Unemployment and returns to education in Europe[1]

Working paper

Barceinas-Paredes, Fernando***; Oliver-Alonso, Josep*; Raymond-Bara, José Luis**; Roig-Sabaté, José Luis*; Weber, Bernhard A.****

* Departament d'Economía Aplicada, Universitat Autònoma de Barcelona
** Departament de Fonaments de l'Anàlisi Econòmic, Universitat Autònoma de Barcelona
*** Universidad Autónoma Metropolitana de México
**** State Secretariat for Economic Affairs and University of Berne, Switzerland

Abstract

Unadjusted marginal internal rates of return to education present a general underestimation because the differentials in employment probability and in unemployment benefits across levels of education are not taken into account. Our work strongly suggests that the inclusion of both aspects increase the non-adjusted marginal internal rates in a non-negligible amount. In fact, the lower the wage dispersion, the higher the unemployment differential between levels, the higher the young unemployment differentials and the higher the absolute level of unemployment the higher the effect of employment probability in the changes in the adjusted internal rates of return to education. Other things equal, the adjusted rates are the most probable ones used by individuals (or households) to decide upon their schooling investment. As a result, the public sector should use these rates to decide what the most profitable investment is.

Key words: education, unemployment.

Classification JEL : I2, J2

[1] We gratefully acknowledge the economic support from the European Commission (PURE SOE2-CT98-2044 "Public funding and private returns to education") and CICYT (grant SS 97-1333). Correspondence to Josep.Oliver@volcano.uab.es

1. Introduction

In the majority of Western European countries, unemployment has been a dramatic problem in the last twenty years, not only due to level reached but also because the burden of unemployment has been unequally distributed across different groups of the labour force. In fact, the three countries in our study that suffered from the highest level of unemployment in the nineties (Finland, Spain and Ireland) showed very different patterns of unemployment differentials among educational levels. Spain, for instance, showed very similar average rates (17,7% and 16,1% in low and medium levels of education), while Finland (21,9% and 15,7%) and Ireland (18,8% and 9,7%) exhibited larger differentials.[2] It is also widely observed that one additional year of schooling increases proportionally more earnings than wage rates (Mincer, 1974 for the United States and Psacharapoulus and Layard, 1979 for the United Kingdom). This difference has been explained as a result of the effect of schooling on the two components of earnings: the wage rate and the number of hours worked.[3] In fact, the data for the European countries analysed in this research clearly confirm that unemployment decreases with education. Distinguishing between low, medium and high educational levels,[4] in all countries, the least educated individuals have higher unemployment rates than the more educated ones. Therefore, increasing the educational level is profitable not only because this allows the more educated to obtain higher wages, but also because the more educated have a lower probability to become unemployed. As a consequence, the returns to education must be computed taking the unemployment probability into account. At the same time, the situation of the unemployed in relation to the unemployment benefit shows a big diversity across countries in terms of both replacement and coverage rates. For instance, in some countries like Spain or Italy benefit eligibility is conditioned on former employment while in others this is not the case.

In a situation with perfect capital markets and perfect information, the individual will invest in human capital until the rate of return is greater than the sum of the income obtained from risk less assets and the risk and liquidity premiums related to this investment (Becker, 1964). Even in a world with imperfect information and financial restrictions, the human capital model suggests that individuals should invest in those levels of education with higher rates of return. Simultaneously, the price of each level (or year) of education, reflected in the rates of return to education, is an indication to the public sector of the relative scarcity of qualifications in the labour force and, consequently, a sign of where public investment should be directed. Then, for both, individuals and public sector, rates of return to education are a guide for their investment. On the other hand, in a neoclassical framework, if there is relative wage rigidity, this should show up in unemployment rate differentials and, in order

[2] That more educated people have less risk to be unemployed has been a well-documented fact in the last forty years. Even in his seminal work on human capital, Becker says, “unemployment tends to be strongly related, usually inversely, to education” (Becker, 1964:2).

[3] Psacharapoulos and Layard (1979: 494-95) state “As regards explanatory power, human capital is slightly better at explaining weekly than annual earnings. (...) As can be seen the power of human capital to explain weeks is not large, which helps to explain the limited power of human capital to explain annual earnings, given the fact that the variance of log weeks is over a quarter the total variance of log annual earnings.”

[4] See the equivalence of these three educational levels for each country in the annex 1.

to estimate the returns to education, a correction for unemployment becomes necessary. In this case, the lower unemployment probability at higher educational levels is transformed in a widening of the gap between the relative *expected* gains that is not captured by the *observed* relative wages. Nevertheless, other interpretations could be used to explain the unemployment differentials.[5] In any case, we are interested in the effects that unemployment differentials have on the unadjusted marginal rates of return to education.

So, the aim of this paper is to connect unemployment differentials by educational levels with returns to education and to capture the influence that both elements may have on the rates and, indirectly, on the private and public decision to invest in human capital.[6] In a standard human capital framework (Becker, 1964; Mincer, 1974; Psacharapoulos and Layard, 1979) the demand for education depends critically on returns. Usually, the rates of return to schooling are estimated using a Mincerian equation in which the logarithm of wages depends upon the level (or years) of schooling, the experience in a quadratic form and an error term, that may capture other factors (basically, ability, financial constraints and familiar background). Economists tend to identify the expected earnings that individuals take into account ex-ante to decide their investment in schooling (with a specific familiar background and financial constraints) with the flow of earnings that can be generated from a parsimonious Mincerian equation. A problem with the returns resulting from this approach is that their estimation does not introduce other factors apart from schooling in the investment decision.[7] In this usual approach, the only *benefit* considered is the change in expected earnings while forgone earnings from schooling period is the cost taken into account.[8] Apart from factors like family background and/or financial constraints, other important aspects that can influence the investment decision in schooling are the probability of being employed or the increasing risk of this investment implied by the growing variance of wages at higher levels of education.[9] A procedure that allows introducing some of these aspects is the so-called '*elaborate method'* (Psacharopoulos, 1981). This

[5] Arrow (1973) and Spence (1973) showed that employers need information about the productivity of their candidates and they can use education as a measure of expected productivity. Thurow (1972), on the other hand, suggest a different process because the labour market can be seen as one in which job-seekers compete to obtain a vacancy and labour supply can be represented as queue, in which the most educated people are better placed. The same effects can occur with the search models, in which employers look for new employees only in the sample of the job seekers. In addition, the firm investment can help to explain these differences, because the relation between skill (highly correlated with educational level) and the firm investment in workers.

[6] In our study, we identify returns to human capital with those obtained from schooling. It's clear, as Becker (1964) or Mincer (1991) had showed that those concepts are not at all identical. According to Mincer, returns to investment in schooling represent approximately half of those obtained from human capital (the other half coming from job learning, job training, information and labour mobility). Nevertheless, this distinction is not central in our approach because, at least partially, school education is also very correlated with those other forms of human capital. In this sense, Psacharapoulus and Layard (1979) obtain a strong relation between schooling and post-school training. Also, Mincer (1989:187), summarising the work done in the on-the-job-training, states that the likelihood of receive on-the-job-training increases with education (and declines with age and length of seniority).

[7] Layard and Psacharapoulus (1979) extended the traditional model allowing the shape of experience differs for each level of schooling. They find that the rate of return to training increases by 3.9% for each additional year of schooling. Also, in the same sense, vid. Brunello and Comi (2000). In addition, Asplund et al. (1996) reformulates the Mincerian equation allowing the unemployment to play a role. However, in this case, longitudinal data are required or a proxy to them.

[8] In addition, the model can incorporate the indirect costs (books, fees, etc.), but this aspect is not essential to the discussion.

[9] Martins and Pereira (2000) in a study of 15 european countries and the United States find evidence for

implies the calculus of the rate of return that equals the opportunity costs and the expected life-cycle earnings. While differences in the value of rates of return obtained by a Mincerian equation and by the *elaborate method* should not occur, the latter approach permits to introduce some other aspects in the decision of schooling that cannot be introduced in the Mincerian approach. In fact, as Becker (1964) showed, ex-ante and ex-post return can differ due to uncertainty. Becker emphasised that uncertainty appears as a result of the length of lifetime, the own ability unknown by the individuals and, in general, because of the long period that spans from the investment to the accruing of income flow. Our approach tries to incorporate in the calculus of the rate of return one additional factor of uncertainty, namely the risk of being unemployed.

According to this, in our research we consider that the distribution of expected earnings results from three factors: the distribution of wages, the probability distribution of being employed and the distribution of unemployment benefit. From this approach it is clear that the institutional factors of the labour market (the level and coverage of unemployment assurance) have a non-negligible impact on the rates of return to schooling and, as a result, on the household decision to invest in education. In addition, the introduction of these aspects affects both the level and the pattern of returns to the different levels of education. As Guiso et al. (1998) have shown, the variability in expected earnings, if wages are non-flexible, depends on unemployment, while in the opposite case depends on wages. In this sense we should expect a larger role for unemployment in the European economies than in the American one. Also, and as Psacharapoulos stated "The main problems with this method (the earnings function procedure), however, are first, one cannot readily incorporate data in order to estimate social rates of return (...) (Psacharapoulos, 1981: 325). In the same way, other main problem with the earnings function is that it does not allow introducing the probability of being employed.

The paper is organised as follows. In section two a review is done so as to set the work context of previous research in the field. The next section describes the pattern of unemployment by age and education level. Section four introduces the framework of our research, while in section five the main results are showed. From them it is interesting to notice that, as could be expected, both the level and relativities of rates of return within each country suffer a non-negligible change. A final section of conclusions finish the paper.

---

increasing wage dispersion within educational groups at higher educational levels in a majority of the countries.

2. Previous work

The relationship between unemployment and schooling has been explored from different approaches all of them related to the demand for non-compulsory education. Nevertheless, it could be possible to distinguish, at least, three different ways in which both have been linked in the economic literature. In the first, unemployment is introduced as one additional factor of uncertainty about future earnings and, as a result, as an element that affects the demand for education. In this sense, while traditionally human capital focussed basically on the opportunity cost and expected earnings as main determinants of the demand for education (Schultz, 1960, 1961; Becker, 1964; Mincer, 1974), some posterior research introduced unemployment as an important factor of it. An extension to this work is that which establishes a connection between demand for education and the business cycle. A second line of work has focused on the reasons of dropouts and their relation with economic conditions. Finally, another topic that relates both aspects is that which explores the relationship between them trough the causes that lye behind the incidence and duration of unemployment.

In relation to the most general function of demand for education, unemployment is introduced as a regressor, along with other factors.[10] Generally, in these models three groups of variables are included: the consumption-value of education, the expected gains in earnings and the differences in unemployment probability for different educational levels (Pissarides, 1982). Most of this work points out that there is a clear relationship between unemployment and demand for education. A decrease in the unemployment rate of a specific educational level *i*, or an increase in the unemployment rate in the lower level, provokes an increase in demand for schooling in the *i* level. Some of these models incorporate regional unemployment, as a proxy to differences between socio-economic composition of household that explain, ceteris paribus, part of the differences in enrolment rates (Rice, 1987). However, conclusions are ambiguous. In the UK case, while Nickell (1979), Pissarides (1981, 1982), Rice (1987) and Withfield and Wilson (1991) obtain a positive relationship between unemployment and post-compulsory education demand, Mickewright et al. (1990) found no evidence of this relationship. In this sense, Pissarides (1981) analysing the determinants of the 16-year-old staying-on rate finds that the answer to registered adult unemployment for male youth was the lowest between the main factors included, while for female the effect of unemployment was not significant. Rivkind (1995) shows that the different employment probabilities between blacks and whites in America can help to explain the higher probabilities for black people to continue high school and attend college than whites with similar academic scores. In the United States, the evidence is less conclusive, but Freeman (1980) finds a clear connection between the problems of post-graduate people for finding a job with a negative effect of new enrolments. In general, youth unemployment is not a factor affecting the demand for non-compulsory education (Handa and Skolnik, 1975), while adult male unemployment is usually very significant. In addition, Gustman and Steinmer (1982) find a

[10] Handa and Skolnik, 1975; Willis and Rosen, 1978; Nickell, 1979; Freeman, 1980; Pissarides, 1981 and 1982; Carpenter, 1984; Rice, 1987; Guerney, 1987; Kodde, 1988; Mickewright et alt. 1990; Withfield and Wilson, 1991; Mincer, 1991; Groot and Oosterbeeck, 1992; Rivkind 1995.

clear relationship between local youth unemployment and enrolment rates. Finally, Kodde (1988), with Dutch data, shows that unemployment clearly affects demand for education. On the same line of research, Groot and Oosterbeeck (1992) develop a model of optimal schooling, introducing in it the employment probability. Additionally, several authors focus on the relation between the business cycle and demand for schooling (Duncan, 1965; Bets and McFarland, 1994). In this approach, the impact of different business cycle phases and the demand for post-compulsory education appears quite clear: when the economy slows down, the demand increases while the opposite appears when the economy grows.

