Forever young: schooling incentives from crises?

A panel-data study for Europe (1980-2010)

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Abstract

Changes in labour market opportunities, income levels, government spending on education or in the expected returns to schooling –among others macroeconomic turbulences– may strongly affect the demand for education of the young generations. The current study evaluates the schooling responses to changes in these aggregate economic conditions using a panel data set with 33 European countries over the period 1980-2010. For high-income countries the theoretical models developed during the last decades as well as the empirical literature suggest a counter-cyclical pattern of the demand for education. The depth and length of the current crisis and the high disparities in the performance of the European economies necessitate a new evaluation though. The main results of the empirical estimations suggest that the pattern found for high-income countries like the US and the UK may not hold for the whole of Europe; since there is consistent evidence suggesting a pro-cyclical behaviour of the demand for education in European countries with relatively low income levels.

Key words: *education, human capital, economic cycle, substitution effect, income effect, panel-data*.

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I. Introduction

The current crisis has been of an unprecedented severity worldwide from the Great Depression times and undoubtedly the largest hit to the EU-block since it was conceived. The original turbulences of the US financial sector rapidly became a real sector problem in the developed world, economies which have accounted for most of the increase in global unemployment with young people bearing the brunt of the crisis impact (Ha et al, 2010; Bonnet et al 2012). At this time, roughly four years into the crisis, the discussions over how it begun and where the explanations may be found for its length and depth continue to resonate. Even more ubiquitous and pressing is the debate surrounding recovery strategies, mainly due to the sensitive nature of public spending cuts[1], and the latent fear of a euro break-up. However, less has been discussed about the effect of these turbulences on households' behavior, for the simple reason that statistical data for the crises years has only recently become available. Although regrettably Europe is not out of the woods yet[2], new studies keep emerging that attempt to measure the legacy of these recession years.

Given the described scenario, this study looks to analyze just one dimension of households' behavior which could be highly affected by the macroeconomic turbulences: the schooling choices by the youngest generations. During the last two decades, the empirical literature from prior recession episodes in different regions of the world has shown that sharp changes in labor opportunities, households' income levels, and public social spending –among other variables which are particularly sensitive to the economic cycle– can have an important effect on the demand for education. Hence, this paper tries to shed light on few simple questions: do young people living in Europe participate more or less in the formal education system when the economy faces negative or positive shocks? As suggested by theory for high-income countries, prior empirical findings for high-income countries and claimed by recent publications from the European authorities; do crises like the current one encourage young people to study more due to the lack of labour opportunities? Finally, is it possible to identify a general pattern for the region; for boys and girls or across lower and higher levels of education? To attempt to answer these questions, a panel data study is carried out for 33 European countries in the period 1980-2010.

During the last decades, scholars and policymakers have been increasingly interested in the evaluation of households' reactions to macroeconomic crises; mainly due to the potentially long-term effects they have, since the effects on early life investments in education tend to persist for a long time (Schady, 2001; Boffy-Ramirez et al, 2010). In particular, the relevance of the schooling dimension of these households' responses to crises comes from the crucial role that the process of human capital accumulation has in many socioeconomic dimensions. European governments explicitly agree that education is a key element to reinforce the skills

[1] Some countries have shown better performance in terms of job promotion for young people during the last years; however, "The shift to fiscal consolidation in a growing number of countries is reducing the scope for pursuing these effective policies. Such a cost-cutting approach would improve fiscal balances in the short term, but at the risk of perpetuating poor employment outcomes for youth in the longer term" ILO (2010).

[2] Uncertainty continues to dominate the projection scenarios and the prospects of global economic recovery, in particular for the European countries, remain weak in most of the recent publications of International Monetary Fund and World Bank; see IMF (2012), World Bank (2012). Within this framework of uncertainty, there is also a deep concern about the potential long-run effects in some low and middle-income economies, since they are often the last to recover from crises (UNDP, 2010)

levels, tackling at the same time one of the major risk factors for unemployment and poverty in order to achieve a "smart, sustainable and inclusive growth" (EU, 2012). This concern has been at the heart of the *Strategic Framework for European cooperation in education and training* (ET 2020); a recently adopted initiative with the aim to generate a guide for cooperation with common educational objectives towards 2020. Despite the exceptional progresses in the educational attainment levels experienced by the European economies from beginnings of the second half of the 20th century (OECD, 2011); there is still a long road to improve educational outcomes and reduce the performances' disparities between countries. During the last years there has been an increasing emphasis on two dimensions of educational progress within the ET2020, which are closely related to the participation rates of the young generations: higher educational attainment for young adults, and the proportion of youth population that leave school with low-secondary as best (the so called *early-school leavers*). It is estimated that more than 6 million of young people in Europe have abandoned the educational system before completing lower-secondary; situation which does not only represent "missed opportunities" for the youngsters but also a "loss of social and economic potential for the European Union as a whole" (EU, 2011). In the current economic situation, reducing this proportion as well as increasing higher education levels in the youngest generations are two powerful drivers to promote an economic growth based on knowledge and innovation which may enable economies to emerge stronger for the recession (EU, 2012). Hence, the main contribution of this research is to give new empirical evidence about how educational decisions are influenced by the economic cycle, trying to find general patterns for Europe but also going beyond the aggregate data in order to identify groups or regions of potential policy priority. Previous research on the subject[3] suggests a counter-cyclical response of human capital investment, particularly for high-income countries: this means an increase (decrease) in human capital investment during adverse (positive) macroeconomic shocks. However, these studies mainly refer to short-run crises; the depth and the length of the current crisis as well as the heterogeneous behavior of European countries in many socio-economic dimensions open the door to evaluating if this pattern holds in these new circumstances.

The theoretical framework for this research is based on the study of Ferreira and Schady (2008); which provides a simple theoretical model to understand the reactions of schooling demand in times of macroeconomic turbulences. Over the last decades, the high levels of youth unemployment has been a concerning problem in the European economies. This indicator for labour market opportunities has been the main variable used in the empirical literature to explain schooling reactions to changes in the macroeconomic conditions, since it is the most common measure for the opportunity cost of studying: higher unemployment rates discourage young people to enter into the labour market and promote higher levels of participation in the educational system. However, simultaneous changes in adults' unemployment rates, tuition fees or other private costs to education, as well as in households' income and public spending on education can potentially work in the opposite direction. For the case of an adverse shock, the theoretical model of Ferreira and Schady explains how the decline in unskilled wages (or an increase in youth unemployment rates) generates a pro-

[3] Card and Lumieux (2000); Chaudhuri and Maitra (2000); Heylen and Pozzi (2007); Ferreira and Schady (2008).

schooling effect (called *substitution effect)*, which acts against a pro-schooling effect coming from the decline in incomes (*income effect*) and the factors associated with the quality of education and the expected returns. Although the net effect of these mechanisms is *a priori* undetermined; certain patterns are more likely to occur under some circumstances. In particular, for high-income countries the *substitution effect* is expected to be strong enough to compensate the other forces, which leads to an expected counter-cyclical reaction of the demand for education.

Why is important to identify how young people react during the different phases of the economic cycle? Basically, it is crucial in order to understand the evolution in human capital accumulation –in particular its volatility– and because it has non-trivial policy implications. If the net impact of a recession leads to a decline in schooling demand (pro-cycle response), the long term consequences of these episodes may be even worse than expected; with potentially high impact on educational and income inequalities if the shock is biased towards individuals with a more disadvantaged socio-economic background. But problems may not only arise when schooling decreases; if, on the contrary, there is a temporary boom in the educational participation of young discouraged workers during a recession, the educational institutions may not be prepared for such a sudden increase in schooling demand. This phenomenon combined with a scenario of cuts in public funding may compromise the quality of education of entire generations; i.e. the "safe port" during this particular "storm"[4] may not be so safe. Moreover, if schooling demand increases during crises, the crucial moment to monitoring these outcomes in order to keep these higher levels of educational participation may be during the recovery process when labor opportunities start growing.

In order to answer the main questions that have inspire this research, the empirical strategy of this study takes from the theoretical model the main relationships and proposes two main equations to be estimated. One of them directly measures the impact of the economic cycle on schooling demand, whereas the other is specified to capture the influence of the mechanisms working from the cycle to the educational outcomes. From the estimation of these equations there is consistent evidence supporting the predictions of the model for the case of high-income countries (a counter-cyclical pattern); whereas, interestingly, the results for lower-income countries suggest a pro-cyclical one.

The paper is organized as follows: section II presents the theoretical framework; section III the literature review; section IV briefly describes the current educational situation with respect to the ET2020 objectives; section V presents the econometric strategy; section VI contains a brief description of the data, the indicators used for the variables and sample; section VII presents the main results of this study; and finally the conclusions can be found in section VIII, followed by the Bibliography the Appendix.

[4] "Safe Port in a Storm: The Impact of Labor Market Conditions on Community College Enrolments" is the title of one of the main papers of reference for the US in the literature, carried out by Julian R. Betts and Laurel McFarland in 1995.

II. Theoretical framework

There are multiple ways in which aggregate economic shocks can potentially affect the path of human capital investment in a country; by their impact in both supply and demand for education. This study looks to analyze schooling reactions from the demand side; therefore, a proper conceptual framework should be able to identify the main variables which are sensitive to these shocks, and at the same time influence the schooling decisions taken by households. Since the topic has received increasing attention in the last decade, there is no need to reinvent the wheel: Ferreira and Schady (2008)[5] propose a simple educational choice model based on a systematization of recent studies, identifying the mechanisms through which certain common turbulences of the economic cycle affect households' demand for education. One remarkable advantage of working with this framework is that its main assumptions and predictions are in general terms consistent with prior theoretical and empirical literature, and therefore it is possible to interpret other studies' outcomes from this approach.

As presented in F&S's paper, the final effect of aggregate shocks on the demand for education is *a priori* undetermined: the prediction in each case will depend on its individual circumstances (country-specific economic and social situation, educational outcome analyzed, and type of shock, among others). The model takes as its unit of analysis a household that lives for two periods and derives utility from total consumption during life. The human capital investment in its young members can be seen then as part of a time-allocation decision in an inter-temporal utility maximization problem. Hence, this specific framework is built on the basis of the standard neoclassical human capital model developed in the early nineteen-sixties by Gary Becker, Jacob Mincer and other precursors of this field. The following sub-section briefly describe the main characteristics of this general framework, highlighting the categories and assumptions that remain in the setting of the specific model presented by F&S for the case of aggregate shocks.

II.1. *Schooling decisions within the standard neoclassical model of human capital*

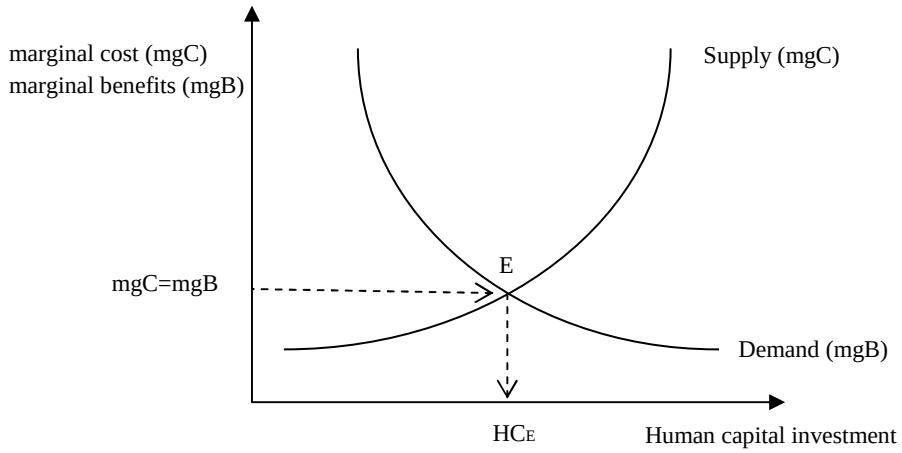
The human capital models developed in the nineteen-sixties introduced for the first time a complete theoretical pricing analysis of individual educational choices, with their implications for labor supply, wage determination and life-cycle income path (Freeman, 1986). In this context, the dual phenomenon of human capital decisions and labour market participation has become one of the main objects of study in the field of modern labour economics during the last decades (Mincer, 1994).

The crucial assumption of the human capital theory states that education is seen by individuals as an investment, with the particular feature that the capital is incorporated to the individuals for the rest of their lives; "since it becomes an integral part of a person, it cannot be bought or sold or treated as property under our institutions" (Schultz, 1960). Another assumption, which is not specific to this model but comes from the general framework of the neoclassical approach to microeconomics, is that individuals are rational and look to maximize their utility during life. In the case of schooling, the optimal decision is therefore determined on the basis of a cost-benefit analysis of this type of investment (Cahuc and Zylberberg, 2004): individuals acquire

[5] From now on "F&S"

schooling until the expected marginal benefit to an additional year of education equals its marginal cost (Becker, 1975). Monetary returns to education come from the labor market, and are derived from the enhanced productivity that follows human capital investment[6]. Since individuals have limited memory and processing capacity, and lives are finite by nature, each year of additional schooling is expected to generate lower additional benefits. This timing aspect of the investment plays a key role, as the decision to invest in schooling carries an associated opportunity cost: the forgone wages (or other types of earnings) that would otherwise have been earned in the time spent studying. Thus, although the function that relates expected marginal benefits with years of schooling may differ between individuals with different abilities and familiar backgrounds, the relationship between the expected marginal benefits and years of schooling is always negative, resulting in an individual demand of education which can be represented graphically as a curve with negative slope (see Figure 1). Additionally, education involves direct financial costs in order to afford tuition fees, transport or books, which are assumed to increase with each additional year of education due to the segmentation of capital markets[7]. Again, although the credit restrictions that individuals or households face may differ between them, the supply of funds –curve with positive slope– given by the relationship between the investment level of schooling and the marginal cost is always positive. Since the equilibrium is reached when the marginal cost equals the marginal benefits and given that individuals have their own demand and supply curve for education, the model predicts that those individuals with "higher" demand curves and "lower" supply curves will invest more than others, Becker (1975).

Figure 1. Optimal educational investment in Becker's human capital model



[6] This according to human capital theory; signalling models, on the contrary, argue that the returns to education come from the signal that it provides about the abilities of individuals and not as a result of changes in productivity (Spence, 1973). However, as Weiss (1995) argues, this connection between schooling and wages can be easily integrated to the human capital models of schooling decisions in their core dynamic of cost-benefit analysis, simply introducing a different causality vector between these variables (education-returns).

[7] Money can be at first supplied by savings or family loans, but for further investment it may be necessary to apply to formal sources for a loan in which the capital cannot be provided as guarantee, as it is incorporated in the individual.

For an individual facing a demand and supply curve as the ones shown in Figure 1, there is an equilibrium point where the marginal benefit of an extra year of schooling or human capital investment equals its marginal cost (point E). Once reached this equilibrium point, there are no further incentives to achieve additional years of schooling, since any higher level of education will conduce to a marginal cost exceeding the expected marginal benefits. Following the same reasoning, the decision to interrupt schooling investment before point E could not be considered rational, since with more schooling the expected marginal benefit would exceed the marginal cost, and therefore there is more space to win from further investments.

II. 2. *Schooling decisions and aggregate shocks: income* vs. *substitution effect*

F&S introduce a simple unitary model[8] of educational choice to explain the effects of aggregate shocks on schooling decisions taken by a representative household that lives for two periods and is dependent on consumption in both periods for total utility[9]. Therefore the key trade-off appears between youths' work (which increases first period consumption with an "unskilled" wage) and schooling (which increases consumption in the second-period with a "skilled" wage). Labour earnings in the second period depend on the human capital investment in period one, a function of the time spent studying and also of the quality of the education received, which is exogenous to this model.

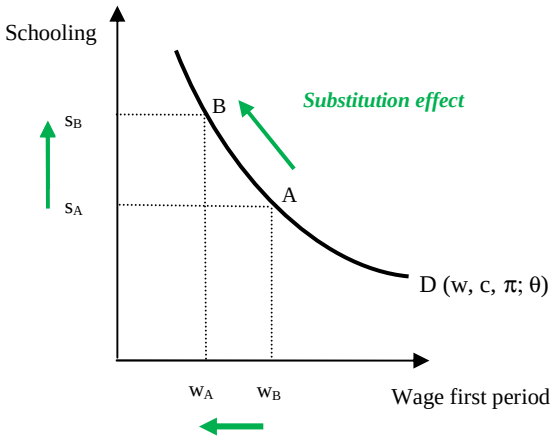
Within this setting, four variables which are potentially sensitive to the economic cycle and at the same time affect the schooling decision taken by the household are identified: i) the (unskilled) wage in the first period (w); ii) the consumption level in the first period (c) or the interest rate in the first period (r); iii) the quality of education in the first period (θ); and iv) expected returns to education in the second period (π). The *substitution effect* comes from the impact of the macroeconomic shocks on the first factor listed: when the shock is positive (negative), wages –and so the opportunity cost of studying– increase (decrease) leading, *ceteris paribus*, to a fall (rise) in the demand for education. Therefore, when the economy faces a period of recession, the model predicts a "pro-schooling" *substitution effect*. A simple illustration may aid understanding of how this mechanism works. In Figure 1 the quantity of schooling demanded is plotted against wages of the first period; and therefore it is possible to draw a demand curve for education with a negative slope. Starting in point A, the negative shock reduces wages from w_A to w_B resulting in a movement along the demand curve that increases the schooling level from s_A to s_B[10]. The final situation –*ceteris paribus*– is represented by point B, with higher levels of human capital investment during a period of economic contraction.

[8] In the literature, the so called "unitary models" for intra-familiar decisions refer to a household as a "small factory" or a "collection of individuals" who "behave as if in agreement to combine time and goods to produce commodities that maximize a common welfare index", Chiappori et al (1993). The main advantage of these models is their simplicity which allows for a diversity of issues that can be addressed; however, their theoretical foundations are weak and restrictive among other limitations that the "collective" models approach tries to overcome.

[9] This model is based the original model from an unpublished manuscript of Francisco Ferreira, "The Economic Rationale of Conditional Cash Transfers" (World Bank, Development Research Group, 2008); Ferreira and Schady (2008).

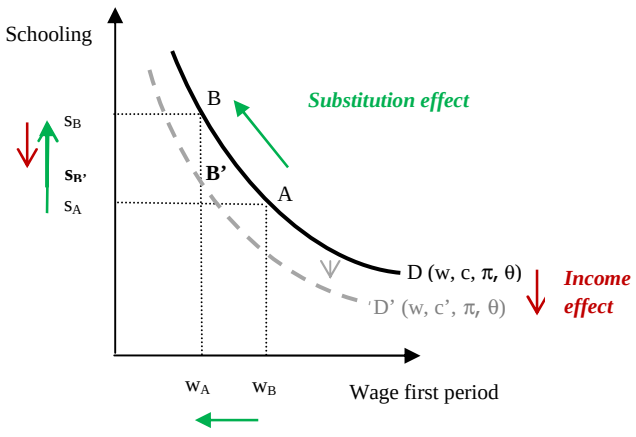
[10] There is no shift in the curve due to the shock since the wage is the independent variable chosen for the horizontal axis.

Figure 2. The pro-schooling substitution effect during a negative aggregate shock

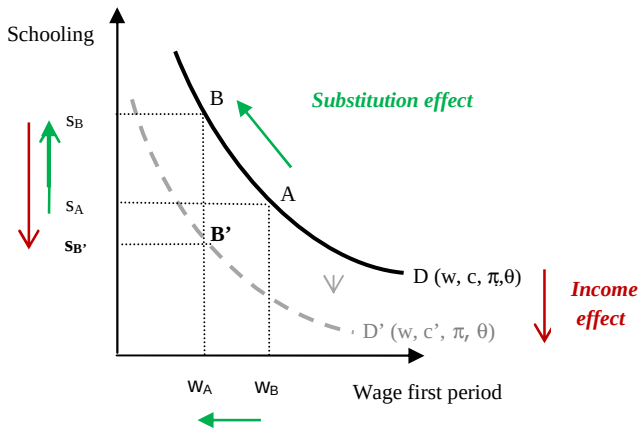


However, during these negative or positive aggregate shocks there is at least one other parameter expected to be affected: the household's income or consumption level. Following with the illustration for the case of a negative shock, where incomes are expected to decrease, the model predicts different reactions depending on whether families can smooth the shock through credit access or not. If the household can easily borrow money in a functioning credit market to smooth the effect of the shock in the first period, the demand for education may remain unchanged. In this case, the determinant of schooling decisions is not the initial level of income/consumption (c) but the interest rate (r). However, when families face financial restrictions during the recession period, the decline in income/consumption raises the marginal utility of whatever the youth can contribute to the household's budget in period one, resulting in an "anti-schooling" *income effect*. This effect is considered by F&S as the main candidate to compensate the pro-schooling effect coming from the declines in unskilled wages of the first period (*substitution effect*).

Figure 3. The anti-schooling income effect during a negative aggregate shock



Panel A. The *income effect* does not offset the *substitution effect;* schooling increases



Panel B. The *income effect* offsets the *substitution effect;* schooling decreases

Which effect is expected to win? The net result of both mechanisms working on opposite directions cannot be theoretically determined *a priori.* Figure 3 shows how the *income effect* shifts the schooling demand curve downward (from D to D'), leading to a fall in the optimal educational investment by the household for every value of unskilled wages in the first period. In both cases represented (panel A and panel B) the negative aggregate shock moves the optimal equilibrium from point A to B due to the *substitution effect*, and from B to B' due to the *income effect*. However, in the first case (Panel A) the *income effect* is relatively weak and does not offset the pro-schooling *substitution effect* whereas in the second case (Panel B) the shift in the demand curve is large enough to offsets the *substitution effect* and even generate a decrease in the optimal schooling investment. The other two shifters of the demand of education, the expected returns (θ) and the quality of education (π) can also reinforce this anti-schooling effect on the quantity demanded during negative phases of the economic cycle. It may be the case in deep recessions, persistent macroeconomic shocks or in special labor market circumstances that the expected returns to education decrease[11]. If the reduction is proportional in all levels of schooling or if the decrease of skilled wages is proportionally larger than the decrease in unskilled wages, the marginal benefit of schooling falls, discouraging schooling during recessions. With respect to the quality of education, the negative effect may come, for instance, from cuts in public budget on materials or teacher salaries. This effect may be more likely to occur in systems where public education plays a leading role. If contemporaneous quality of education decreases, every hour invested in studying generates lower expected benefits from education, making schooling less attractive.

Figure 4. The four mechanisms of the model working together and the undetermined overall effect

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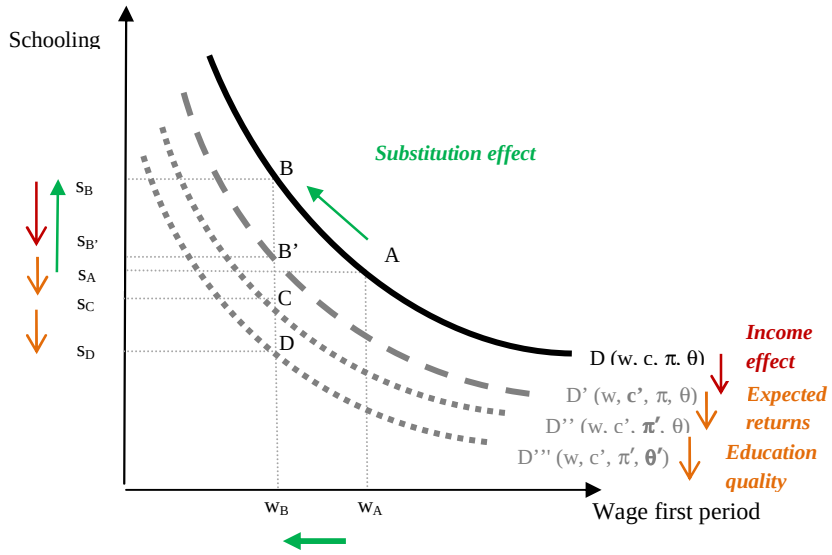


If either of these factors are negatively affected by an adverse aggregate shock, the demand for education shifts downwards (see Figure 4), which makes schooling more likely to be pro-cyclical (i.e. decreasing during

[11] This would be the "case of a recession leading to larger (proportional) declines in income for more skilled workers, and if a component of this shift were expected to be permanent" (Ferreira and Schady, 2008)

negative shocks). The movement of the demand curve from D' to D'', and from D'' to D''' corresponds with the expected returns and education quality effects, respectively. Although these factors receive less attention in the analysis of the model –presumably due to their more complex causal link with aggregate shocks and the difficulties in empirically measuring these variables–, in the dynamics of the model, as shifters of the demand curve for education, they play an important role consistent with prior literature about crises and human capital.

II.3. *Predictions of the model*

Which is the overall reaction of the demand for education during aggregate economic shocks? The model provides an answer conditional to the strength of the mechanisms identified: if the *substitution effect* offsets the other three mechanisms, a counter-cyclically behavior of the demand of education is expected, i.e. an increase (decrease) in human capital investment during negative (positive) aggregate shocks. If, on the contrary, the *substitution effect* is not strong enough to compensate these other forces (as in the example shown in Figure 4), a pro-cyclical behavior is expected, i.e. a decrease (increase) in human capital investment during negative (positive) aggregate shocks. Hence, in theory, it is not possible to identify the final unconditional net effect of these four mechanisms without measuring their strength.

However, there are at least four predictions the authors derive from the model: (i) "the degree of development of credit market matters": it is expected a smaller *income effect* when access to credit is more widespread; (ii) if access to credit is limited "the initial level of income matters"; therefore, the *income effect* should be larger in poorer countries or among poorer households (meaning that it is more likely to find a counter-cyclical demand for education in high-income countries like Western-Europeans, a pro-cyclical pattern in lower income countries, while no prediction is possible for the case of middle-income countries like Latin-American or Eastern Europeans; (iii) for a given initial level of income and for any given level of unskilled wage, "the magnitude and expected duration of the crisis matter": deeper and longer crises are more likely to lead to pro-cyclical outcomes in schooling due to the reinforced anti-schooling effect given by a potential decrease in the expected returns to schooling; (iv) *ceteris paribus*, any reduction in the quality of the public education also reinforces the pro-cyclical trend of the *income effect*[12].

Figure 5. Predicted behavior of the demand for education under credit market restrictions

High-income countries	→	Counter-cyclical
Low-income countries	→	Pro-cyclical
Middle-income countries	→	Ambiguous

[12] The precise mechanism through which this "quality effect" operates depends on many characteristics of the educational system, as the relative importance of the private and public sectors in the provision of these services. For households using the private sector the quality effect can be reinterpreted as another aspect of the *income effect*: "households can afford less and can adjust their demand either on the quantity or quality margin (or both), say by visiting cheaper providers"; however, where the public sector plays a key role the "quality effect" could indeed reinforce the *income effect* coming from a pro-cyclically behaviour of public spending on education. If there were some link between expenditures and service quality, then cuts in public spending on these services may reduce the value to households of using schooling services. Moreover, the negative effect of public spending may be compounded in countries where public sector services are seen as inferior to private sector alternatives since recessions are likely to increase the demand for the public services, affecting the quality in times of fewer resources.

III. Literature review

Since the net effect of aggregate shocks on schooling decisions is undetermined in theory; there is a crucial role of empirical studies for each country, and even within the same country for different shock episodes. During the last decades the empirical literature has shed light on this phenomenon; giving a broad support to the general predictions of F&S's model: rich (poor) countries tend to show a counter-cyclical (pro-cyclical) behavior of schooling demand; while for middle-income countries the empirical picture is mixed. In all cases, what is generally found is that young people do not only face the highest unemployment rates and the most precarious jobs, but also show a particularly elastic behaviour with respect to economic shocks. To briefly describe the main findings, this section is divided in two parts: the first one with country-based studies, and the second one for studies covering groups of countries. At the end of each section there are summary tables with the principal results and basic information about the papers.

III.1. Country-based studies

The results obtained so far by the literature for low-income countries in Africa and Asia show similar patterns; the schooling demand shows a pro-cyclically pattern. For instance, Dillon (2008) reports a negative impact of production shocks on schooling demand in Mali, and highlights that these decisions taken during adverse times have serious potential long-term effects on children's welfare. Similarly, for Nigeria, the study published by CODESRIA (2009) analyzes the effects of the crisis of the early nineteen-eighties generated by the collapse of oil prices and also finds a significant negative effect on human capital accumulation. This negative reaction has been also documented for the case of adverse production shocks in rural areas; in countries like Cote d'Ivoire[13] (Jensen, 2000) and Malawi[14] (World Bank, 2007). Moving to Asia, Jacoby and Skoufias (1997) analyze how time-allocation decisions taken by Indian households are distorted by different type of shocks, finding a particularly negative influence of crop shocks on children's participation in schools. In line with these results, Guarcello et al (2008) also reports a pro-cyclical reaction of the demand for education during adverse production shocks for rural Cambodia. Moreover, with respect to the financial crisis of the mid-nineties in this region, many studies have documented a detriment of educational outcomes (see for the case of Indonesia the studies of Thomas et al (2001) and Sparrow (2004); and Lim (2000) for Philippines.

Overall, young people in low-income countries tend to leave school during negative economic shocks, where child labour is typically used as a self-insurance strategy followed by households facing unexpected reductions in their consumption levels. These strategies may be the only resource when families cannot smooth shocks with credit access and when there is a lack of safety net programs; explaining why the negative effect of crises on capital accumulation in these countries is potentially large (Jacoby and Skoufias, 1997)

[13] Jansen (2000) estimates that school enrolment of boys (girls) grew by 5 (10) percentage points in non affected villages of Cote d'Ivoire, while in those affected enrolment of boys (girls) fell by 14 (11) percentage points.

[14] World Bank (2007) reports an increase of 23 percent in the fraction of students who missed two or more consecutive weeks of instruction in the last 12 months as a reaction of a rainfall shock of 10 percent below the long-run average.

Latin-America is a region that has received particular attention in this field, since the educational disadvantage suffered by individuals coming from poorer households –which are usually those who suffer the most from crises– is found to be one of the main factors behind the persistently high levels of income inequality of this region (PNUD, 2010)[15]. In line with F&S's predictions, low-income countries in this region like Guatemala (Guarcello et al, 2002) and Honduras (Gritter and Barhman, 2007) also show a pro-cyclical reaction of schooling, as in the case of African and Asian economies[16]. However, the most interesting results may come from the mixed evidence about middle-income countries; from which the theoretical predicted sign is undetermined. In Mexico, for example, the demand for education tends to increase during recessions due to a strong *substitution effect.* This phenomenon is well documented for the contractions of 1982-83 and 1986 (Binder, 1999) as well as for the "Peso crisis" of 1994-95 in McKenzie (2003)[17] and Skoufias and Parker, (2006)[18] respectively. This counter-cyclical pattern is also found for Peru (Schady, 2004)[19] and Brazil. For the latter, Duryea and Arends-Kuenning (2003) find a particularly high –and negative– elasticity of boys' participation in school with respect to changes in the unskilled wages during the recessions of beginnings of the eighties and nineties; results that are supported by more recent studies (Kruger, 2007 and Guarcello et al, 2008) [20]. For its neighbour, Argentina the last recession of 1998-2002 also seemed to have affected positively the schooling attendance in these countries (López-Bóo, 2008[21]), although the study of Rucci (2004) carried out for the same crisis period suggests the opposite effect: a negative impact of this crisis on schooling, explaining a decline of between 4.2 and 11 percent in attendance rates of youngsters of 12-17 year old. The mixed picture does not only come from different results obtained for the same countries, but also from the pro-cyclical evidence related with the cases of Chile (De Ferranti, 2000[22]; Checchi and García-Peñaloza, 2004[23]), Venezuela (Blanco and Valdivia, 2006) and Costa Rica (Funkhouser, 1999[24]). In the last case, Funkhouser finds that the sharp decline of incomes in 1981-83, period in which wages fell approximately 50

[15] This paper estimates the correlation between the familiar background and educational achievements from one generation to other. While for the US the coefficient is estimated in 0.21, for LAC the values go from 0.37 (Paraguay) to 0.61 (El Salvador).

[16] The case of Nicaragua, a poor country that has experienced an increase in schooling demand during crises (Maluccio, 2005) may be considered as an exception to the empirical findings supporting the predictions of F&S's model.

[17] McKenzie uses household surveys for 1992, 1994, 1996 and 1998 and a differences-in-differences approach to test for changes in school enrolment before, during and after the crisis. Given some independently trends, enrolment rates were significantly higher during the period of crisis and more evident for males aged 15-20.

[18] For this same crisis period, Skoufias and Parker find that changes in employment situation of households' adult members lead to an "added-work effect" that tends to protect the potential adverse effects of crises on human capital investment for the young members: it is the adult woman who reacts to the household' income loss due to the unemployment of the adult male, increasing her participation in the labour market.

[19]From a probit regression based on a pooled cross-section of household surveys for the years before, during and after the crisis, Schady (2004) finds that whereas the probability of being employed –for youngsters between 12-17 years old– was significantly lower during the crisis, the effect on attendance was almost not significant. However, the effect is significant considering years of schooling.

[20] Neri and Thomas (2000) may constitute an exception in the literature about this country. They suggest that enrolment decisions are unaffected by macroeconomic conditions in Brazil, and even more: grade attainment appears to suffer during a crisis.

[21] López-Bóo analyzes the joint decisions of schooling and labour market participation with a multinomial logit and estimates that half of the enrolment increase during the crisis period can be explained through the decrease in job opportunities.

[22] This study finds that the drop in enrolment rates during crises in Chile is due to the high incidence of government expenditure (pro-cyclical) and private costs of education, which are higher than in most countries of the region.

[23] These authors show that educational achievements in Chile are negatively related to macroeconomic volatility, mainly due to the financial constraints caused by downturns "if Chile were to reduce its level of volatility to that of the U.S. (i.e. by 3.8 percentage points), average educational attainment would increase by almost 1 year and education inequality would fall by 7.9 Gini points".

[24] Funkhouser (1999) studies the effects of a sharp decline in living standards in Costa Rica between 1981 and 1983, when wages fell about 50 percent. The results show that the crisis conduced to a drop in school enrolment rates of approximately 6 percent; however, this decrease was just temporarily, and no lon-run effect can be identified from the crisis' generation.

percent, explained a 6 percent decrease in enrolments, although this fall was just temporary and no long-run effects from the crisis on human capital investment are distinguished. Lastly, a recent study carried out for Jamaica by Kim and Serra-García (2010) illustrates how mixed may be the impact of crises on schooling decisions across different groups, even for the same country and the same shock episode; these authors find that whereas slow growth seems to lower the enrolment rate in primary school (pro-cyclical), secondary school enrolment rates show exactly the opposite behaviour (counter-cyclical).

The literature for North America concerning the effect of shocks on educational outcomes is relatively abundant, and the general findings suggest a counter-cyclical pattern of the demand for education at university and also at high school level. In the United States (US), labour market opportunities have a strong effect on youth educational choices (*substitution effect*); phenomenon that has been documented even from the last decades of the nineteenth century (Redmount, 2002) and the Great Depression of the nineties-thirties (Goldin, 2001). Studies covering more recent periods give additional support for these findings: Dellas and Sakellaris (1995), analyzing the four recessions suffered by this economy during the period 1968-1988 find that, indeed, the cyclical behaviour of enrolment rates in High School come from the cyclical movements on the determinants of schooling; and estimate that an increase in weakly real earnings of 40 dollars leads to a decrease in the probability of college enrolment of 0.78 percentage points; while a one point increase in unemployment rates rises this enrolment probability in 0.25 points. Similar results are obtained for the late ninetieths-eighties to explain the increase in high school graduation of black 18-19 years old (Kane,1994)[25]; and for the changes in community-college attendance rates between the late 1960s and the mid-1980s (Betts and McFarland,1995). Moreover, there is evidence suggesting that the effect of unemployment works, symmetrically, in boom periods, i.e. decreasing schooling demand (Black et al, 2005)[26]. Extending the analysis to more general forms of human capital investment, DeJong and Ingram (1998) study the relationship of "aggregate skill-acquisition activities" with the economic cycle, and find a negative correlation with output of -0.36, which is interpreted as a "clearly" result of "opportunity cost considerations". In line with this approach, Sepúlveda and Méndez (2011) using quarterly data from the NLSY79[27] for a period of 19 years find that the incidence of schooling is strongly counter-cyclical, while aggregate training is a-cyclical and some specific training categories –especially for the case of firm-financed training– tend to behave pro-cyclically. Using the same survey, Kahn (2009) reports negative long-term consequences of graduating during bad times of the economy, and from her estimations suggests that the actual effect of unemployment in school attendance is quite lower than the values obtained in prior estimations, when incorporating a proxy for abilities (AFQT[28]) as explanatory variable in the regressions[29]. Similarly, and also taking advantage of the

[25] This study estimates that an increase of 5 percent in the state unemployment (or a 100 dollars decrease in state average weekly wages in manufacturing) leads to an increase of 3 percent on High School graduation of black 18-19-years-olds

[26] Originated in the OPEC oil embargo, the huge increase in coal industry ("coal boom") pushed sharply the demand for coal miners in rural Appalachia. For the states of Kentucky and Pennsylvania, it is estimated that a long-term 10 percent increase in the earnings of low-skilled workers explained a decrease in high school enrolment rates of between 5 and 7 percent

[27] US National Longitudinal Survey of Youth 1979

[28] Armed Forces Qualifying Test

[29] The estimations show that in response to a 1 percentage point increase in the national or state unemployment rate at age 18, the probability of completing college increases by 0.008 and 0.02, respectively

micro-data available from the NSY79, Boffy-Ramirez et al (2010) find that the increased probability of attendance during times of low labour opportunities is not linear with abilities: while the effect is negligible for individuals in the lowest 10th percentile and in the highest quintile of the AFQT distribution, an increase of one percent in the unemployment rate rises the probability of college attendance in about 2-3 percent for those youngsters between the 50th and 70th percentile. Ewing et al (2010) also shed light on this phenomenon by identifying different reactions between groups facing the same shocks. For the period 1963-2004 their study shows that enrolments of boys decline when households face a sudden positive economic shock –with no significant effect for girls– while sudden increases in inflation rates tend to affect positively girls' enrolments, with no effect on boys. This dissimilar reaction between males and females is also documented in a prior study that uses microdata from US and Canada; Card and Lemieux (2000) covering the last 25 years of the twenty century, provide additional evidence of a *substitution effect* explaining schooling's reactions to changes in labour market conditions and find that this influence is particularly high for young men. Lastly, and similarly to the results obtained by Beck et al (2005) for US; Emery et al, 2011 report that positive shocks tend to decrease schooling demand by youngster in Canada[30].

Within Europe, the United Kingdom (UK) is by far the country with more empirical research in this field. The study of Clark (2009) provides a quite complete systematization of the main results obtained in prior literature about schooling's reactions to credit constraints, income and unemployment. A common finding in Clark's literature review is that the estimated elasticity of the demand for education with respect to unemployment is positive (*substitution effect*). However, the magnitudes highly differ between studies and, according to this author, the effect has been underestimated due to empirical and methodological limitations. Trying to overcome these obstacles, with a 30-year panel of regional data, he arrives to a significantly larger estimated impact of youth unemployment on enrolment in post-compulsory education; an elasticity of 0.18 which almost doubles prior estimations[31]. In line with prior literature for North-America, these results also differ by gender, with males showing a higher sensitiveness to changes in aggregate conditions[32]. Given these findings, Clark suggests that the increasing opportunities in the labour market for young people "may have contributed significantly to the slowdown in enrolment growth in UK from mid-nineteen-nineties". This well documented positive effect of unemployment on schooling demand in the UK is also found in specific studies for Scotland and Northern Ireland –see Willms and Raffe (1998) and Amstrong (1999)–, phenomenon that is interpreted in these studies as a "discouraged worker effect". A more recent study for England and Wales gives support to prior findings but this time considering wages instead of unemployment rates as a measure for the opportunity cost and expected returns; Rice (2010) finds that the national minimum wage introduction

[30] With respect to the "oil boom" episode during the period 1973-1981, these authors find a strong *substitution effect* and suggest that contrary to what prior literature report about the adverse effects of the volatility in resources prices, the short-run reductions in schooling enrolment during a resource boom resulted in higher levels of educational attainment in the long run suggesting that transitory labour demand shocks are, indeed, beneficial to the economy rather than a source of harm.

[31] These results are obtained with a difference transformation of the original lineal model -to avoid spurious relationships- including fixed time and regional effects, as well as other control variables –like students' performance- omitted in prior literature.

[32] Actually, there is a whole specialized literature accounting for gender differences in these areas of education and labour market. Casarico et al (2011), for example, carry out a panel data study with European countries for the period 2005-2009 and find sharp differences in the determinants that explain the participation in post compulsory education for boys and girls.

of 1999 compressed the differentials between skilled and unskilled workers with negative effect on the probability of enrolling in full-time schooling. Following with European country-based studies; Spain is another case with relatively extensive literature on this topic. Differently to the US and UK, the estimated impact of unemployment on schooling choices is mixed. According to Petrongolo and San Segundo (2000), the estimations obtained in prior literature by evaluating the effect of unemployment on the demand for education capture two effects working on opposite directions: the pro-schooling opportunity cost effect with the anti-schooling effect of poorer economic perspectives for the future and the lower income levels (due to the financial market imperfections). From their empirical regressions it is found, indeed, a negative effect of total unemployment (in terms of F&S could be seen as an *income effect*) and a positive effect associated with youth unemployment (*substitution effect*). In line with these results, but for tertiary enrolments in particular, Fernandez and Shioji (2001) find that non-graduate's unemployment has a positive impact on enrolment, while graduate's unemployment has the opposite effect (effect related with the *expected returns*). These two factors work through the "investment effect"; while for the long-run they find that unemployment affects negatively the schooling demand through the "wealth effect", an anti-schooling effect that comes from the imperfections in financial markets. Peraita and Pastor (2000) report that the propensity to dropout from primary decreases with higher youth unemployment rates, suggesting a substitution effect working even at this early step of the educational system. At the same time, unemployment in adults shows a positive effect on dropouts, in line with Petrongolo and Sansegundo's results. For Greece, there seems to be a strong effect of labour opportunities on schooling demand, which also explains the high-qualified labour force migration of youngsters (Bank of Greece, 2010). Although these evaluations suggest a counter-cyclical pattern of the demand for education, there is also evidence supporting that higher education demand increases in periods of rapid economic growth, whereas no effect is found for primary and secondary schooling demand (Asteriou and Agiomirgianakis, 2001). From a similar approach, but for the case of France, Diebolt and Trabelsi (2008) study the causality relationship between growth and human capital investment, and for the period 1982-1990 identify a clear "turnpoint" in 1947, when the causality direction changes starts going from education to economic growth and not in the other way[33]. In addition, and this time differently to the UK and the US, for some European countries there is an extensive literature suggesting a relatively strong influence of the socioeconomic background in the educational attainments[34]; factor that is possible to consider when working with microdata (suitable for country-based studies but quite complex for cross-national ones) and provides additional clues about the heterogeneous impact a shock may have within the population.

[33] This could lead to think about a weak effect of the economic cycle on schooling decisions for France, although it may be more appropriate to interpret these findings in a less strict way, as the authors do: at least what can be said is that "the role of human capital in the French macroeconomic growth process is not as clear as it would seem"

[34] See Lindhal et al (2012) for Sweden; Mocetti (2012) for Italy; Maurin (2002) for France; Hillmert and Jacob (2009) for Germany; and Carey (2007) for Slovakia.

Table 1. Summary of results from empirical literature, country-based studies

	Country	Authors	Period	Type of shock	Educational outcome	Impact
Low –income countries	Mali	Dillon (2008)	2006	Rural shocks (-)	Primary and secondary attendance	(-)
	Nigeria	CODESRIA (2009)	early1980s	Oil-prices crisis	Schooling demand	(-)
	Cote D'Ivore	Jensen (2000)	1986-87	Drought (-)	School enrolment	(-)
	Malawi	World Bank (2007)	1994-95	Rainfall shock (-)	School attendance	(-)
	India	Jacoby and Skoufias (1997)	1975-1983	Income shortfalls	School attendance	(-)
	Cambodia	Guarcello et al (2008)	1999-2004	Nature/crop shocks	School attendancce	(-)
	Philipinas	Lim (2000) / Bacold and Ranjan (2007)	1997-98	Financial crisis	School attendance	(-)
	Indonesia	Thomas et al (2001)	1998	Financial crisis	School enrolment	(-)
	Guatemala	Guarcello et al (2002)	2000	Rural shock (-)	Attendance	(-)
	Honduras	Gitter and Barham (2007)	1994-2001	Natural dissaster	Secondary attendance	(-)
	Nicaragua	Maluccio (2005)	2000-2002	Coffe price decline	Enrolment boys	(+)
Middle-income countries	Mexico	Binder (1999)	1982-83 / 1986	Cycle	School retention and continuation rates	(+)
	Mexico	Mc Kenzie (2001)	1992, 1994, 1996 and 1998	"Peso crisis" 1995-96	Enrolment	(+)
	Brazil	Duryea and Arends-Kuenning (2003)	early 80s / early 90s	Recessions	School participation (boys)	(+)
	Brazil	Neri and Thomas (2000)	1982-99	Labor market negative shocks	Grade attainment /enrolment	(-) / ns
	Peru	Schady (2004)	1988-92	Crisis	Schooling / attendance	(+) / ns
	Uruguay	González et al (2011)	1986-2009	Cycle (crisis 2002)	Highschool attendance	(+)
	Jamaica	Kim and Serra-García (2010)	1991-92 / 1995-96	Inflation crisis / Financial crisis	Primary / secondary	(-) / (+)
	Argentina	López-Bóo (2008) /	1998-2002	Crisis	Attendance	(+)
	Argentina	Rucci (2004)	1996-2002	Crisis	High School attendance	(-)
	Chile	Checchi and García-Peñaloza (2004)	1960-95	Volatility	Enrolment	(-)
	Costa Rica	Funkhouser (1999)	1981-83	Crisis	Educational attainment and inequality	(-)
	Venezuela	Blanco and Valdivia (2006)	2002-2003	Crisis	Attendance	(-)
High-income countries	US	Redmount (2002)	1870-1900	Unemployment	Enrolment(attendance	(+)
	US	Goldin (2001)	1928-1938	Great Depression	H-S graduation rates	(+)
	US	Betts and McFarland (1995)	1960-mid/1980s	Cycle/unemployment	Full- time attendance colleges	(+)
	US	Black et al (2005)	1960-mid80	*Boom	H-S enrolments	*- (+)
	US	De Jong and Ingram (1998)	1948-95	Cycle (-)	Skill-acquisition activities	(-)
	US	Kane (1994	mid-eighties	Unemployment	H-S graduation rates	(+)
	US	Dellas and Sakellaris (1995)	1969-70, 1973-75, 1980-82	Recessions	H-S enrolment rates	(+)
	US	Boffy-Ramirez et al (2010)	1979-2000	Unemployment	College attendance/high-school completition	(+)
	US	Sepúlveda and Méndez (2011)	1979-2006	Cycle (-)	Schooling/gral training/firm-training	(+ /ns/-)
	US	Ewing et al (2010)	1963-2004	Crisis /inflation shocks	Enrolment boys / girls	(+) / (+)
	US- Canada	Card and Lemieux (2000)	1975-2000	Unemployment	School participation	(+)
	Canada	Emery et al (2010)	1973-1981	*Positive shock	Schooling enrolment	*- (+)
	UK**	Pissarides (1981) /Whitfield and Wilson (1991) / McVicar and Rice (2001)	1988 –1994	Unemployment (youth and total)	Higher education enrolments	(+)
	UK	Clark (2009)	1975-2005	Youth Unemployment	Enrolment in post-compulsory education	(-)
	England and Wales	Rice (2010)	1997	Wage ratio (unskilled/skilled)	Enrolment	*- (+)
	Spain	Petrongolo and San Segundo (2000)	1987-1996	Adults/Youth Unemp	Enrolment	(-) / (+)
	Spain	Fernandez and Shioji (2001).	1990-1991	Short-run Unemp.	University enrolment	(+)
	Spain	Peraita and Pastor (2000)	1985	Total/Youth Unemp.	Primary dropouts	(-) / (+)
	France	Diebolt and Trabelsi (2008)	1982-1990	Economic growth	HC accumulation	Amb.
	Greece	Asteriou and Agiomirgianakis (2001)	1960–1994	Economic growth	Schooling demand	Amb.

Note: The sign in brackets is the estimated impact of a negative shock or an increase in unemployment rates (which is also associated with recession times). When the study focuses on positive shocks or other aggregate variables which are positively correlated with output (such as government spending or income); the original sign of the effect is shown with an asterisk (*), while in brackets the sign translated for a hypothetical negative shock

III.2. Cross-country studies

From a cross national panel study for Africa, Buchmann (1996) stresses that High School enrolment rates are negatively affected by recessions, in particular for the case of girls. Covering the period 1975-87, this study estimates a positive influence of the development level of the country in secondary enrolments for boys and girls, while it is also found a negative effect from the intensity of the structural adjustments implemented during in girls' schooling demand; "families may have little motivation to keep daughters in school and girls will be directly and immediately affected by changes in household income, increases in mother's workload, and the implementation of school fees". Similarly, negative effects on education during recessions are found from a cross-country study covering the Asian financial crisis of 1997; Mok et al (2009) point out that high school enrolments were the most affected during this period, phenomenon which increased the educational inequality across gender, zone (urban/rural), income and ethnicity in the region. Turning to Latin-America, Behrman et al (2000) analyze different educational outcomes for 18 countries in this region and highlight that poor macroeconomic prospects of the so called "lost decade" (nineteen-eighties) "set back the rate of growth of schooling attainment in the region", what can be interpreted as evidence of a pro-cyclical behaviour of human capital investment in this region. Concerned about the large gap in educational attainment levels between this region and the developed world, Flug et al (1999) conduct a panel-data study for the period 1970-1992 and estimate that the effect of economic volatility, inequality and the lack of developed credit markets on educational outcomes help to explain 45 percent of the differences in secondary enrolment rates between these two groups of countries. For the whole sample they find a positive influence of the initial conditions (income end educational attainment) and the financial depth indicator[35] and a negative effect coming from income inequality levels as well as income and employment volatility[36]. Although they do not find a significant effect of government expenditure on education, it becomes significant and positive when the GDP per capita is excluded as a regressor from the equations, suggesting a high correlation between these variables.

Taking a look at the cross-countries studies for Europe, McIntosh (2001) shows that the participation rates in post-compulsory education by youngsters with ages between 16 and 18 years in 5 European countries (see Table 2) are positively affected by: i) prior academic attainment, especially for women; ii) the returns to higher level of education; and iii) the "level of real income available to 'spend' on education". A positive effect of youth unemployment is also found, but the estimated effect is weak and this variable explains just a "small part in the decision of whether to remain in education". Since McIntosh works with Western European countries, the result may be somewhat unexpected; on the one hand, the theoretical framework predicts a relatively more important *substitution effect* than the *income effect* for high-income countries, and on the other

[35] In particular, to capture the potential differential impact of the financial depth variable across countries with different income levels, they split the sample in two groups "high-income countries" and "low-income countries" and obtain the same positive and significant effect on enrolment rates; although employment volatility turns to be negative and significant for low-income countries and not significant for the other group while income inequality turns to be only significant and with a negative effect for rich countries

[36] With respect to the reverse causality between volatility variables and educational levels, the authors argue that when using a "measure of flow" like enrolment rates this problem is overcome. However, there are reasons to suspect endogeneity in the indicator of financial depth; therefore they instrument it with initial levels of this variable (1960), but the results do not change.

hand, it also contrasts with the country-based evidence, at least the one available for UK, which has suggested a key role of the youth unemployment rate in schooling decisions (strong *substitution effect*). Another panel-data for Europe is carried out by Brunello et al (2002); in this case considering a special dimension of schooling demand: the completion time for graduation[37]. Covering ten countries in this region and using data from a special survey to college undergraduates undertaken in 50 university faculties during the academic year 1999-2000, this study suggests that the main factors explaining cross-country differences are: i) the intensity of employment protection, which "not only reduces hirings but has the undesirable supply side effect of increasing expected time to college graduation"; ii) public funding , "higher share of public expenditure helps in limiting the negative enrolment effects of liquidity constraints at the price of delaying expected college completion"; iii) the perceived college quality (the higher the quality, measured by the share of public expenditure in higher education on output, the later the expected completion); iv) college wage gap, "wage compression by education reduces the incentives to complete education in time by narrowing the gap between expected benefits and opportunity costs"; and v) unemployment rates for graduated (poorer labour market prospects reduce incentives to graduate early). They also try to evaluate the effect of the economic growth experienced in the five years before to the survey, but obtained significant results just in one of the six specifications estimated –and in this special case the variable presents a significant and positive effect on expected years of completion.

The role of public funding has been largely studied for European countries, and since it is a variable that affects the quality of education –one of the four mechanisms identified by F&S as potential candidates to play a key role during economic shocks– it is interesting to briefly consider some general findings for this region. Winter-Ebmer and Wirz (2002) present a systematization of prior results for European countries and US, which show mixed results. Trying to analyze the effectiveness of public funding on education as well as the effect of tuition costs on enrolment at university level for 14 countries in the period 1980-1996, these authors conduct empirical estimations with fixed-country and time effects, and given the suspect of endogeneity in the variable public funding, they complement the estimations obtained by Ordinary Least Squared (OLS) with an Instrumental Variable (IV) method. The instrumental variables chosen for public funding are based on governments' information (basically, its form and ideology) and demographic data for young people[38]. The estimations suggest that an increase of one percent in public funding tends to increase university enrolment in almost one percent and a strong negative influence of tuition costs in particular on males' enrolment decisions. However, perhaps the most surprisingly result comes again from the non-

[37] Why time for graduation may be an important variable to analyze? A simple argument is given by these authors: "longer than required time to graduation can affect available resources per student and often postpones the delicate process of transition from full time education to the labour market, thereby reducing labour supply and tax revenues"; Brunello et al (2002).

[38]They show that these instruments are in fact relevant in explaining public funding and do not affect enrolments. In particular government ideology turns to be highly significant for both total spending on education and spending on higher education. "Interestingly, centre governments spend less on education than left- and right-wing governments" and "(...) in the case of higher education, single party governments spend significantly more as compared to coalition or minority governments"

significant effect of unemployment rates on university enrolments, giving support to the weak effect found by the study of McIntosh (2001) for the demand for post-compulsory education in this region[39].

Although it is difficult to find empirical evidence for cross-country studies for Eastern European countries, Rodriguez and Pose (1998) argue that the lack of opportunities in the local labour market in this region have contributed to "outward migration of qualified labour and university students to other regions", while the high enrolment rates in upper secondary education is partly a reflection of this same problem. Although without paying special attention on the effect of the economic cycle or the changes in aggregate conditions, many studies show a strong influence of the socioeconomic background on the success of youngsters in the educational system and on the opportunities they face in the labour market; which may be interpreted as a signal of a strong *income effect* working in periods of aggregate shocks. For the case of the Baltic countries (Estonia, Lithuania, Latvia) for example, Hazans et al (2007) stress that parental education has "a strong positive effect on propensity to obtain tertiary education, both in the Soviet era and post-Soviet period".

There are also studies which look to find more general patterns, including in their samples countries from different regions and income levels. Sakellaris and Spilimbergo (2000), for example, study the decisions taken in 74 countries with respect to enrol in higher education abroad –at US's universities. They find a systematic relationship between domestic business cycle and this indicator of schooling demand, and in line with the predictions of F&S's model, the estimated results suggest that students from OECD countries tend to behave counter-cyclically (in this special case, increasing university enrolments abroad during bad times); while for non-OECD countries the pattern is just the opposite: pro-cyclically[40]. Published in the same year, the study of Chaudhuri and Maitra (2000) evaluates the effect of some economic aggregate variables on dropout decisions over the base of a panel data with 138 countries for the period 1960-1985. The schooling indicators used as dependent variables are the drop-out rates incorporated at five-year intervals and calculated for primary, primary to secondary and secondary, and each one is regressed on the level of GDP per capita, its squared values, the stock of human capital, the government expenditure on education and a proxy of political factors[41]. From GLS Fixed Effects estimations these authors find that real per capital income has a significant effect on dropouts, which is positive but non linear in primary, and negative and linear for secondary. In line with prior results, higher government spending tends to reduce dropouts and there is a positive effect of the stock of human capital in adults for primary dropouts, whereas the effect is the opposite for secondary. Undoubtedly, the more complex interpretation of the results comes from the evaluation of the effect of the economic output, since they do not control for other variables that may be related with this regressor with potential different effects on schooling demand, like unskilled wages, youth and adults' unemployment. Another panel-data study covering countries from different regions is the one performed by Heylen and Pozzi

[39] However, as the authors point out, the general unemployment rate may be capturing the positive effect of youth unemployment and the contrary effect of adults' unemployment, as suggested by Petrongolo and San Segundo (2002) for the case of Spain.
[40] The explanation behind this reaction is found in the key role of the opportunity cost of schooling's decisions for the first group –interpretable as a *substitution effect*–, and in the ability to pay and credit constraints for the second group –the same as *income effect*.
[41] As proxy, an indicator is constructed based on a weighted average of Number of Assassinations per million population per year and the number of revolutions per year.

(2007), which considers 86 countries for the period 1970-2000. Trying to distinguish the effect of a particular type of aggregate shock (inflation crises) on human capital investment decisions, these authors regress average years of schooling for the population older than 15 years old (as proxy for educational attainment levels) on the main determinants identified by the theoretical model they develop: inflation dummies[42] and government expenditure on education; while the interest rate, which is also expected to play a key role, is absorbed in the fixed-year dummies. Lastly, a human capital lagged value is also included, aimed to reflect the process of human capital depreciation. The general findings coming from estimations based on a GMM system combining a first differences equation with the equation in levels support the main theoretical predictions of their model; and in particular per capita government spending is significantly positive even when is estimated through instrumental variables –while dropping the assumption of exogeneity– and the crises dummies show in almost all cases a significant and positive coefficient. Interestingly, while *ceteris paribus* a crisis period (inflation higher than 25% or 45%) of five years is expected to increase human capital investment in 0.3 years of schooling, the coefficient related to the crisis dummy for extreme inflation episodes (100% or more) is not significant[43]. In addition, they report that these crises lead to higher effects in open economies, which provides additional support to the predictions of the theoretical model[44].

Finally, the most recent attempt to analyze the effect of the current crisis on educational outcomes for Europe is driven by Barakat et al (2010), which conducts a descriptive analysis with recent data to evaluate the impact of the current crises on labour market and educational variables; providing also a comparative analysis with prior crises in Europe[45]. From a simple explanatory approach to the recent data no clear visible effects of the crisis on education is found, although they recognize important restrictions to this preliminary conclusion, given: (i) the lack of data (at the time the study was realized the most recently data was from 2007-2008); (ii) the expected lagged effect of the crisis (rigid temporal structure of educational systems); and (iii) the non-discretional part of government spending ("changes to funding formulas, mandated staffing ratios or teacher salaries may require legislative action, with the associated delays"). From the labour market analysis by groups one of the main policy At the same time, they "Altogether the decomposition of labour market effects of the economic crisis for certain demographic sub-groups suggests that policy measures should especially focus on young and uneducated individuals".

[42] "High inflation directly affects the relative real return to working today versus tomorrow, at least if high inflation is considered to be temporary. It then also affect the relative attractiveness of studying" (Heylen and Pozzi, 2007)

[43] This non significance is also found for alternative specifications with crisis dummies for inflation higher than 10% or 20%. However, when working with alternative measures trying to identify the unexpected or temporary part of the inflation, they find additional supporting evidence suggesting a positive impact of these crises on human capital accumulation.

[44] For a closed economy it is expectable to see an important increase in the interest rate during recessions, factor that could have anti-schooling effects (similarly to the *income effect* with credit market imperfections).

[45]With respect to age-specific labour market impacts; the authors highlight that for all observed economic crises since the nineteen--sixties young workers were the most affected. However, due to their severity, the oil price crisis (nineteen-seventies) and the current economic crisis show a particular strong effect on youth unemployment, it seems that the spread between young and old workers is determined by the level of unemployment; i.e. when unemployment is very high, young workers are affected disproportionately, whereas in times when unemployment is very low and a shortage of labour exists, the gap between the youth and old-age unemployment is less pronounced.

Table 2. Summary of results from empirical literature, cross-country studies

Group of countries	Authors	Period	Type of shock	Educational outcome	Impact
Africa	Buchmann (1996)	1975-87	Crisis period of structural adjustments	High school Attendance	(-)
Asian southern-east	Mok et al (2009)	1997	Financial crisis	High-School enrolment	(-)
18 countries in LAC	Behrman et al (2000)	1980s	"Lost decade"	Schooling attainment	(-)
Latin-American and developed economies	Flug et al (1999)	1970-1992	Economic volatility	Secondary enrolments	(-)
Europe (Austria, Denmark, UK, France, Germany, Ireland, Italy, Portugal, Switzerland and Check Republic)	Brunello and Winter-Ebmer, 2002	1999-2000	Income / public funding / college wage gap unemployment	expected years of completition compulsory education	*+ (-) (+) weak
England and Wales, Netherlands, Germany and Sweden	McIntosh (2001)	1970-1992 (GE),1969-1992 (NL),1970-1994 (SW),1961-1994 (EN&WL)	unemployment, expected returns	participation rates in post-compulsory education	ambiguous
European countries and US (14 countries)	Winter-Ebmer and Wirz (2002)	1980-1996	Unemployment *public funding	University enrolment	NS *+ (-)
74 countries	Sakellaris and Spilimbergo (2000)	1961-1992	Cycle	enrolment university abroad (US)	(+)
Global - 86 countries	Heylen and Pozzi (2007)	1970-2000	Inflation crises < 100%	Accumulation educational attainment	(+)
Global- 138 countries	Chaudhuri and Maitra (2000)	1960-1985	Growth	Drop-out rates	(+)

Note: The sign in brackets is the estimated impact of a negative shock or an increase in unemployment rates (which is also associated with recession times). When the study focuses on positive shocks or other aggregate variables which are positively correlated with output (such as government spending or income); the original sign of the effect is shown with an asterisk (*), while in brackets the sign translated for a hypothetical negative shock

Before turning to the following sections, it is worth highlighting some lessons from prior empirical evidence. First, the general patterns found from both country-based and cross-country studies are in general terms consistent with the predictions of theoretical model presented in section II: the demand for education tends to be counter-cyclical in rich countries (as in the UK, the US and Canada); pro-cyclical in poor countries (Honduras, Indonesia and Nigeria); while for middle-income countries there is evidence in both directions (Brazil, Mexico and Peru with a counter-cyclical pattern; Costa Rica and Venezuela with pro-cyclical responses). Second, in the literature about Europe there is a large predominance of the UK, not many cross-country studies and just limited empirical literature can be found for Eastern-European countries. Hence, for Western European countries the closest empirical references come from the US and UK, while Latin-American cases may provide some clue of what can be expected for the lower-income European countries. Third, although the empirical approaches and the variables used to measure the effect of changes in aggregate conditions on schooling highly differ; it is also true that unemployment, income and government spending are in general found to be key determinants for schooling decisions. Forth, the type of shock or macroeconomic episode matters: for example, shocks may have stronger effects when unexpected, like the case of crop shocks in rural areas or the sudden inflation crises in the US. Fifth, the reaction to shocks also differs across groups within the same population depending on gender, age, educational level, location (rural/urban), ethnicity and socioeconomic background. Finally, while cross-country studies arrive to average patterns such as a pro-cyclical behavior of Latin-American economies (Behrman et al 2000) and a non-significant effect of unemployment in Europe (McIntosh, 2001); country-based studies show that the reality is by far more complex, underling the carefully interpretation of results coming from aggregate data.

IV. Brief picture: education in Europe

Although the educational levels in European societies have been historically high compared with other regions, the latest statistics available show that there is still a lot of work to do to improve educational outcomes and reduce the large heterogeneity of countries' performances. This concern has been at the heart of the "strategic framework for European cooperation in education and training" (ET 2020)[46]; a recently adopted agreement with common benchmarks for 2020 (see Table 3). Three years later from the adoption of this strategy the 2012 Annual Growth Survey (AGS) "calls for particular focus on young people, who are among the groups worst affected by the crisis". This emphasis on young people has leaded to an increasing attention in the monitoring of the indicators used for the third and fourth benchmarks.

Table 3. Strategic framework for European cooperation in education and training (ET 2020)

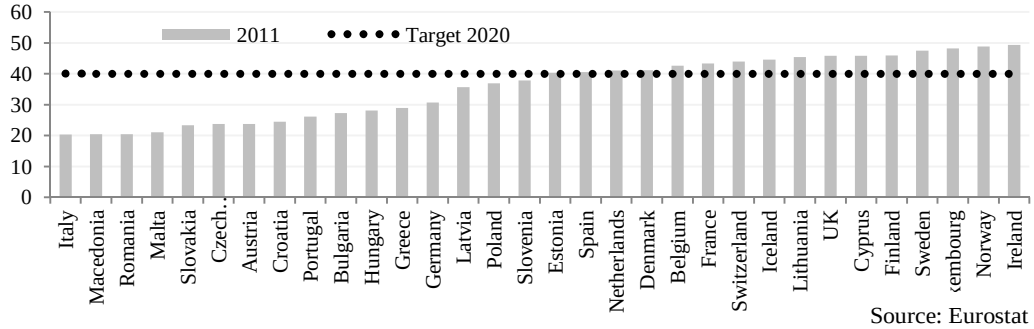
AIMS	BENCHMARKS 2020
Making lifelong learning and mobility a reality; *Improving the quality and efficiency of education and training;* *Promoting equity, social cohesion and active citizenship;* *Enhancing creativity and innovation, including entrepreneurship, at all levels of education and training.*	i) at least 95% of children between the age of four and the age for starting compulsory primary education should participate in early childhood education; ii) the share of 15-years olds with insufficient abilities in reading, mathematics and science should be less than 15%; iii) the share of early leavers from education and training should be less than 10%; iv) the share of 30-34 year olds with tertiary educational attainment should be at least 40%; v) an average of at least 15% of adults (age group 25-64) should participate in lifelong Learning Source: EU(2011)

Recent official publications remark the progress made by the member states but also emphasize the remaining disparities between European countries and the current distance to the goals set for 2020. Moreover, there is a special concern with respect to the data from the last years, since it may be hiding a temporal effect of the crisis, "the Commission is concerned that this is not a result of reforms which will have a long-term impact but rather a by-product of high youth unemployment which means more young people are staying longer in education and training" (EC, 2012). This counter-cyclical pattern induced by a "discouraged-worker effect" is also suggested by recent publications (Bell and Blanchflower (2010); Barakat et al (2010)) although these evaluations come from the simple observation of the evolution of the schooling indicators, mainly for the OECD countries. During the upcoming years, to the extent that the data for the recent years of crisis may become available, new econometric efforts –like the one presented in the current research- will be needed to go deeper in this analysis.

[46] In the European Union (EU), the coordinated reforms of skill formation systems have been part of a broader group of growth, development and integration strategies, starting before the ET2020 with initiatives like the Lisbon strategy (2000), aimed 'to make Europe the most dynamic and competitive knowledge-based economy in the world' (EC, 2004), and The Bologna (1999) and Copenhagen (2002) declarations in higher education and vocational education and training respectively.

As shown in Figure 6, many countries are far from the 40% target for higher education; most of them in Eastern and Southern Europe, with the exception of Austria and Germany which also present relatively low proportion of tertiary educated between young adults. The disparity is high: while in Ireland and Norway almost one half of the population of 30-34 years old have a tertiary diploma, this proportion is around 20% in countries like Italy, Malta and Rumania.

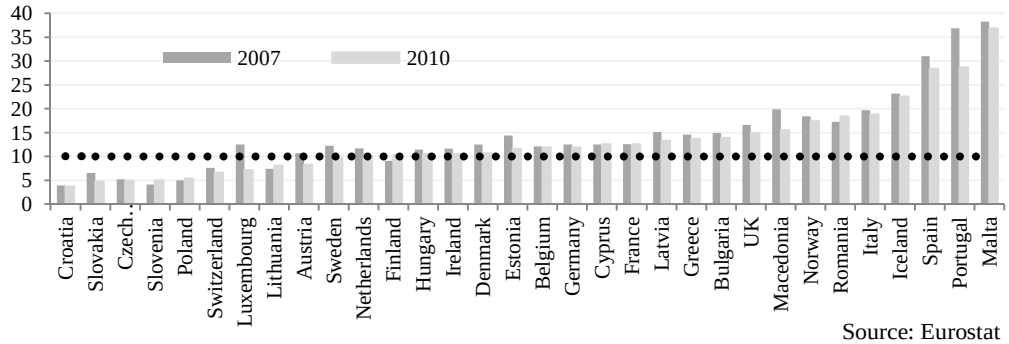
Figure 6. Tertiary educational attainment, age group 30-34



Source: Eurostat

On early school leaving, the vast majority is still surpassing the 10% benchmark (see Figure 7); and there is also a high heterogeneity between countries. While the best performance in terms of low proportion of dropouts is achieved by five Eastern European countries, with early-leavers rates lower than 5% (Croatia, Slovakia, Czech Republic, Slovenia and Poland); the highest levels of dropouts in 2010 are reached by Malta (37%), Portugal (29%) and Spain (28.5%), despite their large declines in dropout rates during the last years of crisis. The fact that around one out of three 18 to 24 year olds has at most achieved a lower-secondary level in Spain, Portugal and Malta is quite concerning[47]. Moreover, the fraction of this population that is neither studying nor working is relatively high; situation commonly referred as "idleness". This phenomenon is characteristically widespread in Eastern European countries, and in the case of Spain, Macedonia, Bulgaria, and Italy reaches more than 10 percent of the population this age (meaning that one out of ten 18-24 years old have achieved at best lower-secondary and currently is neither studying nor working).

Figure 7. Early-school-leavers rate



Source: Eurostat

[47] The consequences for these early leavers may remain throughout their entire lives, by reducing "their chance to participate in the social, cultural and economic dimensions of society", by increasing their "individual risk of unemployment, poverty and social exclusion"; and by conditioning their lifetime earnings and "their wellbeing and their own health and that of their children" (EU, 2011)

V. Empirical strategy

In order to empirically estimate the effect of the economic cycle on the demand for education, a first step is to make the connection from theory to the empirical field by choosing the appropriate indicators for the variables involved. Figure 8 illustrates the relationships between the variables introduced by the theoretical framework and Figure 9 expresses the same links but when replacing them by the indicators available.

Figure 8. The theoretical model – variables

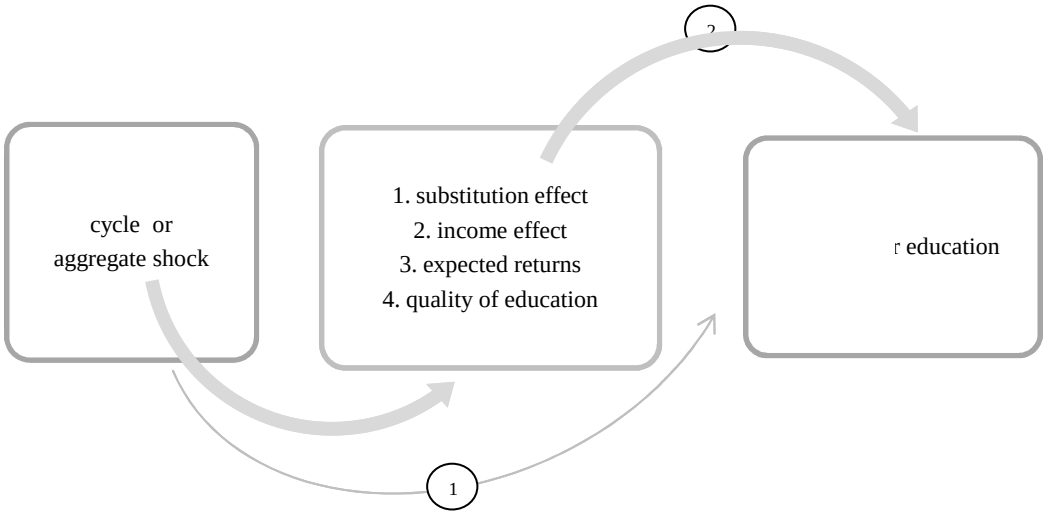
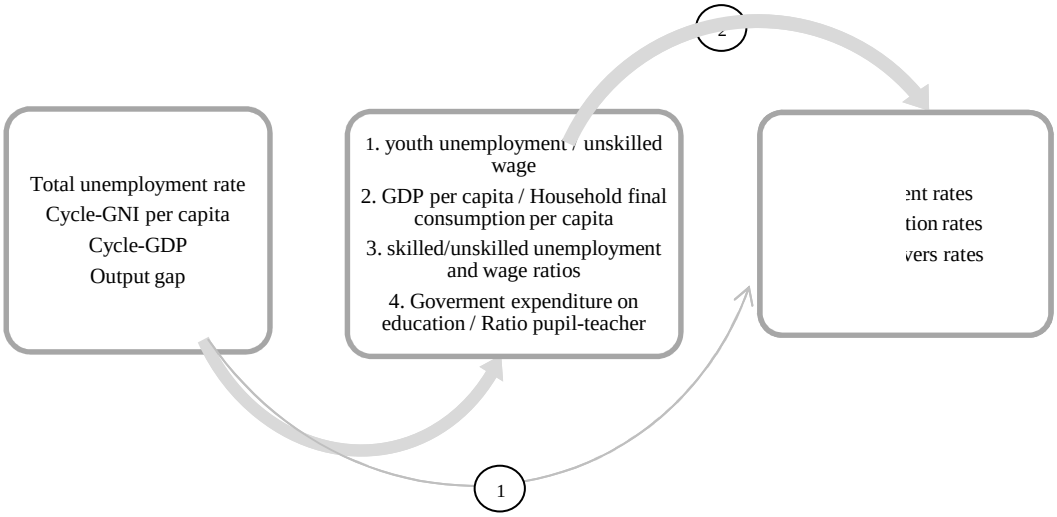


Figure 9. The empirical model – indicators



IV.1 Equations

Given these theoretical relationships, two main equations are formulated: equation [1] looks to measure directly the overall effect of the cycle on schooling demand, while equation [2] is designed to evaluate the impact of the aggregate variables which act as transmission mechanisms from the cycle to the demand for education. In both cases country-fixed effects are included to control for country-specific unobservable

characteristics[48]. This incorporation allows the intercept in the regression model to differ cross-sectionally but not over time; while all other coefficients are fixed both cross-sectionally and over time (Brooks, 2008).

$$s_{it} = \gamma_i + \alpha.cycle_{it} + \mu_{it} \quad [1]$$

$$s_{it} = \delta_i + \alpha_1.opp.cost_{it} + \alpha_2.income_{it} + \alpha_3.quality_{it} + \alpha_4.exp.returns_{it} + v_{it} \quad [2]$$

In [1] and [2] "s_{it}" is the dependent variable accounting for the educational outcome to be analyzed, where "i" denotes the country and "t" the period (year); γ_i and δ_i are the country-specific variables for country "i" (fixed effects) and; μ_{it} /v_{it} are the error terms, respectively. The coefficient α in [1] captures the effect of the cycle on the educational outcome chosen; in a direct way as shown in Figure 8. According to the theoretical predictions of the model presented in section II, the positive (negative) phases of the economic cycle should conduce to a decline (increase) of the schooling demand in high-income countries (Western Europe); with the opposite effect for low-income countries; and with an undetermined expected effect for middle-income countries (Eastern Europe). The interpretation of the coefficient associated with this variable (α) depends naturally on the indicator chosen as a proxy, as will be discussed in the next section.

The second equation [2] is inspired in the mechanisms identified by the model (Figure 9), which are influenced by the cycle and at the same time are likely to impact on different dimensions of schooling demand. For the same group of dependent variables (s_{it}), the four mechanisms identified by the model are expressed in this linear model as explanatory variables. A first approach to evaluating the predictions of the theoretical model involves checking if the signs of the coefficients capture the theoretically expected impact of these variables; say $\alpha_1 < 0$ and $\alpha_2, \alpha_3, \alpha_4 > 0$. Secondly, the significance and strength of these effects needs to be evaluated, as well as their consistency with the results obtained from [1]. A relatively strong (weak) effect captured in α_1 in comparison with the other three effects assumed to work in the opposite direction ($\alpha_2, \alpha_3, \alpha_4$) may indicate a counter-cyclical (pro-cyclical) pattern of the demand for education, *ceteris paribus*. For [2] as well as for [1], and following Binder (1999) [49], a time trend is included as control variable to capture the possibility that schooling-demand variables trend independently from the economic variables included. Additionally, in some specifications other controls (as inflation and interest rates) are also included following prior empirical literature, as well as some lags for the original explanatory variables of the model.

[48] Although it is also possible to estimate the model with random effects instead of fixed effect, as Verbeek (2008) points out, the latter "makes sense intuitively if individuals in the sample are 'one of a kind`, and cannot be viewed as a random draw from some underlying population", and therefore makes usually fixed effect the most appropriate choice when working with countries as unit of analysis ("i"). Moreover, fixed effect estimations is also the option taken in prior empirical literature analyzing schooling options from country-based panel-data; see Chaudhuri and Maitra (2000) or Heylen and Pozzi (2007).

[49] Binder conducts an econometric analysis in which school retention and continuation rates are regressed on log GDP levels in the same year, percentage changes in GDP in the calendar year in which a school year began, percentage changes in GDP in the year in which a school year finished, and a time trend. She interprets the coefficient on log GDP, which tends to be positive and significant in most specifications, as the "income" effect, and the coefficient on GDP changes, which tends to be negative and significant in most specifications, as the "price" effect. It should be clear that these definitions of "income" and "price" effect do not correspond with the notions of income and substitution effect more commonly used in the literature, and which were adopted here in Section 2.

The empirical equations for [1] and [2] are obtained by substituting the original variables with the indicators as illustrated in Figure 9. Since it is possible to use alternative indicators for the same variables (see Table 4), multiple specifications for each equation can be estimated. For indicators with non-negative values, a logarithmic transformation is applied to smooth the series and facilitate the interpretation of the coefficients from the regressions (elasticities). The selection of indicators is based on prior empirical literature and limited by the availability of data for the sample and period of study, which are briefly described in the next section.

Table 4. Indicators for the empirical estimations

Variables	***Indicators***	***Source***
Schooling demand	Gross enrolment ratios for primary, secondary, and tertiary education –female/male–	UNESCO
	Early leavers rate (14-25 years old not attending and with at best lower-secondary educ.)	Eurostat
	Post-compulsory participation rate (share of population attending higher education in total population in age to have completed compulsory education)	Eurostat
	Number of tertiary students per 1000 habitants	World Bank
	Total participation at all IECD levels for population between 14 and 25 years old	UNESCO
		Eurostat
Income-consumption	GDP per capita constant USD 2000 / GDP per capita PPP 2005 / GNI p/c USD2000	World Bank
	Final household consumption per capita	World Bank
Opportunity cost	Youth unemployment rate	World Bank /
	Unemployment rate for unskilled workers (primary and secondary)	IMF
	Unskilled wages (manufacturing sector)	IMF
Quality of education	Government expenditure on education as percentage of GDP	World Bank
	Government expenditure on education as percentage of total public spending	World Bank
	Distribution of government spending on education by levels (primary/secondary/tertiary)	Eurostat
	Ratio pupil/teachers (primary / secondary education)	World Bank
Expected schooling returns	Ratio skilled / unskilled unemployment (percentage of unemployed with tertiary education/ percentage of unemployed with primary education)	OECD
	Ratio skilled wages / unskilled wages: i) total private wages / manufacturing sector wages; ii) minimum wage/average wages	OECD
CYCLE / SHOCK	Unemployment rate (total labour force)	IMF / World
	H-P filter to the series GDP and GNI per capita (USD2000)	Bank /OECD
	Output gap	IMF

With respect to the opportunity cost indicator, although in F&S's model the monetary expression of the earnings forgone due to studying is given by the contemporaneous unskilled wage ("wage in period one"), there is at least another variable playing a key role in the dimension of this cost: the youth unemployment rate (Cahuc and Zylberger, 2004). During a recession, for instance, wages are expected to fall, leading to the pro-schooling *substitution effect*. But if at the same time youth unemployment rises, the actual decrease in labor opportunities may be even stronger; in other words, the opportunity cost is affected by both the potential salary but also the chances to actually find a job. Therefore, given the limited data accounting for the type of unskilled wages that may act as a measure of the forgone earnings for young people, youth unemployment rate may serve as an alternative indicator to measure this effect related to labour market opportunities. Notice that if youth unemployment is included instead of wages, the expected sign for α_1 is now positive, i.e. higher (lower) unemployment encouraging (discouraging) schooling.

The other three variables that are expected to work in the opposite direction are also included in the regressions with the indicators suggested by prior literature. In first place, per capita GDP and household final consumption are included as proxy for the income levels (to capture the *income effect*). Secondly, as a proxy

for the expected returns to education (a difficult indicator to find for large samples) this papers follows the strategy of Rice (2010), employing the ratio between minimum and average wages. In this case, the expected sign of the coefficient associated with this indicator is negative (an increase in the ratio of minimum to average wages means that the qualified jobs result in lower additional returns to the higher educational attainment, which is likely to generate negative incentives on further schooling). In third place, as suggested by F&S and by prior empirical literature, different indicators for government spending on education are included as proxy for the quality of education, as well as the ratio pupil-teacher –although this indicator is neither available for all the countries of the sample nor for the whole period. Finally, some specifications for [2] also include the ratio of total unemployment to youth unemployment. Since youth unemployment and adult unemployment are usually highly correlated and may have opposite effects on schooling decisions (Patrongolo and San Segundo, 2000), this ratio may act as a control for the potential distortions of omitting adults' unemployment movements. Which would be the expected sign for this indicator? If, for instance, both unemployment rates increase (during a recession period, for example), but adult unemployment increases more, a negative effect on schooling demand may be expected.

IV.2. Estimation procedure

A first group of estimations for the different specifications based on equations [1] and [2] are obtained from Fixed Effect - OLS regressions; on a panel covering 33 European Countries with data for the period 1980-2010[50]. The potential problems of heteroskedasticity are treated with White-cross section coefficient covariance method in all regressions. Since in equation [2] some of the regressors may not be exogenous (the main endogenous candidate suggested by prior literature is government spending on education[51]), a second group of estimations are performed with GMM[52], in which the instruments used are the lags of the original explanatory variables of the linear models. With this alternative estimation procedure, the potential bias of the estimated coefficients could be –to some extent– corrected. Evidently, the quality of GMM estimations with instrumental variables depends critically on the choice and quality of the instruments; any weak instrument identification may lead to a "variety of pathologies", such as a particular sensitiveness to the addition of one or more instruments or to changes in the sample, which is clearly not desirable. Better results may arise when using specific instruments for each potentially endogenous regressor, like in the case of Winter-Ebmer and Wirz (2002); however, this option is fairly limited by the lack of series suitable for working with relatively

[50] In some regressions data from the United States is also incorporated to evaluate if there is a similar pattern with its high-income pairs in Europe.

[51] Winter-Ebmer et al (2002), for example, use government information (political party/ coalition government or not) and demographic data to instrument the variable government spending on education, for example, but they work with just ten European countries: these instruments are difficult to find for a sample like the one used for this current study, and even harder for the period 1980-2010. Although some studies highlight a potential endogeneity of output or economic growth, the reverse causality between educational outcomes and these variables is rarely found empirically (Chaudhuri and Maitra, 2000).

[52] The Generalized Moments Method (GMM) estimates the model parameters directly from the moment conditions that are imposed by the model. In order to avoid the bias and inconsistency from OLS estimations in presence of an endogenous regressor, GMM provides an alternative based on a two-step estimation procedure, with the advantage of not requiring distributional assumptions like normality, allowing for heteroskedasticity of unknown form, and providing estimations for the parameters even if the model cannot be solved analytically from the first-order conditions (Verbeek, 2008).

large samples and periods. In order to test the endogeneity of government spending on education and the validity of using lags as instruments, two strategies are followed: i) for the first case, the residual series of the OLS regression carried out with the potential endogenous regressor as dependent variable, and the other regressors and new instruments as explanatory variables, is included in the original equation; if the coefficient for this estimated residual series is significantly different to zero, there is evidence supporting the endogeneity suspect (Verbeek, 2008); ii) for the second case, the explanatory power of the OLS regressions carried out with the potential endogenous regressor as dependent variable is evaluated, in terms of explained variance (Rsquared).

The theoretical model does not establish whether the cycle has a symmetrical effect or not. However, stronger effects are predicted on some mechanisms when the shock has considerable magnitude. In order to capture this potential asymmetry of the effects in periods of expansion and contraction of the economic cycle, in some specifications an interacted term of the original regressors is included, with dummies constructed over the base of the *outputgap* series provided by the IMF and the cyclical component of the output obtained with the Hodrick-Prescott filter. Each of these alternative indicators of the cycle is divided into two dummy variables, one that takes values of 1 when the cycle is positive and 0 when negative (*pogap* / *pos_cycle_gni/ pos_cycle_gdp*); and vice versa in the other (*negap* / *neg_cycle_gni / neg_cycle_gdp*)[53].

In addition, to assess the potential differential impact of these variables across subgroups of countries in Europe, trying to go beyond the "average behavior", the sample is classified into different groups. These are used as sub-samples to regress each specification separately for the equations (when the number of observations allows it), and/or for interacted terms in the case of regressions carried out over the whole sample. As can be seen in Table 5 (Appendix), the classification of countries into these subgroups follows different criteria. One is based on the geopolitical classification commonly used by international organizations (Southern Europe, Eastern and Central Europe and Western Europe); and the other two alternative divisions are based on income levels: i) the groups defined as "*highhalf*" and "*lowhalf*" are simply the half of the sample with highest and lowest income, respectively (a result of ordering the sample from the poorest to the richest country and dividing it in two[54]); ii) three groups are obtained considering income ranges (using GDP per capita at PPP of 2005): "*low20*" is the name of the group in which annual per capita GDP is below 20,000 in 2005; while "*mid2030*" and "*high 30*" group those with per capita income levels between 20,000 and 30,000 and more than 30,000, respectively[55]. The inclusion of these regional dummies or country-group variables enables the capture of certain patterns that may not be included in the country-specific effects (Chaudhuri and Maitra, 2000), and in the case of income-level based divisions the classification allows the evaluation of the predictions of the theoretical model.

[53] Moreover, a dummy for crises periods is also constructed, merely reflecting the years of annual GDP per capita decrease.

[54] This is the procedure followed by Flug et al (1999) in order to capture general patterns by different income levels. The total number of countries is uneven; therefore it is decided to let the lower-income countries being the largest group, since it is the group with relatively lower number of observations.

[55] This classification produces quite similar results as when dividing the sample in three by the distribution function; however, the stepped criterion allows for the grouping of countries with similar levels of income per capita, respecting the largest gaps between them.

VI. Data and sample

The basic sample consists of 33 European countries, with data for the 1980-2010 period. The country selection for the sample follows a simple criterion: given the trade-off between number of countries and the time extension of the series for the whole sample, some cases of extremely poor or limited data for the period of study are excluded[56]. The indicators used for the variables come from statistics provided by the World Bank, OECD, UNECE, IMF, UNESCO and Eurostat. In Table 6 (see Appendix) all indicators and their main descriptive statistics are presented.

In particular, some indicators used as proxies for the dependent variables (educational outcomes) limit the extension of the period; this is the case of early-school leavers and total participation rates provided by Eurostat, from which there is practically no data available for the period 1980-1990. However, the relatively large number of countries considered makes it possible to estimate the equations for a shorter period, and therefore some regressions are run for the sub-period 1990-2010. Given the time-extension of the series, the schooling indicators with more promising results are the gross enrolment ratios provided by UNESCO, which also allows to consider the separately evolution of male and female enrolments decisions, as well as the demand for education across the different levels of the formal educational systems (primary/secondary/tertiary).

From a simple exploratory approach to the statistics of these series a high level of disparity between countries is observed. This is also true in terms of the evolution shown in the last few years. As can be seen in Table 7 (Appendix), the countries with higher tertiary enrolment rates at the end of the period of study of this research (2010) are Finland, Slovakia, Greece and Slovenia; all of them with gross enrolment ratios above 86%. In the other extreme, Macedonia, Malta, Moldova and Luxembourg show tertiary enrolment rates below 40%. In addition, these enrolments are more elevated for women than men; exceeding 30 percentage points of difference in the case of the Baltic countries, Norway, Sweden and Iceland. Although these numbers show a mixed picture of performances, all countries have experienced noticeable increases in higher education enrolments during the last three decades; and this has been especially strong for girls in countries like Greece, Slovenia, Finland, and Iceland. On the other hand, secondary and primary enrolments show naturally higher levels of enrolment rates. For the first, the gross enrolment ratios are above 90%, close to universal access; with exception of Macedonia, Moldova, Russia, and Croatia, with gross enrolment ratios of between 80 and 90 percent; in terms of best performances during the last three decades, Spain, Portugal and Italy occupy the first places. Finally, for primary education, enrolments are all over 90%, and differences in terms of recent levels and evolution are much smaller than in the case of secondary or tertiary education; as well as gender differences, that for primary are almost negligible

[56] Liechtenstein, Malta, Monaco, San Marino, Gibraltar, Holy See, Kosovo, Bosnia, Albania, Belarus and Montenegro.

VII. Results

Equations [1] and [2] provide complementary information about how the demand for education responses in periods of macroeconomic turbulences. The three schooling indicators used as dependent variables for the estimations of both equations are: i) the *total participation rate* at all IECD levels for the population between 14 and 25 years old; ii) the *early-school-leavers rate* (18-24 age group) and iii) the *gross enrolment rates* in primary, secondary and tertiary[57].

VII.1. Results from Equation 1

A first approach to the evaluation of the effects of changes in aggregate economic conditions on schooling demand is carried out by estimating equation [1], using as a proxy for the economic cycle the unemployment rate of the whole population[58]. As can be seen in Figure 10 (Appendix), unemployment tends to increase during negative phases of the economic cycle and decreases during periods of economic expansion. The causality relationship from the economic cycle to the demand for education is not only suggested by the theoretical framework but also supported by the results of the Engle-Granger causality test (Table 8, Appendix). The main results arising from the estimations of equation [1] are summarized in Output Table I.1 for total participation and early-leavers rates and in Output Table I.2 for enrolment rates.

Time trends are significant in the vast majority of the estimated specifications (the same applies in the case of equation [2]); showing a positive coefficient in the case of participation and enrolment rates, and a consistently negative value for the case of early leavers. This means that during the last decades the demand for education in European countries presents a trend which is independent of the changes in the aggregate economic conditions. The unemployment rate also shows a significant effect in almost all estimated specifications for [1], which in broad terms gives the first supporting evidence to the predictions of the theoretical model presented in section II: the demand for education of European youngsters is affected by the economic cycle. Interestingly, the elasticity of schooling demand with respect to this proxy for the cycle differ across different income-level subgroups, between boys and girls and is also dependent on the schooling indicator considered.

[57] Total participation and early-leavers rates are provided by Eurostat for the period 1988-2010, while the enrolment series are published by UNESCO, and up to now there is information for the period 1980-2009. In some countries –mostly Eastern Europeans– the series for two indicators start in the mid-nineteens; however, the relatively large number of countries (33) included in the panel-data set makes it possible to work with shorter periods, taking advantage of the data available for 2010, which has not been published yet for enrolment rates. A more complete evaluation of schooling data for 2010 and the first indicators for 2011 will be possible from beginnings of 2013.

[58] There are some clear advantages from working with unemployment rates in [1]; i) this indicator is widely used for different type of studies and comes from reliable sources, ii) no further estimations or assumptions required, like in the case of the application of filters to obtain the cyclical component of a series, iii) it is a broadly accepted proxy of the cycle; iv) makes easy to interpret the estimated coefficient; v) with few exceptions the data is available for the whole period 1980-2010.

Output Table I.1. Total participation and early-leavers rates – Results from equation [1]
OLS Fixed effects – Period 1992-2010

	Dependent: total participation 14-25 (ln)					Dependent: early leavers (ln)				
	total	low 20	mid 2030	high30	total	total	low 20	mid 2030	high 30	total
ln_unemployment	**-0.029049*** **	**-0.008963**	**-0.028232**	**0.008280**	**-0.042187*** **	**-0.049055***	**0.098296*** **	**-0.057886*** **	**-0.130736*** **	**0.076838** **
	(0.009454)	(0.028691)	(0.020543)	(0.011836)	(0.013127)	(0.026512)	(0.026389)	(0.021220)	(0.040169)	(0.029991)
trend	0.014321***	0.022410***	0.015383***	0.006796***	0.014125***	-0.025642***	-0.033771***	-0.026038***	-0.023217***	-0.026036***
	(0.000739)	(0.942124)	(0.000663)	(0.000737)	(0.000711)	(0.003253)	(0.003399)	(0.001254)	(0.005232)	(0.003328)
ln_unem.*highhalf					**0.023418***					**-0.201547*** **
					(0.013746)					(0.041445)
R squared	0.914840	0.942124	0.870612	0.934782	0.915170	0.895177	0.966175	0.981272	0.647455	0.897393
Cross-sections	32	11	8	13	32	32	19	8	13	32
Observations	399	133	102	164	399	437	114	125	198	437

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets ()

Output Table I.2. Enrolments in tertiary, secondary and primary – Results from equation [1]
OLS Fixed Effects regressions – Period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)				Dependent: secondary gross enrolment ratio (ln)				Dependent: primary gross enrolment ratio (ln)			
	total	low20	mid2030	high30	total	low20	mid2030	high30	total	low20	mid2030	high30
ln_unemployment	**0.007419**	**-0.043883*** **	**0.064463**	**0.035824*** **	**-0.003573**	**-0.008819**	**-0.016390**	**0.026111** **	**0.006186** **	**-0.001146**	**-0.015723*** **	**0.019194*** **
	(0.012515)	(0.016071)	(0.061842)	(0.010373)	(0.007404)	(0.005495)	(0.026554)	(0.010974)	(0.003381)	(0.004198)	(0.005677)	(0.002705)
trend	0.052126***	0.068579***	0.057825***	0.043911***	0.008066***	0.004427***	0.012080***	0.007239***	0.001292***	0.000905	-0.000554	0.002158***
	(0.001794)	(0.002923)	(0.002219)	(0.001664)	(0.000883)	(0.000392)	(0.000840)	(0.001074)	(0.000164)	(0.000662)	(0.000196)	(0.000285)
R squared	0.910995	0.912110	0.896521	0.948976	0.685144	0.589565	0.713786	0.618104	0.604353	0.304686	0.813492	0.537717
Cross-section	32 (1)	12	8	13 (1)	33	12	8	13	33	12	8	13
Obs	781	235	203	373	798	227	195	376	805	234	199	372

References: (***): 1% (**): 5% (*): 10% significance levels - standard errors in brackets - (1): Germany not included

As it is shown in Output Table I.1 the *total participation rate* indicator presents a significant and negative elasticity with respect to the unemployment rate for the whole sample, taking a value of approximately -0.03[59]. Contrary to the predictions for high-income countries of the theoretical framework, this result means that a raise in the unemployment rate, phenomenon associated with "bad economic times", discourages youngsters from participating in the educational system, *ceteris paribus*. Hence, this estimated elasticity suggests a pro-cyclical pattern of the average participation rate at all educational levels. Although no clear pattern is found when estimating the same specification for the different groups of countries classified by income-levels, the interacted term of unemployment with the dummy for the group *high30* shows a positive and significant value, suggesting that whereas on average total participation rates may show a pro-cyclical pattern, in higher income countries this may not be the case. For the case of early-leavers rates, while for the whole sample there is a negative elasticity related with unemployment, it turns to be positive and significant (close to 0.1) for the group with the relatively lower income levels (*low20*); and negative and significant for the other two groups (*mid2030* and *high30*), taking values of around -0.06 and -0.13 respectively. This means that an increase of one percentage point in the unemployment rate in the poorest countries of the sample would explain an increase of 0.1 points in the early-leavers rate (pro-cyclical pattern); while this same phenomenon would leading to a reduction of early leavers of around 0.06 and 0.13 for the group of relatively middle and high-income levels (counter-cyclical pattern)[60]. It is important to mention before proceeding further, that the regressions for the subsamples defined by the groups *low20*, *mid2030* and *high30* face two related problems: one is the relatively low number of observations, specially for the smaller group (*mid2030*), another is the lower number of observations concentrated in the group of lowest income (*low20*). Therefore, all specifications are estimated also for the broader group classification (*lowhalf*/*highhalf*), and the main outputs can be found in the Appendix. Consistently, as shown in Output Table I.3, the different patterns found for early-leavers rates also hold in this case: for the poorest group the unemployment elasticity is positive (pro-cyclical pattern) whereas it turns to be negative for the richest one (counter-cyclical).

The estimated results from the specifications which consider enrolment rates as indicators for schooling demand shed more light on how these schooling decisions are affected by changes in the economic cycle, but in general terms support the first findings: a counter-cyclical (pro-cyclical) pattern for higher (lower) income countries. Starting with the analysis of *tertiary enrolments*, the unemployment rate shows a non-significant coefficient for the whole sample (Output Table I.2), therefore there is no clear pattern among all the countries considered. This does not mean that the economic cycle does not affect tertiary enrolments; instead, the non-significance coefficient comes from the estimation of "average behaviours" for countries showing quite different patterns. In fact, for the group of highest income levels (*high30*) the elasticity is

[59] Unless the contrary is explicitly mentioned, a significant effect refers to a significance level at 1%. Notice that the indicators for the variables are included with a logarithm transformation, and that is why the values of the estimated coefficients can be interpreted as elasticities.

[60] An illustration with a hypothetical case may contribute to understand the dimension of this effect: if a country from the *low20* group has an early leavers rate of 10 percent (the ET2020 target) and during a recession the unemployment rate is doubled (increasing from 5 to 10 percent, for example), the estimated elasticity of 0.1 suggest that the early leavers rate would increase from 10 to 11 percent. On contrary, this same episode would be reducing this rate from 10 to 8.7 in the richest countries.

positive and significant, taking a value close to 0.036. This means that if unemployment doubles during a recession, for example, this phenomenon would lead –*ceteris paribus*- to an increase of 3.6% in the gross enrolment ratio at tertiary level (for example, an enrolment rate going from 90 to 93.24 percent). On contrary, the same adverse shock is expected to discourage young people to enrol in higher education in the case of lower income countries (group *low20*), given the significant estimated elasticity of approximately -0.045 (following with the example, the enrolment rate would decrease from 90 to around 86 percent, *ceteris paribus*)[61]. The counter-cyclical pattern seems also to dominate in the group of middle-income countries given the positive estimated coefficients for this sub-sample, however, the effect is not significant at standard levels. Besides the relatively high explanatory power of these estimated models (R-squared values of around 0.9), the results presented in Output Tables I.4.A, I.4.B and I.5[62] (Appendix) give additional support to these findings, and allows to go deeper in the identification of the differential responses by gender[63]. First, the broader classification of groups show coherent results: pro-cyclical pattern of tertiary enrolments in the group with lower income levels (*lowhalf*) and a counter-cyclical behaviour of this same indicator in the richest group (*highhalf*). Secondly, gender differences seem to be of higher relevance in lower income countries. While the counter-cyclical pattern found for both males and females in higher income countries (considering enrolments and number of tertiary students, for both *high30* and *highhalf* subsamples), gender-specific regressions for the group of lowest income levels (*low20*) show a significant (negative) elasticity just for the case of males (for both alternative indicators of demand for higher education). However, for the broader group classification (*lowhalf*) the unemployment rate turns to be significant and negative also for girls, meaning that on average girls and boys in lower-income countries tend to increase their demand for higher education during "good times" of the economic cycle and to reduce it during "bad" ones. In third place, although the regressions presented in the Output Table I.2 show a positive but non-significant effect of unemployment rates on tertiary enrolments for the group *mid2030*, the same regressions carried out for the alternative indicator "number of tertiary students per 1000 inhabitants" show also positive coefficient (and this time significant) for these countries. In words, European countries with relatively middle income levels –most of them located in Southern Europe- present a similar pattern than the one shown by higher income countries, with a counter-cyclical response of the demand for education at tertiary level (see Output Table I.5, Appendix). Finally, when including the US in the group of higher income countries, the estimated elasticities remains positive and significant but with higher values (Output Table I.4.B, Appendix). Moreover, the significant effect of the interacted term included in this regression suggests that the counter-cyclical response for the case of boys is quite stronger for the US in comparison with European averages; although the standard error is relatively high, turning this coefficient significant just at a 10% level.

[61] Symmetrically, the sign of these elasticities suggest that during the positive phases of the cycle, when unemployment tend to decrease, tertiary enrolments would decrease in higher-income countries and increase in lower-income ones.

[62] Output Table I.5 shows the results of the same specifications but considering the number of students in tertiary per 1000 inhabitants, an alternative indicator to proxy the demand for higher education which shows during the last decades a similar behaviour than the case of enrolment rates.

[63] In order to make easier the comparison of the results from all the alternative specifications for equation [1], the estimated signs for the unemployment elasticities are presented in the Summary Table I.

Turning now to *secondary enrolments*, the results show a quite similar pattern to the one found for tertiary enrolments, although with a lower explanatory power of the models[64], smaller estimated coefficients and more non-significant cases (Output Table I.2). While for the broader classification of groups there is still a pro-cyclical (counter-cyclical) pattern for lower (higher) income countries; the unemployment rate turns to be not significant neither for the *low20* nor for the *mid2030* group, although they all show negative coefficients. The results from the group with the highest income levels (*high30*) show a significant and positive elasticity of around 0.025; lower than the 0.036 for tertiary but of a quite important magnitude. With respect to the gender-specific results (see Output Tables I.6.A and I.6.B), it is interesting to notice that whereas the elasticity for girls is positive and significant for the higher-income countries, it turns to be significant for males just when including the US in this groups. This gives additional evidence suggesting that the counter-cyclical pattern in the demand for education at secondary and tertiary level may be particularly strong in the US in comparison with European averages; which goes in line with the extended literature for the US highlighting this kind of pattern. In the case of lower-income countries (*lowhalf*), the negative elasticity is found for both males and females (of around -0,02) and again here, for the smaller group with lowest income levels (*low20*) this coefficient is negative for both but just significant for the case of boys.

Although the labour market opportunities are not expected to play a key role in young people at primary-age, the study of Peraita and Pastor (2000), for example, estimates significant impact for some macroeconomic variables on dropouts at primary level in Spain. Therefore, the same regressions estimated for tertiary and secondary enrolments are carried out for *primary enrolments*; and perhaps surprisingly the results show a significant impact of the unemployment rate on these decisions, from estimations considering the whole sample. For the groups of higher income levels, similarly to the results obtained for secondary and tertiary enrolments, the unemployment elasticity of primary enrolments is positive and significant. The main differences with respect to the higher levels of education come from the non-significant effect of this proxy for the cycle on primary enrolments in the countries with lowest levels of income; and a positive and negative elasticity estimated for the group of relatively middle income levels. In particular this last result goes in line with the literature for Spain (actually Spain is part of the *mid2030* group), which has documented a strong negative effect from adults unemployment rates on schooling demand by youngsters. Gender differences in primary enrolments are this time almost negligible: in higher income countries the elasticity is positive and significant for boys and girls, and for the middle-income countries the negative impact coming from higher levels of unemployment is evidenced also by both (see Output Tables I.7.A and I.7.B)

Overall, the most interesting results coming from the estimations of equation [1] are: i) the switch of the sign associated with the unemployment rate suggesting different patterns of the demand for education in

[64] R-squared values are around 0.60 for the regressions explaining secondary enrolment, whereas it is around 0.90 for those considering tertiary enrolment rates.

countries with different income levels and ii) the particularly negative impact of higher levels of unemployment on schooling demand by males in poorer income countries[65].

Summary Table I. Counter-cyclical or pro-cyclical? – equation [1]
Sign of the estimated elasticities with respect to total unemployment rate - proxy for the economic cycle

	total participation	early leavers	tertiary enrolment	nº tertiary students	secondary enrolment	primary enrolment
Total	(-) pro-cyclical	(-) counter-cyclical	(+) NS	(+) counter-cyclical	(-) NS	(+) counter-cyclical
male	-	-	(+) counter-cyclical	(+) counter-cyclical	(-) NS	(+) counter-cyclical
female	-	-	(-) NS	(+) counter-cyclical	(-) NS	(+) counter-cyclical
low20	(-) NS	(+) pro-cyclical	(-) pro-cyclical	(-) pro-cyclical	(-) NS	(-) NS
male	-	-	(-) pro-cyclical	(-) pro-cyclical	(-) pro-cyclical	(-) NS
female	-	-	(-) NS	(-) NS	(-) NS	(-) NS
mid2030	(-) NS	(-) counter-cyclical	(+) NS	(+) counter-cyclical	(-) NS	(-) pro-cyclical
male	-	-	(+) NS	(+) counter-cyclical	(-) NS	(-) pro-cyclical
female	-	-	(+) NS	(+) counter-cyclical	(-) NS	(-) pro-cyclical
high30	(+) NS	(-) counter-cyclical	(+) counter-cyclical	(+) counter-cyclical	(+) counter-cyclical	(+) counter-cyclical
male	-	-	(+) NS	(+) counter-cyclical	(+) NS	(+) NS
female	-	-	(+) counter-cyclical	(+) counter-cyclical	(+) counter-cyclical	(+) counter-cyclical
lowhalf	(-) NS	(+) pro-cyclical	(-) pro-cyclical	-	(-) pro-cyclical	(-) NS
male	-	-	(-) pro-cyclical	-	(-) pro-cyclical	(+) NS
female	-	-	(-) pro-cyclical	-	(-) pro-cyclical	(-) NS
highhalf	(+) NS	(-) counter-cyclical	(+) counter-cyclical	-	(+) counter-cyclical	(+) counter-cyclical
male	-	-	(+) counter-cyclical	-	(+) NS	(+) counter-cyclical
female	-	-	(+) counter-cyclical	-	(+) counter-cyclical	(+) counter-cyclical

VIII.3. Results from Equation 2

Equation 2 is specified in order to evaluate the impact of the mechanisms identified by F&S, say income effect, substitution effect, and the impact of educational quality and expected returns. In particular, the estimations coming from this equation may contribute to interpret the general findings coming from equation [1]. Overall, the general results found for almost all specifications, from OLS as well as from GMM regressions when ruling out the assumption of exogeneity of the regressors, give support to the conditional predicted sign for these variables: i) the coefficients associated with the indicators for households' income (per capita GDP and per capita Final Household Consumption at constant prices of 2000) are in general significant and positive to explain the demand for education, suggesting the presence of credit constraints to smooth shocks in households' consumption levels -*income effect*-, and seems to be of relatively more importance in lower-income countries; ii) the elasticity with respect to youth specific unemployment rates (14-25 years old group) shows a positive value when it is significant (suggesting a *substitution effect)*,

[65] A final consideration arises from a group of alternative specifications estimated for equation [1] (Output Table I.8A and I.8.B for Eurostat's indicators and enrolment rates, respectively), in which other controls apart from the time trend are included. The long-term unemployment rate included in control for the structural part of the unemployment rate; and trying to explore if there may be an asymmetrical influence of the unemployment rate or if this variable is not enough to explain some changes in the schooling indicators during recession times, a crisis-dummy is included. In particular, the negative (positive) coefficient associated with this variable for total participation (early-leavers rate) could be interpreted as evidence suggesting that during crises there might be additional forces discouraging the demand for education that the unemployment rate as a measure of the cycle may not be capturing. However, since the explanatory power of these estimations does not significantly change, there is no need to sacrifice the parsimony of the first group of estimations and that is why the main results provided in this section comes from the simplest specifications.

especially for the case of tertiary enrolments and in countries with higher income levels ; iii) there is a positive effect of the expected returns measured by the ratio between the minimum and average wages –although these estimations are less robust given the limited availability of data for this indicator; and iv) government spending on education as a proxy for educational quality is also found to positively affect the demand for education at all levels, with a significant incidence working with one-year lag[66]. Gender differences across these determinants of schooling demand are also noticeable in some cases, and show a consistent pattern with respect to the results obtained in equation [1].

The *total participation rate* for youngsters of between 14 and 25 years old is positively affected by per capita income levels (*income effect*); taking values of between 0.2 and 0.4. Consistently, for the *early-leavers rate*, per capita income shows a significant and negative impact; meaning that *ceteris paribus* higher levels of income discourages youngsters from dropping out[67] (see Output Table II.1). Moreover, the youth unemployment rate also shows a positive effect on total participation rates, giving support to the significant effect of the opportunity cost considerations (*substitution effect*). As expected, this variable shows a negative effect on dropouts, although the elasticity estimated is not significant at standard levels[68]. The remaining two mechanisms identified by F&S's model (quality of education and expected returns effects) seem to play an important role too, to explain both total participation rates and early levers. In line with the general results obtained by prior literature for Europe (Winter-Ember and Wirz, 2002), government spending on education encourages schooling participation at all IECD levels, and discourages dropouts of youngsters at early levels of the educational system[69]. Since the significant effect is lagged one period (also for tertiary enrolments, which are described next), the problems of consistency that emerge from the suspect of endogeneity in this regressor are expected to be weaker, and this could be also explaining why GMM estimations do not show important differences with respect to OLS regressions (see Output Tables III.1 and III.2, Appendix). With respect to the wage ratio (minimum to average[70]), included in order to capture the effect of the expected returns to schooling on the demand for education, the results shown in specification (ii) for both total participation and early-leavers rate give support to the predictions of the model: a higher value of this ratio reduces schooling participation and increases dropouts. However, the interpretations about this effect should

[66] In fact, the non-significant effect of the contemporaneous government spending on the schooling demand indicators and the significant effect of this variable with one period lag makes OLS regressions less vulnerable to the endogenous problem, since it is less likely to expect a reverse causality with this time differences. In words, government expenditure on education may act as a response of higher or lower demand for education in the contemporaneous period or in prior periods, but schooling decisions today cannot influence educational public investment of yesterday so clearly. The other proxy for quality (ratio pupil/teacher) was included in the regressions, but since the availability of data is quite restricted and the estimations do not show any significant effect this indicator was excluded from the final regressions shown for the results of this study.

[67] Quite similar results are obtained from the same regressions when substituting per capita income by household final consumption per capita. Since the goodness-of-fit of the models was not improved with this incorporation, the regressions presented as main results contain per capita income, since it is the most common measure for income and involves less estimation steps.

[68] These estimations may be capturing different patterns across countries, as shown in the last section when interpreting the results from equation [1]. However, the incorporation of more explanatory variables in equation [2] makes not possible to estimate the specifications for early-leavers and participation rates for the different income-level groups and that is why the potential differences by groups are evaluated from the interacted terms included in the equations estimated for the whole sample.

[69] However, only specification (iv) shows a significant effect of this variable on early-leavers rate (see Output Table I.1).

[70] As mentioned in the empirical strategy section, this ratio is constructed following Rice (2010)

be done carefully, since it is a variable with a lower number of observations (just available for 18 countries out of 33), and this is why it is not included in all of them.

Output Table II.1. Total participation and early-leavers rates – Results from equation [2]
OLS Fixed Effects estimations – Period 1988-2010

	Dependent: participation rate (ln)				Dependent: early-leavers rate (ln)			
	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)
trend	0.005460***	-0.001324	-0.001477	0.008193***	0.000565***	-0.013985***	-0.013753***	0.002043
	(0.000836)	(0.002327)	(0.002482)	(0.000909)	(0.002790)	(0.001853)	0.001796	(0.002729)
ln_gdppc	0.223557***	0.387798***	0.402839***	-0.117985	-0.618529	-0.363353***	-0.400384***	-1.003241***
	(0.050537)	(0.064105)	(0.069433)	(0.074525)	(0.115414)	(0.115227)	(0.118415)	(0.164242)
lnun_y	-0.005753	0.037099***	0.056069***	0.004267	0.011753	-0.040351	-0.049418	-0.009764
	(0.004758)	(0.012978)	(0.013775)	(0.0079209)	(0.034529)	(0.032232)	(0.034142)	(0.025246)
ln_govsp(-1)	0.017521***	0.021725**	0.021485**	-0.002222	-0.045689	-0.003970	-0.003460	-0.042502**
	(0.004174)	(0.009623)	(0.009567)	(0.004105)	(0.013140)	(0.011560)	(0.011391)	(0.019963)
lnratiowage		-0.163806***	-0.172141***			0.194140**	0.178731**	
		(0.026639)	(0.025823)			(0.085312)	(0.082574)	
lnunratio_ty			0.095610***	0.000316			-0.084587	-0.287126***
			(0.025067)	(0.014686)			(0.087957)	(0.084963)
lnunratio_ty*lowhalf				-0.003257				0.387333***
				(0.038021)				(0.131044)
ln_govsp(-1)* lowhalf				0.005881***				-0.002092
				(0.001281)				(0.004581)
lngdppc*lowhalf				0.337729***				0.482341***
				(0.063240)				(0.134025)
R squared	0.906007	0.856969	0.867188	0.922319	0.909726	0.975515	0.975619	0.913647
Cross-sections	32	18	18	31	29	18	18	29
Observations	314	176	175	302	342	193	193	342

References: (***): 1% (**): 5% (*): 10% significance levels; standard errors in brackets

Additional information about the potential asymmetries of these effects across groups of countries arises from the interpretation of the interacted terms included in specification (iv). The higher effect of *per capita* income levels and government spending on education on participation rates in the group of relatively lower levels of income (*lowhalf*) give additional support and provide new clues to understand the results obtained from equation [1]. The pro-cyclical behaviour of the total participation rates in lower income countries may be explained, at least to some extent, by a relatively high income and quality effects, the two main candidates to compensate the counter-cyclical pattern encouraged by changes in youth labour market opportunities (*substitution effect*). For the case of early-leavers, although the income effect captured in the *per capita* income levels seems to be actually weaker for lower-income countries and the interacted coefficient with government spending is negative but not significant, the significant coefficient of the interacted term with the unemployment ratio may contribute to explain the pro-cyclical behaviour of dropouts in the poorer European countries suggested by the results of equation [1]: a relatively strong increase in adults unemployment rates with respect to the specific unemployment rates for young people has a significant effect on dropouts, which may be interpreted as a higher incidence of households' budget constraints on the demand for education of the younger members (Petrongolo and Sansegundo, 2002).

The analysis of the effect of these aggregate macroeconomic variables on enrolment rates allows to identify different patterns across lower and higher educational levels, and to go deeper in the analysis of differential patterns across countries with different income levels and between males and females. Overall, and as suggested by the theoretical framework and prior empirical literature, the demand for higher education shows a higher sensitiveness with respect to the economic cycle than the schooling decisions taken at lower

educational levels. This is reflected in the stronger estimated elasticities for the explanatory variables as well as in the higher levels of goodness-of-fit of the empirical models explaining tertiary enrolments, with respect to those considering secondary and primary enrolments. Moreover, there is evidence suggesting a particularly higher sensitiveness of males' schooling demand to some macroeconomic turbulences, in particular for lower-income countries.

Output Table II.2. Enrolments in tertiary – Results from equation [2]
OLS Fixed Effects estimations – Period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)					
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Trend	0.023002***	0.017528***	0.023902***	0.024848***	0.031366***	0.032000***
	(0.001750)	(0.003168)	(0.001687)	(0.001715)	(0.001795)	(0.002166)
ln_gdppc	0.839830***	1.203098***	0.832669***	0.789036***	0.461761***	0.439376***
	(0.086033)	(0.122514)	(0.084999)	(0.085373)	(0.081287)	(0.083056)
lnun_y	0.087461***	0.178093***	0.087089**	0.089878**	0.063539**	0.059476**
	(0.031814)	(0.061112)	(0.035404)	(0.035284)	(0.029752)	(0.029763)
ln_govsp(-1)	0.047357***	0.034931**	0.046490***	0.045498***	0.026028***	0.025365***
	(0.008084)	(0.013556)	(0.008324)	(0.008106)	(0.007534)	(0.007211)
lnratiowage		-0.163303				
		(0.110188)				
lnunratio_ty		0.246287***	0.135084***	0.134524***	0.126868***	0.126869***
		(0.076062)	(0.029724)	(0.029251)	(0.040429)	(0.040728)
neg_cycle_gni*lowhalf				-0.045330**		-0.007777
				(0.022469)		(0.025981)
crisis*lowhalf					-0.122424***	
					(0.030606)	
lnunratio_ty*lowhalf					-0.224343***	-0.187273***
					(0.065262)	0.058999
ln_govsp(-1)*lowhalf					0.023901**	0.007282**
					(0.010653)	(0.002944)
lngdppc*lowhalf					0.390306***	0.385852***
					(0.113544)	(0.113554)
R squared	0.925889	0.931962	0.928480	0.929184	0.940075	0.937512
Cross-sections	31	19	31	31	31	31
Observations	514	261	509	509	509	509

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Similarly to the findings for total participation rates, there is a positive influence of *per capita* income on *tertiary enrolments*, with estimated elasticities of between 0.8 and 1.2, depending on the specifications. Consistently with the results obtained from [1], the *income effect* seems to be stronger in lower-income countries, as suggested by the significant and positive coefficient associated with the interacted term of this variable with the dummy for "*lowhalf*" (specifications v and vi; Output Table II.2). The youth unemployment rate also shows a positive and significant impact on tertiary enrolments in all specifications (*substitution effect*), with estimated elasticities in the range 0.06-0.11; roughly lower but close to recent estimations obtained for the UK by Clark (2009), and in all cases larger than those estimated for total participation rates. These higher values with respect to those found for total participation rates, together with the non significant effect of this variable found for almost all regressions with secondary and primary enrolments, suggest –in line with prior literature– a stronger incidence of the opportunity cost considerations on schooling decisions taken by older youngsters with higher educational levels. In addition, government spending on education is another variable affecting positively this indicator for higher education demand, suggesting a positive effect of

the quality of education on human capital investment decisions or an indirect income effect when the effect of government spending is more associated with items like tuition fees and scholarships[71]. Moreover, the positive and significant coefficient for the interacted term of this variable with the group of lowest income levels (see specifications v and vi) highlights the potential effect that budget cuts on education may have in educational outcomes, especially in these countries. Overall, these three factors (income, youth unemployment and government spending) show the expected sign and do not highly differ between males and females. However, as shown in Output Table II.3 (Appendix)[72], the especially high *income effect* for lower-income economies seems to be more important for girls, whereas the effect of government spending on education seems to be stronger for males. Moreover, the wage ratio negatively affect tertiary enrolments for the case of males, suggesting for the whole sample a higher incidence of labour market opportunities for boys, although the *substitution effect* is found for both boys and girls. Finally, as in the case of total participation rates, the ratio of total unemployment to youth unemployment rates interacted with the dummy for lower income countries show a significant and negative value, with a relatively large coefficient. As already explained, this negative coefficient may be seen as an additional force working in the same direction as the income effect: if youth unemployment rises, but adults unemployment rises more, it is expected to find a negative effect on enrolment decisions in lower-income countries, even if the substitution effect is working with a pro-schooling effect (positive coefficient of youth unemployment rate). I. Also the parsimony criterion explains the decisions of interpreting the results coming from the simplest estimations; however, different specifications with alternative controls and the inclusion of lagged values of the explanatory variables are also estimated, as can be seen in Table II.4.B (Appendix)[73].

For secondary and primary enrolments the results provided in Output Table II.5 for the whole sample and in II.6.A and II.6.B for the estimations carried out for the different subsamples and gender specific indicators show a mixed picture. Similarly to the findings for tertiary enrolments, there is a positive effect of government spending on education with one lag on secondary enrolments, which seems to be stronger for lower-income countries (as suggested by the positive and significant effect of the correspondent interacted term shown in third column of Output Table II.5 (Appendix), as well as for the significant effect of this

[71] Although the estimated coefficient may be biased downwards due to the already discussed suspect of endogenaity, the results obtained with GMM estimations show no significant differences; at least not when using lags of the explanatory variables as instruments (see Output Table III.2).

[72] n Output Tables II.4.A is shown the results of the same specifications estimated for the whole sample this time for each subsample considering the different classifications of groups and gender specific enrolment rates. However, given the relatively low number of observations of these estimations, it is more reliable to interpret the results coming from the estimations of the whole sample with the interacted terms to evaluate potential dissimilarities between groups

[73] Perhaps the most interesting results from these alternative specifications for tertiary enrolments come from the significant interacted term of youth unemployment and the group of lower income levels for the case of boys (suggesting a higher substitution effect for this group), and a higher incidence of government spending, which together with the significance coefficient obtained for the wage ratio in specification (ii) suggest a higher sensitiveness of males towards the economic cycle, at least through these mechanisms. Moreover, the significant impact of income and youth unemployment lagged values (one year) in some of the specifications may be interpreted as an additional positive effect coming from an increase of the growth rate of these variables (apart from the positive direct effect from the contemporaneous value) In addition, the inflation variable shows as suggested by prior literature a negative influence on tertiary enrolments. Finally, and in line with the estimations of equation [1] for case of total participation and early leavers rates, the dummy capturing the negative phases of the cycle show a significant and negative effect, suggesting that the model is not completely explaining the overall changes in enrolment rates induced in a period of recession, since given the changes in the mechanisms (income levels, youth unemployment, etc), there is an "extra" factor unobserved discouraging youngsters from participate in tertiary education.

variable in regressions run for the *lowhalf* subsample (whereas no significant effect is found for the group *highhalf*). In addition, there is also a positive effect of the unemployment ratio for the whole sample, which turns to be negative for the lower-income countries; again, supporting the idea of a negative incidence of adults' unemployment rates on schooling demand in these countries. However, no significant effect is found for the income *per capita* levels and the youth unemployment rates neither for the regressions for the whole sample, nor for the interacted terms and the estimations for the subsamples. For the case of primary enrolments, these two variables remain not significant and in general terms equation [2] seems not to contribute to explain the potential effect of the economic cycle on this schooling indicator. Perhaps the only interesting result to remark come from the regressions shown in Output Table II.6.B (Appendix), suggesting that the model fits better for lower income countries, where there is evidence for a positive influence of the *per capita* income levels and a weak but significant and positive influence of the youth unemployment rate. Overall, the estimations for secondary and primary show a lower explanatory power with respect to tertiary enrolments since the variables included in the model seems not to significantly contribute to explain these schooling indicators, and therefore different models or alternative indicators for the explanatory variables[74] would be necessary in order to understand why both primary enrolments and secondary enrolments seem to behave counter-cyclically in higher income countries, and secondary enrolments pro-cyclically in lower income countries, according to the estimations of equation [1].

Summary Table II. Estimations of the mechanisms for the simpliest specification (iii) – equation [2]

	GDP per capita	*x lowhalf*	Youth unemployment	*x lowhalf*	Goverment spenditure	*x lowhalf*	Unemployment (total/youth)	*x lowhalf*	Wage (min/ave)
Total participation	(+)*** *income effect*	(+)***	(+)*** *substitution effect*	NS	(+)** *quality effect*	(+)***	(+) ***	NS	(-)*** *exp. returns effect*
Early-leavers	(-)*** *income effect*	(+)***	(-) NS	NS	(-) NS	NS	(-) NS	(+)***	(+) ** *exp. returns effect*
Tertiary enrolments	(+)*** *income effect*	(+)***	(+)*** *substitution effect*	NS	(+)*** *quality effect*	(+)***	(+) ***	(-)***	(-) NS
Male	(+)*** *income effect*	NS	(+)*** *substitution effect*	NS	(+)*** *quality effect*	(+)***	(+) ***	(-)***	(-) NS
Female	(+)*** *income effect*	(+)***	(+)*** *substitution effect*	NS	(+)*** *quality effect*	(+)***	(+) ***	(-)***	(-) NS
Secondary enrolments	(+) NS	NS	(-)NS	NS	(+)*** *quality effect*	(+)***	(+)***	(-)***	(+) NS
Primary enrolments	(-) NS	NS	(+)NS	NS	(-)***	NS	(+) NS	NS	(-) NS

To sum up, the estimations obtained from the two equations shed light on some of the questions that have inspired this research. First, *do young people living in Europe participate more or less in the formal education system when the economies face negative or positive shocks?* The results obtained from equation [1] suggest that there is, indeed, a significant effect of the economic cycle on schooling demand, with a particularly strong impact on the decisions taken for higher levels of education. *Do crises like the current one encourage young*

[74] Clearly, better proxies for the quality of education and more precise measures for the opportunity cost and the expected returns for young people with different ages taking decisions across different levels of the educational system may contribute to improve the results. However, these indicators are not easy to find for large samples and extended periods like those used here.

people to study more due to the lack of labour opportunities?; and *is it possible to identify a general pattern for the region; for boys and girls or across lower and higher levels of education?* The simple analysis of the most recently published statistics show a mixed picture: while in some countries the demand for education has notably increased during the last years, in other cases there is stagnation or even decline of some of the educational indicators for schooling demand. Given the backwardness of the publication of the official educational data and the typically lagged reaction of schooling variables to changes in macroeconomic conditions (Barakat et al, 2010), the actual effects of the current crises will be completely visible in the upcoming years. Nevertheless, the empirical results obtained in this study for the period 1980-2010 may provide at least some clues about what may be expected for these years. In particular, a counter-cyclical pattern is likely to be found for high-income countries (Western Europe), in line with the theoretical predictions of the model and the empirical evidence for countries like the US and the UK. However, the relatively strong *income effect* and the particularly high and positive elasticity with respect to government spending evidenced by lower-income European countries explain at least to some extent why the evidence for lower-income countries suggest the opposite behavior: a pro-cyclical pattern of the demand for education, for general participation rates at all IECD levels, but especially for higher education (tertiary enrolments).

The policy implications of the current crisis highly differ between these two scenarios. One the one hand, for the case of lower-income countries (the vast majority of Eastern European countries), the existence of mechanisms discouraging schooling participation during recession may reinforce the current obstacles in order to achieve a "smart and inclusive growth", and may also have an important effect on inequality levels within countries (given the strong influence of the socioeconomic background suggested by prior literature), while enlarging at the same time the heterogeneity between these countries and its better-off peers in Europe. In particular, a pro-cyclical pattern found for the case of early-leavers (higher dropouts during "bad times") may have great not desirable consequences due to the potentially high persistence of the effects of this dropping-out decisions, and given that early leavers are "more likely to have a lower socio-economic status or to belong to vulnerable social groups"; and this is the particular case of immigrants and males; EU (2011). How is it possible to see higher dropout rates while youth unemployment is also increasing –phenomenon that impulse the pro-schooling *substitution effect*? The high proportion of early-school-leavers that are not working provides additional support to the findings of this model: the combination of lower families' budgets, with lower public spending on education may discourage some youngsters to participate in the educational system even when the labour market opportunities are scarce. Lastly, given the relatively high impact of government spending on schooling demand (especially for males), the long-run consequences of the public funding cuts may be more troubling than the expected. On the other hand, for the case of higher-income economies (mainly Western European countries) the implications are different but not of lower importance. If schooling demand increases during recessions like the current one due to the strong incidence of lower labour opportunities, the quality of the education received by these increased population at schools may be highly deteriorated, particularly in those countries where the real government spending on education is declining. Moreover, higher enrolment rates today does not mean higher graduation rates tomorrow (and therefore an increase in

human capital attainment levels of the population), since it may be reflecting, at least in some cases, a delay in the completion time before graduation (Brunello and Winter-Ebmer, 2002). Therefore, as suggested by Barakat et al (2010) it is worth monitoring simultaneously all schooling indicators in order to not misunderstand the real changes in schooling demand.

Finally, *is there any difference between boys and girls or across lower and higher levels of education?* Yes, the pro-cyclical behavior of schooling demand found for lower-income countries seems to be especially intensive for males (for both secondary and tertiary enrolment's decisions); whereas the counter-cyclical behavior of the demand for education in higher-income countries do not show significant differences by gender. Moreover, and as expected, the sensitiveness to changes in the aggregate conditions is significantly stronger for decisions involving higher levels of education: whereas the *income effect* and the positive impact of government spending is found in general for all schooling-demand indicators, the positive and significant impact of youth unemployment (*substitution effect*) plays its most important role on tertiary enrolment decisions, for both males and females.

VIII. Conclusions

The schooling decisions taken by young generations today will strongly determine the potentialities and boundaries to achieve an innovation-based, sustainable and inclusive economic growth tomorrow. The European authorities have been explicitly recognizing and emphasizing the crucial role of human capital, the importance of reducing the large schooling disparities between countries and the special need to focus and monitoring what is going on with young people, group who has been particularly affected by the current crisis. These concerns have been at the heart of recent initiatives like the ET2020 strategy framework, which has set common goals with respect to some schooling indicators to achieve by 2020.

Trying to shed light on how schooling-demand decisions in Europe are affected by changes in the aggregate economic conditions, a panel-data study for 33 countries is carried out for the period 1980-2010. The last documents published by the European Commission have shown a special concern about the recent evolution of some schooling indicators, since the progress made by some countries may be a temporary response to the current specific economic situation characterized by lower labuor market opportunities for young people, and not to long-run efforts from governments. This counter-cyclical response (higher demand for education during crises) is indeed supported by the results coming from the empirical estimations of this research, and goes in line with both the predictions of the theoretical model and the evidence shown by prior literature for developed economies such as US and UK. However, when estimating the equations by sub-samples defined by income-level ranges, the effect of the economic cycle on the demand for education turns to be the opposite for lower-income countries, i.e. a pro-cyclical. These results can be interpreted from the theoretical framework proposed by Ferreira and Schady (2008) as evidence suggesting the presence of tighter credit constraints faced by households living in these lower-income countries, which makes them more vulnerable to shocks in the consumption levels. A relatively higher impact of income levels as well as a

particularly strong incidence of government spending on education in these countries may be the main factors explaining why schooling demand may be negatively affected during crises. In addition, the patterns also differ between the different levels of the educational system (the demand for higher education shows a higher elasticity with respect to the economic cycle than the decisions taken at lower levels of education) and some gender differences are also remarkable (higher elasticity in the behavior of boys for the case of lower-income countries). Hence, a main contribution of this research is a call for an extremely careful attitude when analyzing aggregate data for Europe, since the "big numbers" seem to be hiding quite different patterns. Undoubtedly, more research on a country-based level is necessary to enlarge the broad-brush picture provided by these results coming from a panel data with a relatively large sample. For example, the most recent data show that tertiary enrolment rates have strongly decreased in countries with relatively low-income levels such as Latvia, Hungary and Moldova (in line with the pro-cyclical pattern found for the period 1980-2010); while important increases in enrolment rates have occurred in Romania. However, while country-based studies avoid the problem of "average numbers" and also are especially suitable to overcome same empirical limitations that arise from aggregate studies for many cases there are not large-enough series series to proceed with a country-specific study.

Why is it important to distinguish these differential reactions to changes in aggregate conditions? For countries where the current crisis may be generating positive incentives to participate in the educational system (counter-cyclical pattern) there are at least two major implications. First, a sudden increase of enrolments and participation rates during times of public funding cuts may have important and negative effects on the quality of education of entire generations. Second, while short-term statistics provide an optimistic picture now, (i) it is important to start monitoring these indicators from the very beginning of the recovery process, since higher labour opportunities may discourage young people to stay in schools or colleges, and (ii) for a comprehensive evaluation of the legacy of these recessions times it is also crucial to distinguish to what extent the higher enrolment rates today will lead to higher graduation rates, since they may be reflecting in a considerable number of cases a delay in the completion time for graduation. On the other hand, the policy implications are quite different if the contrary is going on, for those countries or population groups where the crisis is generating a net negative effect on schooling participation. In this case, the main policy measures should be taken now in order to soften the adverse consequences of the crisis, which is a particularly major challenge in times of tight public budgets. In both cases, an attitude of omission by the correspondent policy-makers or a misunderstanding of the real process by which the demand for education is affected by aggregate shocks may conduce to non-desirable long-run effects in multiple dimensions.

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X. Appendix

Table 5. Groups of countries - classifications

Geo-political classification			Income range-level clasification			Income level - two halfs	
East and central Europe	*South*	*West*	*Low 20*	*Mid 2030*	*High30*	*Low half*	*High half*
Bulgaria	Cyprus	Austria	Bulgaria	**Cyprus**	Austria	Bulgaria	Austria
Croatia	Greece	Belgium	Croatia	Czech Republic	Belgium	Croatia	Belgium
Czech Republic	Italy	Denmark	Estonia	France	Denmark	**Cyprus**	Denmark
Estonia	Portugal	Finland	Hungary	**Greece**	Finland	Czech Republic	Finland
Hungary	Spain	France	Latvia	**Italy**	Germany	Estonia	Germany
Latvia		Germany	Lithuania	**Portugal**	Iceland	**Greece**	Iceland
Lithuania		Iceland	Macedonia	Slovenia	Ireland	Hungary	Ireland
Macedonia		Ireland	Malta	**Spain**	Luxembourg	Latvia	**Italy**
Malta		Luxembourg	Poland		Norway	Lithuania	Luxembourg
Poland		Norway	Romania		Sweden	Macedonia	Norway
Romania		Sweden	Russia		Switzerland	Malta	**Spain**
Russia		Switzerland	Slovakia		The Netherlands	Poland	Sweden
Slovakia		The Netherlands			United Kingdom	**Portugal**	Switzerland
Slovenia		United Kingdom			(United States)	Romania	The Netherlands
						Russia	United Kingdom
						Slovakia	United States
						Slovenia	

Table 6.1 Descriptive statistics - indicators for schooling demand –gross enrolment ratios

	Primary	Primary (f)	Primary (m)	Secondary	Secondary (f)	Secondary (m)	Tertiary	Tertiary (f)	Tertiary (m)
Mean	100.9205	100.5225	101.2994	97.46693	98.76746	97.25686	39.70702	43.99032	36.44903
Median	100.5591	100.3058	100.7629	95.85812	96.61842	96.32498	35.52189	38.16940	34.80871
Maximum	126.6652	123.0487	132.5244	162.3487	175.0678	154.7720	95.07212	111.3482	87.64780
Minimum	79.54179	79.19665	79.87714	53.76776	45.24251	53.82991	1.444930	1.364780	1.524640
Std. Dev.	6.255269	6.078731	6.694721	13.73717	15.29379	13.08084	20.40148	25.32847	16.91465
Skewness	0.472022	0.223616	0.666890	0.966888	1.272400	0.722180	0.453941	0.533050	0.294443
Kurtosis	5.838164	5.155591	6.385152	5.751639	6.948260	4.684059	2.420455	2.365346	2.553034
Jarque-Bera	354.1281	180.1316	492.0208	437.3589	791.5733	176.5851	45.77647	56.76366	20.15460
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000042
Sum	95874.44	89666.09	90359.07	90449.31	85038.78	83738.16	37602.55	38931.43	32257.39
Sum Sq. Dev.	37132.85	32923.32	39933.98	174934.1	201154.1	147153.2	393744.3	567113.9	252917.1
Observations	950	892	892	928	861	861	947	885	885

Table 6.2 Descriptive statistics - indicators for schooling demand – other indicators

	Part. 14-25	Part. Post-compulsory	Part. Post-compulsory (f)	Part. Post-compulsory (m)	Early leavers rate	Nº of students in tertiary/1000	Nº of students in tertiary/1000 (f)	Nº of students in tertiary/1000 (m)
Mean	56.97482	85.05697	86.40784	83.74401	16.73112	2933.691	2817.926	3088.801
Median	58.00000	89.40000	90.20000	87.50000	13.70000	2800.659	2861.020	2839.616
Maximum	71.70000	102.6000	102.9000	102.3000	54.40000	6675.391	6234.300	7513.711
Minimum	32.70000	42.90000	38.10000	41.90000	3.700000	115.0419	124.4644	106.0272
Std. Dev.	9.010635	12.40276	11.93122	13.18721	10.24958	1366.550	1174.010	1627.001
Skewness	-0.528449	-1.157170	-1.241877	-1.094449	1.367032	0.421578	0.246582	0.504507
Kurtosis	2.486762	3.893683	4.250007	3.718044	4.478089	2.651689	2.860007	2.545736
Jarque-Bera	23.75520	104.8887	131.4363	90.43779	175.8899	32.90780	9.712955	45.25423
Probability	0.000007	0.000000	0.000000	0.000000	0.000000	0.000000	0.007778	0.000000
Sum	23530.60	34788.30	35254.40	34251.30	7311.500	2784073.	2499500.	2739767.
Sum Sq. Dev.	33450.92	62762.00	57938.07	70952.27	45803.52	1.77E+09	1.22E+09	2.35E+09
Observations	413	409	408	409	437	949	887	887

Table 6.3 Descriptive statistics - indicators for labour market variables (expected returns and opportunity cost)

	Ratio wages (min / average)	Manufacturing wages	Proportion unemployment with primary	Proportion unemployment with secondary	Proportion unemployment with tertiary	Youth Unemployment rate	Youth Unemployment rate (f)	Youth Unemployment rate (m)
Mean	0.370157	76.30305	36.20955	47.98928	13.95010	17.53679	18.49402	16.69412
Median	0.359000	76.17155	33.70000	49.20000	12.40000	16.05000	16.40000	15.80000
Maximum	0.592000	160.5560	78.40000	77.30000	47.30000	70.90000	73.50000	58.90000
Minimum	0.082000	20.05014	12.10000	7.400000	1.500000	2.600000	2.400000	3.000000
Std. Dev.	0.075772	27.54479	15.05514	16.53442	9.379530	10.02934	11.36421	8.547468
Skewness	0.034562	0.097009	0.819523	-0.348225	1.387690	1.371861	1.207242	0.897536
Kurtosis	3.476053	2.446699	2.984231	2.465413	5.150405	6.357338	4.793338	3.936771
Jarque-Bera	4.174916	8.222182	57.42870	16.47641	263.4891	604.7247	289.0884	124.3613
Probability	0.124002	0.016390	0.000000	0.000264	0.000000	0.000000	0.000000	0.000000
Sum	160.2780	43797.95	18575.50	24618.50	7156.400	13538.40	14184.92	12153.32
Sum Sq. Dev.	2.480295	434744.0	116048.6	139974.3	45043.50	77553.10	98925.23	53114.04
Observations	433	574	513	513	513	772	767	728

Table 6.4 Descriptive statistics - indicators for the cycle

	Cycle GDP (H-P)	Cycle GNI per capita (H-P)	Dummy crisis	Output gap	Unemployment rate
Mean	-5.02E+08	-3.877202	0.224280	0.266030	7.974361
Median	-69490413	-19.30734	0.000000	-0.124000	7.196000
Maximum	3.02E+11	2213.140	1.000000	15.77800	37.25000
Minimum	-4.50E+11	-2556.536	0.000000	-9.797000	0.025000
Std. Dev.	3.43E+10	342.7789	0.417322	2.943555	5.430205
Skewness	-2.286864	0.083754	1.322059	1.092517	2.101659
Kurtosis	64.77092	12.76880	2.747840	6.541230	10.33750
Jarque-Bera	136837.5	3862.055	285.7253	437.1958	2723.216
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	-4.30E+11	-3764.763	218.0000	161.2140	7288.566
Sum Sq. Dev.	1.01E+24	1.14E+08	169.1070	5242.034	26921.75
Observations	856	971	972	606	914

Table 6.5 Descriptive statistics - indicators for income

	GDP per capita (constant USD 2000)	GDP per capita (PPP 2005)	Household Final Consumption per capita (Constant USD 2000)	GNI_PC
Mean	15387.69	21575.34	8914.339	16010.46
Median	14728.86	21302.56	8833.073	15825.57
Maximum	56388.99	74113.94	27608.83	44438.42
Minimum	346.0160	1619.869	135.8854	353.2851
Std. Dev.	11434.76	11275.76	6018.881	10921.38
Skewness	0.603383	0.888047	0.496866	0.364096
Kurtosis	2.737314	4.913521	2.528501	2.170901
Jarque-Bera	62.34611	278.6070	48.54375	46.16991
Probability	0.000000	0.000000	0.000000	0.000000
Sum	15095328	21165413	8584509.	14569523
Sum Sq. Dev.	1.28E+11	1.25E+11	3.49E+10	1.08E+11
Observations	981	981	963	910

Table 6.6 Descriptive statistics - indicators for quality of education

	Gov. Spending by pupil as % GDP	Gov. Spending as % of GNI	Gov. Spending as % of GDP	% Gov spending destined to primary	% Gov spending destined to pre-primary	% Gov spending destined to secondary	% Gov spending destined to tertiary
Mean	23.53962	4.904657	5.240169	25.94845	8.455477	42.03389	19.98158
Median	23.85977	4.808030	5.162690	24.61373	8.084850	43.04021	19.67299
Maximum	47.06441	8.961950	9.509730	58.28306	20.12554	55.15216	34.37130
Minimum	8.899610	1.646520	1.768990	12.93789	0.050600	13.30562	3.565890
Std. Dev.	5.662450	1.270403	1.329830	7.670324	3.770720	7.726416	6.162712
Skewness	0.247246	0.339976	0.284076	1.136297	0.528117	-1.007042	-0.051834
Kurtosis	4.332586	3.640068	3.593708	4.860715	3.198409	3.959057	3.726406
Jarque-Bera	32.07241	13.84333	10.72016	136.9527	18.33556	78.99914	8.547310
Probability	0.000000	0.000986	0.004701	0.000000	0.000104	0.000000	0.013931
Sum	8968.596	1868.674	1996.504	9886.359	3221.537	16014.91	7612.982
Sum Sq. Dev.	12184.07	613.2911	672.0106	22356.87	5402.965	22685.05	14432.03
Observations	381	381	381	381	381	381	381

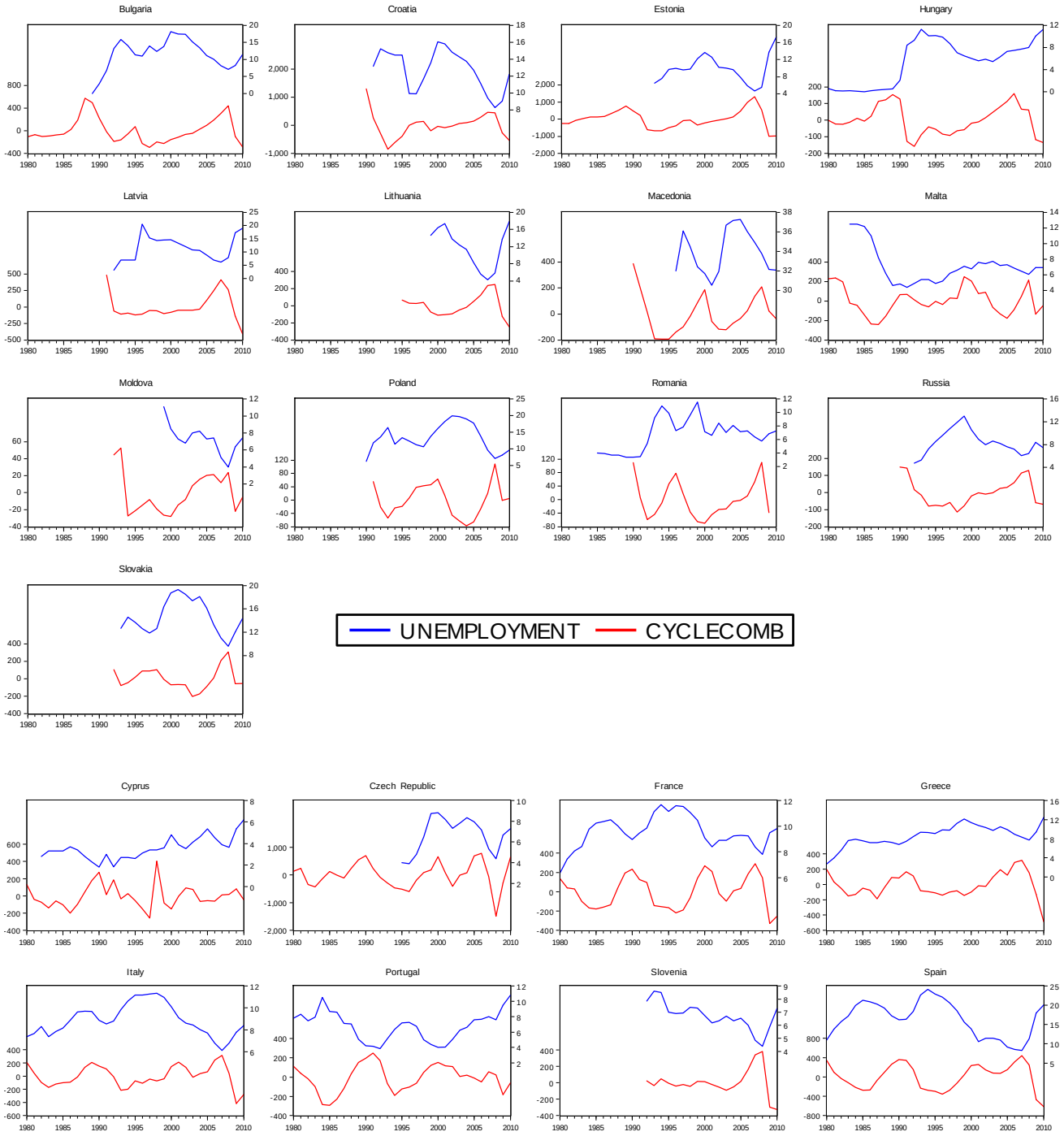
Table 7. Gross enrolment ratios by levels - 2010

Country	Primary			Secondary			Tertiary		
2010	Females	Males	Total	Females	Males	Total	Females	Males	Total
Germany	102,0616	102,5299	102,30161	100,44195	106,0781	103,32467	-	-	-
US	101,14345	102,03979	101,60174	96,54987	95,55646	96,04074	111,34822	79,17424	94,80865
Finland	98,6581	99,18207	98,92597	110,01433	105,16045	107,54187	101,34322*	82,2944*	91,59335*
Slovakia	100,5794	101,39043	100,99511	90,80944	89,92885	90,35863	54,15651*	66,86351*	89,44209*
Greece	99,90286	99,72042	99,809	98,11628	103,52257	100,90353	93,89188***	85,2154***	89,3785***
Slovenia (*)	97,31791	98,1189	97,72976	96,82889	97,26977	97,05525	103,41579	71,25795	86,92523
Lithuania	95,47575	96,44865	95,97624	97,74551	99,61585	98,70269	93,39608	61,92683	77,36905
Russia (*)	98,70038	98,55664	98,62688	87,49019	89,60847	88,57177	87,4148	64,73945	75,88788
Denmark	99,27219	98,92292	99,0932	118,52371	116,27422	117,37025	88,44869	60,90798	74,39921
Iceland	99,53185	99,36547	99,44715	108,77719	105,66748	107,18761	97,11556	51,94225	74,09565
Norway	99,23999	99,05435	99,14498	109,97065	111,97558	111,00127	92,23966	56,17178	73,79431
Spain	105,13565	105,93749	105,54745	126,10889	123,41314	124,72306	81,24631	65,62034	73,24268
Sweden	101,06647	101,63134	101,35626	98,66118	99,72361	99,20664	87,30786	55,06002	70,78167
Poland (*)	96,77922	97,90961	97,35838	96,54662	97,5211	97,04457	83,18916	58,34137	70,53748
Belgium	104,40864	104,83271	104,62502	108,79742	112,20027	110,53265	75,12815	60,03549	67,46295
Italy	101,04719	102,44403	101,76339	99,69533	101,06635	100,39974	77,42897	54,91557	65,9829
Romania	95,36399	96,38074	95,88669	96,61842	97,67161	97,15839	73,16347	54,71782	63,76617
The Netherlands	107,26069	108,25563	107,77001	120,74124	122,15133	121,46396	66,37814	59,17927	62,70366
Estonia	98,21384	99,64689	98,95081	104,66594	102,65777	103,63485	79,3718	46,73533	62,69846
Portugal (*)	111,8622	115,75857	113,85672	108,71463	104,7698	106,701	67,71562	56,89361	62,19675
Hungary	100,94032	102,17195	101,57218	97,58665	99,00267	98,31039	71,42238	52,30648	61,68492
Ireland	108,09845	107,81872	107,95508	124,01815	118,11731	120,98887	67,22802	54,96779	60,96375
Czech Republic	105,77421	106,36446	106,07735	90,90245	89,89359	90,38502	70,69231	51,21148	60,65055
Austria	98,6405	99,64075	99,15391	97,00437	100,75897	98,92984	65,3386	55,25983	60,20413
Latvia	100,31311	101,11493	100,72471	94,07315	96,2805	95,19672	76,81374	43,98297	60,1008
UK (*)	106,01112	106,36428	106,19186	102,90821	100,80196	101,82521	68,52256	49,04998	58,52579
France	109,25001	110,69964	109,9914	113,70212	112,69343	113,18583	61,35242	47,95834	54,53309
Croatia	102,39679	102,71139	102,55865	86,7351	90,8583	88,8517	60,39266	45,98591	53,01785
Cyprus	105,44554	106,10716	105,78471	98,95945	98,61098	98,78194	48,46208	55,5818	52,00389
Swizterland	102,46377	102,85747	102,66636	93,97839	96,7392	95,39561	51,67545	51,23449	51,45253
Croatia	93,01455	93,02134	93,01804	98,94041	92,5973	95,69524	55,11608	43,44471	49,174
Macedonia	90,76762	89,42675	90,07067	83,41211	83,92362	83,67676	44,10522	36,94657	40,42233
Moldova	93,34633	93,72455	93,54078	89,02747	86,97663	87,98113	43,73392	32,72997	38,14536
Malta	101,46827	100,75051	101,10064	94,9777	106,54948	100,91237	38,73957	28,26988	33,36772
Luxembourg	100,48972	99,07937	99,7648	98,80494	96,42718	97,59177	10,35269	10,70643	10,53276

Note: for some countries tha last data available is not for 2010; (*): 2009; (**): 2008; (***): 2007

Source: UNESCO

Figure 10. Total unemployment rate and the cycle component of per capita GNI (H-P filter)



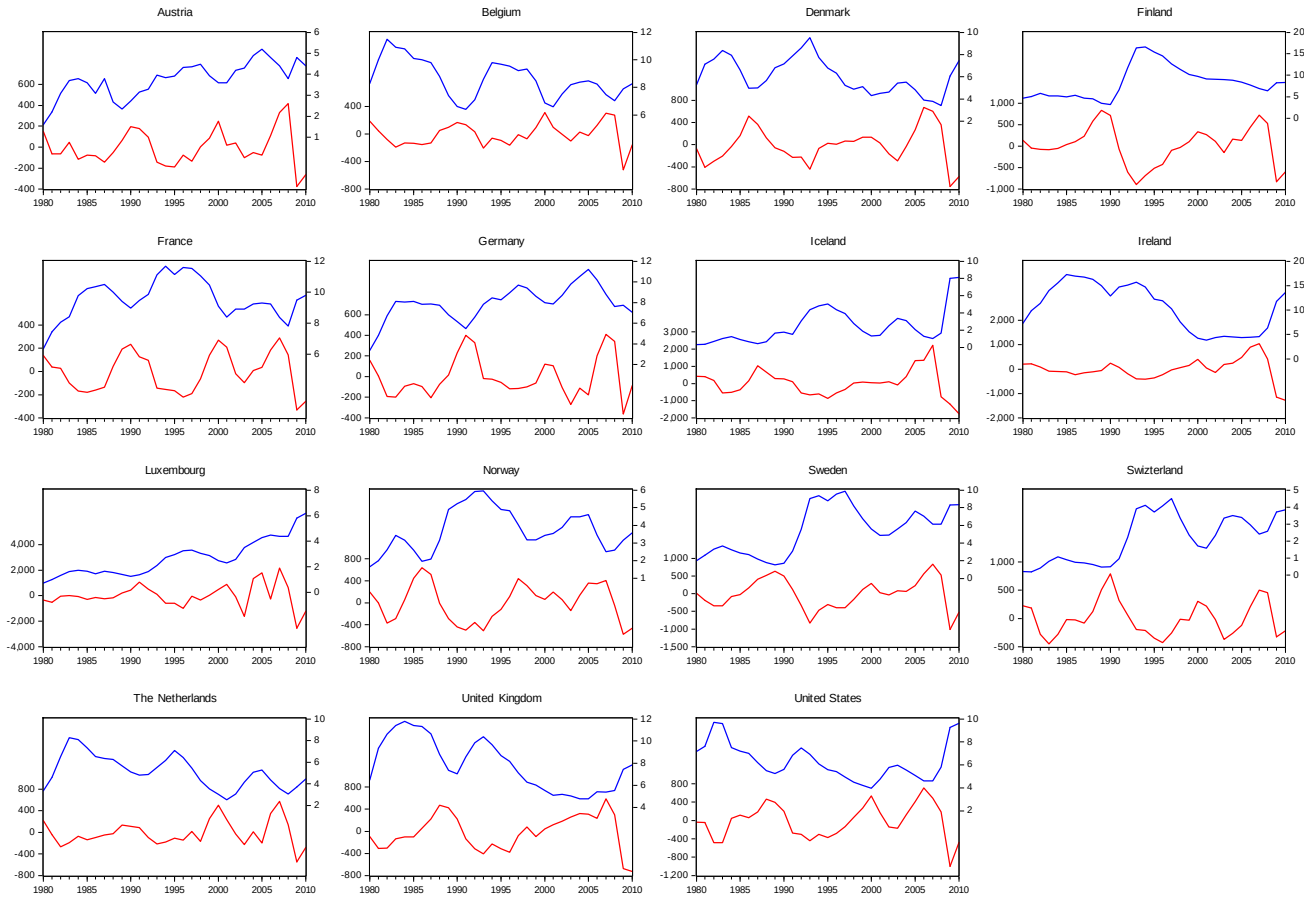


Table 8. Granger causality test – equation [1]
Pairwise Granger Causality Test. Sample 1980-2010. Lags: 4

Null Hypothesis:	Obs	F-Statistic	Prob.
LNUN does not Granger Cause LNT_ENROLMENT	631	2.67056	0.0313
LNUN does not Granger Cause LNELEAVERS	285	2.16905	0.0727
LNUN does not Granger Cause LNPART	279	2.74855	0.0287

Output Table I.3: Total participation and early-leavers rates – Groups *highhalf* and *lowhalf* – equation [1]
OLS Fixed-Effects regressions for the period 1988-2010

	Dependent: total participation 14-25 (ln)			Dependent: early leavers (ln)		
	low-half	high-half	total	low-half	high-half	total
ln_un	-0.024631	0.001244	-0.040555***	0.076492***	-0.118583***	-0.135432***
	(0.021091)	(0.010758)	(0.012287)	(0.025232)	(0.034890)	(0.042836)
Trend	0.021884***	0.007738***	0.014104***	-0.031212***	-0.024296***	-0.025482***
		(0.000604)	(0.000719)	(0.002019)	(0.004666)	(0.003326)
ln_un*low20						0.258387***
						(0.046801)
ln_un*mid2030						0.079959***
						(0.047920)
ln_un*high30			0.022326*			
			(0.012885)			
R squared	0.940987	0.926111	0.915139	0.975233	0.779464	0.898078
Cross-sections	16	15	32	16	15	32
Observations	196	190	399	183	236	437

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets ()

Output Table I.4.A Enrolment rates in tertiary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)							
	total sample		low20		mid2030		high30	
	Male	female	Male	female	male	female	male	female
ln_un	**0.021874***	**-0.004200**	**-0.023779***	**-0.080190**	**0.086947**	**0.064858**	**0.042746*****	**0.051369*****
	(0.011862)	(0.015443)	(0.013037)	(0.024789)	(0.080742)	(0.052103)	(0.011562)	(0.012192)
@trend	0.043104***	0.061698***	0.058164***	0.080484	0.051513***	0.064701	0.033400	0.052960***
	(0.001617)	(0.002141)	(0.002330)	(0.004544)	(0.002259)	(0.002354)	(0.001491)	(0.002009)
R squared	0.893251	0.918862	0.908194	0.899882	0.874938	0.906564	0.932628	0.954979
Cross-sections	32	32	12	12	8	8	13	13
Obs	748	748	216	216	200	200	360	360

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets / Germany not included

Output Table I.4.B Enrolment rates in tertiary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)								
	low half			high half			high half (+US)		
	total	Male	female	Total	male	female	total	male	female
ln_un	**-0.058957*****	**-0.044307*****	**-0.088930*****	**0.035348*****	**0.033567*****	**0.047413*****	**0.041738*****	**0.037815*****	**0.053594*****
	(0.017040)	(0.014178)	(0.023465)	(0.009981)	(0.011043)	(0.011218)	(0.010126)	(0.011222)	(0.010755)
@trend	0.072652***	0.064834***	0.081742	0.043802	0.034062***	0.054097***	0.041937***	0.032461***	0.051767***
	(0.002558)	(0.002045)	(0.003504)	(0.001582)	(0.001407)	(0.001880)	(0.001640)	(0.001431)	(0.001966)
ln_un*us							**0.408645***	**0.363134***	0.435855
							(0.232348)	(0.195325)	(0.287516)
R squared	0.929082	0.923925	0.919800	0.949987	0.935179	0.960509	0.943336	0.929439	0.952187
Cross-sections	17	17	17	15	15	15	16	16	16
Obs	350	329	329	409	397	397	439	426	426

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets / Germany not included

Output Table I.5A. Number of students in tertiary per 1000 inhabitants (ln) – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: number of students in tertiary per 1000 inhabitants (ln)					
	Total			*low20*	*mid2030*	*high30*
	Total	Males	Females	Total	Total	Total
ln_un	**0.043119*****	**0.033689*****	**0.061895*****	**-0.025801***	**0.144720***	**0.043460*****
	0.010555	0.012593	0.010808	0.003143	0.056833	0.009479
trend	0.041394***	0.050770***	0.032021***	0.071303***	0.041603***	0.030640***
	0.001565	0.002532	0.002132	0.012730	0.002197	0.001050
R squared	0.872993	0.001825	0.842312	0.918452	0.810928	0.940412
Cross-sections	32	32	32	12	8	13
Observations	783	750	750	243	193	376

Output Table I.5B. Number of students in tertiary per 1000 inhabitants (ln) – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: number of students in tertiary per 1000 inhabitants (ln)					
	low20		*mid2030*		*high30*	
	Males	Females	Males	Females	Males	Females
ln_un	**-0.061786*****	**-0.003406**	**0.151254*****	**0.160769***	**0.070739*****	**0.059173*****
	0.020286	0.011985	0.052489	0.068448	0.011443	0.011420
trend	0.082408***	0.061000***	0.047967***	0.035634***	0.038091***	0.018896***
	0.004529	0.002687	0.002532	0.002132	0.001199	0.000683
R squared	0.904390	0.920101	0.844828	0.747830	0.943632	0.919174
Cross-sections	12	31	8	8	15	15
Observations	224	224	190	190	399	399

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets [for tertiary enrolments Germany is not included]

Output Table I.6.A Enrolment rates in secondary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: secondary gross enrolment ratio (ln)							
	total		*low20*		*mid2030*		*high30*	
	male	female	male	female	male	Female	male	female
ln_un	**-0.007916**	**-0.000521**	**-0.012373****	**-0.008254**	-0.035487	-0.006647	0.019122	**0.033357*****
	(0.006932)	(0.007984)	(0.005168)	(0.005944)	(0.027206)	(0.024950)	(0.012309)	(0.010876)
@trend	0.008052***	0.008004***	0.005391***	0.004343***	0.011788***	0.011658***	0.007586	0.007448***
	(0.000763)	(0.001040)	(0.000496)	(0.000444)	(0.000802)	(0.001247)	(0.000948)	(0.001140)
R squared	0.690838	0.685142	0.583279	0.653114	0.695718	0.712281	0.635870	0.618322
Cross-section	33	33	12	12	8	8	14	14
Obs	779	779	220	220	189	189	400	400

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table I.6.B Enrolment rates in secondary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: secondary gross enrolment ratio (ln)								
	lowhalf			*high-half*			*high-half (+ US)*		
	male	female	total	male	female	total	male	female	Total
ln_un	**-0.020613*****	**-0.017354****	**-0.018511*****	**0.015716**	**0.029865*****	**0.022939****	**0.018789***	**0.032537*****	**0.024402***
	0.005707	0.007242	0.006354	0.012054	0.011210	0.011273	0.011369	0.010668	(0.011007)
trend	0.007333***	0.007326***	0.007391***	0.007925***	0.008179***	0.008052***	0.007498***	0.007764***	0.007674
	0.000761	0.001343	0.000867	0.000847	0.001078	0.000957	0.000784	0.001007	(0.000950)
ln_un*us									0.084358
									(0.066969)
R squared	0.467462	0.480834	0.457510	0.686493	0.670238	0.675687	0.680609	0.667528	0.672631
Cross-section	17	17	17	15	15	15	16	16	16
Obs	318	318	329	431	431	438	456	456	465

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table I.7.A Enrolment rates in primary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: primary gross enrolment ratio (ln)							
	total		*low20*		*mid2030*		*high30*	
	Male	female	male	female	male	female	male	female
ln_un	**0.007387****	**0.005868***	**0.001303**	**-0.003847**	-0.015985***	-0.015495***	0.021447	**0.023316*****
	(0.003540)	(0.003512)	(0.004268)	(0.004179)	(0.006017)	(0.005877)	(0.003339)	(0.003225)
@trend	0.001408	0.001243	0.000711	0.001173**	-0.000492**	-0.000655	0.002203	0.001886***
	(0.000178)	(0.000147)	(0.000719)	(0.000586)	(0.000207)	(0.000208)	(0.000269)	(0.000262)
R squared	0.616787	0.586174	0.275494	0.307311	0.831906	0.779381	0.589573	0.574742
Cross-section	33	33	12	12	8	8	14	14
Obs	785	785	229	229	197	197	389	389

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table I.7.B Enrolment rates in primary – by groups and gender – equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: primary gross enrolment ratio (ln)								
	lowhalf			*high-half*			*high-half (+US)*		
	male	female	Total	male	female	total	male	female	total
ln_un	0.001535	-0.002429	-0.000389	0.023598***	0.025196***	0.021382***	0.023835***	0.025321***	0.021587***
	(0.003894)	(0.003690)	(0.003775)	(0.003207)	(0.003107)	(0.002578)	(0.003232)	(0.003143)	(0.002603)
trend	4.41E-05	0.000206	0.000103	0.002071***	0.001744***	0.001833***	0.002003***	0.001708***	0.001782***
	(0.000524)	(0.000465)	(0.000492)	(0.000248)	(0.000236)	(0.000241)	(0.000243)	(0.000231)	(0.000236)
ln_un*us							-0.014490	-0.037314***	-0.023010**
							(0.013271)	(0.013789)	(0.011590)
R squared	0.663482	0.629613	0.651626	0.576501	0.558653	0.560126	0.571221	0.555979	0.556884
Cross-section	17	17	17	15	15	15	16	16	16
Obs	31	334	340	421	421	434	447	447	461

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table I.8.A. Alternative controls for equation [1]
OLS Fixed-Effects regressions for the period 1992-2010

	Dependent: total participation 14-25 (ln)			Dependent: early leavers (ln)		
trend	0.014834***	0.015243***	0.015049***	-0.023142***	-0.023904***	-0.024181***
	(0.001081)	(0.001112)	(0.001101)	(0.003753)	(0.003459)	0.003566
ln_unemployment	-0.043641***	-0.034662***	-0.045212***	-0.086113**	-0.139589***	-0.006672
	(0.013626)	(0.012627)	(0.015268)	(0.035461)	(0.035548)	0.034494
longterm_unemployment	0.001740**	0.001210**	0.001160*	0.003166*	0.006305***	0.006790***
	(0.000731)	(0.000654)	(0.000624)	(0.001671)	(0.001590)	(0.001673)
crisis		-0.020513*	-0.021064*		0.111279***	0.118907***
		(0.012337)	(0.012125)		(0.021599)	(0.020218)
lnun*highhalf			0.020744*			-0.219239***
			(0.012440)			(0.041566)
R squared	0.894024	0.895664	0.895982	0.882683	0.886772	0.889731
Cross-sections	31	31	31	31	31	31
Observations	367	367	367	412	412	412

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets ()

Output Table I.8.B. Alternative controls for equation [1]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)			Dependent: secondary gross enrolment ratio (ln)			Dependent: primary gross enrolment ratio (ln)		
trend	0.049420***	0.049307***	0.049274***	0.008622***	0.008590***	0.008556***	0.001077***	0.001066***	0.001059***
	(0.001886)	(0.001790)	(0.001815)	(0.001079)	(0.001050)	(0.001052)	(0.000202)	(0.000198)	(0.000201)
ln_unemployment	-0.028003	-0.013296	-0.082969**	0.048623**	0.054081***	0.010228	0.008982*	0.010547**	0.002765
	(0.024480)	(0.028148)	(0.039574)	(0.018992)	(0.016797)	(0.020948)	(0.004845)	(0.004949)	(0.009549)
longterm_unemployment	0.003785***	0.002661**	0.002388**	-9.37E-05	-0.000513	-0.000679	-6.52E-05	-0.000187	-0.000215
	0.000857	(0.001149)	(0.001143)	(0.000773)	(0.000532)	(0.000542)	(0.000216)	(0.000226)	(0.000231)
crisis		-0.043333	-0.045982		-0.016978	-0.018779		-0.004874	-0.005168
		(0.030023)	(0.029396)		(0.016143)	(0.015638)		(0.003494)	(0.003579)
lnun*highhalf			0.102385**			0.063779**			0.011312
			(0.042085)			(0.027874)			(0.011007)
R squared	0.907338	0.908098	0.908975	0.687038	0.688551	0.692612	0.642170	0.643012	0.643880
Cross-sections	31	31	31	32	32	32	32	32	32
Observations	603	603	603	643	643	643	642	642	642

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets ()

Output Table II. 3 Tertiary enrolments by gender – equation [2]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)							
	males				females			
	(i)	(ii)	(iii)	(v)	(i)	(ii)	(iii)	(v)
trend	0.015997***	0.011168***	0.017401***	0.025677***	0.030719***	0.021347***	0.031524***	0.037176***
	(0.001397)	(0.003047)	(0.001441)	(0.001858)	(0.002121)	(0.003421)	(0.002095)	(0.002284)
ln_gdppc	0.764318***	1.080968***	0.749784***	0.349948***	0.899496***	1.258032***	0.899907***	0.626106***
	(0.072447)	(0.137256)	(0.070140)	(0.073870)	(0.078504)	(0.136536)	(0.077780)	(0.106302)
lnun_y	0.086726***	0.143468**	0.090259***	0.068113**	0.104206***	0.148384**	0.104211***	0.085174**
	(0.029811)	(0.059259)	(0.034456)	(0.028885)	(0.036153)	(0.064616)	(0.038474)	(0.034165)
lngovsp(-1)	0.054612***	0.046477***	0.052708***	0.023486***	0.037927***	0.033312***	0.036950***	0.019169***
	(0.009553)	(0.015462)	(0.009977)	(0.007823)	(0.007441)	(0.012534)	(0.007427)	(0.007266)
lnratiowage		-0.158464*				-0.172813		
		(0.091559)				(0.107097)		
lnunratio_ty			0.163035***	0.145785***			0.134573***	0.139553***
			(0.040339)	(0.047173)			(0.028153)	(0.040886)
crisis*lowhalf				-0.107607***				-0.134113***
				(0.032314)				(0.029932)
lnunratio_ty* lowhalf				-0.239589***				-0.240719***
				(0.063797)				(0.073267)
lngovsp(-1) *lowhalf				0.041094***				0.023101**
				(0.011657)				(0.011540)
lngdppc* lowhalf				0.407713				0.287174**
				(0.110681)				(0.128326)
R squared	0.897899	0.909890	0.902585	0.922773	0.941195	0.939622	0.943146	0.950062
Cross-sections	31	19	32	31	31	19	32	31
Observations	507	261	506	502	507	261	506	502

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table II.4.A Tertiary enrolments by groups and gender – specification (iii) – equation [2]
OLS Fixed-Effects regressions for the period 1980-2009

	Dependent: tertiary gross enrolment ratio (ln)								
	lowhalf			highhalf			highhalf (+US)		
	total	males	females	total	males	females	total	males	females
trend	0.065092***	0.061096***	0.066695***	0.027249***	0.020138***	0.035721***	0.023394***	0.017047***	0.031332***
	(0.005328)	(0.005034)	(0.006474)	(0.001777)	(0.001846)	(0.002332)	(0.001726)	(0.001757)	(0.002245)
ln_gdppc	0.083704	-0.053882	0.210585	0.607263***	0.536688***	0.687215***	0.703969***	0.610899***	0.792301***
	(0.158806)	(0.140669)	(0.172945)	(0.078703)	0.060085*	(0.106319)	(0.081640)	(0.076655)	(0.111187)
lnun_y	-0.037972	-0.035814	-0.025554	0.047924	0.060085	0.064320*	0.064879**	0.070886**	0.077214**
	(0.064883)	(0.059176)	(0.075567)	(0.032460)	(0.035172)	(0.035511)	(0.032717)	(0.035339)	(0.037172)
ln_govsp(-1)	0.015952*	0.028129***	0.014660	0.035474***	0.033057***	0.026853***	0.034607***	0.032643***	0.026840***
	(0.009338)	(0.010166)	(0.010147)	(0.009771)	(0.010417)	(0.009107)	(0.009468)	(0.010135)	(0.009019)
lnunratio_ty	-0.155764**	-0.148805**	-0.162617**	0.145707	0.157227***	0.163005***	0.131721***	0.142999***	0.142220***
	(0.061251)	(0.060266)	(0.077986)	(0.039430)	(0.044615)	(0.041088)	(0.035756)	(0.040326)	(0.039723)
R squared	0.935421	0.923330	0.939893	0.953523	0.934095	0.962117	0.945895	0.927751	0.955249
Cross-sections	16	16	16	14	14	14	15	15	15
Observations	193	188	188	291	289	289	309	306	306

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table II.4.B. Alternative specifications for equation [2]
OLS Fixed-Effects regressions for the period 1980-2009

Dependent: tertiary gross enrolment ratio (ln)												
	Total				Males				Females			
	(vii)		(viii)		(vii)		(viii)		(vii)		(viii)	
	coef	st.error	coef	st.error	coef	st.error	coef	st.error	coef	st.error	coef	st.error
trend	**0.032895*** **	0.002394	**0.034362*** **	0.003211	**0.026715*** **	0.002479	**0.027034*** **	0.003078	**0.039111*** **	0.002555	**0.041696*** **	0.003410
ln_gdp	**1665089*** **	0.558463	**1.399941** **	0.705143	**1.419741*** **	0.500580	**1.426335** **	0.690321	**2.103139*** **	0.625639	**1.636000** **	0.698493
ln_gdp(-1)	**-1.267916** **	0.603236	-0.935478	0.783591	**-1.106807** **	0.551574	-1. 045607	0.772965	**-1.572937** **	0.667109	-1. 043876	0.778012
lnun_y	**0.151372** **	0.065237	**0.149459** *	0.081099	**0.138822** **	0.066227	**0.179373** **	0.081540	**0.203496*** **	0.069562	**0.192530** **	0.082704
lnun_y(-1)	**-0.112428** **	0.056408	-0.068554	0.082933	-0.089717	0.054684	-0.062214	0.082578	**-0.144392** **	0.060265	-0.101966	0.083570
ln_govsp	-0.008473	0.017454	-0.022830	0.014489	-0.012639	0.016490	-0.022086	0.014687	-0.006463	0.018339	-0.023190	0.014650
ln_govsp(-1)	**0.035970** **	0.015569	**0.035274*** **	0.012076	**0.037956*** **	0.014634	**0.029375** **	0.012150	0.026349	0.016442	**0.028055** **	0.011856
lnunratio_ty	0.059140	0.067936	-0.057017	0.109936	0.089686	0.065359	-0.037526	0.109199	0.026563	0.072852	-0.061418	0.105905
lnunratio_ty(-1)	0.069619	0.086371	0.078256	0.135836	0.070191	0.093094	0.086718	0.137814	0.097788	0.084774	0.096555	0.135693
ln_gdppc*lowhalf	0.697503	0.643883	0.611893	0.885283	0.926494	0.610879	0.473910	0.895529	0.532578	0.760508	0.556466	0.883026
lngdppc(-1)*lowhalf	-0.248632	0.611421	-0.280940	0.868372	-0.459055	0.586056	-0.155441	0.892670	-0.165426	0.728820	-0.329981	0.866625
lnun_y*lowhalf	0.126619	0.097101	-0.034429	0.145573	**0.182430** *	0.110168	-0.003037	0.153904	0.083317	0.106349	-0.086457	0.159930
lnun_y(-1)*lowhalf	-0.020945	0.113978	-0.009871	0.138665	-0.085281	0.122063	-0.073215	0.144124	0.001259	0.123633	0.018520	0.151436
ln_govsp*lowhalf	**0.041762** *	0.024810	0.037637	0.029727	**0.046583** *	0.025812	0.033285	0.031424	0.038021	0.025615	0.039178	0.030961
ln_govsp(-1)*lowhalf	-0.013437	0.020727	-0.026111	0.021982	-0.003663	0.021824	-0.003998	0.024675	-0.008245	0.021931	-0.022900	0.024455
lnunratio_ty*lowhalf	0.081504	0.126119	0.109755	0.180917	0.082098	0.133831	0.131451	0.191783	0.112181	0.136314	0.093114	0.186190
lnunratio_ty(-1)*lowhalf	**-0.321185*** **	0.112607	**-0.322277** *	0.168560	**-0.337036*** **	0.125666	**-0.338516** **	0.169247	**-0.358114*** **	0.129884	**-0.365758** **	0.174104
lninflation			**-1.025943*** **	0.312843			**-1.120722*** **	0.277240			**-1.119110*** **	0.322794
rir			0.002735	0.002415			0.000840	0.002499			0.002548	0.002325
neg_cycle_gdp*lnunratio_ty			**-0.035100** **	0.017063			**-0.028237** *	0.016418			**-0.030383** *	0.016926
R squared	0.941566		0.953697		0.924968		0.942315		0.951950		0.963613	
Cross-sections	30		25		30		25		30		25	
Observations	439		324		434		319		434		319	

References: (***): 1% (**): 5% (*): 10% significance levels / Germany not included

Output Table II.5 Secondary and primary gross enrolment ratios – equation [2]
OLS-Fixed effect estimations for the period 1980-2010

	Dependent: secondary gross enrolment ratio (ln)			Dependent: primary gross enrolment ratio (ln)		
	(i)	(iii)	(iii) + inter	(i)	(iii)	(iii) + inter
trend	0.005461***	0.005711***	0.006402***	0.001958***	0.001859	0.001288***
	(0.001623)	(0.001501)	(0.001690)	(0.000592)	(0.000625)	(0.000551)
ln_gdppc	0.003423	0.022016	0.019726	-0.019365	-0.009191	0.021111
	(0.032699)	(0.032196)	(0.048506)	(0.021089)	(0.021563)	(0.020101)
lnun_y	-0.012150	-0.005779	-0.017928	-0.000828	0.000968	-0.000654
	(0.017720)	(0.017856)	(0.019214)	(0.004313)	(0.004237)	(0.004163)
ln_govsp(-1)	0.014080***	0.012760***	0.006863	-0.005630***	-0.005844***	-0.004506
	(0.004785)	(0.004739)	(0.005585)	(0.001689)	(0.001701)	(0.001460)
lnunratio_ty		0.082367***	0.118353***		0.012339	0.020204***
		(0.028851)	(0.035482)		(0.012347)	(0.001460)
neg_cycle_gni*lowhalf			0.009107			0.013371**
			(0.008364)			(0.005566)
crisis*lowhalf			0.007733			-0.007910
			(0.017804)			(0.005967)
lnunratio_ty*lowhalf			-0.174137***			-0.024671
			(0.058626)			(0.022655)
ln_govsp(-1)*lowhalf			0.004400**			-0.000265
			(0.001744)			(0.000444)
lngdppc*lowhalf			-0.043667			-0.023931
			0.033226			(0.017550)
R squared	0.695466	0.701320	0.713218	0.684242	0.687499	0.695185
Cross-sections	32	32	32	32	32	32
Observations	526	521	521	530	525	525

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table II.6.A Secondary enrolments by groups and gender – equation [2]
OLS-Fixed effect estimations for the period 1980-2010

	Dependent: secondary gross enrolment ratio (ln)					
	lowhalf			*highhalf*		
	total	males	females	total	males	females
Trend	0.008302***	0.006011**	0.008634***	0.005446***	0.005524***	0.005397***
	(0.002789)	(0.002787)	(0.002733)	(0.002045)	(0.001904)	(0.002200)
ln_gdppc	-0.096887	-0.019328	-0.141029**	0.053004	0.065472	0.040807
	(0.063776)	(0.065233)	(0.065364)	(0.056180)	(0.052530)	(0.061637)
lnun_y	-0.042881	-0.036723	-0.049425***	-0.007119	0.001930	-0.015689
	(0.027486)	(0.031235)	(0.027804)	(0.025528)	(0.023792)	(0.027774)
ln_govsp(-1)	0.021952***	0.018375***	0.019733***	0.006085	0.005094	0.006877
	(0.006164)	(0.006506)	(0.006260)	(0.006967)	(0.006114)	(0.007919)
lnunratio_ty	-0.092302	-0.096597	-0.083077	0.117310	0.110213***	0.123320***
	(0.066922)	(0.075782)	(0.063001)	(0.035387)	(0.034551)	(0.037159)
R squared	0.534325	0.508901	0.516450	0.659702	0.678771	0.653735
Cross-sections	16	16	16	15	15	15
Observations	189	186	186	305	304	304

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets

Output Table II.6.B Primary enrolments by groups and gender – equation [2]
OLS-Fixed effect estimations for the period 1980-2010

	Dependent: primary gross enrolment ratio (ln)					
	lowhalf			*highhalf*		
	total	males	females	total	males	females
trend	-0.003309*	-0.003383	-0.003863**	0.002819	0.003042***	0.002621***
	(0.001945)	(0.002056)	(0.001894)	(0.000663)	(0.000712)	(0.000634)
ln_gdppc	0.093372*	0.095882*	0.101806**	-0.035581	-0.038089	-0.037044*
	(0.052418)	(0.055594)	(0.050980)	(0.021691)	(0.023707)	(0.022241)
lnun_y	0.016998*	0.017824*	0.019705**	-0.006949	-0.007845	-0.007380
	(0.008857)	(0.009620)	(0.008842)	(0.005615)	(0.006311)	(0.005636)
ln_govsp(-1)	-0.001767	-0.001514	-0.000970	-0.003298**	-0.003606**	-0.002054
	(0.002935)	(0.003117)	(0.002797)	(0.001632)	(0.001510)	(0.001646)
lnunratio_ty	0.016258	0.020120	0.015667	0.023613*	0.020335	0.027333**
	(0.016815)	(0.019582)	(0.017447)	(0.013332)	-1.377.755	(0.013290)
R squared	0.762690	0.777029	0.740435	0.526493	0.527536	0.501191
Cross-sections	16	16	16	15	15	15
Observations	196	194	194	302	299	299

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets ()

Output Table III. 1. Estimations for specification (iii) – Total participation and early-leavers rates – equation [2]
OLS – GMM comparison

	Dependent: Early leavers		Dependent: participation rate	
	(iii)		(iii)	
	OLS	GMM	OLS	GMM
Trend	-0.000405	0.001101	0.005722***	0.005687***
	(0.002634)	(0.003459)	(0.000758)	(0.000723)
ln_gdppc	-0.702596***	-0.755170***	0.205242***	0.210626***
	(0.115668)	(0.141179)	(0.041475)	(0.043293)
lnun_y	-0.010476	-0.002975	-0.004606	-0.000625
	(0.031725)	(0.034849)	(0.005907)	(0.006713)
ln_govsp (-1)	-0.041406***	-0.042109***	0.017140***	0.010803***
	(0.014439)	(0.013762)	(0.004196)	(0.003512)
lnunratio_ty	-0.174951**	-0.173912**	0.014689	0.019398
	(0.078761)	(0.083544)	(0.013435)	(0.015710)
Rsquared [J-statistic]	0.911157	[1 .887097]	0.909498	[3 .423975]
Cross sections	29	29	31	29
Observations	342	306	302	270

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in brackets
Instruments: lags of explanatory variables (t-1) and (t-2)

Output Table III.2. OLS – GMM results' comparison for the basic specifications

	Dependent: tertiary enrolments		Dependent: secondary enrolments		Dependent: primary enrolments	
	OLS	GMM	OLS	GMM	OLS	GMM
trend	0.023902***	0.023872***	0.005711***	0.004708***	0.001859***	0.001837
	(0.001687)	(0.001974)	(0.001501)	(0.001609)	(0.000625)	(0.000555)
ln_gdppc	0.832669***	0.793000***	0.022016	0.022823	-0.009191	-0.029995
	(0.084999)	(0.091980)	(0.032196)	(0.039816)	(0.021563)	(0.021918)
lnun_y	0.087089**	0.069644*	-0.005779	-0.008763	0.000968	-0.003927
	(0.035404)	(0.038662)	(0.017856)	(0.020152)	(0.004237)	(0.005433)
ln_govsp (-1)	0.046490***	0.049465***	0.012760***	0.015519***	-0.005844***	-0.004582**
	(0.008324)	(0.009182)	(0.004739)	(0.005567)	(0.001701)	(0.001896)
lnunratio_ty	0.135084***	0.137429***	0.082367***	0.074361***	0.012339	-0.001153
	(0.029724)	(0.026819)	(0.028851)	(0.028592)	(0.012347)	(0.009655)
Rsquared [J-statistic]	0.928480	[8 186161]	0.701320	[8.479457]	0.687499	[3.808520]
Cross sections	31	30	32	31	32	31
Observations	509	431	521	444	525	446

References: (***): 1% (**): 5% (*): 10% significance levels / standard errors in bracket
Instruments: lags of explanatory variables (t-1) and (t-2)

Table 9. Statistical picture of the last years of crisis 2007-2010

Country	**Ranking GDP 2010**	**Var participation rate post-comp 2007-2010**	**Average annual var GDP 2008-2010**	**Youth Unemployment Rate 2010**	**Youth Unemployment Rate 2010- 2007-2010**
Lithuania	**28**	**-2,6**	**-3%**	**35,1**	**26,9**
Latvia	**29**	**-2,4**	**-7%**	**34,5**	**23,8**
Belgium	10	-1,4	-1%	22,4	3,6
Austria	7	-0,9	0%	8,8	0,1
Czech Republic	**21**	**-0,7**	**0%**	**18,3**	**7,6**
Finland	14	-0,6	-2%	21,4	4,9
Norway	2	-0,2	-2%	9,2	2,0
Slovakia	**23**	**-0,1**	**2%**	**33,6**	**13,3**
Poland	**24**	**0,3**	**4%**	**23,7**	**2,0**
Bulgaria	**30**	**0,7**	**1%**	**23,2**	**8,1**
France	15	0,7	-1%	23,6	3,8
Sweden	8	0,8	-1%	25,2	6,0
Romania	**31**	**0,8**	**1%**	**22,1**	**2,0**
Cyprus	**18**	**1,0**	**0%**	**16,7**	**6,5**
Germany	9	1,1	0%	9,9	-2,0
Slovenia	**19**	**1,1**	**-1%**	**14,7**	**4,6**
Denmark	13	2,0	-2%	14,0	6,5
The Netherlands	5	2,3	0%	8,7	1,7
Iceland	11	2,4	-4%	27,8	18,9
Croatia	**27**	**2,8**	**-2%**	**32,6**	**8,6**
Spain	**17**	**2,9**	**-2%**	**41,6**	**23,4**
Ireland	6	3,0	-4%	27,8	7,5
Luxembourg	1	3,5	-2%	15,8	0,2
Portugal	22	3,8	-1%	27,7	7,3
United States	3	4,7	-1%	18,4	7,9
Estonia	**26**	**4,8**	**-5%**	**32,9**	**22,9**
United Kingdom	12	4,8	-2%	19,6	5,3
Hungary	**25**	**4,9**	**-1%**	**26,6**	**8,6**
Greece	**20**	**7,3**	**-3%**	**32,9**	**10,0**
Italy	**16**	**7,5**	**-2%**	**9,3**	**1,6**