extra years of schooling, and that crises do not need to be extreme to translate into more human capital accumulation. Moreover, Sakellaris and Spilimbergo (2000) study the relationship between tertiary education enrolment and economic fluctuations for a large number of countries from 1962 to 1992. They focus on foreign students who enrol in US universities and find a strong correlation between enrolment and the business cycle in the sending countries. However, the direction differs depending on the level of development of the country of origin: while enrolment for those from an OECD country is counter-cyclical, it is pro-cyclical for those from a non-OECD country.[5] To the best of our knowledge, there are no studies exclusively based on Europe that would show a counter-cyclical relationship of schooling decisions as we do in the current paper.

Few papers have found a pro-cyclical relationship between schooling and business cycle fluctuations. King and Sweetman (2002) focus on the group of individuals over 25 years of age who have been working for at least 20 weeks and decide to return to education (in what they label "retooling"). Using administrative data from Canada between 1979 and 1993, they find that transitions back into education move in the opposite direction from the unemployment rate and in the same direction as a "help-wanted index" and the natural logs of GDP and investment. The authors conclude that during boom years, workers have more incentive to leave their low-productivity jobs in order to gain access to higher-paying occupations in the future. In a similar vein, Edwards (1976) also finds a pro-cyclical response of school enrolment and retention to changes in the business conditions among teenage girls during the postwar period in the United States. By contrast, the effect is not found among boys (except for non-white males, who behave counter-cyclically). The difference is attributed to a lesser degree of variation in the opportunity costs of enrolment among teenage girls.

Finally, a small number of papers have found no association between the business cycle and schooling decisions. The only one based on Europe that we have found is by Vandenberghe (2010). Using data from the EU-SILC (as in the current paper) for 2006 and 2007, the author analyses whether final educational attainment is influenced by the labour market conditions that young people observed when they were 17. His identification strategy is based on first-difference models that capture the impact of changing unemployment rates on educational attainment trends across quasi-cohorts. He does not find any statistically significant correlation between changing labour market conditions at age 17 and subsequent educational attainment. However, note that his results are based on only changes between two consecutive years, and his period of analysis is prior to the Great Recession. Similarly, Kane (1994) finds that state unemployment rates are not re-

effect on teenage girls. However, lower attendance among girls did not seem to impede advancement to the next grade. The authors use the event of unemployment of the household head as a proxy for the economic conditions. Finally, Rucci (2003) provides evidence for Argentina during the crisis of 1998–2002. The author finds that the 55% observed decline in real household income can be associated with a reduction in the probability of attending school of between 4.7% and 12% among 12–17-year-olds.

[5]This different behaviour seems to be explained by institutional differences in the financial and educational systems and in the labour market (with those students from OECD countries facing fewer credit constraints and higher returns to education) rather than by differences in the income level or the degree of income inequality in the countries of origin.

lated to individual enrolment either for whites or for blacks in the United States through the 1970s and 1980s. Rather, he finds that changes in tuition fees and increasing average parental education explain the trends. Finally, Polzin (1984), in his analysis of university enrolment in the state of Montana at the beginning of the 1980s, finds that short-term economic conditions do not influence the decision to enrol in higher education, but they do have an impact on the type of college that is chosen.

Thus, the impact of the Great Recession on schooling decisions in Europe is not *a priori* defined; it is an empirical question that we undertake in the remainder of the paper.

3 Data

We use data from the European Union — Statistics on Income and Living Conditions (EU-SILC) in its cross-sectional and longitudinal form. The EU-SILC has several advantages for the purposes of our analysis: (i) it provides detailed information on the socio-economic and demographic characteristics of individuals and households, (ii) it allows a comparative analysis across Europe, with evidence for 28 countries, and (iii) it covers a sufficiently long period of time: the years prior to the start of the Great Recession (2004–2007), the time when countries were hardest hit by the economic downturn (2008–2011) and the years afterwards (up to 2014).[6]

As with other panel datasets, the longitudinal component of the EU-SILC suffers from a number of limitations.[7] One is that individuals are only followed for four consecutive waves. This implies that in each wave, 25% of the sample is replaced by a new rotational group: thus, for example, we can only observe a possible transition back into education on three occasions for each individual. If a transition into education occurs outside our observational window, we cannot account for it.[8] The longitudinal component has also been questioned for not tracking well those young people who leave the parental home in a number of countries (Iacovou and Lynn, 2013). To make sure that our findings are not driven by the EU-SILC survey design and its tracking rules, we ran our main specification using those countries that are identified as best following young people (namely, Spain, Portugal, Italy, France and Cyprus) (see Iacovou and Lynn, 2013); our qualitative findings remained unchanged (though the level of significance decreased due to the lower number of observations).

Our sample includes young people aged 17 to 29.[9] In the case of the cross-sectional

[6] An alternative dataset would have been the European Union – Labour Force Survey (EU-LFS). However, we decided against this option for two main reasons: 1) age is not reported in the harmonized dataset, but only in five-year intervals, and 2) there is no information on family income, which is important for understanding our results (see below).

[7] In order to avoid the duplication of households, researchers need to make a choice as to how the pooled dataset is constructed (Iacovou and Lynn, 2013). In our case, for each rotational group, we take the information available from the last wave in which each individual participates in the panel. This way not only are observations not duplicated, but we also make sure that if there was a change between years in the way information is collected, our individual observations are not affected by this.

[8] Notwithstanding this, it is important to take into account that the EU-SILC is the dataset that has allowed the identification of the greatest number of transitions back to education — compared to, for example, the EU-LFS, which contains a variable that allows a change of status in the labour market since the previous year to be identified. Because information is collected for only one possible transition, the chances of observing a return to education for a given individual are greatly reduced.

[9] We excluded young people turning 16 during the survey year, because they participate only if their birthday is prior to the interview date, which implies lots of missing information. Moreover, individuals

data, an individual is considered to be *enrolled in education* if she declares that she is currently studying and that her current economic status is as a student. We conditioned the variable to this self-declared main activity information, because it captures the person's own perception of her main activity and it is meant to determine how most time is spent.[10] There are very few exceptions when individuals declare that they are studying, while their main activity status is as an employed, unemployed or inactive person. In these cases, we did not consider them to be enrolled in education. We wanted to avoid considering as enrolled in education any individual who may be receiving some type of job training while working or looking for a job.[11]

In the longitudinal data, we consider that a young individual makes a transition *back into education* if she declares that her main activity status is as an employed, unemployed or inactive person at $t-1$ and as a student at t. Thus, we exclude individuals who are students at $t-1$ and individuals with missing information on their labour market status at $t-1$ or at t. By the same token, we consider that an individual is retained in the educational system if at $t-1$ he was a student and declares that he is still a student at t. Again, we disregard individuals with missing information in one of the two years.

We derive results for all the countries that are available in both components of the dataset, with the exceptions of Croatia and Serbia, because they joined the EU-SILC project only in 2010 and 2013, respectively, and therefore the number of available waves was considered insufficient. We also disregard Germany and Switzerland, because although both countries provide information at the cross-sectional level, there is no longitudinal component. As mentioned, the period under analysis runs from 2004 to 2014, but it should be noted that few countries joined the EU-SILC project later on. Table A.1 in the Appendix provides detailed information on the period covered in each country by the cross-sectional and the longitudinal components.[12] The sample contains 898,130 observations in the case of the cross-sectional dataset; 235,461 for the longitudinal component of the analysis of returns to education; and 222,658 for the analysis of school retention — though the sample can vary slightly in the different regressions, depending on the number of missing values in the control variables used.

Finally, Table 1 summarizes some of the most important characteristics of our samples. As for the dependent variables, 35.1% of individuals declare that they are students, about 4.8% of young people engage in a transition from employment, unemployment or inactivity to education, and 78.5% are school retained.[13] Average age differs in the three samples

aged 16 are still in compulsory education in the majority of countries analysed.

[10]Note that this decision also makes our results more comparable to those drawn from the longitudinal component (see below).

[11]About 0.4% of those who declare that they are studying and state that their current economic status is as a student do actually also say that they work more than 20 hours a week. In such cases, we considered that they were enrolled in education, as they themselves consider their main activity to be as a student. Also there are a few individuals who say they are studying, while their main activity status is as an employed person, though they work for less than 20 hours a week. In such cases, we coded them as not being enrolled in education. Note that considering them as enrolled would mean an increase of only 1.6% in the pool of individuals enrolled in education. Finally, about 3.2% of those declaring that their main activity status is as a student also say they are not currently in education. In this case, we considered them not enrolled in education. Note that according to the dataset guidelines, the "current education activity" variable covers only the formal education system, thus potentially helping us to classify as not enrolled those in non-formal education. In any case, robustness checks indicated that none of our results is dependent on these decisions.

[12]As a robustness check, we have run our main regressions with the countries that participate continuously from 2004 or 2005 to 2014 and our main findings do not change.

[13]As noted by King and Sweetman (2002), the number of individuals who decide to return to education

under consideration, with younger individuals more likely to be present in the sample for the analysis of school retention (mean age at 20.9) and older youths in the analysis for transitions back into education (25.1). Important differences are also observed in terms of demographic characteristics: whereas 74.4% of the sample for analysing school retention lives with their parents, only 44.8% of those potentially transiting back into education do so. The figure is 66.0% in the cross-sectional sample. The percentages for the number of individuals who have a partner and/or have their own children in the different samples are in accordance with the relevant age structure. As for the educational level, in the cross-sectional sample 50.2% hold a high-school diploma and 20.6% a university degree. The rest of the sample did not graduate from secondary education. In the longitudinal files, the percentage of university graduates is larger in the sample for the analysis of transitions back into education and smaller for the study of school retention. Furthermore, 27.7% of the cross-sectional sample lives in a household with an equivalent income placed in the first quartile, while those in the fourth quartile represent 22.3%.[14] By comparison, in the longitudinal sample for the study of transitions back into education, youths are more evenly spread across the different quartiles, while we find more young individuals belonging to the first income quartile among the sample for the analysis of school retention.

[TABLE 1 AROUND HERE]

4 Methodology

In order to understand the potential relationship between changes in the labour market (measured by the unemployment rate) and young people's schooling decisions, we merged the EU-SILC samples with information from Eurostat on unemployment rates in the different countries and regions. As the Great Recession had a very diverse impact on the different countries and regions of Europe, we can exploit this variability to capture the relationship between changes in the unemployment rate and our outcomes of interest.

Figure 1 shows the unemployment rate trends by country for the period between 2004 and 2014, and Figure 2 summarizes the same information by means of a box plot, where the adjacent line shows the lower and upper values, while the box contains the values between the 25th and the 75th percentile. The dots are outside values and the diamonds indicate the median. In both figures, it is easy to observe the great variability in the total unemployment rate across the 28 countries analysed. The unemployment rate varies from as low as 2.3% in Iceland (for 2007) to as high as 27.5% in Greece (for 2013). Note also that while some countries have an unemployment rate that varies within a relatively small range (for example, Luxembourg, Norway or Romania), others experience a dramatic change, with large differences between the minimum and the maximum values (Spain, Greece, Ireland or Lithuania). We confirm our results by using the unemployment rate at the regional level and the youth unemployment rate (at both country and regional level). In both cases, the variability is even larger. When working with data at the regional level,

may seem small; however, cumulatively they represent an important part of the workforce.

[14]Household income is made equivalent by using the modified OECD equivalence scale that gives a weight of 1 for the first adult, 0.5 for the rest of the adult members in a household and 0.3 for children under the age of 14. Note that equivalent income quartiles do not necessarily contain 25% of the observations in our sample, as quartiles have been computed for the whole income distribution in each country and per year.

we use information at NUTS (*Nomenclature of Territorial Units for Statistics*) 1 or 2, depending on the information available in the EU-SILC. We use 113 regions.[15]

[FIGURE 1 AROUND HERE]

[FIGURE 2 AROUND HERE]

Our results are based on logit models with fixed effects which we specify as follows:

$$Y_{ict} = \alpha + X_{ict}\beta + Unempl_{ct}\gamma + C_c + T_t + \epsilon_{ict} \quad (1)$$

where subscript i is for individuals, c is for country (or r, in the case of regions) and t for time. Y_{ict} represents the outcome of interest, young people's decision to enrol, return or continue in education. X_{ict} is a vector of control variables that includes gender, age, age squared, living with at least one parent, living with a partner and having one's own children, and household equivalent income quartiles. γ is the parameter of main interest as it captures the relationship between changes in the unemployment rate and changes in education attendance. ϵ_{ict} is the usual error term.

Importantly, we control for country (or region) and time fixed effects, C_c and T_t, respectively. Country fixed effects account for characteristics that are specific to a given country — e.g. the cost of education or cultural factors that influence acquisition of a university degree. In turn, time fixed effects control for possible shocks that occur at a point in time throughout Europe — e.g. a change in the rules for exchange students within the Erasmus+ programme.[16] All the regressions are weighted, and clustered standard errors (either at country or at regional level) are used throughout the paper.[17]

5 Results

We present the results in three subsections. First, we use cross-sectional data to investigate the relationship between total enrolment in education and changes in the unemployment rate. Specifically, we test whether bad labour market conditions during the Great Recession led more young people to enrol in education. Second, we take advantage of the longitudinal component of the EU-SILC data and investigate whether some young people — who may have given up education in the boom years — decided to return to the educational system when labour market conditions worsened. Finally, we complete the analysis with a brief section on school retention.

In all cases, we present our preferred specification, which uses the total unemployment rate as a measure of change in the labour market conditions; but we also detail the results for youth unemployment. Arkes (2007) argues in favour of using the total unemployment rate, because potential sampling error may be less important. As he says, the use of

[15] A certain number of (small) countries provide regional codes in the EU-SILC at NUTS-1 level that, in practice, refer to the whole national territory — e.g. Cyprus, Latvia and the Slovak Republic, among others. When this occurred, we treated these small countries as regions. We took the same decision when a given country did not provide any information at the regional level.

[16] Note that it is particularly important to control for year fixed effects (or a linear trend for time) because enrolment has generally increased during the last decades and was likely to increase regardless of the economic downturn. So we need to control for this upward trend to capture the effects of the Great Recession beyond the annual growth rate of enrolment.

[17] In this respect, we made sure not to use country-year (or region-year) pairs as clusters (Bertrand et al., 2004; Cameron and Miller, 2015).

a youth unemployment rate could introduce some endogeneity. Instead, such an effect is likely to have a minimal impact on the total unemployment rate. On the other hand, though, it can be argued that young people are more likely to make decisions on remaining in or returning to education while keeping an eye on their own age-group opportunities in the labour market, rather than on those of the adult population as a whole. Therefore, in a second analysis, we run our main regressions using the youth unemployment rate, instead of the total unemployment rate. We also check whether our findings are robust to alternative specifications, different standard error adjustments and sample selection. Finally, we carry out a subgroup analysis to explore whether the business cycle affects differently the human capital accumulation decisions of youths with different characteristics.

5.1 Enrolment in education

Table 2 displays the main results for the unemployment rate coefficient by estimating equation (1) using the total unemployment rate at country and regional level. The dependent variable is an indicator that takes the value 1 if the individual is currently studying and 0 otherwise. First, we present the raw estimates; then we add individual characteristics (gender, age, age squared, living with at least one parent, living with a partner and having one's own children); and finally, we add dummy variables indicating whether the individual's household income is in the first (omitted), second, third or fourth quartile of the income distribution by country and wave. In Panel A, we use the current unemployment rate.[18] Alternatively, Panels B and C present the results using the unemployment rate lagged by one and two years, respectively.

[TABLE 2 AROUND HERE]

The results in Table 2 indicate a positive relationship between the level of unemployment in a given country or region and enrolment in education. Given that we control for country and year fixed effects, the relationship is net of other possible circumstances that may affect a particular country and other common shocks that may affect all the countries in our sample. As can be seen from Panel A, after controlling for individual characteristics and family income, a 1 percentage point increase in the total unemployment rate at the country level is associated with a 0.25 percentage point increase in the proportion of young people who are currently studying. Panels B and C show that the marginal effects are larger when the lagged (rather than the current) unemployment rate is considered: 0.29 percentage points for the unemployment rate at $t-1$ and 0.36 percentage points when unemployment is measured at $t-2$. The magnitude of the estimated effects is smaller when we carry out the analysis at a more disaggregated level. Indeed, when exploiting the differences in the unemployment rates across regions (instead of across countries) the effect varies from 0.23 to 0.31 percentage points, depending on the point in time used for consideration of the unemployment rate (see last column). As pointed out by Lindo (2015), this is consistent with the idea that the estimated effects of country economic conditions are fully inclusive of spillover effects across regions within a country, whereas more disaggregated analyses are not.

In Appendix Table A.3 we show that our findings are robust to the unemployment measure chosen, to different standard error adjustments and specifications, and also to

[18] Table A.2 in the Appendix shows all the coefficients of the control variables included in the main regression (Panel A in Table 2).

the sample of countries under analysis. First, we consider the youth (rather than the total) unemployment rate, and again we find a positive relationship, though the effect is smaller.[19] Second, we show the results when clustering the standard errors at year and at country (regional) level simultaneously.[20] In Panels C and D, respectively, we include a general linear trend and country (region)-specific linear trends, and find a slightly larger effect at both country and regional level. In Panel E, we run our main regressions with the countries that participate continuously from 2004 or 2005 to 2014, whereas in Panel F we check the robustness of our results by leaving out of our sample those countries that introduced educational reforms during the period of analysis.[21] Again, these robustness checks support our main results. Finally, borrowing from Long (2015), we check the robustness of our results to a Difference-in-Difference approach, with the first difference between the period before and after the recession. We put the beginning of the recession in 2009 and set the variable *post* equal to 1 from 2009 onwards. The second difference is between countries greatly affected by the recession versus those slightly affected. We define as *treated* those countries (regions) that experienced an increase in the unemployment rate between 2008 and 2013 of more than 5 percentage points (Bulgaria, Cyprus, Greece, Ireland, Italy, Lithuania, Portugal, Slovenia, Spain). The remaining countries (regions) are in the control group.[22] The results in Panel F suggest that total enrolment increased after the recession in all regions in our sample, but the increase was even greater in those regions most affected by the economic downturn.[23]

Given that individuals are asked about the level of education in which they are enrolled, next we investigate whether the increase in the total enrolment during the Great Recession is driven by those youths enrolled at university or by those attending either a high school or a vocational programme. To this end, we estimate equation (1) using two alternative dependent variables: first, the dependent variable takes the value 1 if the individual is enrolled in a high school or in a vocational programme and 0 otherwise; and second, the dependent variable takes the value 1 if the individual is currently attending college and 0 otherwise.[24] The results are displayed in Table 3. As can be seen, in both cases the relationship between education attendance and the unemployment rate is positive and

[19] In this regard, it is important to take into account that youth unemployment rates increased significantly more than the total unemployment rate during the Great Recession.

[20] We follow the multi-way cluster approach suggested by Cameron and Miller (2015). We use the Stata command *logit2*, where *fcluster* is the country (region) and *tcluster* is the year. The magnitude of the effects differs from those in the main analysis due to the fact that the *logit2* command does not allow for the use of weights. Note, however, that the effect found remains positive and statistically significant at the regional level.

[21] According to the UNESCO Education Statistics, Hungary, Luxembourg and Latvia introduced changes in their educational systems in 2009 which affected the age of completion of compulsory education.

[22] We estimate the following equation by OLS:

$$Y_{ict} = \beta_1 + \beta_2 Post_t + \beta_3 Treated_c + \beta_4 (Post_t * Treated_c) + C_c + T_t + X_{ict}\gamma + \epsilon_{ict} \quad (2)$$

where X_{ict} is a vector of control variables which includes the same individual characteristics as in Columns 3 and 6 of Table 2.

[23] The interaction between *treated* and *post* is positive, but only statistically significant in the specification at the regional level. In this regard, it is important to take into account the fact that more disaggregated analyses usually give more precise estimates, because they exploit variation in economic conditions specific to the area, in addition to variation driven by broader changes (Lindo, 2015).

[24] In the case of college, we also estimate an alternative specification, where the dependent variable is defined conditional on having finished high school. The results are quite similar, but we lose precision given the smaller sample size.

statistically significant, and the magnitude of the effect is quite similar.

[TABLE 3 AROUND HERE]

In summary, our results suggest that, as a consequence of bad labour market conditions during the period of the Great Recession, more young Europeans decided to enrol in education. This finding is consistent with the literature documenting that schooling decisions are counter-cyclical (Alessandrini et al., 2015; Méndez and Sepúlveda, 2012; Heylen and Pozzi, 2007; Dellas and Sakellaris, 2003; DeJong and Ingram, 2001; Betts and McFarland, 1995). However, our estimates for Europe are substantially lower than the estimates for the United States. Specifically, among those studies which also use the unemployment rate as a proxy of the business cycle, Méndez and Sepúlveda (2012) find that a 1 percentage point increase in the unemployment rate is associated with an increase of between 0.6 and 0.9 percentage points in the likelihood of someone being in formal education; Dellas and Sakellaris (2003) document a 0.8 percentage point increase in college enrolment; and Betts and McFarland (1995) estimate a rise of 0.5 percentage points in full-time college attendance.

In the next section, we carry out an analysis by socio-demographic characteristics, with the objective of understanding whether different groups have been differently (and even in opposite ways) affected during the period. This could help to explain why our estimates are smaller than those typically found in the United States. The analysis reveals whether the balance between "opportunity costs" and "ability to pay" for education leads to different behaviours across groups. This is relevant because, as Méndez and Sepúlveda (2012: 149) point out *"while it could be optimal for many individuals to engage in counter-cyclical skill acquisition, the inability to obtain financing in recessions may distort this decision toward acquiring skills procyclically"*.

5.1.1 Subgroup analysis

Our analysis by subgroups considers gender, age and household income quartiles. The results are shown in Table 4. Panel 1 presents the results for the likelihood of being enrolled in education (regardless of level), whereas Panels 2 and 3 present the results for the likelihood of being enrolled in high school or a vocational programme and of being enrolled in college, respectively.

As can be seen from Panel 1.A, labour market conditions have a stronger influence on male than on female schooling decisions. The marginal effect for a 1 percentage point increase in the unemployment rate is larger (and estimated with more precision) for men than for women (0.3 versus 0.2 percentage points), with the difference statistically significant at the 95% confidence level.[25] Given that women typically face worse labour market conditions than men, it is possible that they have been less affected by the Great Recession. Additionally, it could also be that, since girls are more likely to participate in non-compulsory education than are boys, the former somehow take their schooling decisions more independently of the economic environment. This pattern is also observed in the two educational levels analysed (see Panels 2.A and 3.A), yet tests indicate that the differences between the genders are only statistically significant for those participating in high school.

[25] We use Wald tests of simple linear hypotheses throughout the paper (not shown for reasons of space, but commented on in the text when relevant).

When we divide the sample into two groups depending on whether the individuals are younger or older than the median (in this sample, 23), we find that the positive effect between the unemployment rate and enrolment is driven by the youngest group (see Panels 1.B, 2.B and 3.B of Table 4). For every 1 percentage point increase in the unemployment rate, the probability that a young person aged between 17 and 23 is enrolled in education increases by between 0.36 and 0.39 percentage points, while the increase in the probability for those older than 23 is less than half of that and is only statistically significant at 10% in the analysis at the regional level. As a matter of fact, tests indicate that differences between the two age groups are only meaningful at standard confidence levels in the regional analysis. These results could suggest that the effect on the total enrolment is mostly driven by new cohorts, rather than by transitions back into education by those who left education during the boom years. In the next section, we explore this issue in more detail by studying whether those young Europeans who actually decided to go back into education were motivated by the rise in unemployment during the Great Recession.

Finally, Panels 1.C, 2.C and 3.C show the results by quartile of household equivalent income. An interesting pattern emerges from this analysis. First, the labour market conditions do not affect the schooling decisions of those in the first quartile of the income distribution, who were not as likely to enrol in education during the period as their wealthier peers. Moreover, focusing on the total enrolment of those in the second quartile or above, we can observe that the richer the household, the stronger the positive effect of the unemployment rate on decisions to enrol in education — with the differences between the first quartile and the rest statistically significant at 99% both in the analysis at country and at regional level. Méndez and Sepúlveda (2012) also find a stronger counter-cyclical behaviour of skills acquisition among wealthier people in the United States, but only for those engaged in training activities.

Panels 2.C and 3.C show that this pattern differs, depending on the level of education in which the individual is enrolled. Indeed, as can be seen from Panel 2.C, the rise in the unemployment rate has a greater effect on the likelihood of being enrolled in high school or in a vocational programme for those in the middle of the income distribution. The marginal effect of a 1 percentage point increase in the unemployment rate drops from 0.22 percentage points for those in the second quartile of the income distribution to 0 for those in the fourth quartile, according to the results at country level — the difference being statistically significant at 95%. Panel 3.C shows that the relationship between the labour market conditions and the likelihood of being enrolled in college is strongly affected by the individual's household income. As a matter of fact, a negative relationship between the unemployment rate and the likelihood of being enrolled in college is found for the poorest group (those in the first quartile), for whom schooling decisions are pro-cyclical.[26] These results support the hypothesis that the rising cost of college education, along with more credit constraints during the Great Recession, distorted the decisions on skills acquisition for some groups of individuals, jeopardizing the opportunities of those with fewer economic resources. Unfortunately, to the best of our knowledge, there are no data available to test the mechanisms behind the pro-cyclical college enrolment among

[26]While further research is needed in this direction, note that results seem also to indicate that youths belonging to the second and third quartiles would be more likely to enrol in high school because of the economic downturn, while those in the third and fourth quartiles would do so at the university level. Moreover, separate regressions by residential emancipation status indicate that there are no statistically significant differences between those who live with their parents and those who live in another type of household. Thus, results do not depend on who the income earners in the household are.

the poorest in Europe.[27]

[TABLE 4 AROUND HERE]

5.2 Back to education

In order to gain a more nuanced understanding of the overall trend of rising education enrolment along with growing unemployment rates, in this section we disaggregate the analysis by focusing on a group of young individuals: those who left education at some point in time, were employed, unemployed or inactive, and then decided to return to education because of the bad macroeconomic conditions. In this respect, we try to disentangle whether the results presented in the previous section are mostly driven by new cohorts (as suggested by the cross-sectional results) or whether the overall trend can be explained by young people who decide to transit back into education — or is it both groups? To this end, we exploit the longitudinal component of the EU-SILC, which follows individuals during four periods, and create a dependent variable that takes the value 1 if the individual transited from employment, unemployment or inactivity (different from being a student) at time $t-1$ to education at time t, and 0 otherwise.

[TABLE 5 AROUND HERE]

The results in Table 5 indicate a positive relationship between the level of unemployment in a given country or region and the decision by young people to make the transition back into education. The effect holds after controlling for individual characteristics and household income.[28] Specifically, we find that a 1 percentage point increase in the current population unemployment rate at the country level is associated with a 0.18 percentage point increase in the proportion of young people who return to education. The marginal effects are slightly higher if we consider the lagged unemployment rate: a 1 percentage point increase in the unemployment rate one or two years earlier is associated with an increase of about 0.20 percentage points in the proportion of young people who return to education.

As can also be seen in Columns 4, 5 and 6 of Table 5, the results are quite similar when we exploit the regional variation in the unemployment rates. In this case, the effect varies from 0.15 to 0.19 percentage points, depending on the unemployment rate considered. Our results are robust to the use of the youth unemployment rate, different adjustments

[27] For example, we would like to test whether the rising cost of college education in those countries that applied austerity measures during the Great Recession (like the UK and Spain) is behind this behaviour. Unfortunately, there are no data on fees that are comparable across countries for the period of our analysis. We tried to proxy the cost of college education using data on public spending on tertiary education from 2008 to 2014. The idea is that in those countries where the public spending on education decreased due to the application of austerity measures during the Great Recession, the private cost of college education increased. We define an indicator variable that takes the value 1 if public spending per student (adjusted by inflation) decreased between 2008 and 2014 and 0 if it remained unchanged or increased, and include this variable and its interaction with the unemployment rate. We also tried including the full series of public spending per student in real terms and its interaction with the unemployment rate. The interaction term was always statistically insignificant either for the whole sample or for the first quartile of income. While this evidence suggests that the pro-cyclical relationship for the poorest is not driven by those countries that reduced the public budget in tertiary education during the Great Recession, we think that it is enough to reject the hypothesis that the rising cost of education affected the decisions on skills acquisition for the poorest.

[28] Table A.4 in the Appendix shows all the coefficients of the control variables included.

of the standard errors and specifications, and the sample of countries analysed (see Table A.5 in the Appendix.).[29]

Our results therefore suggest that during the Great Recession, a non-negligible proportion of young Europeans decided to return to education. To the best of our knowledge, Dellas and Sakellaris (2003) is the only other paper to investigate whether individuals who return to the educational system drove the effect on total enrolment in the United States in the late 1960s to the late 1980s. Given that they do not have panel data, the authors look at the results by age and find that the older the individual, the lower the effect; this suggests that their results are mainly driven by the enrolment of new cohorts and that the effect of those returning to education is more limited. They conclude that, in their case, the effect of the business cycle on schooling decisions is permanent, as those who left education do not return to it when economic conditions worsen. In our case (and given that we find a clear effect when we look at those who decide to return to education), it implies that for some young individuals in Europe the effect of the business cycle on their schooling decisions is transitory: they move out of education in boom times, but return to formal education when economic activity falls off.[30]

5.2.1 Subgroup analysis

Having found that a proportion of young people return to education during bad economic conditions, we now turn to a subgroup analysis. We explore again whether there are differences by gender, age, educational level and household income, and also by the previous year's labour market status.[31]

The results are displayed in Table 6. As can be seen from Panel A, there are differences by gender (as in the previous section): while a 1 percentage point increase in the unemployment rate leads to an increase of 0.23 percentage points in the likelihood of transiting back into education for young men, the magnitude of the effect is much lower (about half) for girls.[32] Differences are statistically significant at 99% in the analysis at the country and at 95% at the regional level. Panel B presents the results by age group. The results suggest that the business cycle has a stronger effect on the propensity to return to education among those younger than 23. However, Wald tests indicate that this is not the case, as the differences are not statistically meaningful at any standard confidence level. In this respect, it is important to recall that the sample in this analysis is mostly composed of older youth, as shown in Table 1.

Panel C details the analysis by educational level. Note that although we observe

[29]We carry out the same robustness checks as in the previous section and our qualitative findings remain unchanged. The only exception is the Difference-in-Difference analysis. In this case, the results suggest that all the effect on the likelihood of transiting back to education is driven by the countries (regions) most affected by the recession (the variable *post* is not statistically significant in this case).

[30]To test whether this is a feature of the European countries (in comparison with the United States) or is rather a new trend brought about by the Great Recession is an empirical question that is beyond the scope of this paper. For example, Long (2004) hypothesizes for the United States that college decisions may have become more linked to the development of the economy in recent decades. In any case, it is important to note that the Great Recession in Europe has been different from other periods of economic downturn, in the sense of being particularly hard on young people (Bell and Blanchflower, 2011).

[31]We also considered residential emancipation status but we did not find statistically meaningful differences between youths living with their parents and those living on their own, and therefore results are not presented.

[32]In a departure from our results, Dellas and Sakellaris (2003) do not find gender differences in the cyclicality of enrolment in college education in the United States.

the current educational level, it is unlikely that we are capturing the level reached after the return to education, given that we are studying transitions in a one-year window. The results indicate that only those who have a high-school diploma or lower decide to return to education during a recession. Specifically, a 1 percentage point increase in the unemployment rate is associated with an increase of between 0.19 and 0.21 percentage points in the likelihood of a young person who dropped out of high school returning to education, and of between 0.17 and 0.20 percentage points in the case of youths with a high-school diploma. By contrast, our findings suggest that poor economic conditions do not lead young people who already have a college degree to enrol in education again.[33] As Alessandrini et al. (2015) point out, low-productivity individuals tend to react more to changes in the labour market conditions, because they face a lower opportunity cost of education and a higher marginal product of human capital.

We next analyse the effect depending on an individual's initial labour status. As detailed in Panel D, the decision to return to the educational system is counter-cyclical for those who were employed or unemployed one year earlier, although the estimates are less precise for the latter group, for whom the number of observations in our sample is substantially lower. In the case of inactive individuals (not students), none of the specifications yields statistically significant results. This is a very heterogeneous group, which includes permanently disabled individuals, those doing compulsory military service and "other inactive".[34]

Finally, we explore whether the labour market conditions affect the decision to transit back into education in a different way, depending on household income. As can be seen from Panel E, the effect of an increase in the unemployment rate on the propensity to return to education is positive and statistically significant for all groups, although slightly stronger for those in the highest quartiles of the income distribution. Tests indicate that there are no differences between adjacent quartiles, but differences are statistically significant at 90%, for example, between the first and the third quartile or between the first and the fourth in the analysis at the country level. Thus, unlike in the previous section, we find that transitions back into education are counter-cyclical for all income groups. In this respect, it is important to recall that the results in Panel C showed that transitions back into education are partly driven by high-school drop-outs potentially going back to complete their studies (which, at that level, does not generally require the payment of fees in the majority of countries). Moreover the sample of potential individuals who make the transition back to education is composed of older youth, who have largely already engaged in several transitions to adulthood and may be able to rely on their own income.

[TABLE 6 AROUND HERE]

5.3 School retention

For the sake of completeness, we also ran all the specifications for the group of young people who have continued in education. The results are not shown (for reasons of space), but are available from the authors upon request. In this case, the dependent variable takes the value 1 if the individual is a student at $t-1$ and at t, and 0 if the individual is a student

[33] Tests also indicated a higher probability of enrolling among high-school drop-outs and high-school graduates than among individuals already holding a university degree.

[34] If the group of young people not in employment, education or training (NEET) belongs in part to this category of "other inactive", our results indicate that worse economic conditions do not necessarily bring them back to education.

at $t-1$ but changed status at t. Naturally, with the data to hand, we cannot distinguish between those individuals who remain in education because their studies have not ended and those who decide to continue studying (possibly moving to a higher educational level) because of the macroeconomic conditions. Nevertheless, the main results indicate a positive relationship between the unemployment rate and school retention; however, the results are not robust across specifications, since the coefficient for the unemployment rate at the country level is not statistically significant when using controls, while the coefficient for unemployment at the regional level is significant at 1% in all regressions. In this case, a 1 percentage point increase in the regional unemployment rate is associated with an increase in school retention of between 0.21 and 0.25 percentage points. The coefficients for lagged unemployment rates are not precisely estimated in any of the specifications at country level, while at regional level the significance drops to 5% when the unemployment rate refers to $t-1$ and to 10% for the unemployment rate at $t-2$ and when we use controls.

In the analysis by subgroups, girls present a more robust relationship between rising unemployment rates and the probability of staying on at school — with the regression among boys only statistically significant at the regional level. By age group, once again the relationship is mostly driven by those younger than 23, with no significant sign found among those older. Interestingly, the results indicate that school retention during bad times is mostly driven by university students, with the coefficient for the unemployment rate significant at 5% in all regressions. For example, a 1 percentage point increase in the unemployment rate at country level increases retention by 0.74 percentage points, while the figure when economic conditions are measured at the regional level is 0.53. In other words, growing unemployment rates enhance retention among university students — as was found by Long (2015) for the United States — but the same is not true of those who have not yet graduated from high school. Finally, by household income, once more individuals belonging to the first quartile do not show a higher probability of school retention associated with higher unemployment rates, indicating again the great difficulty of acquiring education for those at the bottom end of the income distribution, compared with their richer counterparts.

6 Conclusions

This is the first paper to study enrolment, returns to education and school retention of young people in 28 European countries during the Great Recession. We analyse the extent to which rising unemployment rates can be associated with more young people being engaged in non-compulsory education. To this end, we use two sources of data: 1) the cross-sectional component of the European Union — Statistics on Income and Living Conditions, which allows analysis of total enrolment, and 2) its longitudinal component, which follows individuals for four consecutive waves, thus permitting the identification of returns to education and school retention. The period under analysis starts in 2004 and ends in 2014.

The main results show that young Europeans were more likely to enrol in education in response to the poor labour market conditions brought about by the recession. A 1 percentage point increase in the overall unemployment rate translated into an increase of between 0.28 and 0.42 percentage points in the probability of being enrolled in education. Moreover, our analysis by educational level revealed that the overall trend is driven as much by those enrolling in non-compulsory secondary education as by university students. As previously documented in the literature for the United States (and also for

Europe), individuals are more likely to react to adverse economic conditions by engaging in education when the opportunities in the labour market are scarce.

In our analysis by socio-demographic characteristics, we found that males and younger individuals are more likely to be enrolled in education in response to rising unemployment; but more importantly, our results also showed that not all young people had the same chances of being enrolled in education during the period: boys and girls in households at the lowest end of the income distribution (first quartile) are not *equally* more likely to be enrolled in education as their richer counterparts. The results are particularly worrying in the case of university studies: youths in the lowest quartile were actually less likely to be enrolled in university studies during the Great Recession. This is the only pro-cyclical result that we find in the whole paper, indicating that actually the effect of "ability to pay" (or rather *inability*) overrides the "opportunity cost" for individuals from more disadvantaged backgrounds.

In order to gain a more nuanced understanding of the overall trend of increased enrolment, we used longitudinal data to isolate the effect of returning to education from that of staying on at school. Importantly, while we find that both groups can explain the overall trend, it is transitions back into education that have the most robust link with the macroeconomic conditions.[35] This means that in the case of Europe, we can establish a transitory effect of the business cycle on human capital accumulation decisions, whereby those who moved away from education in good times often come back to it. Such a transition is also more likely among males than females — something which may help narrow the gender gap in education. Otherwise, rising unemployment rates have a less robust impact on those who are already in the educational system and stay on at school. The increased trend of transition back to education is mostly driven by high-school drop-outs and high-school graduates (rather than by those who hold a university degree), which reveals the need for skills acquisition among those with fewer opportunities in the labour market. Possibly because returns to education occur mostly at the non-compulsory secondary school level, we find that the likelihood of returning to education is similar across income quartiles.

Our findings suggest that not only did the Great Recession in Europe bring about a change in the pattern of young people's schooling decisions, but it also increased the inequality of opportunities in skills acquisition according to socio-economic characteristics. The reasons underlying our results are difficult to disentangle, given the great heterogeneity of the countries under analysis and the different responses to the Great Recession that each took; but probably education cutbacks in the form of higher tuition fees or a reduced number of scholarships play a part.

The policy implications of our results are straightforward: during periods of economic downturn, austerity measures should not be introduced if they further jeopardize the possibilities for skills acquisition in that section of the population which, because of low household income, already has most difficulty in undertaking non-compulsory education. The educational sector acted as a buffer for many young people during the Great Recession, but it is up to policy-makers to make sure that such a cushion exists equally for everyone.

This analysis has several limitations. Our results are necessarily an imperfect measure of the impact of the Great Recession on school attendance, because we cannot control for young people's patterns of emigration in search of labour market or educational op-

[35] In this respect, this paper also provides new evidence to guide theoretical applications for the cyclicality of schooling in Europe.

portunities. Moreover, our results based on longitudinal data may be limited by the fact that the EU-SILC survey does not follow all young people equally well in their transition from the parental home in the different countries. Finally, our results may be biased by attrition, something that the EU-SILC can improve upon.

References

Alessandrini, D., S. Kosempel, and T. Stengos (2015): "The business cycle human capital accumulation nexus and its effect on hours worked volatility," *Journal of Economic Dynamics and Control*, 51(C), 356–377.

Arkes, J. (2007): "Does the economy affect teenage substance use?," *Health Economics*, 16, 19–36.

Arulampalam, W., A. Booth, and M. Taylor (2000): "Unemployment persistence," *Oxford Economic Papers*, 52(1), 24–50.

Arulampalam, W., P. Gregg, and M. Gregory (2001): "Unemployment scarring," *Economic Journal*, 111(475), 577–584.

Ayllón, S. (2018): "Job insecurity and fertility in Europe," unpublished Working Paper.

Barr, A., and S. E. Turner (2014): "Out of work and into school: Labor market policies and college enrollment during the Great Recession," CESifo Working Paper Series 4732, CESifo Group Munich.

Becker, G. S. (1975): *Human capital: A theoretical and empirical analysis, with special reference to education*, NBER Books. National Bureau of Economic Research, Inc.

Becker, S. O., S. Bentolila, A. Fernandes, and A. Ichino (2010): "Youth emancipation and perceived job insecurity of parents and children," *Journal of Population Economics*, 23(3), 1047–1071.

Bell, D. N. F., and D. G. Blanchflower (2011): "Young people and the Great Recession," *Oxford Review of Economic Policy*, 27(2), 241–267.

Bertrand, M., E. Duflo, and S. Mullainathan (2004): "How much should we trust differences-in-differences estimates?.," *Quarterly Journal of Economics*, 119(1), 249–275.

Betts, J. R., and L. L. McFarland (1995): "Safe port in a storm: The impact of labor market conditions on community college enrollments," *The Journal of Human Resources*, 30(4), 741–765.

Cameron, A. C., and D. Miller (2015): "A practitioner's guide to cluster-robust inference," *Journal of Human Resources*, 50(2), 317–372.

Cantó, O., and D. O. Ruiz (2015): "The contribution of income mobility to economic insecurity in the US and Spain during the Great Recession," *Research on Economic Inequality*, 23, 109–152.

Canton, E. (2002): "Business cycles in a two-sector model of endogenous growth," *Economic Theory*, 19(3), 477–492.

Card, D., and T. Lemieux (2001): "Dropout and enrollment trends in the postwar period. What went wrong in the 1970s?," in *Risky behavior among youths: An economic analysis*, ed. by J. Gruber, chap. 9, pp. 439–482. University of Chicago Press.

Christian, M. (2007): "Liquidity constraints and the cyclicality of college enrollment in the United States," *Oxford Economic Papers*, 59(1), 141–169.

De la Rica, S. (2005): "Career planning in Spain: Do fixed-term contracts delay marriage and parenthood?," *Review of Economics of the Household*, 3, 49–73.

DeJong, D. N., and B. F. Ingram (2001): "The cyclical behavior of skill acquisition," *Review of Economic Dynamics*, 4(3), 536–561.

Del Bono, E., A. Weber, and R. Winter-Ebmer (2012): "Clash of career and family: Fertility decisions after job displacement," *Journal of the European Economic Association*, 10(4), 659–683.

——— (2015): "Fertility and economic instability: the role of unemployment and job displacement," *Journal of Population Economics*, 28(2), 463–478.

Dellas, H., and V. Koubi (2003): "Business cycles and schooling," *European Journal of Political Economy*, 19(4), 843–859.

Dellas, H., and P. Sakellaris (2003): "On the cyclicality of schooling: theory and evidence," *Oxford Economic Papers*, 55(1), 148–172.

Edwards, L. (1976): "School retention of teenagers over the business cycle," *The Journal of Human Resources*, 11(2), 200–208.

Heylen, F., and L. Pozzi (2007): "Crises and human capital accumulation," *Canadian Journal of Economics/Revue canadienne d'conomique*, 40(4), 1261–1285.

Iacovou, M., and P. Lynn (2013): "Implications of the EU-SILC following rules, and their implementation for longitudinal analysis," Discussion Paper 2013-17, Institute for Economic and Social Research (ISER).

Kane, T. J. (1994): "College entry by blacks since 1970: The role of college costs, family background, and the returns to education," *Journal of Political Economy*, 102(5), 878–911.

King, I., and A. Sweetman (2002): "Procyclical skill retooling and equilibrium search," *Review of Economic Dynamics*, 5(3), 704–717.

Kodde, D. A. (1986): "Uncertainty and the demand for education," *The Review of Economics and Statistics*, 68(3), 460–467.

Lindo, J. M. (2015): "Aggregation and the estimated effects of economic conditions on health," *Journal of Health Economics*, 40, 83–96.

Long, B. T. (2004): "How have college decisions changed over time? An application of the conditional logistic choice model," *Journal of Econometrics*, 121(1-2), 271–296.

Long, B. T. (2015): "The financial crisis and college enrollment. How have students and their families responded?," in *How the financial crisis and Great Recession affected Higher Education*, ed. by J. R. Brown, and C. M. Hoxby, chap. 7, pp. 209–233. The University of Chicago Press.

Matsudaira, J. D. (2016): "Economic conditions and the living arrangements of young adults: 1960 to 2011," *Journal of Population Economics*, 29(1), 167–195.

Mattila, J. P. (1982): "Determinants of male school enrollments: A time-series analysis," *The Review of Economics and Statistics*, 64(2), 242–251.

McGuinness, S., A. Bergin, and A. Whelan (2015): "A comparative time-series analysis of overeducation in Europe. Is there a common policy approach?," Discussion paper, Style Working Paper D5.1.

Méndez, F., and F. Sepúlveda (2012): "The cyclicality of skill acquisition: Evidence from panel data," *American Economic Journal: Macroeconomics*, 4(3), 128–52.

Polzin, P. E. (1984): "The impact of economic trends on Higher Education enrollment," *Growth and Change*, 15(2), 18–22.

Public Funding Observatory (2016): "Report 2015," Discussion paper, European University Association.

Rucci, G. (2003): "Macro shocks and schooling decisions: The case of Argentina," Discussion paper, University of California at Los Angeles.

Sakellaris, P., and A. Spilimbergo (2000): "Business cycles and investment in human capital: international evidence on higher education," *Carnegie-Rochester Conference Series on Public Policy*, 52, 221–256.

Schady, N. R. (2004): "Do macroeconomic crises always slow human capital accumulation?," *World Bank Economic Review*, 18(2), 131–154.

Skoufias, E., and S. W. Parker (2006): "Job loss and family adjustments in work and schooling during the Mexican peso crisis," *Journal of Population Economics*, 19(1), 163–181.

Valero, A., and J. Van Reenen (2016): "The economic impact of Universities: Evidence from across the Globe," Working Paper 22501, National Bureau of Economic Research.

Vandenberghe, V. (2010): "The long-term effects of recessions on youth: Reviewing the evidence," Discussion paper, Université catholique de Louvain (UCL), Economics School of Louvain.

Table 1: Summary statistics

Variable	Cross-sectional		Longitudinal (transitions back)		Longitudinal (school retention)	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Enrolled in education	0.351	0.477	-	-		
Back to education	-	-	0.048	0.214	-	-
School retained	-	-	-	-	0.785	0.411
Female	0.495	0.499	0.472	0.499	0.507	0.499
Age	23.15	3.753	25.19	2.951	20.96	2.68
Age squared	550.14	173.60	643.42	144.34	446.76	118.68
Living with parents	0.660	0.474	0.448	0.497	0.744	0.436
Living with a partner	0.224	0.417	0.332	0.471	0.033	0.179
Has own children	0.173	0.516	0.297	0.664	0.011	0.128
High-school drop-out	0.292	0.455	0.224	0.417	0.285	0.451
High-school graduate	0.502	0.500	0.518	0.499	0.546	0.498
University degree	0.206	0.404	0.257	0.437	0.168	0.375
Hh. equivalent income (1st quartile)	0.277	0.448	0.242	0.428	0.302	0.459
Hh. equivalent income (2nd quartile)	0.245	0.430	0.245	0.430	0.253	0.434
Hh. equivalent income (3rd quartile)	0.254	0.435	0.279	0.448	0.234	0.423
Hh. equivalent income (4th quartile)	0.223	0.417	0.233	0.423	0.211	0.408
N	898,130		235,461		222,658	

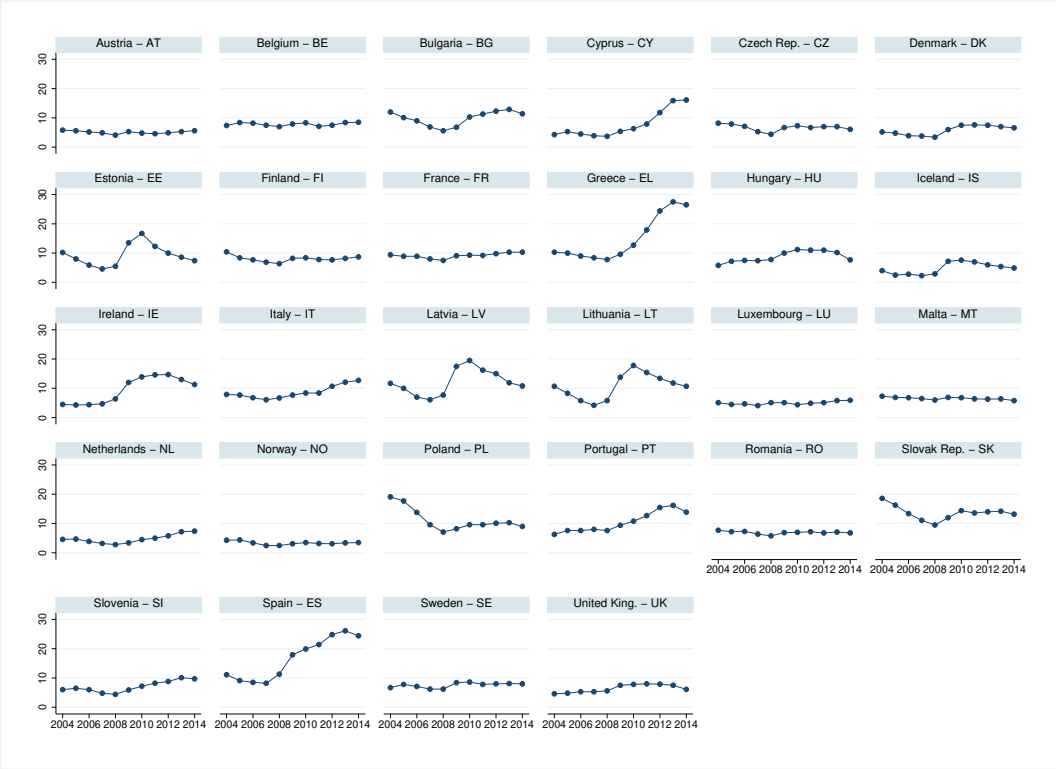
Source: Authors' computation on the EU-SILC, 2004-2014. Weighted results.

Table 2: Total enrolment and the unemployment rate — main results

	At country level			At regional level		
	Raw	+ Individual characteristics	+ Family income	Raw	+ Individual characteristics	+ Family income
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
UR (t)	0.0189***	0.0189**	0.0178*	0.0163***	0.0175***	0.0166***
	(0.0055)	(0.0096)	(0.0093)	(0.0035)	(0.0055)	(0.0054)
Marginal effect	0.0042***	0.0027**	0.0025*	0.0037***	0.0025***	0.0023***
	(0.0012)	(0.0013)	(0.0013)	(0.0008)	(0.0008)	(0.0008)
N	898,130	897,915	897,232	870,174	870,011	869,328
Panel B						
UR (t-1)	0.0207***	0.0217***	0.0208***	0.0174***	0.0187***	0.0179***
	(0.0049)	(0.0082)	(0.0080)	(0.0033)	(0.0051)	(0.0051)
Marginal effect	0.0046***	0.0031***	0.0029***	0.0039***	0.0026***	0.0025***
	(0.0011)	(0.0011)	(0.0011)	(0.0007)	(0.0007)	(0.0007)
N	898,130	897,915	897,232	870,046	869,883	869,200
Panel C						
UR (t-2)	0.0242***	0.0265***	0.0257***	0.0211***	0.0228***	0.0221***
	(0.0049)	(0.0076)	(0.0074)	(0.0031)	(0.0049)	(0.0049)
Marginal effect	0.0054***	0.0037***	0.0036***	0.0048***	0.0032***	0.0031***
	(0.0011)	(0.0011)	(0.0011)	(0.0007)	(0.0007)	(0.0007)
N	898,130	897,915	897,232	869,897	869,734	869,060

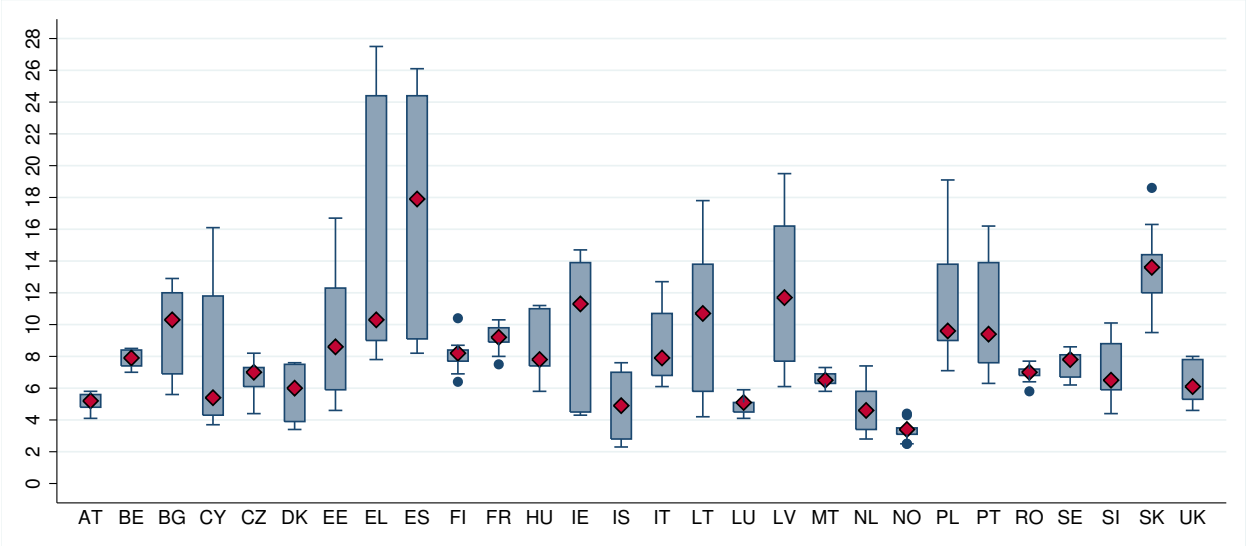
Note: Results from estimating equation (1) using the pooled EU-SILC cross-sectional microdata from 2004 to 2014. Sample: Youth 17-29 years old. All the regressions contain country (or region) and year fixed effects. Individual controls include: sex, age, age squared, an indicator variable of whether the individual has a partner, an indicator variable of whether the individual lives with his/her parents, and an indicator variable of whether the individual has children. Household income is captured in a set of dummies indicating whether the household is in the second, third or fourth quartile of the equivalent income distribution (the first quartile is omitted). Standard errors are clustered at the country (regional) level. *** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Unemployment rate trends at country level, 28 European countries, 2004–2014



Source: Labour Force Survey, Eurostat.

Figure 2: Box plots for the unemployment rate at country level, 28 European countries, 2004–2014



Source: Labour Force Survey, Eurostat.

Table 3: Total enrolment and the unemployment rate by educational level

	At country level			At regional level		
	Raw	+ Individual characteristics	+ Family income	Raw	+ Individual characteristics	+ Family income
	(1)	(2)	(3)	(4)	(5)	(6)
A. Enrolment in high school or vocational programme						
UR (t)	0.0220***	0.0216**	0.0211**	0.0192***	0.0218***	0.0213***
	(0.0062)	(0.0102)	(0.0100)	(0.0034)	(0.0062)	(0.0062)
Marginal effect	0.0031***	0.0015**	0.0014**	0.0027***	0.0015***	0.0015***
	(0.0009)	(0.0007)	(0.0007)	(0.0005)	(0.0004)	(0.0004)
N	893,751	893,536	892,856	866,309	866,146	865,466
B. Enrolment in university studies						
UR (t)	0.0088**	0.0112**	0.0105**	0.0071**	0.0086**	0.0080**
	(0.0037)	(0.0045)	(0.0044)	(0.0035)	(0.0039)	(0.0039)
Marginal effect	0.0012**	0.0013**	0.0013**	0.0010**	0.0010**	0.0010**
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0005)
N	893,536	892,856	866,309	866,309	866,146	865,466

Note: Results from estimating equation (1) using the pooled EU-SILC cross-sectional microdata from 2004 to 2014. Sample: Youth 17-29 years old. Individual controls include: sex, age, age squared, an indicator variable of whether the individual has a partner, an indicator variable of whether the individual lives with his/her parents, and an indicator variable of whether the individual has children. Family income is a set of dummies indicating whether the household is in the second, third or fourth quartile of the equivalent income distribution (the first quartile is omitted). Standard errors are clustered at the country (regional) level. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Total enrolment and the unemployment rate — subgroup analysis

	At country level			At regional level		
	UR(t)	Marginal effect	*N*	UR(t)	Marginal effect	*N*
1. TOTAL enrolment						
A) By gender						
Males	0.0223**	0.0032**	*458,656*	0.0205***	0.0030***	*445,008*
	(0.0093)	(0.0013)		(0.0058)	(0.0008)	
Females	0.0131	0.0018	*438,576*	0.0122**	0.0017**	*424,320*
	(0.0098)	(0.0013)		(0.0056)	(0.0008)	
B) By age						
23 or younger	0.0206*	0.0039*	*521,593*	0.0196***	0.0036***	*505,362*
	(0.0109)	(0.0020)		(0.0062)	(0.0012)	
Older than 23	0.0115	0.0010	*375,639*	0.0091*	0.0008*	*363,966*
	(0.0087)	(0.0007)		(0.0050)	(0.0004)	
C) By income						
Q1	-0.0042	-0.0007	*230,978*	-0.0036	-0.0006	*223,627*
	(0.0071)	(0.0012)		(0.0063)	(0.0010)	
Q2	0.0227***	0.0032***	*222,063*	0.0234***	0.0033***	*215,297*
	(0.0086)	(0.0012)		(0.0070)	(0.0010)	
Q3	0.0323***	0.0040***	*234,454*	0.0297***	0.0037***	*227,009*
	(0.0111)	(0.0014)		(0.0067)	(0.0008)	
Q4	0.0323**	0.0038**	*209,737*	0.0339***	0.0040***	*203,395*
	(0.0147)	(0.0017)		(0.0087)	(0.0010)	
2. HIGH SCHOOL OR VOCATIONAL PROGRAMME						
A) By gender						
Males	0.0276***	0.0020**	*456,512*	0.0278***	0.0020***	*443,103*
	(0.0104)	(0.0008)		(0.0070)	(0.0005)	
Females	0.0140	0.0009	*436,344*	0.0141**	0.0009**	*422,363*
	(0.0103)	(0.0007)		(0.0062)	(0.0004)	
B) By age						
23 or younger	0.0193**	0.0024*	*518,505*	0.0193***	0.0024***	*502,621*
	(0.0098)	(0.0013)		(0.0061)	(0.0008)	
Older than 23	0.0349*	0.0003*	*374,351*	0.0411***	0.0003***	*355,132*
	(0.0192)	(0.0001)		(0.0101)	(0.0001)	
C) By income						
Q1	0.0168	0.0015	*229,668*	0.0164**	0.0015**	*222,517*
	(0.0108)	(0.0010)		(0.0082)	(0.0007)	
Q2	0.0293**	0.0022**	*220,948*	0.0295***	0.0022***	*214,290*
	(0.0125)	(0.0010)		(0.0079)	(0.0006)	
Q3	0.0245**	0.0014**	*233,378*	0.0240***	0.0014***	*226,040*
	(0.0115)	(0.0007)		(0.0075)	(0.0004)	
Q4	0.0116	0.0005	*208,862*	0.0149**	0.0007**	*202,619*
	(0.0078)	(0.0004)		(0.0061)	(0.0003)	
3. UNIVERSITY						
A) By gender						
Males	0.0129***	0.0015***	*456,512*	0.0099**	0.0011**	*443,103*
	(0.0043)	(0.0005)		(0.0046)	(0.0005)	
Females	0.0085	0.0011*	*436,344*	0.0064	0.0008	*422,363*
	(0.0052)	(0.0006)		(0.0043)	(0.0005)	
B) By age						
23 or younger	0.0113***	0.0017***	*518,505*	0.0091**	0.0013**	*502,621*
	(0.0038)	(0.0006)		(0.0045)	(0.0007)	
Older than 23	0.0098	0.0008	*374,351*	0.0063	0.0005	*362,845*
	(0.0080)	(0.0006)		(0.0049)	(0.0004)	
C) By income						
Q1	-0.0161***	-0.0020***	*229,668*	-0.0167***	-0.0021***	*222,517*
	(0.0039)	(0.0005)		(0.0059)	(0.0007)	
Q2	0.0096**	0.0011**	*220,948*	0.0099	0.0011	*214,290*
	(0.0040)	(0.0004)		(0.0064)	(0.0007)	
Q3	0.0246***	0.0027***	*233,378*	0.0218***	0.0024***	*226,040*
	(0.0059)	(0.0006)		(0.0048)	(0.0005)	
Q4	0.0278**	0.0032**	*208,862*	0.0270***	0.0032***	*202,619*
	(0.0112)	(0.0013)		(0.0076)	(0.0009)	

Note: Standard errors are clustered at country (regional) level.*** p<0.01, ** p<0.05, * p<0.1.

Table 5: Back to education and the unemployment rate — main results

	At country level			At regional level		
	Raw	+ Individual characteristics	+ Family income	Raw	+ Individual characteristics	+ Family income
	(1)	(2)	(3)	(4)	(5)	(6)
UR (t)	0.0405***	0.0451***	0.0434***	0.0360***	0.0387***	0.0372***
	(0.0083)	(0.0092)	(0.0092)	(0.0086)	(0.0085)	(0.0083)
Marginal effect	0.0018***	0.0018***	0.0018***	0.0016***	0.0016***	0.0015***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0003)
N	235,461	234,171	234,112	230,232	229,286	229,266
UR (t-1)	0.0441***	0.0504***	0.0486***	0.0394***	0.0437***	0.0420***
	(0.0082)	(0.0089)	(0.0090)	(0.0075)	(0.0076)	(0.0075)
Marginal effect	0.0020***	0.0021***	0.0020***	0.0018***	0.0018***	0.0017***
	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0003)
N	235,461	234,171	234,112	230,232	229,286	229,266
UR (t-2)	0.0472***	0.0540***	0.0522***	0.0430***	0.0484***	0.0467***
	(0.0088)	(0.0093)	(0.0094)	(0.0078)	(0.0083)	(0.0082)
Marginal effect	0.0021***	0.0022***	0.0021***	0.0019***	0.0020***	0.0019***
	(0.0004)	(0.0004)	(0.0004)	(0.0003)	(0.0003)	(0.0003)
N	235,461	234,171	234,112	230,198	229,252	229,232

Note: Results from estimating equation (1) using EU-SILC longitudinal microdata from 2004 to 2014. Sample: Youth 17-29 years old. Individual controls include: sex, age, age squared, an indicator variable of whether the individual has a partner, an indicator variable of whether the individual lives with his/her parents, and an indicator variable of whether the individual has children. Household income is a set of dummies indicating whether the household belongs to the second, third or fourth quartile of the equivalent income distribution (the first quartile is omitted). Standard errors are clustered at the country (regional) level. Marginal effects are calculated at mean values of the covariates. *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Back to education and the unemployment rate — subgroup analysis

	At country level			At regional level		
	UR(t)	Marginal effect	*N*	UR(t)	Marginal effect	*N*
A) By gender						
Males	0.0596***	0.0023***	*125,932*	0.0518***	0.0020***	*123,580*
	(0.0107)	(0.0004)		(0.0117)	(0.0005)	
Females	0.0261***	0.0011***	*108,180*	0.0215**	0.0009**	*105,548*
	(0.0084)	(0.0004)		(0.0086)	(0.0004)	
B) By age						
23 or younger	0.0451***	0.0040***	*72,897*	0.0403***	0.0035***	*71,353*
	(0.0096)	(0.0008)		(0.0075)	(0.0007)	
Older than 23	0.0449***	0.0010***	*161,215*	0.0352***	0.0008***	*157,554*
	(0.0111)	(0.0002)		(0.0135)	(0.0003)	
C) By highest educational level						
HS drop out	0.0577***	0.0021***	*56,286*	0.0497***	0.0019***	*55,341*
	(0.0163)	(0.0006)		(0.0136)	(0.0005)	
HS graduated	0.0444***	0.0020***	*128,228*	0.0377***	0.0017***	*125,278*
	(0.0134)	(0.0006)		(0.0109)	(0.0005)	
College degree	0.0091	0.0003	*48,092*	0.0081	0.0002	*46,249*
	(0.0143)	(0.0004)		(0.0153)	(0.0005)	
D) By labour status at $t-1$						
Employed	0.0465***	0.0014***	*164,478*	0.0423***	0.0012***	*160,659*
	(0.0081)	(0.0002)		(0.0091)	(0.0003)	
Unemployed	0.0386**	0.0024**	*41,123*	0.0282*	0.0018*	*40,647*
	(0.0168)	(0.0010)		(0.0158)	(0.0010)	
Inactive (not students)	0.0185	0.0013	*28,511*	0.0155	0.0011	*27,804*
	(0.0137)	(0.0010)		(0.0129)	(0.0009)	
E) By income quartiles						
Q1	0.0351***	0.0018***	*53,434*	0.0319**	0.0016**	*52,217*
	(0.0108)	(0.0005)		(0.0135)	(0.0007)	
Q2	0.0452***	0.0020***	*55,472*	0.0272**	0.0012**	*54,166*
	(0.0143)	(0.0006)		(0.0109)	(0.0005)	
Q3	0.0486***	0.0017***	*65,200*	0.0423***	0.0014***	*63,620*
	(0.0140)	(0.0005)		(0.0148)	(0.0005)	
Q4	0.0681***	0.0023***	*60,006*	0.0670***	0.0023***	*58,174*
	(0.0164)	(0.0005)		(0.0156)	(0.0005)	

Note: Results from estimating equation (1) using EU-SILC longitudinal microdata from 2004 to 2014. Sample: Youth 17-29 years old. All specifications control for individual characteristics and household income and include year and country (region) fixed effects. Standard errors are clustered at the country (region) level. Marginal effects are calculated at mean values of the covariates. *** p<0.01, ** p<0.05, * p<0.1.

A Appendix

Table A.1: Countries in the analysis and period of time covered

Country	Period of time covered	
	Cross-sectional	Longitudinal
AT - Austria	2004–2014	2004–2014
BE - Belgium	2004–2014	2004–2014
BG - Bulgaria	2007–2014	2006–2014
CY - Cyprus	2005–2014	2005–2014
CZ - Czech Republic	2005–2014	2005–2014
DK - Denmark	2004–2014	2004–2013
EE - Estonia	2004–2014	2004–2014
EL - Greece	2004–2014	2004–2014
ES - Spain	2004–2014	2004–2014
FI - Finland	2004–2014	2004–2014
FR - France	2004–2014	2004–2014
HU - Hungary	2005–2014	2005–2014
IE - Ireland	2004–2014	2004–2014
IS - Iceland	2004–2014	2004–2014
IT - Italy	2004–2014	2004–2014
LT - Lithuania	2005–2014	2005–2014
LU - Luxembourg	2004–2014	2004–2014
LV - Latvia	2005–2014	2005–2014
MT - Malta	2008–2014	2006–2014
NL - Netherlands	2005–2014	2005–2014
NO - Norway	2004–2014	2004–2014
PL - Poland	2005–2014	2005–2014
PT - Portugal	2004–2014	2004–2014
RO - Romania	2007–2014	2007–2014
SE - Sweden	2004–2014	2004–2014
SI - Slovenia	2005–2014	2005–2014
SK - Slovak Rep.	2005–2014	2005–2013
UK - United Kingdom	2005–2014	2005–2014

Table A.2: Detailed results of main estimates in Panel A of Table 2

	At country level			At regional level		
	Raw	+ Individual characteristics	+ Family income	Raw	+ Individual characteristics	+ Family income
	(1)	(2)	(3)	(4)	(5)	(6)
UR(t)	0.0189***	0.0189**	0.0178*	0.0163***	0.0175***	0.0166***
	(0.0055)	(0.0096)	(0.0093)	(0.0035)	(0.0055)	(0.0054)
Female		0.4491***	0.4493***		0.4668***	0.4676***
		(0.0544)	(0.0557)		(0.0252)	(0.0258)
Age		-0.7311***	-0.7331***		-0.7328***	-0.7330***
		(0.1096)	(0.1111)		(0.0744)	(0.0739)
Age squared		0.0078***	0.0078***		0.0077***	0.0077***
		(0.0024)	(0.0025)		(0.0017)	(0.0016)
Living with parents		-0.1018	-0.0789		-0.0347	-0.0273
		(0.2340)	(0.2127)		(0.1307)	(0.1154)
Living with a partner		-1.3003***	-1.2800***		-1.2749***	-1.2659***
		(0.1279)	(0.1310)		(0.1143)	(0.1178)
Has own children		-1.2578***	-1.2685***		-1.3442***	-1.3446***
		(0.1563)	(0.1367)		(0.0865)	(0.0817)
Hh. income (2nd quartile)			-0.1307			-0.0966
			(0.0967)			(0.0670)
Hh. income (3rd quartile)			-0.1809			-0.1352
			(0.1265)			(0.0892)
Hh. income (4th quartile)			-0.0010			0.0535
			(0.1481)			(0.0945)
N	898,130	897,915	897,232	870,174	870,011	869,328

Note: Results from estimating equation (1) using the pooled EU-SILC cross-sectional microdata from 2004 to 2014. Sample: Youth 17-29 years old. Standard errors are clustered at country (regional) level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Total enrolment and the unemployment rate — robustness checks

	At country level	At regional level
A) Using youth UR		
UR (t)	0.0085***	0.0081***
	(0.0031)	(0.0017)
Marginal effect	0.0012***	0.0011***
	(0.0004)	(0.0002)
B) Two-way cluster SE: year and country (region)		
UR (t)	0.0138	0.0127**
	(0.0086)	(0.0055)
Marginal effect	-.-	-.-
C) Adding a linear time trend		
UR (t)	0.0279***	0.0242***
	(0.0085)	(0.0051)
Marginal effect	0.0039***	0.0034***
	(0.0012)	(0.0007)
D) Adding linear time trends by country (region)		
UR (t)	0.0295***	0.0256***
	(0.0082)	(0.0051)
Marginal effect	0.0042***	0.0036***
	(0.0012)	(0.0007)
E) Keeping countries with data from 2004-2005		
UR (t)	0.0190**	0.0170***
	(0.0094)	(0.0054)
Marginal effect	0.0027**	0.0024***
	(0.0013)	(0.0008)
F) Dropping countries that changed the upper age of compulsory education		
UR (t)	0.0182*	0.0170***
	(0.0095)	(0.0054)
Marginal effect	0.0026*	0.0024***
	(0.0013)	(0.0008)
G) Diff-Diff analysis		
Post	0.0450*	0.0431***
	(0.0259)	(0.0096)
Treated	0.0290**	0.2340***
	(0.0117)	(0.0071)
Post x Treated	0.0251	0.0317***
	(0.0191)	(0.0096)

Note: Results from estimating equation (1) using the pooled EU-SILC cross-section microdata from 2004 to 2014. Sample: Youth 17-29 years old. In Panel A we use the youth unemployment rate instead of the total unemployment rate. In Panel B we use the two-way cluster approach to adjust the standard errors. The magnitude of the coefficient estimated differs from the ones in Columns 3 and 6 of Table 2 because the Stata command *logit2* does not allow for the use of weights. Panels B and C add a linear trend and country (region)-specific linear trends, respectively. Panel E keeps only those countries (and regions) with data from 2004–2005 (excludes Bulgaria, Malta and Romania). Panel F excludes the countries that changed the upper age of compulsory education completion during the period analysed (Hungary, Luxembourg and Latvia). Panel G displays the results from estimating a Difference-in-Difference model in which the *post* variable takes the value 1 from the beginning of the recession (2009) onwards and the variable *treated* includes the countries (regions) where the unemployment rate increased by more than 5 percentage points between 2009 and 2013. All specifications control for individual characteristics and family income. They also include year and country (region) fixed effects, except specifications C and D, which do not include year fixed effects. Standard errors are clustered at the country (region) level, except in Panel B. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: Detailed results of main estimates in Panel A of Table 5

	At country level			At regional level		
	Raw	+ Individual characteristics	+ Family income	Raw	+ Individual characteristics	+ Family income
	(1)	(2)	(3)	(4)	(5)	(6)
UR(t)	0.0405***	0.0451***	0.0434***	0.0360***	0.0387***	0.0372***
	(0.0083)	(0.0092)	(0.0092)	(0.0086)	(0.0085)	(0.0083)
Female		0.4920***	0.4876***		0.5030***	0.4988***
		(0.0339)	(0.0344)		(0.0467)	(0.0472)
Age		-0.7763***	-0.7733***		-0.7649***	-0.7580***
		(0.1938)	(0.1970)		(0.1269)	(0.1280)
Age squared		0.0108***	0.0109**		0.0105***	0.0105***
		(0.0041)	(0.0042)		(0.0027)	(0.0028)
Living with parents		0.0953	0.1491**		0.1112*	0.1610***
		(0.0806)	(0.0610)		(0.0607)	(0.0592)
Living with a partner		-0.8541***	-0.8082***		-0.8758***	-0.8342***
		(0.1083)	(0.1222)		(0.1088)	(0.1179)
Has own children		-0.3953***	-0.4477***		-0.4069***	-0.4529***
		(0.1389)	(0.1163)		(0.1067)	(0.1028)
Hh. income (2nd quartile)			-0.0828			-0.0636
			(0.1120)			(0.0895)
Hh. income (3rd quartile)			-0.3281***			-0.3223***
			(0.1243)			(0.0981)
Hh. income (4th quartile)			-0.2219			-0.1895
			(0.1725)			(0.1253)
N	235,461	234,171	234,112	230,232	229,286	229,266

Note: Results from estimating equation (1) using EU-SILC panel microdata from 2004 to 2014. Sample: Youth 17–29 years old. Standard errors are clustered at country (regional) level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: Back to education and unemployment rate — robustness checks

	At country level	At regional level
A) Using youth UR		
UR (t)	0.0232***	0.0202***
	(0.0045)	(0.0039)
Marginal effect	0.0009***	0.0008***
	(0.0002)	(0.0002)
B) Two-way cluster SE: year and country (region)		
UR (t)	0.0343***	0.0321***
	(0.0080)	(0.0076)
Marginal effect	-.-	-.-
C) Adding a linear trend		
UR (t)	0.0434***	0.0372***
	(0.0092)	(0.0083)
Marginal effect	0.0018***	0.0015***
	(0.0004)	(0.0003)
D) Adding linear trends by country (region)		
UR (t)	0.0426***	0.0372***
	(0.0091)	(0.0084)
Marginal effect	0.0017***	0.0015***
	(0.0004)	(0.0003)
E) Keeping only countries with data from 2004-05		
UR (t)	0.0429***	0.0364***
	(0.0096)	(0.0084)
Marginal effect	0.0018***	0.0015***
	(0.0004)	(0.0004)
F) Dropping countries that changed the upper age of compulsory education		
UR (t)	0.0431***	0.0370***
	(0.0094)	(0.0085)
Marginal effect	0.0018***	0.0015***
	(0.0004)	(0.0003)
F) Diff-Diff analysis		
Post	-0.1025	-0.1026
	(0.0768)	(0.0667)
Treated	0.0210**	-0.0069*
	(0.0078)	(0.0037)
Post x Treated	0.0283***	0.0300***
	(0.0075)	(0.0071)

Notes: Results from estimating equation (1) using the pooled EU-SILC panel microdata from 2004 to 2014. Sample: Youth 17-29 years old. In Panel A we use the youth unemployment rate instead of the total unemployment rate. In Panel B we use the two-way cluster approach to adjust the standard errors. The magnitude of the coefficient estimated differs from those in Columns 3 and 6 of Table 2 because the Stata command *logit2* does not allow the use of weights. Panels B and C add a linear trend and country (region)-specific linear trends, respectively. Panel E keeps only those countries (and regions) with data from 2004-2005 (excludes Bulgaria, Malta and Romania). Panel F excludes the countries that changed the age of compulsory education completion during the period analysed (Hungary, Luxembourg and Latvia). Panel G displays the results from estimating a Difference-in-Difference model in which the *post* variable takes value 1 from the beginning of the recession (2009) onwards and the variable *treated* includes the countries (regions) where the unemployment rate increased by more than 5 percentage points between 2009 and 2013. All specifications control for individual characteristics and family income. They also include year and country (region) fixed effects, except specifications C and D, which do not include year fixed effects. Standard errors are clustered at the country (region) level, except in Panel B. *** p<0.01, ** p<0.05, * p<0.1.

2013

2013/1, Sánchez-Vidal, M.; González-Val, R.; Viladecans-Marsal, E.: "Sequential city growth in the US: does age matter?"
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2013/5, Garcia-López, M.A.; Holl, A.; Viladecans-Marsal, E.: "Suburbanization and highways: when the Romans, the Bourbons and the first cars still shape Spanish cities"
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2014

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2015

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2016

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2016/7, Choi, A.; Gil, M.; Mediavilla, M.; Valbuena, J.: "Double toil and trouble: grade retention and academic performance"
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2016/9, Guio, J.; Choi, A.; Escardíbul, J.O.: "Labor markets, academic performance and the risk of school dropout: evidence for Spain"
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