A second line of work focuses on dropouts.[11] Theoretically, the impact of unemployment on dropouts is ambiguous. An increase in heads of household unemployment could lead to an increase in dropouts (and 'added worker' effect), to support family income. In addition, a slack labour market reduces income expectations for an individual who wants to leave the school (a 'discouraged worker' effect). In this sense, and in the United States, Duncan (1965) found that the national unemployment rate was negatively correlated within a specific age cohort with the proportion of students of this cohort who dropped out. In the same sense can be interpreted the research of Mattila (1982), who find that the 'discouraged worker' effect dominates the 'added worker' effect. In addition, also with US data, Rees and Mocan (1997) found evidence that the second effect is higher than the first.[12] In addition, Chuang (1997) also found a significant negative effect of the high local unemployment rates on dropouts. Some research, controlling for household income, finds a positive relationship between dropouts and unemployment for low-income families (Ehrenberg and Brewer, 1994). However, the evidence is not conclusive (Rumberger, 1983, shows a negative relationship between unemployment rate and dropouts but other work did not find any relationship at all). In the UK case, studies using time-series show a clear positive relationship between unemployment and the proportion of cohort that remains in full-time education after completion of compulsory school (Pissarides, 1981; Whitfield and Wilson, 1991; Rice, 1996; Mcvicar, 1996). Nevertheless, using micro-data the evidence is less clear. However, results from Rice (1987 and 1999) strongly suggest that local labour market conditions affect the decision to continue in further education, although (like in the American case, Rees and Mocan, 1997) this impact is very different across groups of individuals. In fact, Rice (1999), analysing a sample of 16 year-olds in England and Wales, finds that, according to the time-series evidence, both boys and girls participation rates in further education are strongly and positively related to the economic conditions, especially in recessions. In the Spanish case, Peraita and Pastor (1995) find the expected positive relation between enrolment in primary school and regional youth unemployment rates.

Finally, the relationship between unemployment spells, unemployment duration and schooling has

[11] In a descriptive relationship between labour market conditions and dropouts in the USA, Duncan (1965) wrote "Since the end of World War II fluctuations about the trend toward higher rates of school attendance for teen-age boys have been coincident with changes in the job market for youth. When jobs are scarce, young men seem to defer leaving school; when jobs are plentiful, the dropouts rate accelerates" (Duncan, 1965: 134).
[12] In fact, they find that, for white high-school students and with data from 1978 to 1986, an school district with a dropout rate of 3,7% could expect a decrease in it by 2% as county unemployment rate increases by 1%.

also been object of attention, especially trying to investigate why an additional year of schooling has a bigger proportional effect on earnings than on wages. From this point of view, Nickell (1979) showed that while the number of unemployment spells changes intensively between schooling levels, the impact of schooling on duration is less important. The same results obtained by Ashenfelter and Ham (1979) that found that schooling has a strong effect on unemployment incidence, but a negligible one in its duration. In addition, Kiefer (1985) found, as Nickell did, a negative relation between education and unemployment duration. Also, the same point of view is shared by Mincer (1991), that points out that while unemployment of the least educated male workers is approximately three times higher than the most educated, these differences arise because of the higher incidence rather than a longer duration.[13] Finally, Kettunen found that while the transition intensity for the most educated people into unemployment is quite low, their unemployment could be a long term problem.

All these approaches are very interrelated and, generally speaking, focussed mainly on education demand, dropouts or incidence/duration of unemployment. Nevertheless, little research has been directed to investigate the impact of employment differentials between educational groups on rates of return. Nonetheless some research has been undertaken. Even if there is a clear agreement on the underestimation of values of internal rates[14] previous work trying to adjust them by unemployment is rather scarce. Nickell (1979) adjusts rates of return by introducing unemployment because "we shall be underestimating the private rate of return to the extent that the individual will only be in receipt of those earnings for some proportion of the time where the proportion is directly related to schooling" (Nickell, 1979: S126).[15] Groot and Oosterbeeck (1992) estimate also the effect of unemployment in the level of rates of return to education[16] while Asplund et alt. (1996) reformulates the earnings equation to allow for the introduction of unemployment.[17] In all these cases, when unemployment differentials are taken into account returns to education increase, in general, at all levels. In fact, it is quite surprising that while the number of papers devoted to the calculus of rates of return to education is really impressive[18] the study of impact of unemployment on it is so scarce.[19] Our aim is

[13] Mincer relates unemployment duration and educational levels because the job training. This relation appears as a result the great training and learning if the more educated people (Mincer, 1989: 188). Also, Mincer shows that productivity sector growth tends to reduce the duration of unemployment, because the larger reduction in layoffs than in quit unemployment.

[14] Pasacharopoulus states than "Age-earnings profiles often need a downward adjustment because of the probability of unemployment. (Pasacharapoulus and Hinchliffe, 1973: 29). Also, Weale (1993) or Trostel and Walker, that states that " These issues have been addressed to a small extent in the rate-of-return literature. For exmaple, Ashenfelter and Ham (1979) and Nickell (1979) estimate the risk.adjusted rate of return to education by accounting for unemployment. Some studies, e.g., Mincer (1974), have inbcluded weeks of work (assumed exogenous) in their earnings equations. But it does not appear that these issues have been fully appreciated. Our very preliminary examination of this issue suggest that it causes a non-trivial dowward bias in the estimated of rate of return to education." (Trostel and Walker, 2000: 3).

[15] Nickell found that after correcting for unemployment, the pre-tax weekly income rises by 0.6 percentage points (from 8% to 8,6%), while after-tax income and unemployment benefit are considered the impact is lower and very small (0.1-0.2 percentage points).

[16] Their study limits this approach to 35-45 year-old-men. It is worth noticing that Wale (1993) signalling the potential sources of downward bias in the value of rates of return points out, in the first place, the unemployment differentials: "Obviously, any assessment of the benefits of education which compares the remuneration of different types of employed labour, and neglects the differential probability of unemployment, will normally understate both private and social returns to education" (Wale, 1993: 732).

[17] They introduce the unemployment by defining the *basic earnings* as the product of the wage rate and the *expected* number of hours worked.

[18] Blaug states that "Calculations of the rates of return to invest in formal schooling have proved to be the bread-

to contribute to the discussion on the relationship between unemployment and education through this particular point, in line with Nickell, Groot and Oosterbeeck and Asplund et alt. approaches, introducing the employment probability and unemployment benefit as determinants of the level (and relative position) of the marginal rates of return to schooling.

3. The Data

Eleven European countries make up our sample (Austria, Finland, France, Germany, Greece, Ireland, Italy, Portugal, Spain, Sweden and Switzerland). For each of them a Mincerian equation has been estimated for 1995 (or the closest year otherwise) using comparable information[20], according to a common criterion both for education and employment status.[21] The sample refers only to full-time wage-earners. In Table 1 the structure of employment, broken down by educational level, is summarised. In relation to our study, the most important trait is the differentials that appear in unemployment rates by educational levels, but also by age. In almost every country we observe the typical negative relationship between unemployment rates and level of schooling with a few exceptions. In Greece and Portugal, for instance, we find significantly higher unemployment rates at medium level as compared to the low level. This fact may at least partly be explained by the relative importance of agriculture in these countries.

Table 1. Unemployment rates by educational levels, by countries[1]
Percentage of labour force and change between levels in percentage

and-butter of the human capital research program: literally hundreds of such studies have now been carried around the world in both developed and developing countries (...)."(Blaug, 1992:16).

[19] Psacharapoulus ('Mr. Rate-of-Return himself', Blaug, 1992: XII) treat the unemployment effect on rates of return indirectly when he considered (Psacharapoulus, 1981) the differences between incidence and duration, and the graduate unemployment has a result of a 'job-search' process in their surveys about rates of return have no mention about this topic (Psacharapoulus and Hinchliffe, 1973, Psacharapoulus, 1973, 1985). Mincer (1991) states that while the wage structure by education has generated an impressive amount of research, less effort has been devoted to mobility and unemployment aspects of education.

[20] In annex 4 the equations used are reproduced.

[21] We obtain from Eurostat a common classification of high, medium and low educational levels according to the ISCED, International Standard Classification of Education) and employment status. See annex 1 for the country equivalence. The employment status used is defined in annex 2.

	Low	Medium	High	Total	Medium/low	High/medium
Austria	8,2	4,4	2,5	5,0	-46	-43
Finland	21,9	15,7	6,4	15,4	-28	-59
France	14,3	8,7	6,2	10,2	-39	-29
Germany	12,9	7,1	4,3	7,3	-45	-39
Greece	5,2	8,7	4,5	6,2	67	-48
Ireland	18,8	9,7	5,2	13,5	-48	-46
Italy	9,6	8,8	4,4	8,9	-8	-50
Portugal	5,3	6,3	3,0	5,3	19	-52
Spain	17,7	16,1	11,1	16,3	-9	-31
Sweden	12,3	10,7	4,9	9,8	-13	-54
Switzerland	6,4	3,1	2,6	3,5	-52	-16

1. For each country, the period over which is calculated the average of different periods. For Austria is the average of 1995 to 1998; for Finland is 1995 to 1999; for France, Italy, Portugal and Spain is 1992 to 1999; for Germany and Ireland is 1992 to 1997; for Greece is 1992 to 1998; for Sweden is 1992 to 1996 and for Switzerland is 1996 to 1999.

In some countries the differences have the expected sign but are not statistically significant. In general the relative difference in unemployment rates between high and medium levels of schooling is more important.

If we classify the EU countries according to their structure of unemployment rates, we can split the sample into some groups (Table 2). So, it can be identified one group with a significant negative relative unemployment difference between high and medium level, but a lower difference between the medium and low level of education (Finland, Sweden and Italy) or even a positive difference (Portugal). A second group has significant unemployment differences at both levels of education (Austria, Ireland, Germany, Switzerland and France), while Spain presents lower differences in comparison between both levels, and Greece has an increasing pattern between low and medium. Certainly, there is no relationship between these unemployment differential rates in education levels and the absolute level of unemployment. According to it, Spain was the country with the highest average unemployment rate in the period considered, while the relative differences between low and medium is one of the lowest of the countries considered. Austria and Switzerland, on the other hand, are located on the opposite situation, with a small total unemployment rate (5% and 3,5%) and with a big dispersion in unemployment rates between both levels in Austria and between low and medium in the Switzerland case.

Table 2. European countries according to their relative unemployment rates
Change in unemployment rate between levels

	high/med	
med/low	[-75, -45)	[-45, -15)
[-75, -45)	**IE**	**AT CH**
[-45, -15)	**FI**	**DE FR**
[-15, 15)	**SE IT**	**ES**
[15, 45)	**PT**	
[45, 75]	**GR**	

Nevertheless, as we will see later, as important as the absolute value and the relative difference of unemployment between levels of education is their distribution by age. From the data in Table 3 (a breakdown by five years age groups is displayed in Table 13 and 14 in the annex 3) two special features should be noticed. Firstly, as it was expected, youth unemployment rates are higher than the adult ones: the average total youth unemployment rate is 15.3% (compared with 6.6% for adults). The youth unemployment rates follow a clearly decreasing pace between levels of education (19.8% for low to 14.6% for medium and to 11.7% for high), but not all countries show the same pattern. Italy presents exactly the opposite pattern while Portugal, Greece and Switzerland present also alterations from the common pattern. Secondly, the change between levels is higher in the adult unemployment rates than in the younger: while the decreasing unemployment change between low and medium levels in young people is -19.3% and -14.0% between medium and high, these values for the adult population increases to -29.4% and -44.9%.

Table 3. Unemployment rates by age and educational level
Average values of the available years for each country. Countries ranked by youth and adult unemployment rate. Change and rates in percentage

	Rates				Relative differentials	
	Low	Medium	High	Total	Medium/low	High/medium
Youth unemployment (< 30 years)						
Spain	29.4	26.9	24.5	26.9	-8.2	-9.2
Finland	43.3	23.2	11.6	26.0	-46.5	-49.8
Italy	20.5	21.3	24.2	22.0	3.8	13.8
France	25.6	14.8	11.5	17.3	-42.2	-22.7
Ireland	28.2	14.1	9.2	17.2	-49.9	-34.5
Greece	11.8	17.3	15.4	14.8	47.0	-11.2
Sweden	23.5	15.1	5.5	14.7	-36.0	-63.2
Portugal	8.4	10.8	8.2	9.1	29.0	-23.5
Germany	11.5	7.3	5.2	8.0	-36.7	-28.1
Austria	8.9	5.3	5.0	6.4	-41.2	-4.7
Switzerland	6.4	4.4	7.9	6.2	-31.4	78.7
Average	19.8	14.6	11.7	15.3	-19.3	-14.0
Adult unemployment (>29 years)						
Finland	16.0	12.5	5.6	11.4	-22.1	-54.9
Spain	13.5	8.6	5.6	9.3	-36.1	-35.3
Ireland	15.7	6.4	3.4	8.5	-59.0	-47.1
Germany	13.7	7.0	4.2	8.3	-49.0	-40.0
Sweden	10.1	9.0	4.8	8.0	-11.2	-46.4
France	11.2	6.4	4.6	7.4	-42.5	-28.2
Switzerland	6.4	6.4	1.9	4.9	0.0	-71.1
Austria	7.9	4.1	2.1	4.7	-48.5	-48.1
Italy	5.8	3.1	2.1	3.7	-46.0	-34.3
Greece	3.8	4.0	2.4	3.4	6.4	-38.8
Portugal	4.3	3.6	1.8	3.3	-15.3	-49.3
Average	9.9	6.5	3.5	6.6	-29.4	-44.9
Total average unemployment rates						
	12.1	9.0	5.0	9.2	-28.9	-28.0

4. The Framework

In a human capital framework, individuals face a decision in completing their compulsory education. They can stop studying and look for a job or they can continue in further education, to increase their human capital (or to consume education as well). This choice is made maximising the present discounted value of expected future net benefits, other things being equal. Moreover, returns to this investment depend on the conditions of demand and, because the imperfect foresight, expectations about future demand are made with present information about it. The important point is that students form their earnings expectations from the wages and employment rates of those who are in the labour market.

In a first step we try to give an impression on how unemployment rates influence the rate of return with the help of a very simple model. In a second part, we make estimates with a more explicit model, with fewer assumptions but more data requirement. These estimates should give an overview on how inclusion of unemployment changes the relative differences between rates of return to

education in Europe.

As a point of departure we take the following simple model to estimate private rates of return to education (Psacharopoulos, 1987):

$$r = \frac{\overline{w}_h - \overline{w}_{h-1}}{s \cdot \overline{w}_{h-1}} = \frac{1}{s}(b-1), \qquad where\ b = \frac{\overline{w}_h}{\overline{w}_{h-1}} \tag{1}$$

$\overline{w}_h$ stands for the average wage at educational level h and $\overline{w}_{h-1}$ for the average wage at the next lower level of education. s are the years of schooling necessary after h-1 to reach level h.

If we introduce unemployment, we get:

$$r' = \frac{\overline{w}_h \cdot (1-u_h) - \overline{w}_{h-1} \cdot (1-u_{h-1})}{s \cdot \overline{w}_{h-1} \cdot (1-u_{h-1})} = \frac{1}{s} \cdot \left(b \cdot \frac{1-u_h}{1-u_{h-1}} - 1 \right), \tag{2}$$

where u_h and u_{h-1} represent the unemployment rates for the respective educational groups. We can see, that conventional rates of return are not biased, when unemployment rates is identical for two consecutive educational groups. If however unemployment rates vary with the educational level, rates of return should be adjusted. In order to get (3) we solve (1) for b and substitute it in (2).

$$r' = r \cdot \frac{1-u_h}{1-u_{h-1}} + \frac{1}{s} \cdot \left(\frac{1-u_h}{1-u_{h-1}} - 1 \right) \tag{3}$$

Equation (3) gives a rule, how conventional rates of return should be corrected, when unemployment rates vary with the educational level. If the unemployment rate decreases with the level of education (i.e. $u_h < u_{h-1}$), then $\frac{1-u_h}{1-u_{h-1}} > 1$ and the conventional rate of return should be corrected upwards.

Equation (3) gives only a rough idea of the magnitude of the bias of rates of return to education, since several simplifying assumptions have been made. In order to get more reliable results, we try in the following section to correct estimates of rates of return with a more elaborate method, which takes into account age-earnings-profiles, age- and education-specific unemployment rates as well as some characteristics of the national system of unemployment assurance.

Depending on the legal framework, the expected rate of return to education for the people that decide to continue in the educational system facing the alternative to enter the labour market would be more adequately approached by the rate of return with unemployment benefits, but in others, without such benefits. If accession to unemployment benefits is not restricted, the more adequate approximation to the expected rate of return would consist in the alternative that considers the

unemployment probability plus the unemployment benefits. In other countries, like Italy or Spain, in which eligibility for unemployment benefits is conditioned on previous employment, the expected rate of return should be approximated thorough a weighted average of the rate of return to education with and without unemployment benefits. However, if the income expectation includes the whole life cycle income, the worker expects to become employed after a certain period of job search, and to have access to the unemployment benefits if, in the future, he enters unemployment.

Since estimates of returns to education are based on the observed wage structure, there are actually two potential sources of bias. One source lies in the fact that observed wages might not be representative for the whole population. Taking into account differences in characteristics of observed and unobserved individuals (i.e the employed and unemployed) and correcting the wage level (for instance with the Heckmann 2 step procedure) can reduce this bias. The corrected results simulate a situation where all individuals are on the labour market. Besides the first problem there is, however, a second one. The individuals involuntarily unemployed actually do not earn the wage that is simulated by the earnings equation. In fact they earn no income or depending on the unemployment insurance system somewhat less than their reservation wage. This paper deals with the second aspect.

In order to get estimates of rates of return that are adjusted for differences in unemployment probability, we will apply a method, which takes into account age-earnings profiles, age- and education-specific unemployment rates as well as some characteristics of the national system of unemployment insurance.

An earnings equation could be used to introduce these elements (as Asplund et alt. 1996 have shown). Nevertheless, because we try to incorporate not only the average unemployment rate by each educational level but also their life-cycle profile (and also the related unemployment benefits), a better way is by calculating the internal rate of return. This approach allows us to avoid the problem, raised by Psacharapoulos (1981), that could arise if the average rate of unemployment is used as a proxy of the unemployment rate because of the job searching process of the young graduated. From his point of view “certainly it would be a mistake to reduce a whole age-earnings profile by the average rate of unemployment that mainly refers to young people” (Psacharapoulos, 1981: 332).

In order to introduce these factors the calculus of the returns to education follows a three steps approach. In each step the expected life-cycle profile is modified by the introduction of different hypothesis. In the first, the expected life-earnings profile is obtained from the classical Mincerian equation. The formula of the expected earnings flow has the traditional expression:

$$\tilde{Y} = \exp\{\hat{Y} + \frac{1}{2}\hat{\sigma}^2\}$$

where $\hat{Y}$ is the predicted value of the log of earnings from the Mincerian equation and σ^2 is the regression residuals variance. In the second, this profile is modified to take into account the differences in employed probability according to each educational level and age. Logically, the introduction of this probability will reduce, in most cases, the expected earnings obtained directly through the Mincerian equation.

$$\tilde{Y} = (\exp\{\hat{Y} + \frac{1}{2}\hat{\sigma}^2\}) * f$$

where *f* is the employment probability. Finally, we shift these age-earnings profile by the unemployment benefit.

$$\tilde{Y} = (\exp\{\hat{Y} + \frac{1}{2}\hat{\sigma}^2\}) * f + b * c * (1 - f)$$

where *b* is the unemployment benefit and *c* the coverage rate. In most countries, b has been estimated as a percentage of wages, assuming that the individual would be employed. For this reason, in general $b=\hat{Y} * p$, where *p* is the average replacement rate.

The three different life-cycle earnings flows are used to obtain three internal rates of return that equal the expected earnings with the opportunity costs. Let *Y* be the earnings life-cycle flow and 1 and 2 two different educational levels, where 2 is higher than 1, the *r* (marginal internal rate of return to education of the 2 level) is obtained by resolving the following equation in *r*:

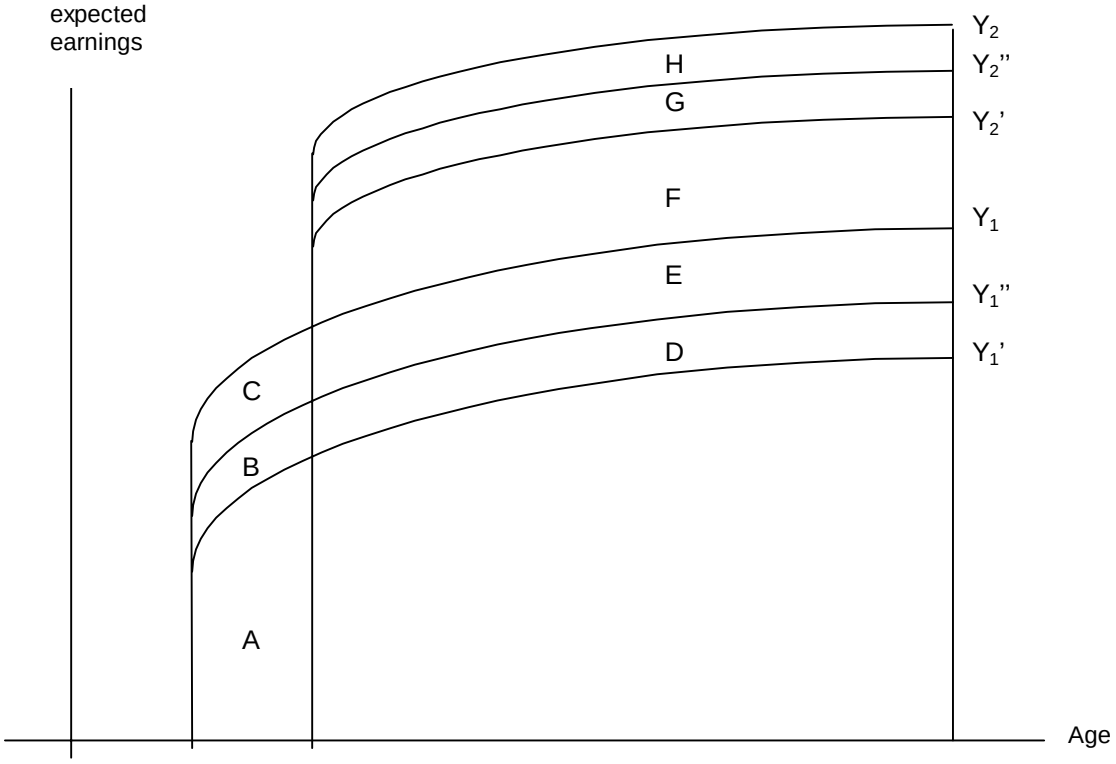
$$\sum_{t=c+1}^{n} (Y_2 - Y_1)_t (1+r)^{-t} = \sum_{t=1}^{c} (Y_1)_t (1+r)^t$$

where *c i*s the total of years of forgone earnings of one individual which continues in level 2 (or the amount of income earned by the individual with the 1 level of education) and *n* is the number of years of active life.

In Figure 1 the three definitions of Internal Rate of Return are depicted. Y_1 and Y_2 represent observed wages at educational levels 1 and 2. In the first definition, uncorrected internal rate, the opportunity costs are delimited by the area A+B+C, while the additional expected earnings is the area F+G+H. Taking the unemployment probability into account shifts expected earnings to Y_1' and Y_2' respectively. This decreases the opportunity costs (A), but also modifies the expected benefit of education 2 (D+E+F). Finally, when the unemployment benefit is introduced, expected earnings shift

to Y_1'' and Y_2''. The opportunity cost increases (A+B) while the expected benefit of education 2 is again modified (E+F+G). As can be seen, the total effect of the unemployment probability and expected earnings is ambiguous. Whereas opportunity cost decreases when unemployment is taken into account, the direction of the change in the net benefit from education is not determined. If unemployment rates are lower at higher educational levels, however, the benefit should rather increase which would increase adjusted rates of return furthermore. As we will see in the results, this is very often, but not always the case.

Figure 1. Earnings and opportunity costs before and after the introduction of employment probability and unemployment benefit



To predict expected gross earnings, a traditional functional form of the Mincerian equation was used:

$$LnWages_i = a + b_2*ISCED\text{-}LEVEL_{2i} + b_3*ISCED\text{-}LEVEL_{3i} + c*POTENTIAL\text{-}EXPERIENCE_i + d*POTENTIAL\ EXPERIENCE_i\text{^}2 + e_i \quad (4)$$

Where LnWages are annual gross earnings instead of gross hourly wages. The introduction of annual earnings allows us to consider the impact of unemployment in the total earnings received, because, as Ashenfelter and Ham (1979) showed, the relationship between earnings and unemployment comes from the number of hours worked in each period, which is dependent on the educational level.[22] The use of gross earnings (instead of post-tax income) is both related to the

[22] They showed that desired supply of hours is not correlated with the level of education, but with the actual

economic meaning of the rates of return (the productivity of the labour force) and the difficulties to homogenise the tax treatment of the unemployment benefit across countries.[23] ISCED-LEVEL are dummy variables for medium and higher levels, the lower level being the reference group. Finally, POTENTIAL EXPERIENCE is defined, as usual, as age minus six minus the number of years of each educational level, while e_i is an error term. This equation is used to obtain the expected life-cycle profile of earnings for each educational level.

The probability of being employed was introduced in the following way[24]. A specific tabulation was obtained from Eurostat with population shares broken down by five-years age-groups and a common definition of employment status (employees, self-employed, unemployed, not active) for 1992 to 1999[25]. In fact, the unemployment life-cycle profile obtained from a probit equation[26] offers very similar results that those reached using actual unemployment rates.[27] Additionally, to avoid the impact of a particular cyclical situation in the unemployment we use an average unemployment rate for all the disposable years. Our approach with standardised average unemployment rates has additionally the advantage that the stability of unemployment structure (relative unemployment rates according to educational levels) can be considered. And so even taken into account that the period for which we obtain data from Eurostat (1992-1999) is relatively short, and not all of the countries have gone through a complete business cycle in it. Even though, we think that taking an average unemployment rate for as many years as possible is a second best solution. Finally, it has to be underlined that in our approach we simplify the unemployment situation considering that all of it is involuntary, in accordance with the Eurostat definition.

number of hours worked. The use of earnings as a dependent variable can also be found in Groot and Oosterbeek (1992).

[23] Nickell (1979) uses pre-tax weekly income, on one hand, and, on the other hand, post-tax and unemployment benefit.

[24] A probit model was first estimated for each country. But problems with homogeneity of information from the different national datasets made comparisons difficult.

[25] See note to table 1.

[26] Using educational levels, age and age squared as regressors.

[27] We carried out a comparative exercise between the two approaches with Spanish data. The wage equation was obtained using data from the Wage Structure Survey-1995, while the probit model use data from the Labour Force Survey-1995. The differences between the rates of return based on a probit model (a rate of return of 10,85% for medium vs. low level and an 11,12% for high vs. medium) and the rates based on the unemployment Eurostat data set (10,32% and 11,93%, respectively) are negligible.

Table 4. Average unemployment benefit
Percentage of the earnings

	Coverage rate A	Average replacement rate B	Average benefit C=A*B
Austria	100,0	26,0	26,0
Finland	75,0	69,1	51,8
France	56,0	66,5	37,2
Germany	100,0	62,0	62,0
Greece	?	?	?
Ireland	?	?	28,0
Italy	?	?	19,0
Portugal	?	?	?
Spain	68,0	65,0	44,2
Sweden	66,9	75,0	50,2
Switzerland	60,0	75,0	45,0

Finally, defining a representative individual for each country allows including the unemployment benefits. In Table 4 the different conditions to obtain (and maintain) the unemployment benefit in all countries considered are summarised. The unemployment benefit imputation has followed this scheme, except for Ireland (is considered an individual who earns more than 70 pounds per week with a dependent adult and who can obtain the unemployment assistance after the unemployment benefit), Spain (an individual with one child with a maximum unemployment benefit is 195% of the minimum wage), Sweden (individual who is eligible for Unemployment Insurance).

As in the unemployment rates, they can be divided in some groups according to the importance of the average benefit. Germany (62%) and Finland and Sweden (almost 50% in both cases) are the most generous countries in the average benefit: Germany because of 100% coverage rate and Finland and Sweden as a result of important coverage and average replacement rates. Switzerland and Spain are in a second group, with an average benefit around 45%, while France, Ireland and Austria show average benefit less than 40% and more than 25%. Finally, Italy (19%) presents the less important average benefit. On the other hand, we have no information on Portugal and Greece.

In any case, it is interesting to call attention about the following fact. In order to appreciate the social rate of return to education, if we face the need to select one of the three considered measures, the rate of return to education with unemployment probability and without unemployment benefits is probably the more adequate magnitude. The reason is due to the fact that this is the rate that most closely approximates the rate that would be obtained if wage flexibility equalise unemployment rates among the different educational levels. Therefore, from a market perspective, this return approximates the relative scarcity of the different human capital endowments. But, from an individual point of view, in order to set the optimal length of schooling, the relevant rate of return is that obtained when the unemployment probability as well as the unemployment benefits has been taken into account. Therefore, like in other economic fields, public intervention can introduce a certain wedge between the private and the social return. This distortion could be fully justified from a redistributive point of view but, doubtless, can have a cost in terms of efficiency.

5. Results

In this section we present our results and suggest some clues about the underlying reasons of the absolute magnitude and relative change in rates. In the first part, we describe the main characteristics that appear from the change in the definition of rates and, in the second, we try to advance an explanation for this changes using a double approach. First, a decomposition of the wage, employment and benefit effects is made using an arithmetical procedure. Second, a simple model with all the countries and the modified internal rate is regressed against variables of unemployment.

5.1. Changes in internal rates of return to education by levels and countries

Table 5 show a summary of the main results. IRR1 is the non-adjusted internal rate of return calculated using the coefficients of the Mincerian equation to predict the expected life-cycle earnings flow. IRR2 (the partially adjusted) is the internal rate when this profile is conditioned to the employment probability, while IRR3 (the fully adjusted) includes also the expected unemployment benefit. From Table 5 it is clear that the introduction of the probability of being employed and the consideration of the unemployment benefit leads to an important change in the fully adjusted rates. In particular, some stylised facts arise from these changes.

First of all, and considering the change between the unadjusted and fully adjusted marginal internal rates (IRR1 vs. IRR3), in all situations and countries the expected pattern of increasing rates appears, with only few exceptions (Finland and Switzerland in the change between high and medium levels of education). For marginal rates of return of medium level, Ireland, France and Finland show particularly important increases. These increases are quite big and suggest that this modification may be affecting the schooling decision of individuals.[28] A second group of countries show also an important, but less dramatic, increase in the adjusted internal rate. This is the case for Sweden, Italy, Austria, Spain and Germany. Finally, a few countries experience a minimum change: Switzerland, Greece and Portugal.[29]

It is worth noticing that the *absolute level* of unemployment seems to have a non-negligible impact. When the unemployment rate is below 7% even important changes between two consecutive educational levels produce only a slight difference in internal rates. This is the case of Switzerland, Greece and Portugal.

[28] Those results show a clearer dispersion than those obtained by Groot and Oosterbeeck (1992). Nevertheless, it has to be taken into account that their analysis is made only with men with ages between 35 and 45 (in which the unemployment differential rates are very low), while in our approach all the life-cycle profile is considered.

[29] In Greece and Portugal, the reported change in the IRR corresponds to IRR2/IRR1, because the information of unemployment benefit is not available.

Table 5. Returns to education in Europe (IRR) with average unemployment rates and unemployment benefits
Percentage. Ranked by decreasing change in IRR3/IRR1

	IRR1 a	IRR2 b	IRR3 c	Change in the IRR b/a*100	Change in the IRR c/a*100	Change in the IRR c/b*100	Unemployment rates Low	Unemployment rates Medium	Unemp. different.
Medium versus low									
Ireland	9,2	19,5	15,9	112,0	72,8	-18,5	18,8	9,7	-48,4
France	6,4	13,4	10,3	109,4	60,9	-23,1	14,3	8,7	-39,2
Finland	4,0	11,3	6,2	182,5	55,0	-45,1	21,9	15,7	-28,3
Sweden	4,6	7,6	5,8	65,2	26,1	-23,7	12,3	10,7	-13,0
Italy	5,7	7,2	6,9	26,3	21,1	-4,2	9,6	8,8	-8,3
Austria	12,9	15,7	15,0	21,7	16,3	-4,5	8,2	4,4	-46,3
Spain	8,1	11,0	9,3	35,8	14,8	-15,5	17,7	16,1	-9,0
Germany	12,7	17,3	14,4	36,2	13,4	-16,8	12,9	7,1	-45,0
Switzerland	8,9	9,7	9,3	9,0	4,5	-4,1	6,4	3,1	-51,6
Greece	5,0	5,1	-	2,0	-	-	5,2	8,7	+67,3
Portugal	8,6	8,7	-	1,2	-	-	5,4	6,3	+16,7

	IRR1 a	IRR2 b	IRR3 c	Change in the IRR b/a*100	Change in the IRR c/a*100	Change in the IRR c/b*100	Unemployment rates Medium	Unemployment rates High	Unemp. diferent.
Higher versus medium									
Italy	4,3	7,3	6,4	69,8	48,8	-12,3	8,8	4,4	-50,0
Sweden	5,1	7,9	6,3	54,9	23,5	-20,3	10,7	4,9	-54,2
Ireland	9,4	12,5	11,5	33,0	22,3	-8,0	9,7	5,2	-46,4
Greece	8,3	9,9	-	19,3	19,3	0,0	8,7	4,5	-48,3
Spain	7,5	10,0	8,6	33,3	14,7	-14,0	16,1	11,1	-31,1
France	7,2	8,6	8,0	19,4	11,1	-7,0	8,7	6,2	-28,7
Germany	5,7	6,9	6,1	21,1	7,0	-11,6	7,1	4,3	-39,4
Austria	5,4	5,8	5,7	7,4	5,6	-1,7	4,4	2,5	-43,2
Portugal	20,6	22,5	-	9,2	0,0	-8,4	6,3	3,0	-52,4
Finland	7,7	10,2	7,6	32,5	-1,3	-25,5	15,7	6,4	-59,2
Switzerland	9,1	8,8	8,9	-3,3	-2,2	1,1	3,1	2,6	-16,1

In the case of the adjustment of the marginal rate of high level, less important changes than before appear. Italy is the country experiencing the larger change; Sweden, Ireland and Greece present an intermediate change, while Spain and France have a lower increase (between 10% and 15%) and Germany and Austria show a minor change (7% and 5,6%). Portugal experiences zero increase while for Finland and Switzerland the adjustment in the rate leads to a small reduction of returns. Therefore, again, when the absolute level of unemployment is below 7-8% the changes in internal rates are, generally, small. This is the case for France, Austria, Portugal, Greece and Switzerland.

A second point is that the influence of institutional factors has to be considered. This effect is clearly showed by the change between IRR2 (the partially adjusted rates, without including benefits) and IRR3 (the fully adjusted ones, including unemployment benefits), that may give us a first approach to the effect of the inclusion of benefits in the expected earnings on the rates of return. Therefore we should expect a reduction from IRR2 to IRR3. Nevertheless, the differences in this fall appear across countries. For instance, in the case of the rate of return of medium level Finland, Sweden and France

are the countries that experience a larger reduction. It is worth noticing than these countries are not the most generous in their unemployment benefit. On the other hand, Switzerland shows the lower impact. When looking at the return to high level, Finland, Sweden and Spain appear as the countries with a bigger impact of the unemployment benefit in the change in the IRR, while Austria and Switzerland show the minimum change.

Thirdly, it has to be stressed also the modification in the *relative position* of each rate within a country. As important as the relative, or absolute, change in the rate due to the adjustment is the effect that it has on the relativities among returns within countries given that it is an indication of the market relative scarcity of labour force skills. Then, if our definition of internal rates alters the pattern of 'relative prices', the consequences for both public and private decision of investment on education should not be negligible. And this seems to be the case. From this point of view, countries can be clustered in three different groups according to the change in relative returns from IRR1 to IRR3 as can be seen in table 6.

In the first group appear those countries for which relative returns change from IRR1 to IRR3. These are the cases of France, Switzerland and Ireland. In the three cases IRR1 generates a pattern of increasing returns as educational level increases. However, in adjusting the rates of return in IRR3 the former pattern is reversed. The extent of the change varies across the three countries as shown in the last column of table 6. The most dramatic change is suffered by Ireland where the adjustment produces a large increase in the return to medium level enough to reverse the pattern. Switzerland is next but the even though the changes are large in relative terms but in a 'regime' of low return differentials. Finally, France goes from a relatively high differential of returns to a situation in which the pattern has been reverted but with a larger differential than before the adjustment.

In the second group we find countries that show a decreasing pattern of returns with educational level in both IRR1 and IRR3. This is the case for Austria, Germany, Italy and Spain. In this group, two countries, Austria and Germany, have large differentials that remain unchanged with IRR3. Italy has a differential of returns that is half that of the two first countries but after adjusting the differential is reduced to –7.2%. Finally, Spain is one of the countries with the lowest returns differentials and they do not change after adjustment.

Finally, the rest of the countries follow pattern of increasing returns with education in both definitions of rates (Finland, Portugal, Sweden and Greece) but with significant differences. Returns differentials in Greece and Sweden are low whereas the reverse occurs with the other two countries. But the effect of the adjustment leads to various results. In one case the differential increases (Greece), in other a large decrease of the differentials take place (Finland). Finally, in Sweden and Portugal the adjustment has a slighter effect on returns.

Table 6. Change in relative returns differentials
IRR and changes in percentage. Ranked by the relative change of returns differentials

	IRR1			IRR3			
	A	B	C=B/A*100	D	E	F=E/D*100	G=C/F
Greece	5,0	5,1	2,0	8,3	9,9	19,3	9,6
Finland	4,0	7,7	92,5	6,2	7,6	22,6	4,1
Italy	5,7	4,3	-24,6	6,9	6,4	-7,2	3,4
Sweden	4,6	5,1	10,9	5,8	6,3	8,6	1,3
Spain	8,1	7,5	-7,4	9,3	8,6	-7,5	1,0
Germany	12,7	5,7	-55,1	14,4	6,1	-57,6	1,0
Portugal	8,6	20,6	139,5	8,6	20,6	139,5	1,0
Austria	12,9	5,4	-58,1	15,0	5,7	-62,0	0,9
Ireland	9,2	9,4	2,2	15,9	11,5	-27,7	-0,1
Switzerland	8,9	9,1	2,2	9,3	8,9	-4,3	-0,5
France	6,4	7,2	12,5	10,3	8,0	-22,3	-0,6

A and D: Medium vs. low; B and E: high vs. medium.

5.2. Wage, employment and benefit effects

As it was explained in the previous section, the changes in the internal rates across countries and levels are very different. Some countries with a high level of unemployment, and also a non-negligible differential between levels, show important modifications in the level and differentials of rates of return, while others with similar situation experience smaller changes. In addition, the sign of this change is different across countries. Overall, these results suggest that the effect of average employment probability in rates is very different across countries and levels, and the same could be said for the unemployment benefit. A double approach was followed to try to capture the reasons that underlie these differences across countries. In the first approach, we decompose the change in the earnings life-cycle flow (as a proxy of the change in the internal rates) in their different components (wages, employment and unemployment benefit). In the second we regress the modified internal rates of each country against youth and adult unemployment rates.

The decomposition of the life-cycle earnings flow is based in the following approach. Let Y_i be the earnings flow , p_i and $(1-p_i)$ the employment and unemployment probabilities, b_i the unemployment benefit, and w_i the wage of the educational level *i*. Then, the (1) expression shows the expected earning flow of an individual with the educational level 1:

$$Y_1 = p_1 w_1 + (1-p_1)b_1 = p_1 w_1 + b_1 - p_1 b_1 \qquad i=1,2 \qquad (5)$$

In addition, the change in earnings flow between the 1 and 2 levels is:.

$$dY= p_1 dw + wdp_1 + dpdw + db- p_1 db - b_1 dp - dpdb$$

$$dY= p_1 dw + dp (w_1 -b_1) + db (1-p_1) + (dpdw - dpdb)$$

$$dY= (w_2 - w_1)p_1 + (p_2 - p_1)(w_1 - b_1) + (b_2 - b_1)(1-p_1) + ((p_2 - p_1)(w_2 - w_1)-(p_2 - p_1)(b_2 - b_1))$$

$$\frac{dY}{Y} = \underbrace{\frac{(w_2 - w_1)p_1}{Y}}_{\text{Wage effect}} + \underbrace{\frac{(p_2 - p_1)(w_1 - b_1)}{Y}}_{\text{Unemployment effect}} + \underbrace{\frac{(b_2 - b_1)(1-p_1)}{Y}}_{\text{benefit effect}} + \underbrace{\frac{((p_2-p_1)(w_2-w_1)-(p_2-p_1)(b_2-b_1))}{Y}}_{\text{cross effect}} \quad (6)$$

The expression $((w_2-w_1)p_1)/Y$, the wage effect, shows the change in the expected earnings flow as a consequence of the change in wages from the level 1 to level 2, while the probability of being employed is constant at the level 1. The unemployment effect, $((p_2-p_1)(w_1-b_1))/Y$, signals the change in the expected earnings flow as a result of the change in the probability of being employed (p_2-p_1) let constant the *net* wages (w_1-b_1) of the level 1. The benefit effect, $((b_2-b_1)(1-p_1))/Y$ expresses the modification in earnings as a result of the change in the benefit (b_2-b_1), letting constant the probability of being unemployed at the level 1 $(1-p_1)$. Finally, the last part of the expression (6) captures the cross effect.

The results of this decomposition are shown in table 7 (average effects from the period available for each country). According to the change in IRR, two facts are noticeable. Firstly, the unemployment effect is greater in the change between medium to low level than from high to medium. That is, on average the unemployment effect explains approximately the 9.6% of the change in the earnings flow between low and medium levels of education, while this percentage goes down to 5.1% in the high vs. medium. The same is true for the benefit effect, which goes from 3.2% in the change between low and medium to 1.8% in the medium vs. high.

This difference between the part of the change in earnings flow explained by the employment effect seems to be correlated with the *absolute level* of the unemployment rates, rather than with the *relative changes*. That is, in low and medium levels of education the average unemployment rates are 12.1% and 9.0% respectively, that is, a relative differential of –25.2%, the average change in rates is an increase of +24.6%. Conversely, the average unemployment rate in high level is 5.0% and the relative differential from medium to high is larger (-44.5%), while the average modification of rates is lower (only an increase of +12.4 %).

Table 7. Average wage, employment and benefit effect
In percentage

	Medium versus low				High versus medium		
	wage	employment	benefit		wage	employment	benefit
Austria	84,6	11,4	1,8	Austria	94,4	3,1	1,1
Germany	79,4	11,2	7,4	Germany	86,5	7,6	5,0
Greece	104,1	-7,7	--	Greece	93,0	5,4	--
Portugal	101,4	-0,9	-	Portugal	94,8	2,5	-
Ireland	67,7	26,0	2,2	Sweden	84,7	11,2	0,4
France	71,3	22,6	3,6	Ireland	87,2	10,1	0,3
Finland	78,6	14,0	6,3	Spain	88,6	7,9	0,3
Sweden	84,3	11,2	2,3	Finland	85,3	6,0	5,7
Spain	87,9	6,5	1,5	France	94,9	2,1	2,3
Italy	90,9	6,1	0,8	Italy	98,5	0,2	0,2
Switzerland	89,8	5,6	2,7	Switzerland	99,1	0,0	0,6
Average	85,5	9,6	3,2	Average	91,5	5,1	1.8

Second, there is no correlation between the absolute level of the employment effect and the benefit effect. Some countries have a big employment effect, while they present a low benefit one and also the contrary is true. For instance, the employment effect between medium and low is higher in Ireland, France and Finland (with a proportion explained by this effect that goes from the 26% of Ireland to 14% of Finland). On the other hand, the benefit effect is higher in Finland and France. In addition, while Ireland has an employment effect that more than doubles the average, it presents a benefit effect below it. When we look at the change in earnings between medium and high levels, besides the common pattern of less important weight of employment and benefit effect, some country characteristics can be stressed. For instance, Sweden, Ireland and Spain have the highest employment effect, while Italy presents an employment effect clearly below the average. In addition, Finland and France show the most important benefit effect.

Thirdly, besides these two features, a more particular view of each country reveals some clues about the reasons of the weight of each effect. The absolute magnitude of the wage, employment and benefit effect shows three different groups of countries, according to their values: below, above and on the average. Certainly, the distribution of weights across the three effects is a combination of the initial wage dispersion and the change in employment probability and the generosity of the unemployment benefit. Generally speaking, a clear relationship between the importance of the wage effect and the wage rate dispersion appears, but with some exceptions. For instance, Germany, Finland, France, Ireland, Sweden and Austria present a wage effect below the average and, in each case, wage differentials between medium and low levels are the lowest (see Table 8). Nevertheless, above the average the relationship between earnings differentials and wage effect is less clear. Spain, for instance, that has one of the highest dispersion earnings ratio in the sample considered (1.5, only below Portugal, with 1.7) shows a wage effect that is less important than those of the

Switzerland or Italy, with lower earnings ratio.

Table 8. Earning differentials across levels and countries in Europe.
Ratio to earnings of each level, ordered by decreasing values

Countries	Medium/low	Countries	High/medium
Portugal	1.7	Portugal	2.1
Spain	1.5	Finland	1.6
Italy	1.4	France	1.5
Greece	1.4	Austria	1.5
Switzerland	1.3	Switzerland	1.4
Sweden	1.2	Spain	1.3
Finland	1.2	Greece	1.3
Ireland	1.2	Germany	1.2
Germany	1.2	Italy	1.2
Austria	1.2	Sweden	1.2
France	1.1	Ireland	1.1

Looking at the employment effect in the change between low and medium levels of education, Sweden (11,2%), Germany (11,2%), Austria (11,4%), Finland (14%), France (22,6%) and Ireland (26%) are the countries with the highest value, all of them above the average (9.3%). It is worth noticing that these countries are in the group that present the highest modification in unemployment rates between low and medium levels (only Switzerland presented bigger change, but her absolute level of unemployment was low). The other countries can be clustered into two groups. Spain, Italy and Switzerland show a small employment effect (6.5%, 6.1% and 5.6% respectively). These values reflect the low value of the unemployment differentials between medium and low levels of education in the Italian and Spanish case, and large differentials in Switzerland, but with an absolute low level.
Finally, the unemployment benefit effect is higher in Germany (7,4%), Finland (6,3%), Portugal (4,8%) and France (3,6%). As it can be seen from this list, some of those countries have a very low employment effect but a relatively high unemployment benefit (this is the case of Portugal and Austria).

All in all, the main conclusion of this description is that the *absolute change* in unemployment rates between educational levels is not enough to provide an explanation of the differences in the weights of each effect (wage, employment and benefit). This seems to be due to the fact that it should be taken into account not only the *absolute change* in the average unemployment rate, but *its distribution by age.* As it is well known, the internal rates of return are very sensitive to the youngest ages. Therefore, it could be possible that similar average changes in total unemployment rates are consistent with different age distributions of unemployment. And certainly this is the case, at least partially, for those countries that present a less sensitive answer to the change in the unemployment rates. Certainly when the employment effect between medium and low levels is considered those that experienced lower values are those that experience an increasing pattern of unemployment in the age group below 30 years. That is, the unemployment rate is higher in the medium level than in

the low. In Table 9 the information about unemployment change between levels and ages is summarised in two groups (15-29 years old and 30-64). As can be seen from this table, the lower the difference between unemployment rates in the first age group (15-29) the lower the employment effect. From this point of view, Greece, Portugal, Italy and Spain are among those countries which exhibit both an increasing unemployment rate between low and medium levels of this age[30] or a very slight decrease (Spain only shows a small variation of -8.2%).

When the employment effect of high vs. medium is considered, appears also that, generally speaking the lower the earnings differentials between medium and high levels of education, the higher the employment effect. But this general rule has, as previously, some exceptions. For instance, Finland presents one of the highest values in earnings ratio between high and medium levels (1.6, only under the 2.1 of Portugal), while its employment effect is above average. On the opposite position appear Italy with a lower employment effect (0.2% well below the average 5.1%), but with relatively low dispersion wages (1.2 ratio in high vs. medium wages). Beside this aspect and in the context of a less important value of the employment effect than in the medium vs. low case (5.1% vs. 9.6%), six countries show higher values than the average: Sweden (11.2%), Ireland (19.1%), Spain (7.9%), Germany (7.6%), Finland (6.0%) and Greece (5.4%).

The rest of the countries show an employment effect lower than the average value of 5.1%: Austria (3.1%), France (2.1%), Italy (0.2%), Portugal (2.5%) and Switzerland (0.0%). As it has been pointed out before, except for Italy, in the rest of the countries the lower employment effect reflect either a higher earnings ratio (Portugal, France, Austria and Switzerland are into those countries with higher values) or a combination of youth unemployment and/or decreasing youth unemployment below average.

The features summarised above suggest that the reasons that help to explain the importance of the employment effect in the change between earnings flow are quite different when the rate considered is the marginal between high and medium or between medium and low. Nevertheless, and summarising the previous description, we can conclude some common elements that explain, at least partially, the differential impact of the employment probability in the change of earnings. That is, the lower the wage dispersion, the higher the unemployment differential between levels, the youth unemployment differentials and the absolute level of unemployment the higher the employment effect.

These results show a quite different pattern between the factors that affect the adjusted marginal internal rate and those related with the demand of non-compulsory schooling. In fact, as has been underlined before, generally speaking in the demand for schooling models that use the unemployment as explanatory variable, youth unemployment is not significant (this is the case of the

[30] Greece, Portugal, Italy show a quite important increase in unemployment rates that ranges from the 47.0% in the Greek case to 3.8% in the Italian one.

determinants of the 16-year-old staying-on rate of Pissarides, 1981[31]). Pissarides, for instance, attribute most of this paradoxical finding to the collinearity between youth and adult employment and the availability of generous unemployment benefits for young unemployment.

[31] He finds a significant impact of the adult unemployment, a marginal influence of new-graduate unemployment and a totally insignificant impact of the youth unemployment (Pissarides, 1981: 353).

Table 9. Unemployment rate differentials between levels

Average of available time period for each country. In percentage. Decreasing order by the unemployment differential in 15-29 group

A. Medium to low

	15-29	30-65	Total
Greece	47.0	6.4	66.2
Portugal	29.0	-15.3	16.8
Italy	3.8	-46.0	-7.6
Spain	-8.2	-36.1	-8.7
Switzerland	-31.4	0.0	-52.3
Sweden	-36.0	-11.2	-12.9
Germany	-36.7	-49.0	-45.0
Austria	-41.2	-48.5	-46.3
France	-42.2	-42.5	-39.5
Finland	-46.5	-22.1	-28.2
Ireland	-49.9	-59.0	-48.1

B. High to medium

	20-29	30-65	Total
Switzerland	78.7	-71.1	-14.9
Italy	13.8	-34.3	-50.2
Austria	-4.7	-48.1	-44.2
Spain	-9.2	-35.3	-31.4
Greece	-11.2	-38.8	-48.1
France	-22.7	-28.2	-28.2
Portugal	-23.5	-49.3	-52.4
Germany	-28.1	-40.0	-39.1
Ireland	-34.5	-47.1	-46.7
Finland	-49.8	-54.9	-59.2
Sweden	-63.2	-46.4	-54.0

5.3. Cross-country differences between adjusted internal rates of return: a statistical approach

A second approach to assess the effect of unemployment consists of estimating a regression model. The dependent variable is the adjusted marginal internal rates of return (the IRR3) of each country and for both medium vs. low and high vs. medium educational levels. Because we consider that the earnings equation is unlikely to experience a substantial change in the nineties for the countries in our sample, we use them to estimate as many IRR3 as possible by plugging the unemployment rate for each year. As a result, the panel used is made up of a set of IRR3 for each country corresponding to each year for which Eurostat has homogeneous unemployment data (eleven countries and 68 observations). The explanatory variables are fixed country effects, the youth unemployment rate (16-30 years of age) and the adult unemployment rate. By definition, the fixed effects should approach the non-adjusted internal rate, while the coefficients of the unemployment rates of both levels express the change in the non-adjusted internal rate as a result of the introduction of the probability of being employed and the unemployment benefits. Then, the model takes the following form:

$$IRR_{ijk} = \alpha_1 UR_{iyk} + \alpha_2 UR_{jyk} + \alpha_3 UR_{iak} + \alpha_4 UR_{jak} + \gamma \text{ Fixed Effect}_k + \varepsilon \quad (7)$$

Where IRR_{ijk} is the IRR including the probability of being employed and the unemployment benefit between the education levels *i* and *j* in the country *k*, UR_{iyk} and UR_{jyk} are the youth unemployment rates of level *i* and *j* in the country *k*, respectively, the UR_{iak} and UR_{jak} are the adult rates of unemployment of level *i* and *j* in the country *k*, respectively, the FIXED $EFFECT_k$ is a fixed effect for the country *k* and ε is an error term. Table 10 shows the results to $IRR_{medium\text{-}low}$ and $IRR_{high\text{-}medium.}$ From the results we see that the differences between adjusted marginal internal rates across countries are basically explained, besides the fixed factor, by the two types of unemployment rates. In both equations the coefficient of the explanatory variables have the expected sign and all the coefficients are significant at the 5 % level, except for the coefficient associated to $UR_{medium,a,k}$ in the equation for $IRR_{high\text{-}medium}$.

If youth unemployment rate at the low educational level increases by a percentage point, the adjusted marginal internal rate between medium and low ($IRR_{medium\text{-}low}$) will increase by 0.09 percentage points. On the other hand, if the adult unemployment rate at the low level increases by a percentage point, $IRR_{medium\text{-}low}$ also increases by 0.13 percentage points. Looking at the unemployment rates of medium levels, if youth unemployment rate increases by a percentage point the $IRR_{medium\text{-}low}$ will decrease by 0.11 percentage points and will decrease also by 0.08 percentage points with an increase of 1% in the adult unemployment rate. Summarising, the factors that mostly influence the variability of $IRR_{medium\text{-}low}$ are youth unemployment of both levels. When we turn our attention to the change in the $IRR_{high\text{-}medium}$ it is clear that the role of youth unemployment rates are not as important as in the previous case.

Table 10. Adjusted marginal internal rates of return to education and unemployment in Europe. Generalised least squares with fixed effects*

	Dependent variables	
Explanatory variables	$IRR3_{M,L}$	$IRR3_{H,M}$
Low youth unemployment rate	0.135	-
	(11.81)	-
Low adult unemployment rate	0.091	
	(3.70)	
Medium youth unemployment rate	-0.109	0.162
	(-10.45)	*(8.5)*
Medium adult unemployment rate	-0.079	0.036
	(-2.44)	*(0.99)*
High youth unemployment rate	-	-0.069
	-	*(-4.92)*
High adult unemployment rate	-	-0.126
	-	*(-2.58)*
Fixed effects:		
Austria	13.9	5.3
Germany	13.0	5.6
Greece	5.4	8.3
Portugal	8.6	21.5
Spain	7.7	6.3
Finland	2.4	5.0
France	7.9	6.8
Ireland	12.3	9.8
Italy	6.1	4.8
Sweden	4.0	4.5
Switzerland	8.6	8.9
S.E. of regression	0.24	0.27
Mean dependent variable	9.52	9.70
Adjusted R^2	0.99	0.99
Number of observations	68	68

* t statistics within parenthesis.

As has been indicated before, the fixed effects can be interpreted as the marginal internal rate of return, which will appear in absence of employment probability and unemployment benefits between two levels. From this point of view, Table 11 shows both the estimated fixed effects for each country and the IRR estimated directly from the Mincerian equation.

Table 11. Estimated fixed effects and IRR from Mincerian equation
Rates in percentage

	$IRR3_{M,L}$ Fixed effects	IRR 1	$IRR3_{H,M}$ Fixed effects	IRR 1
Austria	13.9	12.9	5.3	5.4
Germany	13.0	12.7	5.6	5.7
Greece	5.4	5.0	8.3	8.3
Portugal	8.6	8.6	21.5	20.6
Spain	7.7	8.1	6.3	7.5
Finland	2.4	4.0	5.0	7.7
France	7.9	6.4	6.8	7.2
Ireland	12.3	9.2	9.8	9.4
Italy	6.1	5.7	4.8	4.3
Sweden	4.0	4.6	4.5	5.1
Switzerland	8.6	8.9	8.9	9.1

In order to demonstrate that the fixed effects are a good approximation to the unadjusted IRR (IRR1), a simple test had been carried out. It consists of running the following regression for both medium-low and high-medium cases:

$$\text{Fixed effect}_k = \varphi_0 + \varphi_1 IRR1_k + e_k$$

Then we test for the null hypothesis

$$H_0: \varphi_0 = 0, \varphi_1 = 1$$

The F-statistics are 1.22 and 1.18 for medium-low and high-medium cases, respectively. Therefore, the null hypothesis is not rejected at the 5% significance level, so it is possible to claim that fixed effects are a good approximation to the unadjusted IRR (IRR1). As a consequence, it is also viable to assert that the estimated fixed effect model is able to isolate the unemployment effects over the adjusted IRR.

5.4. Returns, unemployment differentials and unemployment benefits: some simulation results.

As the previous sections indicate, the returns to education basically depend on the unemployment rates and the unemployment benefits. The relationship between the IRR to educational investment and the mentioned variables are clearly non-lineal. The purpose of this section is to analyse such a relationship through the design of a simple and flexible method that allows clarifying the existing link.

The followed approach has consisted of, first of all, to start from a wage equation. The selected wage equation has been the corresponding to the Spanish economy. Then, the response of the IRR to

educational investment has been evaluated in relation to the following variables:

a) The replacement ratio **(rho)** defined as the ratio of unemployment benefits and the forecasted wages. This ratio ranges between 0 and 1.

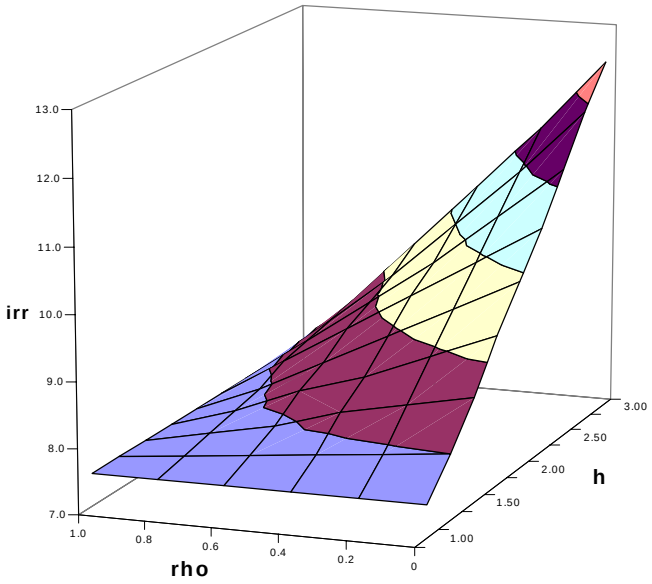
b) The ratio between the employment probabilities **(h)** previously defined. Because we are interested in analysing the IRR of post-compulsory education, the ratio between the employment probabilities of high to medium level has been used. In order to fix one of the two employment probabilities, that corresponding to high level has been hold constant and equal to the observed probabilities. So, the modification of the ratio is a consequence of the modification of the employment probability of the secondary level.

Values for both variables, between 0 and 1 for the replacement ratio and between 1 and 3 for the probabilities ratio, were generated randomly, and, for each couple of values, the corresponding IRR to educational investment was calculated. Full coverage of unemployed by the benefit system was assumed as well as no upper bounds to the benefit. As Table 12 and Figure 2 show, this allows drawing the response surface of the IRR to educational investment to both variables. The figure proves that when the employment probabilities between the two educational levels are equal, the IRR is 7.5%, regardless of the values of the replacement rate. This fact supports the idea that the rate of return depends mainly on the differences in the employment probabilities, instead of their levels. On the other hand, if the replacement rate is constant and equal to 1, the rate of return is also 7,5%, independently of the values of the unemployment probabilities. This is understandable because, from the private point of view, it does not matter whether the income consists of wage or unemployment benefits, as far as the quantity does not vary. Finally, with a replacement ratio equal to 0 and increasing the ratio between employment probabilities, the IRR to educational investment increases until reaching 12.5% for a ratio of 3 between the employment probabilities.

Table 12. Response of the IRR3 to the values of the explanatory variables

rho / h	**0**	**0.2**	**0.4**	**0.6**	**0.8**	**1.0**
1.00	7.5	7.5	7.5	7.5	7.5	7.5
1.25	8.0	7.9	7.8	7.7	7.6	7.5
1.50	8.6	8.4	8.2	7.9	7.7	7.5
1.75	9.3	8.9	8.5	8.2	7.8	7.5
2.00	9.9	9.4	8.9	8.4	7.9	7.5
2.25	10.5	9.9	9.3	8.7	8.1	7.5
2.50	11.2	10.4	9.6	8.9	8.2	7.5
2.75	11.9	10.9	10.0	9.1	8.3	7.5
3.00	12.5	11.4	10.4	9.4	8.4	7.5

Figure 2. Response surface of the IRR3 to the values of the explanatory variables.



But, in fact, both variables can vary jointly, and this is what the response surface show. However, a graph gives a visual impression, but does not deliver a precise interpretation. In this sense, a way to summarise the response surface of the IRR to both variables is to calculate a regression equation between the three variables. In this case, the dependent variable is the IRR and the explanatory variables are the other two mentioned variables, the selected specification includes levels, squares and cross products of the two variables.

As the estimated equation shows, -see Table 13-, the fit of the equation is very good and all the variables appear as highly significant. In this sense, the clear response of the IRR to the replacement ratio, the employment probabilities and, basically, the cross product of employment probabilities and the replacement ratio should be mentioned.

Table 13. Estimated equation of IRR3.

Dependent variable: IRR3		
Variable	Coefficient	t-Statistic
Constant	5.0849	91.4
RHO	2.4131	35.9
H	2.3352	42.6
RHO^2	0.2133	4.4
H^2	0.0404	3.0
RHO*H	-2.5314	-114.9
R^2	0.99	
Mean dependent variable	8.69	
S.E. of regression	0.0357	

The derivative of the dependent variable with respect to the explanatory variables gives a clear evaluation of the corresponding effects. These effects always depend on the levels of the analysed variables, result that is a manifestation of the lack of linearity that exists between the variables. The corresponding derivatives are:

$$\partial(IRR)/\partial(rho)=2.41+0.42\cdot(rho)-2.53\cdot(h)$$

$$\partial(IRR)/\partial(h)=2.33+0.08\cdot h-2.53\cdot(rho)$$

Using this equation, Table 14 shows the response of IRR to changes in replacement ratio and the ratio between employment probabilities. As a further extension of the analysis we are trying to generalise the results submitting all the possible conditioning variables of the IRR to educational investment to a random generation process. Following a similar methodology, this would permit to obtain a large sample size of values for the relevant variables and to estimate the response of the IRR to all the possible conditioning variables with high precision. Also, in this extension, we will carry out those simulations using wage equations of the countries that in this study have been considered.

Table 14. Estimated changes of the IRR in response to explanatory variables

a) Changes of rho (replacement rate)

rho / h	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
1.25	-0.75	-0.71	-0.67	-0.62	-0.58	-0.54	-0.50	-0.45	-0.41	-0.37	-0.32
1.50	-1.38	-1.34	-1.30	-1.26	-1.21	-1.17	-1.13	-1.09	-1.04	-1.00	-0.96
1.75	-2.02	-1.97	-1.93	-1.89	-1.85	-1.80	-1.76	-1.72	-1.68	-1.63	-1.59
2.00	-2.65	-2.61	-2.56	-2.52	-2.48	-2.44	-2.39	-2.35	-2.31	-2.27	-2.22
2.25	-3.28	-3.24	-3.20	-3.15	-3.11	-3.07	-3.03	-2.98	-2.94	-2.90	-2.86
2.50	-3.92	-3.87	-3.83	-3.79	-3.74	-3.70	-3.66	-3.62	-3.57	-3.53	-3.49
2.75	-4.55	-4.51	-4.46	-4.42	-4.38	-4.34	-4.29	-4.25	-4.21	-4.16	-4.12
3.00	-5.18	-5.14	-5.10	-5.05	-5.01	-4.97	-4.93	-4.88	-4.84	-4.80	-4.75

b) Changes of h (unemployment rate of medium level/unemployment rate of high level)

rho / h	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
1.00	2.42	2.16	1.91	1.66	1.40	1.15	0.90	0.64	0.39	0.14
1.25	2.44	2.18	1.93	1.68	1.42	1.17	0.92	0.66	0.41	0.16
1.50	2.46	2.20	1.95	1.70	1.44	1.19	0.94	0.68	0.43	0.18
1.75	2.48	2.22	1.97	1.72	1.46	1.21	0.96	0.70	0.45	0.20
2.00	2.50	2.24	1.99	1.74	1.48	1.23	0.98	0.72	0.47	0.22
2.25	2.52	2.26	2.01	1.76	1.50	1.25	1.00	0.75	0.49	0.24
2.50	2.54	2.28	2.03	1.78	1.52	1.27	1.02	0.77	0.51	0.26
2.75	2.56	2.30	2.05	1.80	1.54	1.29	1.04	0.79	0.53	0.28
3.00	2.58	2.32	2.07	1.82	1.57	1.31	1.06	0.81	0.55	0.30

6. Conclusions

Traditionally, the returns to education have been approximated through a Mincerian wage equation that relates wages to schooling. In a situation of full employment, or almost full employment, or in a situation in which the unemployment rates are similar between different educational levels, such an approach could be adequate. However, if the unemployment rate is relatively high and unevenly distributed a bias in the estimation could be produced if unemployment is not taken into account. Our analysis strongly suggests that the adjusted marginal internal rates of return are different from the non-adjusted ones. Summarising, these results show the following stylised facts.

Firstly, unemployment inclusion notably changes the values of the non-adjusted internal rates (an increase of 24.6% in marginal medium level and another of 12.4% in high level). Then, unemployment (and unemployment benefit) matters when the calculus of internal rates of return to education is the target. Not taking into account both effects has the general consequence, as could be expected, that the values of the rates of return are underestimated. Theoretically the sign of the change is ambiguous, since both opportunity cost and expected income decrease, but in most cases the joint effect of employment probability and unemployment benefit is a rate increase. Of course, this trend is most important when the internal rate is only adjusted by the inclusion of the employment probability. When the unemployment benefit is included, a decreasing pattern appears, but not as important so as to offset the employment probability effect.

Secondly, the higher the unemployment differential between levels the higher the change in the non-adjusted internal rate. Nevertheless, this effect is not straightforward, because the age distribution of unemployment differentials plays a non-negligible role in the change of the rates of return. From this point of view in the case of the marginal rate of medium vs. low level of education, the higher the decreasing pattern of youth unemployment the higher the employment effect. In fact, the lower the wage dispersion, the higher the unemployment differential between levels, the higher the youth unemployment differentials and the higher the absolute level of unemployment the higher the effect of employment probability in the changes in the adjusted internal rates of return to education. Actually, the average effect of youth low and medium unemployment rates has a major contribution in the explanation of changes in rates of return, while in the high marginal rates of return the most important factors are the youth medium and the adult high unemployment rates.

Thirdly, adjusted rates change as a result of variation in unemployment rate (both youth and adult). This aspect should be expected to have an impact both in the decision of individuals (or households) and in the public sector in their education investment decisions. In a standard human-capital framework (Becker, 1964; Mincer, 1974; Psacharapoulus and Layard, 1979) the demand for education depends on the changes in returns. Then, the value of these rates is critical to understand the investment decision on education. Given an imperfect foresight by individuals, it seems quite adequate to assume that expectations about future earnings are likely to be correlated with the current economic conditions.

From this point of view, our work suggests that the rates of return that individuals or households use to decide on their schooling investment are those adjusted for the employment probability and the unemployment benefit. In fact, individuals cannot observe neither non-adjusted nor adjusted marginal internal rates. Nevertheless, is rather likely that they introduce the employment probability as one element that affects the expected flow of earnings. In our opinion individuals can have a quite good approximation to the real opportunity costs (which incorporates the average expected earnings that individuals can get from the labour market, which are conditional on the probability of being employed and in the level and duration of unemployment benefits). Additionally, when the future flow

of earnings is taken into account, economic agents observe the future expected earnings, but also both the probability of employment and the unemployment benefits. As Patricia Rice (1999) has showed with youth cohorts in England and Wales, higher unemployment rates, by reducing the opportunity costs to continue in the school, increases the demand for post-compulsory education.

A last consideration arises when the adjusted marginal internal rates of returns are considered from the point of view of the investment in education by the public sector. As has been showed before, if the public sector takes the marginal rates of return between levels as a proxy of the relative scarcity of those levels of education in the labour market misguided decisions can be taken. The unadjusted internal rate could appear only in a situation of full employment or, simultaneously, in a country in which wages present a totally flexible response to unemployment. But in a situation, as it is in most European countries in which both elements (differentials in unemployment levels and institutional factors) have a clear impact on the labour market, the unadjusted internal rate obtained from the most parsimonious Mincerian equation is not the appropriate one.

As a final point, it should be mentioned that the proposed methodology to correct the internal rates of return to education could supply an input to those models that try to determine the optimal length of schooling and its relation with the cyclical economic evolution. The experience of countries like Spain, in which a big push in the enrolment rate in the educational system has been observed in a period of high unemployment rates and slack labour market, is the rational response of the population facing the employment prospects. If the unemployment rate of the unskilled individuals is high, continuing in the educational system barely has a perceptible opportunity cost, and, at the same time, the expected benefits of higher education increase to the extent that the higher educational level has a lower unemployment rate. Conversely, if there is a plenty of good job opportunities for all educational levels, staying in the educational system has a clear opportunity cost that must be compared with the extra benefits that the higher educational level is able to offer. Without this element that clearly affects the household’s decisions, in some countries, like Spain, is difficult to understand the recent evolution of the enrolment rate in the educational system.

References

Arrow, K.J. (1973): "Higher education as a filter", *Journal of Public Economics*, **2**: 193-216.

Ashenfelter, O. and Ham, J. (1979): "Education, Unemployment, and Earnings," *Journal of Political Economy*, Vol. 87, nº 5: S99-S116.

Asplund. R.; Barth, E.; Le Grand, C.; Mastekaasa, A. and Westergard-Nielsen, N. (1996): "Wafe Distribution Across Individuals", in Wadensjö, E. (Ed.) *The Nordic Labour Markets in the 1990's*. Part Two: 9-53. Amsterdam: North-Holland.

Becker, G. (1962): "Investment in Human Capital: A Theoretical Analysis," *The Journal of Political Economy*, Vol. **LXX**, October (5), Part 2:9-49.

Becker, G. (1964): *Human Capital. A Theoretical and Empirical Analysis with Special Reference to Education*, New York: NBER.

Betts, J.R. and McFarland, L.L. (1994): "Safe Port in a Storn. The Impact of Labour Market Conditions on Community College Enrollment," *The Journal of Human resources*, XXX, 4: 741-65.

Blaug, M. (1976): "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey," *Journal of Economic Literature*, **14** (3), September: 827-55.

Blaug, M. (1992): *The Economic Value of Education*. The International Library of Critical Writings in Economics 17. Edited by Mark Blaug, Edward Elgar Publishing Limited.

Brunello, G. and Comi, S. (2000): "Eduaction and Earnings Growth. Evidence from 11 European countries," Nota di Lavoro 29, Economic Energy Environment, Fondaziones Eni Enrico Mattei.

Chuang, H-L. (1997): "High School Youths' Dropout and Re-Enrollment Behavior," *Economics of Education Review,* Vol. **16**, Nº 2: 171-186.

Duncan, B. (1965): "Dropouts and the unemployment," *Journal of Political Economy*, **73**: 121-64.

Ehrenberg,R.G. and Brewer, D.K. (1994): "Do school and teacher characteristics matter? Evidence from *Hugh School and Beyond*". *Economics of Education Review*, **13**, 1-17.

Freeman, R. B. (1980); "Employment Opportunities in the Doctorate Manpower Market," *Industrlal and Labor Relations Review*, Vol. **33**, Nº 2 (January): 185-197.

Groot, W. and Osterbeeck,H. (1992): "Optimal investment in Human Capital Under Uncertainty," *Economics of Education review*, vol 11, nº 1: 41-49.

Guiso, L.; Jappelli, T. and Pistaferri, L. (1998): "What determines earnings and unemployment risk", Discussion Paper, Nº 2043, Centre for Economic Policy Research, London.

Gustman, A.L. and Steinmeier, T.L. (1981): "The Impacto of Wages and Unemployment on Youth Enrollment and Labour Supply," *The Review of Economics and Statistics:* 553-560.

Kettunen, J. (1997): "Education and Unemployment Duration," *Economics of Education Review*, Vol. **16**, Nº 2: 163-170.

Kiefer, N.M. (1985). "Evidence of the Role of Education in Labor Turnover," *The Journal of Human Resources*, **XX**, 3: 445-452.

Kodde, D.A. (1988): "Unemployment expectations and human capital formation," *European economic Review*, vol 32:1445-60.

Handa, M.L. and M.L. Skolnik (1975): "Unemployment, expected returns and the demand for university education in Ontario. Some empirical results," *Higher Education* **4: PENDENT**

Martins, Pedro Silva and Pedro Telhado Pereira (2000), "Schooling, Wage Risk and Inequality", Working Paper, Universidade Nova de Lisboa.

Mattila, J.P. (1982): "Determinants of Male School Enrollments: A Time-series Analysis," *The Review of Economics and Statistics*, Vol. **64**, May, 2: 242-251.

Micklewright, J. (1989): "Choice at Sixteen," *Economica**, 56**: 25-39.*

Micklewright, J.; Pearson, M. And Smith, S. (1990): "Unemployment and Early School Leaving," *The Economic Journal*, **100**(Conference 1990): 163-169.

Mincer, J. (1989): Human Capital and the Labour Market. A Review of Current Research," *Educational Researcher*, **18** (5): 27-34, May.

Mincer, J. (1991): "Education and Unemployment", NBER Working Papper, nº 3838, September.

Nickell, S. (1979): "Education and Lifetime Patterns of Unemployment," *Journal of Political economy*, vol. **87**, nº 5: S117-S131.

Peraita, C. and Pastor, M. (1995): "The primary school dropout in Spain: The influence of family background and labour market conditions," Working Paper

Pissarides, C.A. (1981): "Staying at School in England and Wales", *Economica*, **48**: 345-363.

Pissarides, C.A: (1982): "From School to University: The Demand for Post-Compulsory Education in Britain," *The Economic Journal*, **92**, September:645-667.

Psacharopoulos, G. (1981): "Returns to Education: An Updated International Comparison," *Comparative Education*, **17** (3): 321.41.

Psacharopoulos, G. (1985): "Returns to Education: A Further International Update and Implications," *Journal of Human Resources*, **XX** (4), Fall: 583-604.

Psacharopoulos, G. (1987), "The Cost-Benefit Model", in: Psacharopoulos, George (Ed.), *Economics of Education: Research and Studies,* Oxford etc.: Pergamon Press, 342-347.

Psacharopoulos, G. and Hinchliffe, K. (1973): *Returns to Education: An inetrnational comparison*, Amsterdam: Elsevier Scientific.

Psacharapoulus, G. and Layard, R. (1979): "Human Capital and Earnings: British Evidence and a Critique," *Review of Economic Studies,* **XLVI** (3): 485-503.

Rea, S. (1974): "Unemployment and the Supply of Labor," *Journal of Human Resources*, 9 (Spring): 279-89.

Rees, D.I. and Moncan, H.N. (1997): "Labour Market Conditions and the High School Dropout Rate: Evidence from New York State," *Economics of Education Review*, Vol. 16, nº 2: 103-109.

Rice, P. (1987): "The Demand for Post-Compulsory Education in the UK and the Effects of Educational Maintenance Allowances," *Economica*, **54**, November: 465-475.

Rice, P. (1999): "The impact of local labour markets on investment in further education: Evidence from the England and Wales youth cohort studies," *Journal of Population Economics*, **12**: 287-312.

Rivkind, S.G. (1995): "Black/White differences in schooling and employment," *Journal of Human Resources*, **30**: 626-52.

Rumberger, R. W. (1983): "Dropping out of high school: The influence of race, sex, and family background", *American Educational Research Journal*, **20**, 199-220.

Spence, M. (1973): "Job market signalling," *Quarterly Journal of Economics*, 355-374.

Shultz, T.W: (1960): "Capital formation by education", *Journal of Political Economy,* **68.**

Shultz, T.W: (1961): "Investment in human capital", *American Economic Review,* **51**: 1-17.

Trostel, P. And Walker, I. (2000): “Education and Work”, Department of Economics. University of Warwick, mimeo.

Weale, M. (1993); “A Critical Evaluation of Rate of Return Analysis,” *The Economic Journal*, **103** (May): 729-737.

Willis, R.J. and Rosen, S. (1979): “Education and self-selection”, *Journal of Political Economy* (Supplement), 87:S7-S36.

Whitfield, K. And Wilson, R.A. (1991): “Staying on in Full-time Education: The Educational Participation Rate of 16-year-olds,” *Economica*, **58**, August: 391.404.

Annex 1. Educational equivalence levels

Some countries have experienced problems in allocating national qualifications to the different levels of education as defined by Eurostat (ISCED). For this reason, data on ISCED is available only for three categories: low: level equal to or lower than the first stage of secondary education; medium: second level education; high: third level education. The very high rate of non-response for Germany is due to the fact that the corresponding questions are not compulsory. The number of persons who have completed second-level education is underestimated for Ireland due to the nature of the Irish questionnaire, which does not provide information on specific vocational training.

ISCED variable (3 categories) in the LFS 1992-1997 series.Columns 86 (Highest level of general education attained) and 87 (Highest level of post-school or vocational training attained) of the LFS (cf. Methods and Definitions - 1992 Series) do not have direct equivalents in the international terminology used in the ISCED (International Standard Classification of Education). It therefore seemed necessary to create a new variable based on the two headings concerned in order to achieve a closer alignment with the concepts used in the ISCED. Eurostat thus created an indicator for "Level of education and training" based on a combination of columns 86 and 87, which is calculated as follows. Each individual is allocated to the first of the following four levels (in the order set out below):

ISCED variable	Columns 86 and 87 (LFS 1992-97)
Level of higher education (ISCED 5-7) - *High*	Col. 87 = 5-7 or col. 86 = 4
Level of upper secondary education (ISCED 3) – *Medium*	Col. 87 = 2,4 or col. 86 = 3
Level of education below upper secondary level (ISCED 0-2) – *Low*	(col.86 = 1,2,5) or (col. 86=blank and col. 87=1,3,8)
undefined	if col. 86 = blank and col. 87 = blank

Danmark

Sajle 86: 1 = Folkeskole op til 8. Klasse; 2 = Afsluttet folkeskole 9. eller 10. Klassetrin; 3 = Afsluttet gymnasie eller Hoejere Forberedelseseksamen uddannelse; 4 = Sajle 87 = 5/6/7; 5 = Andet

Sajle 87: 1 = Ingen erhvervsuddannelse; 2 = Erhuerusfaglig Grunduddannelse, basisâr; 3 = -; 4 = Afsluttet lærlinge- og elevuddannelse, efteruddannelse af faglærte og tillærte; 5 = Kortere og mellemlange videregående uddannelser af mindre end 3 års varighed; 6 = -; 7 = Mellemlange og længerevarende uddannelser af 3 års varighed eller derover; 8 = Anden erhvervsuddannelse.

Deutschland

Spalte 86:1 = Kein Hauptschulabschluß oder Realschulabschluß; 2 = Hauptschulabschluß / Realschulabschluß; 3 = Fachhochschulreife / Hochschulreife; 4 = Spalte 87 = 5/6/7; 5 = Andere

Spalte 87: 1 = Keine berufliche Ausbildung oder berufliche Schulung; 2 = Mittlere Reife / Hochschulreife an einer beruflichen Schule; 3 = Berufliches Praktikum; 4 = Abschluß einer beruflichen Ausbildung im dualen System (Lehre), Berufsfachschulabschluß; 5 = Meister- / Technikerabschluß; 6 = -; 7 = Fachhochschulabschluß / Hochschulabschluß; 8 = Sonstiger beruflicher Bildungsabschluß

Ellada

Column 86: 1 = Illiterate, Primary school or less, Dimotiko or lower; 2 = Gymnasio; 3 = General lykeio; 4 = Column 87 = 5/6/7; 5 = Other

Column 87: 1 = None; 2 = TCL from vocational/technical lykeio or from specialised branch of polytechnical lykeio or equivalent qualification from other institute; 3 = Vocational training (minimum one year) in working environment; 4 = TES; certificate of technical-vocational training (third-level vocational and ecclesiastic education); Technical-vocational schools (for graduates of three-year of High School); 5 = Graduates with certificate of Third-level technical Education (KATEE/TEI); Graduates with certificate of SELETE/ASETEM; Graduates with certificate of Charokopios School of Home Economics; 6 = Graduates with certificate (Higher education); 7 = Graduates with doctorate or diploma of post-doctorate studies; 8 = Other vocational qualification

España

Columna 86: 1 = Analfabetos, sin estudios, estudios primarios, ensenanza general basica (EGB), ciclos inicial y medio o primera etapa y equivalente; 2 = Ensenanza general: segundo grado, primer ciclo. Bachiller elemental, ensenanza general basica (EGB), ciclo superior o segunda etapa y educacion secundaria obligatoria (nuevo sistema); 3 =

Bachillerato superior, bachiller unificado polivalente (BUP) y bachillerato; 4 = Columna 87 = 5/6/7; 5 = Otra.
Columna 87: 1 = Ninguna formación post-secundaria o profesional; 2 = Formación profesional de grado medio o equivalente; 3 = Formación profesional dentro de la empresa; 4 = Formación profesional mixta (en una empresa y en un centro escolar); 5 = Formación profesional de grado superior o equivalente, estudios superiores no equivalentes a diplomado universitario; 6 = Carreras universitarias de ciclo corto; diplomados universitarios o equivalentes; tres cursos aprobados (o primer ciclo), sin derecho a titulacion, de una carrera de ciclo largo; 7 = Carreras universitarias de ciclo largo; Licenciados, Ingenieros, Doctores o equivalentes; 8 = Otra formación

France
Rubrique 86: 1 = Études primaires ou inférieures; 6ème, 5ème, 4ème de l'enseignement secondaire; études professionnelles sans diplôme; 2 = 3ème, 2ème, 1ère de l'enseignement secondaire (les personnes ayant suivi un enseignement professionnel de niveau supérieur ou égal à la dernière année du Brevet d'Études Professionnelles sont supposées être passées par la classe de 3ème de l'enseignement général); 3 = Terminale de l'enseignement secondaire général ou technologique, y compris préparation au brevet de technicien – Baccalauréat; 4 = Rubrique 87 = 5/6/7; 5 = Autres
Rubrique 87: 1 = Aucun diplôme supérieur ni professionnel; 2 = Formation professionnelle de niveau secondaire sanctionée par un diplôme (Certificat d'Éducation Professionnelle, Certificat d'Aptitude Professionnelle, Brevet d'Études Professionnelles, baccalauréat professionnel, brevet professionnel, etc.) hors apprentissage; 3 = -; 4 = Certificat d'Aptitude Professionnelle ou Brevet d'Études Professionnelles obtenu par apprentissage; 5 = Brevet de Technicien Supérieur, Diplôme Universitaire de Technologie, diplômes des professions de la santé (hors celle de médecin) et autres de niveau technicien supérieur; 6 = Licence; 7 = Maîtrise, diplômes universitaires du 3ème cycle (Diplôme d'Études Supérieures, Diplôme d'Études Approfondies, doctorat), Certificat d'Aptitude Professionnelle de l'Enseignement Supérieur, Certificat d'Aptitude Professionnelle de l'Enseignement Technique, agrégation; diplôme d'une grande école; 8 = Diplôme d'Études Universitaires Générales ou équivalent (1er cycle universitaire)

Ireland
Column 86: 1 = Primary or lower; 2 = Junior cycle; Intermediate/Group/Junior Certificate; 3 = Senior cycle; Leaving Certificate; 4 = Column 87 = 5/6/7; 5 = Other
Column 87: 1 = No professional/vocational qualifications; 2 = -; 3 = At the workplace only; 4 = