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Educational expectations in the great recession: has the impact of family background become stronger?

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Abstract

This article addresses the impact of economic climate, and particularly of the Great Recession, on the configuration of educational expectations among students around 14 years old. We analyze expectations regarding educational attainment conditional on school performance and compare our results across countries with varying levels of economic growth over time. We expect a changing economic environment to impact on (a) the average level of educational expectations, (b) the association between social background and expectations, and (c) the association between school grades and expectations. Using pooled data from TIMSS for the years 2003, 2007 and 2011 among 8th graders for 24 developed countries, we estimate a set of country-fixed effects and hierarchical random-slope linear regression models. Most notably, our results indicate that economic down times depress educational expectations, especially among average-performing students, and lead to a growth in educational inequalities by family background.

Key words: economic growth, inequality, education, crises, uncertainty

JEL classification: I24, E02

1. Introduction

The Great Recession started to show its devastating effects on different social indicators in 2007 (Grusky *et al*., 2011; Gallie, 2013). The most immediate repercussions of the economic downturn take the form of job and income losses or even entry into poverty. Yet, it is too early to know whether these negative experiences will live on—for instance, in the form of lasting mental health problems or diminished wealth. Even with a global economic recovery

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and sustained growth in the future, some of the adverse consequences of the crisis might endure, especially among children. Their economic situation may not only deteriorate temporarily as a consequence of parental income loss; because of the crucial developmental importance of early stimulus (McCartney *et al*., 2007), children's life chances might be affected in the longer run, too. There will possibly be lasting effects on the life course of individuals experiencing worsened living conditions, even in the next generation.

An important dimension of these enduring repercussions of recession that might already be visible relates to the educational prospects of today's children. Since educational attainment correlates with other relevant outcomes throughout the life course—such as occupational attainment, earnings or family formation—the crisis may leave a permanent mark on children's life chances.

In this article, we are interested specifically in the impact that the Great Recession might have had on inequality of educational opportunities in a broad sample of countries with diverse levels of wealth. The global crisis can be seen as an external shock that has affected most national economies, albeit to different degrees and with varying timing. In fact, some countries have already largely overcome this economic crisis, while others are still stuck in it, or have double-dipped back into recession after temporary recovery. Recent educational transitions, that is, how far children actually proceed in post-compulsory education and what track they follow, are not readily observable for large samples of countries, so with the kind of data available to date it is not possible to test the effect of the Great Recession on completed transitions across countries. Focusing on students' expectations—how far they expect to advance in their educational careers—is thus arguably the best feasible measure of educational attainment within a comparative research design.

The Great Recession has had a notable impact on inequalities in labor market outcomes, according to the analysis by Tåhlin (2013): 'Gender inequality has decreased, class inequality has increased in employment but not in earnings, while the change in age inequality has been mixed' (Tåhlin, 2013: 87). In turn, studies of contextual changes on inequality of educational opportunity are scarce. There is a solidly established theoretical and empirical literature about the effects of educational expansion on changes in inequality of educational opportunity (e.g. Breen and Jonsson, 2005). Other fertile areas of study about the influence of macro-social factors on the educational decision making process have been the examination of how varied types of educational institutions— tracking and the level of standardization of curricula—enhance or mitigate, respectively, inequality of opportunity by social background (Van de Werfhorst and Mijs, 2010) and the analysis of the effects of credential inflation on continuation decisions (Van de Werfhorst and Andersen, 2005). Little is known, however, about how inequality of educational attainment is affected by macro-level trends such as changes in economic tide or unemployment rates. Notable exceptions include the analyses such as Chmielewski and Reardon (2016) on the implications of changes in income inequality on educational inequalities in the USA. Studies using US data from different time periods and focusing on various stages of education tend to show that schooling rates have mostly followed a counter-cyclical pattern, i.e. educational enrolment tends to increase during economic down times (Dellas and Koubi, 2003; Johnson, 2013; Pöyliö; 2017). However, single-country studies are limited in their capacity to assess the impact of macro-social conditions (Renzulli and Barr, 2017). Thus, comparative research on a greater

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number of countries is required. More knowledge is necessary to evaluate the impact of the economic downturns on advanced societies and to develop adequate public policies to cushion their adverse consequences. Up until now, the academic literature on the impact of macroeconomic conditions on the educational expectations of families and students has been limited. Educational expectations of children are not a perfect predictor of actual achievement, but they constitute an important determinant in the educational decision-making process (Morgan, 1998).

This article aims to elucidate the interplay of family background, educational expectations and the macroeconomic context. Specifically, we ask: has the impact of family background on offspring's educational expectations become stronger because of the economic recession? One of our main objectives is to contribute to theory building in a scantly developed area of research, namely the interaction between overall economic performance and the educational plans that students develop. In this vein, we put forward a number of mechanisms potentially underlying changes in the patterns of educational inequality. We expect any pronounced economic downturn to modify the educational expectations of children of all social origins to some extent, but we argue that, more crucially, recessions might also have a differential effect on the offspring from specific socioeconomic backgrounds. The aim of the article is therefore to systematize and test for these two types of processes.

The article is structured as follows: In the next section, we further contextualize our research question within the existing theoretical and empirical literature. We then formulate testable hypotheses about the impact of recessions on inequality of educational expectations. The description of the data and methods used follows. Then we show and interpret our main results and finally conclude.

2. Economic context and educational attainment: literature review and theoretical background

2.1 Socio-economic differences in educational attainment

In searching for theoretical mechanisms through which family background impacts on educational careers, social stratification scholars have shed light on the contextual conditions for attainment processes, and particularly the role of educational expansion. The model of Relative Risk Aversion by Breen and Goldthorpe (1997) tries to explain why higher absolute rates of attainment—contrary to conventional wisdom—do not necessarily reduce class differentials in education. Accordingly, class differentials in education arise from two different sources of inequality: cognitive skills or proven ability at school (usually referred to in the literature as 'primary effects') and class-specific cost-benefit structures at each branching point (known as 'secondary effects'). Class differences in academic performance persisting over the generations arguably owe themselves to biological or socio-cultural factors, whereas class differences in educational decision-making relate to the costs, payoffs and probabilities of success of alternative educational transitions (Erikson and Jonsson, 1996; Stocké, 2007). By determining the economic returns to education, the labor market thus impacts on educational outcomes.

It is uncontroversial that children's educational attainment is positively associated with household resources, and the latter are sensitive to economic context (e.g. Acemoglu and

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Pischke, 2001). Parental unemployment and job loss have been shown to impact on educational achievement measures as diverse as cognitive outcomes (Levine, 2011), children's schooling effort (Andersen, 2013) and grade retention (Stevens and Schaller, 2011).

2.2 The interplay between educational institutions, labor markets and social inequality

The effect that the Great Recession might have had on students' educational expectations is, naturally, dependent on the institutional characteristics that shape educational systems, labor markets and income distributions as well as the interplay between them. A prolific line of research has focused on the role of average educational attainment levels in a country, and in the unequal distribution of skills, as one of the main drivers of economic inequality (Goldin and Katz, 2009), inspiring the so-called 'education welfare state' (Brown, 2001). This argument has been addressed differently by various disciplines (Solga, 2014), including critical visions that question the rather mechanical link between human capital and social cohesion that underemphasize public investment in areas other than education. Instead, the institutionalist account in political economy underscores the role of labor market regulation (Crouch *et al.,* 1999) and the investments in specific types of skills that mediate the relationship between education and inequality (Iversen and Stephens, 2008). Crucially, these alternative views posit that a more equal distribution of market income might promote more egalitarian educational outcomes (and opportunities) because it smoothes competition around the education issue (Erikson, 1996). On these grounds the so-called 'social investment with double liability' model was developed, a program that combines investments in education and social protection (Allmendinger and Nikolai, 2010). Empirical assessments of the relative role of each of those two types of interventions on reducing poverty and inequality suggest that the skills component should not be overemphasized and that welfare states that are able to combine both strong educational and social policies tend to succeed at reducing inequalities of all kinds (Solga, 2014).

While inspired by these previous contributions connecting educational attainment and skill supply in the population with corresponding wage levels and economic inequality discussed above, in this article we take an alternative approach by focusing on economic cycles and their potential effect on educational expectations. In other words, we address the influence of economic factors on educational outcomes rather than vice versa.

As for the institutional framework, there are three characteristics of educational systems that are, in our view, the most relevant for our research question, namely the degree of stratification of the system, the extent of public expenditure in education, and the strength of the vocational track as an indicator of the so-called 'skill system' (Estevez-Abe *et al.,* 2001). First, in highly stratified systems, credentials are a strong predictor of labor attainment and this results in well-differentiated occupational structures and more stable work trajectories (Allmendinger, 1989). In addition, in more differentiated educational systems (measured e.g. by early selection or the number of tracks) the social background gradient in educational achievement tends to be larger (Van de Werfhorst and Mijs, 2010; Chmielewski and Reardon 2016). Secondly, more public expenditure on pre-compulsory and compulsory education is associated with a reduction in inequality of educational opportunity (Balcázar *et al*., 2015). Finally, strong vocational systems have been generally found to correlate with

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lower wage inequality, and it has been argued that vocational orientation needs to be differentiated from other forms of tracking (Österman, 2017); this might have implications for social inequality because the more specific the skills system is, the more work opportunities open up for students in the vocational tracks, who disproportionally often come from disadvantaged social origins (Estevez-Abe *et al.,* 2001).

Hardly any existing research examines the interplay between macro level factors and educational outcomes at the microlevel. Single-country studies about secular trends in achievement gaps, such as Pöyliö's (2017) analysis of the USA, are insightful but not specifically aimed at testing the impact of contextual factors. In turn, contributions like by Chmielewski and Reardon (2016) explore the role of a number of contextual characteristics in explaining the size of achievement gaps across countries without theorizing at the microlevel. Torche's (2010) study of four Latin American countries explicitly pursues a comparative approach and is able to show that achievement gaps have widened during recessions, but her results refer to an economic crisis with only regional scope that occurred decades ago. In order to comprehensively assess the influence of the economic cycle on educational outcomes, broader cross-country cross-time data are required.

2.3 The concept and analysis of educational expectations

There is an important conceptual debate about the distinction between motivations, (idealistic) aspirations and expectations. Aspirations usually refer to the degree of attainment that is idealistically desired, while expectations tend to incorporate some probabilistic account of the chances of succeeding in the desired attainment (Hanson, 1994). Hence, educational expectations are understood, throughout this article, as probabilistic (future-oriented) beliefs about one's most likely educational outcome (Morgan, 2005). One could also regard expectations as realistic accounts of idealistic aspirations.

The study of educational expectations as a dependent variable has a long tradition in social psychology (Ajzen and Fishbein, 1980) and sociology of education (Kahl, 1953). The literature has evolved along two lines. First, sociologists have tried to understand how these expectations are formed. Seminal contributions inspired by the Wisconsin school proposed that parental views influence their children's expectations in the early process of socialization (Sewell and Hauser, 1993) and that this explains the temporal stability of long-term wishes. The Wisconsin model of status attainment places educational expectations as the cornerstone in the formation of social background differentials in educational performance. It views educational expectations as an important mediating variable that transmits social background factors into subsequent behavior. Students internalize their educational expectations under the influence of significant others (parents, teachers, peers), taking into account their academic performance. Furthermore, educational plans have long been known to convert ambition and motivation into real effort, thus boosting educational performance (Spenner and Featherman, 1978). Therefore, expectations are viewed as something more than fantasies or status-based value orientations; rather they result from rational calculations subject to constant updates seen in the light of existing information about the context and students' (self)estimated potential (Andrew and Hauser, 2011).

Secondly, the literature has tried to analyze the consequences that expectations have for eventual educational outcomes (Jacob and Linkow, 2011; Karlson, 2015), and the engagement in health-protective behaviors (Whitehead *et al.,* 2015). In the USA, much of the

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debate has been articulated along the differential ability of diverse groups to materialize their own expectations (Hanson, 1994). However, the causal connection between expectations and outcomes is still debated. Behavioralists would voice certain skepticism against looking at intentions to predict behavior, denying the importance of expectations altogether (Manski, 1990). Yet, studies on educational expectations remain an important thread of sociological research (Alexander *et al.,* 2008; Andrew and Hauser, 2011).

Recent research has shown not only that beliefs about one's educational and occupational futures are rather inaccurate and uncertain, but also that a dynamic interplay exists between expectations and performance (Morgan *et al.,* 2013). Educational expectations go beyond wishful thinking. Albeit under important information deficits, students make consequential choices regarding their own educational future, and these expectations are also clearly influenced by their families' beliefs about their ability and the amount of effort required to succeed at each stage (Breen, 1999).

Despite these contributions considerably less is known about the role played by the broader economic context for educational expectations. Morgan (1998) has suggested that individual education plans are, among other factors, a function of the cost of and returns to education. Thus, changes in the broader economy that alter the premium or cost of education also impact on the formulation of educational expectations and eventually affect educa- tional attainment rates. The availability of resources in the household is another determining factor of educational decisions, according to Morgan, and is likewise contingent on the eco- nomic environment. Renzulli and Barr (2017) found that family economic shocks impact the formulation of educational expectations and this happens unevenly across socioeco- nomic backgrounds.

3. The impact of economic context on educational expectations: hypotheses

The relationship between economic environment and the social gradient in educational attainment is complex in theoretical terms. Multiple mechanisms can be identified at different levels that may shape the social background effects in opposing directions. We for- mulate five (partly competing) hypotheses about the impact of different rates of economic growth.

Loosely building on Morgan (1998), the individual-level expectation to obtain a given level of non-compulsory education (E) is generally determined by:

$$\mathrm{E} = \mathrm{p} * \mathrm{B} - \mathrm{C}/\mathrm{I}$$

Students evaluate whether the expected benefits (B) obtained by completing each level weighted by their probability of success (p) exceed the costs (C), whether direct or indirect, associated with attaining it, relative to their level of household income (I). The individual is expected to pursue each additional level when the weighted benefits are greater than the relative costs, such that the obtained utility is positive and expectations adjust accordingly. Students receive signals about the state of the economy from parents, their personal networks as well as through mass and social media, and incorporate them (consciously or unconsciously) into their formation of expectations.

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Conventional wisdom suggests that educational careers tend to be prolonged in times of recession (Dellas and Koubi, 2003). Due to a shortage of job openings, increased layoffs, dwindling wages, and generally higher uncertainty about potential returns, the monetary payoff of entering the labor market is reduced during economic down times. When the economy is weak, there should hence be a larger number of potential school leavers who decide to continue education than during times of economic growth. Therefore, students should expect to remain longer in the education system during recessions and exit education earlier when the economy is expanding and there are more attractive jobs available. In terms of the equation of continuation decisions posed above, the opportunity cost (C) of education decreases. A recession would therefore, ceteris paribus, produce higher attainment via a substitution effect (Torche, 2010).

Hypothesis 1a: *Students expect to obtain higher levels of education when the economy is contracting than when the economy is growing.*

The effect of economic recessions on educational expectations might as well be the opposite. At least two factors suggest a lowering of educational expectations. First, education entails direct costs (especially at post-compulsory levels) as well as opportunity costs in the form of foregone personal and family earnings. Given that economic contraction brings about income losses for private households (I), these costs might become too heavy a burden for a larger number of students than during periods of growth. Secondly, in the Great Recession, the response to diminished tax revenues and tight finances on the part of many (especially European) governments has consisted of introducing austerity programs that include cutbacks in education, or the adoption of other policies that increase the economic burden of families (e.g. increase in VAT). Lower public spending on education (Barr and Turner, 2013) might lead to lower quality and/or higher fees, both of which would seem to undermine the attractiveness of post-compulsory education. In short, declining household incomes, rising fees or diminished quality of educational programs would all tend to make the costs of education exceed its benefits for a larger share of students in economic down times. In our equation, a crisis would cause term C to increase due to the rise in direct and opportunity costs while the expected benefits of continuing in education, term B, would decrease if the quality of post-compulsory education is diminished. Under *ceteris paribus* conditions, a recession would, in this case, constrain educational expectations via an income effect, whereas periods of growth would engender a 'rose-colored glasses' effect of optimism and enhanced educational careers.

Hypothesis 1b: *Students expect to obtain lower levels of education when the economy is contracting than when it is growing.*

As illustrated in Figure 1 both hypotheses 1a and 1b speculate about changes in the constant of the function producing fluctuations in expectations (conditional on prior performance) as a consequence of differing levels of economic growth. Therefore, all students, regardless of their background characteristics, would be affected by them. Yet, a changing economic environment probably has deeper implications. In the second set of hypotheses, we elaborate two different scenarios for inequality in expectations that the economic crisis might bring about.

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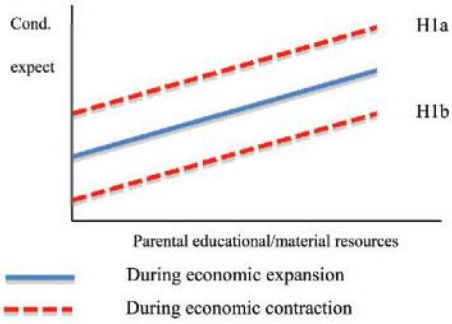

H1a Empirical implications: The constant of the function linking parental resources and conditional expectations shifts as a consequence of changes in the rate of economic growth.

H1b

Figure 1 Illustration of hypothesis 1a (opportunity costs) versus hypothesis 1b (direct costs).

As discussed earlier, the model of Relative Risk Aversion maintains that the utilities students assign to the completion of a given educational milestone differ by social origins because the primary goal of preventing downward social mobility is accomplished at a lower level for working-class children. In addition, there is also evidence that a privileged family background leads to higher expected returns to education, even after performance at school has been taken into account (Brunello *et al.,* 2004). This raises the question whether differences in expected payoffs related to successful educational transitions contribute to educational differentials by social origin. Young students from better-off social backgrounds not only have higher average expectations, but in addition the association between those expectations and later attainment is stronger than it is for their less advantaged counterparts (Hanson, 1994). Whereas college students seem to hold relatively realistic perceptions regarding expected returns to college (Botelho and Pinto, 2004), 8th grade students in secondary school have been found to hold inaccurate beliefs about the returns to schooling, with expected wages being lower than measured returns (Jensen, 2010). At the same time, expected returns depend on institutional characteristics (Brunello *et al.,* 2004). Furthermore, because education functions as an insurance against the risk of unemployment, the returns to schooling are likely to be sensitive to a changing economic environment (cf. Blöndal *et al.,* 2002). Inequality of educational expectations may be altered when the economy contracts if awareness about deteriorating employment opportunities and wages is unevenly distributed. Young people from better origins may more clearly perceive the need to accumulate additional human capital to become fit for increased competition for jobs or better understand the state of the business cycle in the first place. This 'privileged information' effect modifies term B in the equation. With the economic crisis, the perceived benefits of staying in education are more accurate (and virtually insensitive to economic context) among students coming from better-off households. Students from advantaged social backgrounds may even hold quasi-inelastic expectations (Lucas, 2009), with tertiary education being the unalterable reference point independent of any payoff considerations.

The economic crisis might also entail immediate consequences at the household level. Specifically, there may be a negative effect of parental job or wage loss on children's educational attainment. As argued in hypothesis 1 b, continuing in education is contingent on the material resources available in the household (I). Hence, the offspring of poorer parents may

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have to exit education and seek employment faster and in greater proportions than their better-off counterparts. Although this income effect should theoretically be operating at all times, its impact could become stronger during economic downturns. Due to compositional effects, economic crises could cause a larger proportion of households to be subject to income constraints leading to shortened educational careers among children. This 'income loss compensation' effect can be expected to exacerbate pre-existing differences in educational expectations by social origin. During the recession, the relative costs of staying longer in the education system, noted as C/I in our above model, are likely to increase disproportionately for children from less privileged backgrounds.

> **Hypothesis 2a**: *Social origin effects on educational expectations become more pronounced when the economy is shrinking than when it is expanding.*

As Figure 2 illustrates, the effect of a shrinking economy on class differentials may also be the opposite. Rising levels of unemployment are often closely linked to the contraction of low-skilled jobs, whereas high-skilled jobs are more crisis-resistant.[1] This implies that recessions may not reduce every student's incentives to drop out to the same extent or lead to across-the-board extensions of educational careers at all levels of parental socioeconomic status, as claimed by hypothesis 1a. Rather, if the crisis-related loss of employment is concentrated in the low-skilled job sectors and students from lower social backgrounds attach a lower utility to educational credentials than those from better social backgrounds, as suggested by the model of Relative Risk Aversion, this 'diminished outside option' effect of the crisis should disproportionally affect the former and less the latter. By incentivizing continued education, economic crises might then paradoxically help children from lower social origins avoid myopic educational decision-making. Because there are not enough jobs available that would represent an attractive alternative to longer educational careers, economic contractions could lead to increased educational attainment among children from lower social origins. In the model equation on the formation of expectations, this 'diminished outside option' is captured by the term C. In a context of crisis and limited options in the labor market for children from poorer backgrounds, the opportunity cost of staying in education decreases considerably, thus improving their expectations.

> **Hypothesis 2b**: *Social background effects on educational expectations become weaker during economic downturns and stronger during economic upswings.*

There is yet another parameter in the equation that can be altered by a changing economic context, namely the probability of success (p) as perceived by students and/or their parents. Students configure and update their beliefs about their educational futures as a

[1] For instance in the period 2008–2011, unemployment of adults with low educational attainment grew by five percentage points in the European Union. Meanwhile, unemployment rates for adults with a high level of education rose by only 1.5 percentage points. Tåhlin (2013: 66–70) shows for the period 2007/08–2010 that the respective drops in employment rates by education follow a very similar pattern of stratification. Moreover, his study demonstrates that while this regularity – greater employment losses among the low educated – can be observed in a similar fashion in all countries, education-specific gaps in employment rates have widened more in those countries where the total decline in employment rates has been more pronounced.

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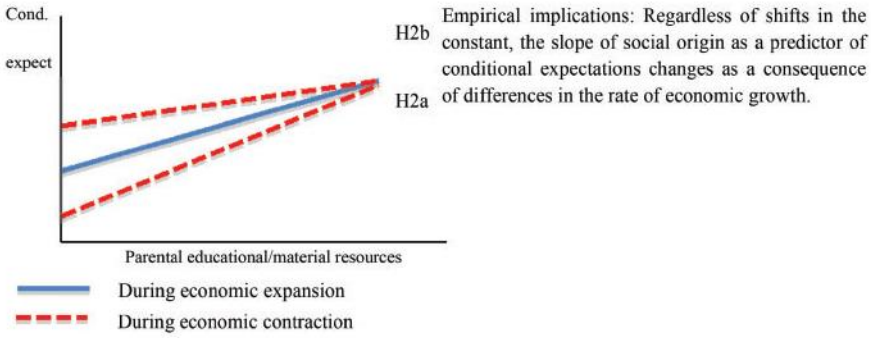

Figure 2 Illustration of hypothesis 2a (income loss compensation) versus hypothesis 2b (diminished outside option).

function of the grades they receive (Breen, 1999). This potentially reinforces social background inequality either if students from different origins attribute a different share of their final grades to the effort exerted, as suggested by previous evidence (Osborne Groves, 2005), or if they have different ability to estimate the chances of succeeding. The extent to which students and their families correctly estimate the probability of success in the next educational stage using their grades is actually dependent on the distribution of actual performance. For students with the best performance, overcoming the next hurdle in their educational career is a virtual certainty (in terms of the equation, p is close to unity). Similarly, students with the worst performance already know that even if they wanted, their chances of continuing their education are virtually nil (p is close to zero). In contrast, for families whose children's grades are in the middle range of the distribution, the formation of an accurate belief about how likely s/he is to succeed in education is more complicated, adding more uncertainty to the decision about whether to continue in education (p around 0.5). In other words, they cannot be certain whether they will meet the academic requirements for the subsequent educational transition and may thus be quite sensitive to external signals (Bernardi and Cebolla-Boado, 2014). It is among these average performers that we expect an economic contraction to be more consequential. Economic crises are periods of increasing uncertainty about the future, while sustained economic growth creates a positive social climate beyond the economic sphere alone. Our expectation is that students whose performance is average and therefore face more difficulties in inferring their likelihood of succeeding in education, will be more likely to echo the negative consequences of the uncertainty that prevails during an economic downturn than students whose performance places them at either extreme of the distribution. We term this mechanism the 'cognitive inequality' effect.

> **Hypothesis 3**: *Economic expansion is associated with higher educational expectations among students with average grades, whereas economic contraction is associated with lower educational expectations among those students. The educational expectations of the best and worst-performing students are unaffected by economic growth.*

In line with the previous argumentation, this hypothesis has two plausible implications for middle-achievers— increasing or decreasing expectations— depending on whether H1a or H1b holds, as Figure 3 illustrates.

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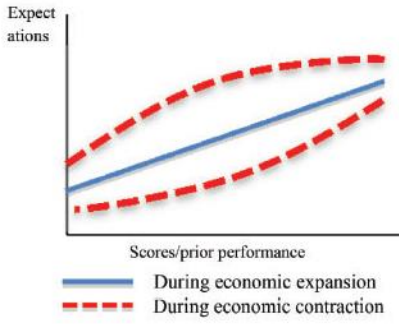

H3a Empirical implications: Because tests scores in the middle of the distribution convey less clear information to families regarding the chances that the student will succeed in the next educational stage, the impact of an economic contraction will be at its maximum among average performers.

H3b

Figure 3 Illustration of hypothesis 3 (cognitive inequality).

4. Data and variables

Trends in International Mathematics and Science Study (TIMSS) measures academic performance along with students' expectations regarding continuation in education in a large number of countries; it constitutes our principal data source. This survey, developed by the International Agency of Evaluation of Educational Achievement (IEA), is an internationally comparable assessment of the knowledge of mathematics and science that 4th and 8th grade students around the world have. The study includes data collected from students, teachers and schools in each participating country, and is therefore well suited for hierarchical approaches.

We use the surveys carried out among 8th grade students at three points in time (2003, 2007, 2011),[2] including all countries with GDP per capita higher than $15,000 and excluding, due to their particular characteristics, the major oil producing countries. Our final sample includes 24 countries, although not all are present in each year (see Table A.1 for details). The time span covered allows us to observe students before, during and (for some countries) after the Great Recession. Since countries around the world have experienced the economic downturn with differing timings and intensities, the choice of this period is particularly well suited to capture variability of economic conditions and individual responses across countries and over time.

In order to properly assess the impact of an economic tide on the prospective educational careers of youngsters across countries, we need variability in economic contexts, even if the information regarding educational careers available in this type of international datasets is less fine-grained than in single-country studies. TIMSS contains a large number of countries that can be included in the analysis and hence allows us to exploit variation in educational outcomes over time (2003–2011). Because the current economic downturn entails substantial variation in the contextual conditions of educational decision-making, it also provides a unique opportunity to improve our understanding of the driving forces of unequal educational trajectories of children at the end of compulsory education.

Since this article addresses the effect of the economic context on continuation decisions,we choose to restrict our analysis to students in 8th grade, who are usually 13 or 14 years

[2] There is a small number of countries participating in the two studies prior to 2003.

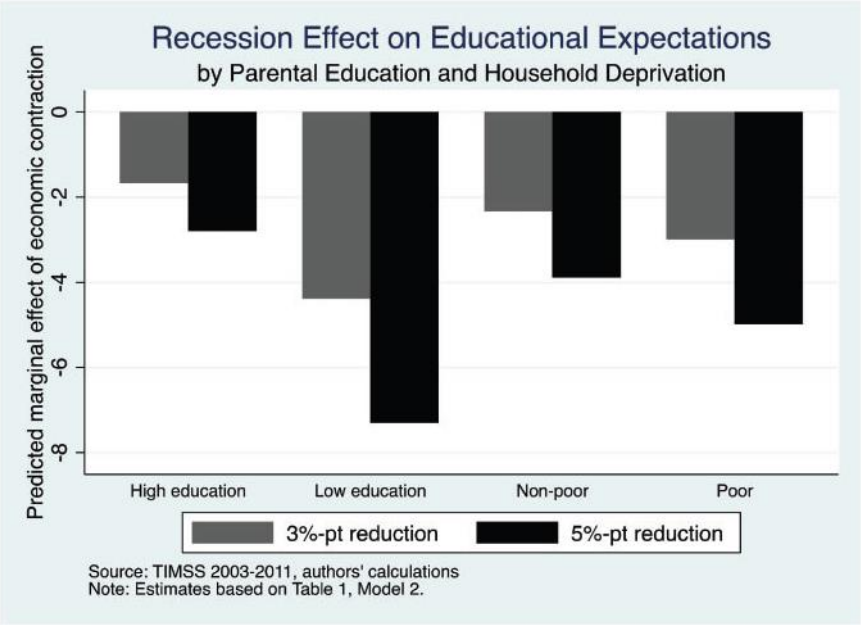

Figure 4 Effect of a 3 and 5 percentage points decrease in GDP by household resources.

old and therefore close to the end of compulsory schooling. Students are asked how far they expect to proceed in the education system, and responses are coded into a variable ranging from 0 to 100, following the International Standard Classification of Education (ISCED).[3]

Since continuation decisions are strongly influenced by actual performance, expectations are adjusted by standardized scores in mathematics. Specifically, since the effect of performance on expectations is nonlinear, we use a set of dummy variables where we divide the sample of students in each country-year cluster into five quintiles according to their scores in this test. The first (lowest) quintile contains the 20% of the distribution having the poorest prior performance while the fifth (top) quintile contains the 20% of the distribution showing the best results. By examining expectations conditional on math scores we capture the influence of social background on young students' expectations, net of the effect on abilities, prior to making the choice of staying on, dropping out or choosing between educational tracks in non-compulsory education (Morgan *et al.,* 2013).

In the empirical analyses, we use two different measures of social background, one for each of the most well-documented mechanisms reproducing inequality of educational opportunity, namely cultural capital and material resources at the household level. Regarding the first of them, having information on both the mother and father's ISCED level of

[3] ISCED categories were coded in the following way: 0 = less than lower secondary education (<ISCED 2), 10 = lower secondary education (ISCED 2); 40 = higher secondary education (ISCED 3); 50 = post-secondary education (ISCED 4); 80 = short-cycle tertiary education (ISCED 5B); 90 = tertiary education (BA, MA, or equivalent) (ISCED 5A); 100 = Doctoral degree (ISCED 6).

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education, we use the highest parental ISCED (see footnote 3 for details) as our measure of the socioeconomic background of students, applying the dominance principle. For matter of simplicity, we use highest parental education as a continuous variable. As for the second measure of social background, unfortunately TIMSS does not provide any direct indicators of the financial situation of families such as employment status or household income. Using several country-year-specific indicators of the availability of assets that are regarded as basic for a household in each nation and year devised by each national team participating in the adaptation of the general questionnaires and the adaptation to each national setting,[4] we construct a composite measure of deprivation at the household level. Using factor analysis, the various dummy indicators were collapsed into a single continuous measure in each of the 3 years (results are omitted because they are not immediately meaningful). We term these two measures 'educational resources' and 'material resources', respectively (both are group-mean centered).

GDP data are drawn from the World Development Indicators (WDI) database. To measure the economic context, we use both data on GDP per capita (in constant 2005 PPP and expressed in thousands) and GDP growth (expressed in annual percentages, either positive or negative). Our analyses will focus on the growth rate as the primary crisis indicator. The combined inclusion of the two GDP measures permits not only capturing the yearly change in the economic climate, but, crucially in such a heterogeneous sample of countries, also the general level of development in each country. Table A.1 in the Appendix displays both GDP indicators for all countries in the sample.

Finally, in parts of our analyses we include two sets of macrovariables capturing factors that were discussed above: measures of the configuration of national education systems on the one hand, and inequality related factors on the other. As regards, the educational variables we use three indicators obtained from different sources. First, government expenditure on education as a percentage of GDP was obtained combining data from the UNESCO Institute for Statistics and World Bank Open Data. We use this variable to proxy the relevance of education in the government investment portfolio. Secondly, we use information on the first age of tracking, and thirdly on the percentage of students enrolled in vocational training to measure the comprehensiveness of educational systems. These latter indicators were obtained from OECD official statistics, Eurostat and were appropriately completed with national data.

[4] For instance, the Japanese questionnaire for 2011 included items such as a calculator, a dictionary, book or puzzle related to mathematics, astronomical telescope, a terrestrial globe and a pictorial book of plants. In contrast, a different list of goods was considered relevant for Hong Kong: taking piano or other orchestral instrument lessons, domestic help, car, a private tutor and travelling by plane with parents at least twice a year. Please refer to TIMSS User Guide in each year for complete information on country-specific lists of assets. The list of assets in each country/year is intended to appropriately capture national standards at the time of the survey, broad societal preferences and average levels and types of consumption. Far from challenging comparability in the level of material wellbeing across countries, this approach implies a more nuanced consideration of consumption standards and practices across countries with markedly heterogeneous levels of development and consumption patterns. Note that the use of country-specific variables is common practice in international studies similar to TIMSS. See Table OA.1 in the Supplementary Appendix for the full country details.

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As for our inequality-related factors, we chose unemployment rates and income inequality as socio-structural measures. Unemployment rates were also taken from WDI, are measured as percentages over the total labor force and refer to the year of observation; the level of income inequality is measured by the Gini index on a 0 to 100 scale, obtained from the World Income Inequality Database (UNU-WIDER).

The use of GDP growth seemed preferable to the alternative option of using either unemployment or income inequality as the main independent variable modeling the effect of the crisis. First, it is well-known that employment changes follow the growth of the economy with a certain lag (hysteresis). Secondly, cross-nationally GDP growth is the more comparable economic indicator since our sample comprises both countries with high levels of unemployment during economic expansions (such as Spain, where even in the relatively well-to-do Basque Country, 11.3% of the active population was unemployed in 2003), as well as others that did not experience significant rises of unemployment during the years of recessions (such as Sweden, with 6.1% of unemployment in 2007 and only 7.7% in 2011).

Note that all contextual variables are mean centered except for GDP growth. Table A.2 in the Appendix shows descriptive statistics for individual and country level variables.

5. Methods

Hierarchical regression analysis allows for a joint estimation of individual and aggregate level explanations. It is an appropriate methodological tool for analyzing clustered data and, in our case, to test explanations on the country-level predictors of individual-level processes. Our merged TIMSS sample consists of students nested within country-year clusters.

The so-called random-slopes regression models improve the estimation of standard errors on selected estimators compared to OLS regression. Equation (1) is the linear regression specification, where a continuous dependent variable (y_i) is estimated as a function of a number of independent variables. The effect of predictors is jointly estimated regardless of whether they operate at the aggregate (x_{1j}) or individual level (x_2 to x_n).

$$y_i = ß_0 + ß_1 x_{1j} + \ldots + ß_2 x_2 + ß_n x_n + \varepsilon_i \quad (1)$$

Note that a single random residual adjusts our prediction to the observed value in each individual case (i). In its simplest form, the multilevel approach (2) includes a random term adjusting the constant to each cluster:

$$y_{ij} = \gamma_{00} + \gamma_{1j} x_{1j} + u_{0j} + \beta_2 x_2 + \ldots + ß_n x_n + \varepsilon_{ij} \quad (2)$$

Here, the constant (2.1) is the result of several separate components:

$$ß_0 = \gamma_{00} + \gamma_{1j} x_{1j} + u_{0j} \quad (2.1)$$

γ_{00} is the average intercept of all clusters considered, which in other words absorb the effects of all factors that, beyond the covariates in a given model specification, affect the educational expectations in all countries. In contrast, γ_{1j} refers to the idiosyncratic component in the determining factors of expectations that is specific to each national setting. Finally, u_{0j} is a random noise term correcting the average intercept to each country-year observation.

All initial models also include further random corrections to allow the impact of individual-level independent variables to vary across contexts (3). Specifically, we added

random slopes around our key covariates of interest, parental education and household material resources. Notably, the recent methodological literature on multilevel models has underscored the need to add random effects at the lower level to allow of adequate estimation of high-level effects (Schmidt-Catran and Fairbrother, 2016; Heisig *et al.,* 2017).

$$ß_2 = \gamma_{20} + u_{2j} \quad (3)$$

Where γ_{20} is the average cross-country slope of x_2 on our dependent variable and u_{2j} is a country-specific adjustment to this effect. As consequence, the specification of our equations has three residual terms, u_{0j} u_{2j} and ε_{ij}, to allow for the estimation of unbiased standard errors and the production of reliable statistical contrasts. Estimations are carried out using restricted maximum likelihood.

For specific analyses, we use country/year fixed-effects models, which neutralize unwanted variation due to unobserved heterogeneity between clusters and thus allow us to purely concentrate on within-country variation over time. These models do not have random corrections to the constant or the slopes of our independent variables. While fixed-effects models are better suited to control for unobserved heterogeneity, this kind of estimations entails a sensible loss in the number of clusters in our analytic sample; hence, we present the random-slopes estimation as our preferred specification.

Note that missing values have been imputed by means of multiple imputation by chained equations in order to minimize any potential bias due to item non-response. Estimated standard errors have correspondingly been corrected using Rubin's rule.

6. Results

The results are presented in Table 1 in stepwise fashion. Model 1 estimates the effect of economic growth on the constant of the regression, net of the effect of a number of relevant covariates, including the gender and migrant status of the student. The effects of the control variables are largely unsurprising: good students expect to have longer educational careers (Breen, 1999), girls have lower expectations than boys and immigrant children are more optimistic and/or more ambitious than the children of native-born parents, which coincide with the standard findings in the literature (Kao and Tienda, 1995). The two indicators of family background exert the expected effects, too, with household material and educational resources both being associated with higher educational expectations.

More importantly, even after controlling for differences in national GDP per capita, growth rates have a significant effect on children's educational plans. The analysis suggests that, consistent with H1b, an expanding economy is associated with more educational ambition at the individual level across countries: a unit increase in GDP annual growth is associated with an increase of almost 1 point in educational expectations (0.914 on the 100-point scale); this effect is statistically significant. Economic contractions are thus connected with lower educational expectations, probably as a consequence of either income losses or rising fees making education less affordable. Alternatively, spending cuts (Barr and Turner, 2013) may have led to diminished quality of education.

Our second set of hypotheses refers to the impact of economic growth on social inequality in conditional expectations. Once it is established that economic recessions have a negative effect on expectations on average, in this step our substantive interest is not anymore in

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Table 1. Random slopes hierarchical linear models of educational expectations

		Model 1		Model 2		Model 3	
		β	*se*	*β*	*se*	*β*	*Se*
Prior performance *(ref. 1st quintile)*	2nd Quintile (Q2)	7.040***	0.126	7.040***	0.126	5.867***	0.228
	3rd Quintile (Q3)	11.670***	0.126	11.670***	0.126	10.877***	0.225
	4th Quintile (Q4)	15.559***	0.126	15.559***	0.126	15.161***	0.229
	5th Quintile (Q5)	19.331***	0.130	19.332***	0.130	19.473***	0.238
Controls	Female *(ref. male)*	−4.450***	0.077	−4.450***	0.077	−4.452***	0.077
	Native *(ref. migrant parents)*	−2.120***	0.150	−2.120***	0.150	−2.113***	0.150
Family resources	Educational resources	0.201***	0.011	0.241***	0.018	0.239***	0.018
	Material resources	1.480***	0.149	1.840***	0.261	1.841***	0.260
Economic context	GDP per capita (in thousands)	0.268**	0.091	0.268**	0.091	0.268**	0.091
	GDP growth (annual %)	0.914*	0.398	0.914*	0.398	0.768+	0.400
Interactions	Educational res. × growth			−0.013*	0.005	−0.012*	0.005
	Material res. × growth			−0.118+	0.069	−0.117+	0.069
	Q2 × growth					0.390***	0.062
	Q3 × growth					0.263***	0.062
	Q4 × growth					0.132*	0.063
	Q5 × growth					−0.046	0.066
Constant		77.458***	0.826	77.459***	0.826	77.454***	0.826
Random components	Random intercept	−2.474***	0.090	−2.519***	0.091	−2.519***	0.091
	Random slope (education)	0.062	0.107	0.040	0.110	0.038	0.110
	Random slope (material)	1.866***	0.090	1.866***	0.090	1.866***	0.090
N of students		235,020		235,020	235,020	235,020	
N of countries/clusters		24/59		24/59		24/59	

Note: *$P < 0.05$; **$P < 0.01$; ***$P < 0.001$; standard errors in parentheses. Level 1 is the student; level 2 is the country-year cluster.

the constant of the equation, but in the slope of the social origin effect. According to H2a, we expect an increasing level of inequality in expectations when the economy shrinks, whereas H2b suggests a decreasing gradient. To examine whether economic growth affects the way in which social background variables produce inequality, parental education and household material resources, respectively, are interacted with GDP growth rates in Model 2. Our results suggest that the impact of the economic context on expectations is identical in terms of sign regardless of which of these two variables is used. An expanding economy decreases the main effects of parental education (0.241) and the amount of household material resources (1.840) by 0.013 and 0.118, respectively, per percentage point of growth. As the negative interaction terms indicate, as the economy grows, higher levels of resources are less closely associated with offspring's educational expectations. Vice versa, when the economy shrinks, parental background becomes more decisive for expectations, and therefore social inequality in the distribution of educational expectations becomes reinforced. Note that the main effect of GDP growth in this model still indicates that, for the general case, educational expectations are more ambitious when the economy grows (as stipulated by H1b). To sum up, H2a is confirmed for both sources of (dis)advantage. It turns out that the intensity to which the two different kinds of household resources impact on educational expectations does indeed hinge on the broader economic context. In general, both educational and material resources have a positive impact on expectations, but this relationship is weakened during times of economic expansion. In contrast, when growth rates go down, material and cultural deprivation become even stronger predictors of educational expectations.

One relevant aspect of our results so far refers to the relative strength of each type of resources, educational vis-a`-vis material, in the configuration of educational expectations as a consequence of changes in the economic cycle. This nexus is illustrated in Figure 4 (based on Model 2 in Table 1) which, maps the effect corresponding to a three and five percentage points decrease in GDP on the expected level of education for students belonging to households with different levels of resources. A drop of five points has been observed for instance in Singapore between 2007 and 2011; it also roughly corresponds to the difference in growth rates in 2011 between the USA and China (see Table A.1 in the Appendix). By comparing the falling expectations in the two recession scenarios illustrated in Figure 4, two findings are noteworthy. First, the decline in expectations seems to be stronger the more profound the economic contraction is. Secondly, it becomes clear that those with fewer resources, whether cultural or economic, are more heavily affected by recessions. However, the gap between those with different educational resources is substantially more marked than the difference when material assets are considered. Additional tests (data not shown) confirm that this is due to the use of random slopes in Model 2 and the fact that the cross-cluster variance component related to material resources is remarkably larger than the one associated to parental education.

To test H3, Model 3 explores the impact that a changing economy has on a further type of inequality: disparities stemming from the students' prior school results. In order to explore the role of cognitive inequalities, the model includes a number of interactions with student performance, measured in quintiles referring to standardized test scores in mathematics. Our third hypothesis suggested that origin-based inequalities in educational expectations across students are at their maximum among average performers. Since good and bad grades send clearer signals both to students and their families (regardless of social

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background), it is unlikely that the change in the rate of economic growth substantially alters their prospects regarding future school careers. However, students in the middle range of the distribution are likely to be less certain about their chances of succeeding in the subsequent stage of the education system. This uncertainty could be reinforced when the economy contracts and expected returns in the labor market decrease. Accordingly, we expect a curvilinear (hump-shaped) pattern in interaction effects between growth and grades. The results of our estimation fully support this theoretical expectation: the impact of annual GDP growth is at its maximum for students in Q2 (0.390) and Q3 (0.263), with the reference category being Q1. Both of these interaction terms are larger than those corresponding to the fourth and fifth quintiles, which do not differ significantly from Q1. It is worth noting that our estimates control for parental resources, and that the inclusion of interactions to account for performance-specific expectations in the model does not substantially change the rest of the parameters. Our results confirm the hump-shaped association between economic growth and academic performance stated in the third hypothesis. Economic growth boosts the expectations of children with mid-level grades. In fact, the interaction effects show that the top-performing students, as well as those with the worst grades, are unaffected by economic growth rates. In accordance with H3, then, growth seems to lead to optimism about educational outcomes, but this 'rose-colored glasses' effect appears to be restricted to children found in the middle section of the grade spectrum. Moreover, given that the interaction is much stronger for the second quintile (Q2) when compared with the fourth (Q4), the finding seems to fall in line with the general pattern of economic growth having an equalizing effect on educational expectations.

In Section 2, we argued that institutional arrangements are crucial to understand cross-country variation in our outcome of interest. So as to increase the confidence in our results, in this final part of the article, we explore whether differences in key institutional characteristics of education systems and in the level of inequality across countries might explain the pattern observed in Table 1. Specifically, Table 2 re-estimates model 2 from Table 1 while controlling for: (a) two variables reflecting the level of inequality, namely unemployment rate and the Gini coefficient referred to income (we refer to these as inequality related factors in Model 1), and (b) three salient features of educational systems, namely the first age of tracking, the level of public expenditure on education as a percentage of GDP, and the coverage of vocational training (shown in Model 2). A joint contrast of all these macro controls is provided in Model 3. Finally, two-way fixed effects models are implemented in Models 4 and 5 that include both country and year dummies (and clustered standard errors) to control for any national or time-specific idiosyncrasies. By exclusively exploiting within-country changes in growth these models account for unobserved cross-country heterogeneity, although we inevitably lose the six country cases that only participated in one installment of TIMSS.

Interestingly, in the random slopes models, the inclusion of macro factors renders the coefficients of our variables of the economic climate, namely GDP level and GDP growth, not significant. This is the combined result of the positive correlation between growth and income inequality that we observe in our sample, on the one hand (Models 1 and 3), and the fact that part of the effect of the economic climate on expectations is actually due to country differences in educational institutions, on the other (Models 2 and 3). This finding would mean no specific support for either H1a or H1b. The rest of the substantive results remain, in these first three models, unaltered. Using, alternatively, two-way fixed effects models (in

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Table 2. Macro-level estimations: determinants of educational expectations controlling for societal factors

Random intercept models (except M4 and M5)	(1) Inequality-related factors	(2) Educational system	(3) All (1 + 2)	(4) 2-way Fixed-Effects Model	(5) 2-way Fixed-Effects with inequality-related factors
Math scores (Ref. 1st Quintile)					
2nd Quintile (Q2)	7.040***	6.740***	6.740***	7.200***	7.200***
3rd Quintile (Q3)	11.670***	11.205***	11.205***	11.715***	11.715***
4th Quintile (Q4)	15.559***	15.011***	15.011***	15.448***	15.448***
5th Quintile (Q5)	19.332***	18.810***	18.810***	19.028***	19.028***
Female (ref. male)	−4.450***	−4.251***	−4.251***	−4.504***	−4.504***
Native (ref. migrant parents)	−2.119***	−2.366***	−2.365***	−2.266***	−2.266***
Educational resources	0.241***	0.255***	0.255***	0.235***	0.235***
Material resources	1.839***	1.971***	1.971***	1.871***	1.871***
GDP per cap (in thousands)	0.11	0.173	0.108	0.730***	0.630***
GDP growth (annual %)	0.269	0.585	0.298	0.647*	0.532+
Educational resources × GDP growth	−0.013*	−0.018**	−0.018**	−0.016**	−0.016**
Material resources × GDP growth	−0.118+	−0.165*	−0.165*	−0.125*	−0.125*
Unemployment (% of total labor force)	−0.277		−0.227		0.133
Gini coefficient of income inequality	0.442***		0.518***		0.290*
First age of selection in education system		−0.183	−0.373		
Government expenditure on education. % of GDP		−0.907	1.238		
Vocational training (%) PISA 2012		−0.120+	−0.025		
Survey Year (ref. 2003)					
2007				−3.501***	−2.527*
2011			–	−3.582***	−3.516***
Country (Ref. USA)			–		
Australia			–	−6.734**	−4.143*
Canada			–	3.992***	5.218***

continued

dom intercept models (except M4 and M5)	(1) Inequality-related factors	(2) Educational system	(3) All (1 + 2)	(4) 2-way Fixed-Effects Model	(5) 2-way Fixed-E inequality-rela
Cyprus				9.265***	11.6
HongKong				0.908	−0.7
Hungary				9.602***	10.9
Israel				10.806***	9.9
Japan				−7.116***	−5.4
Korea				14.411***	15.6
Lithuania				7.748**	8.3
NewZealand				−1.694	−0.6
Norway				−6.858***	−1.0
Singapore				−7.751***	−7.8
Slovenia				1.83	5.2
Spain				0.79	2.0
Sweden				−6.580***	−2.3
UK				−6.444***	−4.8
stant	76.282***	75.492***	76.449***	77.005***	75.5
dom intercept	2.519	2.532	2.532		
dom slope (education)	0.040	0.056	0.056		
dom slope (material)	1.767	1.88	1.787		
servations	235,020	218,070	218,070	213,280	213,280
untries	24	21	21	18	18

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Models 4 and 5), none of the different model specifications challenge the findings shown in Table 1.

7. Conclusions

When trying to address the impact of macro variables in shaping educational careers across countries, mainstream comparative research has mostly focused on the institutional design of education systems as the main explanatory factor. Our article contributes to this literature by focusing on the role of economic context in the formation of educational expectations among students in the final stages of their compulsory education. Our results demonstrate that educational expectations are sensitive to external shocks altering the economic context in which actors are immersed. This finding is consistent with recent evidence showing that educational expectations are more malleable than traditionally thought as youth adjust their beliefs to family economic difficulties (Renzulli and Barr, 2017).

More specifically, our analysis suggests that the state of a country's economy has a twofold effect on the expectations that students hold (conditional on their prior school results). In periods of economic growth, students on average tend to be more optimistic and/or more ambitious about their future educational careers. Economic contraction, conversely, results in diminished expectations for the average student. In other words, the income effect of growth (i.e. more available resources to pay the direct and indirect costs of education) seems to overcome the possible substitution effect (i.e. more attractive outside options for school-leaving students in the labor market).

Besides this general implication for the average level of expectations, our empirical evidence has shown that economic recession is likely to boost the degree of inequality of expectations by social origin. The recent economic downturn led to stronger social background effects on educational expectations, arguably because income losses mostly affect the parents of disadvantaged, youth inducing the need to abandon educational programs and enter the labor market. Perhaps the offspring of privileged parents simply hold inelastic expectations fixated on obtaining college degrees. Alternatively, this finding of accentuated social inequalities may be due to advantaged students benefiting from more accurate information about the expected payoffs of educational credentials during economic down times. While children from more advantaged social origins, with the help of their parents, could better understand the increased importance of education in times of crisis and thus prolong their educational careers accordingly, children from lower social origins appear not to fully perceive that returns to education increase during economic downturns, offering few benefits to early school leavers. In this way, economic recessions appear to not only lead to greater social inequality in the short term by exacerbating social background effects on children's educational attainment. Because of the manifold implications of education for later achievement, economic crises are additionally likely to have enduring effects on social disparities and life chances in the long term. It should be noted that this finding proved robust with respect to the indicator of background used, i.e. whether social origins are measured in terms of parental education or in terms of the household's material resources. It also remains unchanged when specific controls for variability in educational institutions and income inequality are included. Results are also substantively unchanged when separate analyses are carried out for boys and girls (see Supplementary Appendix, Table OA.2).

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The present research has three important limitations that need to be addressed. First and most importantly, our analytical strategy is not capable of strictly identifying causal effects. While we contend that the presented hierarchical models make the best use of the available data, and country/year two-way fixed effects models produce equivalent results, we cannot rule out the possibility of unobserved heterogeneity distorting the estimated coefficients. For example, ongoing institutional changes (such as educational reforms, access to credit, or labor market policies oriented to youth) in certain countries may condition educational expectations in ways that bias our estimates of the impact of economic growth. Indeed, our finding of procyclical expectations is at odds with previous single-country studies that focus on educational enrolment in the USA (Dellas and Koubi, 2003; Johnson, 2013; Pöyliö, 2017). Besides, because of data constraints, we could only comparatively study the impact of the Great Recession on educational expectations at the end of compulsory education. While this is arguably the most critical period of educational decision-making, educational decisions at later stages are beyond the study's scope. Particularly, the impact of economic tide on the transition to higher education would merit further investigation.

Despite these limitations, our paper brings to the forefront the existence of long-term threats to the goal of granting an equal distribution of educational opportunities in advanced societies that economic crises could trigger. The policy implications of our findings are numerous and should inspire a careful rethinking of the composition of public spending on education during harsh economic times, so as to maximize the protection of socially disadvantaged students whose attention and efforts could be otherwise even less decisively committed to achieving higher levels of education. Our findings on educational disparities, which are consistent with Torche's conclusions (2010) for Latin America, have further implications for broader societal inequalities since expectations could also affect the distribution of skills in the labor market and, eventually, wages and market income inequalities. Finally, future research should also explore how increasing preferences for education at the global level may reshape our conclusions, hopefully mitigating the concerning trend of increasing long-term educational inequalities arising from economic recession.

Supplementary material

Supplementary material is available at SOCECO online.

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Australia	GDP growth	3.2	3.8	1.9	12
	GDP per cap.	31.0	33.7	34.4	
Belgium	GDP growth	0.8			3
	GDP per cap.	30.9			
Canada	GDP growth	1.9	2.2	2.5	29
	GDP per cap.	33.6	36.1	35.7	
Chile	GDP growth			6.0	5
	GDP per cap.			15.3	
Cyprus	GDP growth	1.9	5.1		6
	GDP per cap.	23.6	25.8		
Czech Republic	GDP growth		5.7		4
	GDP per cap.		23.8		
Finland	GDP growth	3.1	6.5	4.9	2
	GDP per cap.	31.6	40.8	44.6	
Hong Kong	GDP growth	3.9	0.1	1.7	11
	GDP per cap.	15.5	17.7	17.3	
Hungary	GDP growth	1.5	5.5	4.7	11
	GDP per cap.	22.0	25.1	26.7	
Israel	GDP growth	0.0	1.7	0.4	10
	GDP per cap.	28.0	29.0	27.1	
Italy	GDP growth	1.7	2.2	−0.7	11
	GDP per cap.	29.4	31.6	30.7	
Japan	GDP growth	2.8	5.1	3.6	11
	GDP per cap.	21.1	24.9	27.5	
Korea	GDP growth	.	9.8	5.9	13
	GDP per cap.		17.0	16.9	
Lithuania	GDP growth	.	4.3		6
	GDP per cap.		22.1		
Malta	GDP growth	0.3			3
	GDP per cap.	33.8			
Netherlands	GDP growth	1.0	2.7	1.4	2
	GDP per cap.	45.2	49.2	47.0	
New Zealand	GDP growth	4.3		1.0	6
	GDP per cap.	24.2		24.4	
Norway	GDP growth	4.6	8.9	4.9	8
	GDP per cap.	40.1	49.9	53.6	
Singapore	GDP growth	2.9	6.9	−0.2	14
	GDP per cap.	21.7	26.3	25.0	
Slovenia	GDP growth	2.3	3.3	3.9	9
	GDP per cap.	30.7	34.8	35.2	
Spain	GDP growth	3.1	6.5	4.9	1
	GDP per cap.	31.6	40.8	44.6	
Sweden	GDP growth	3.9	0.1	1.7	10
	GDP per cap.	15.5	17.7	17.3	

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Table A1. Continued

Country		2003	2007	2011	Sample
United Kingdom	GDP growth	3.8	3.6	0.8	12 937
	GDP per cap.	31.5	34.6	32.9	
United States	GDP growth	2.6	1.9	1.7	25 841
	GDP per cap.	40.6	43.6	42.5	
Total	GDP growth	2.4	4.1	2.6	235 020
	GDP per cap.	31.0	32.6	32.5	

Note: GDP growth is measured in percent. GDP per capita is expressed in thousands of dollars, PPP.

Table A2. Descriptive statistics

Individual-level variables[a]	Mean	Std. Dev.	[95% Conf. Int.]	
Continuous variables				
Expectations	80.26	22.56	80.17	80.35
Educational resources[b]	60.44	31.02	60.30	60.58
Material resources[b]	0.23	0.94	0.23	0.24
Score in mathematics	523.37	85.71	523.03	523.72
Dichotomous variables				
Female	49.6%	0.50	49.4%	49.8%
Native	91.3%	0.28	91.2%	91.4%
Macro-level variables[c]	Mean	Std. Dev.	Min.	Max.
GDP per capita (in thousands)[b]	31.81	8.89	15.25	53.59
Annual GDP growth (in %)	3.03	2.04	−0.70	9.84
Unemployment (%)[b]	6.07	2.23	1.90	12.4
Gini (0–100)[b]	34.62	8.05	22	52.6

[a]$N = 235\,020$ observations per imputation; $m = 5$ imputations.
[b]Pre-centering.
[c]Cross-country statistics based on 65 country/region-cohort clusters clustered within 24 countries.

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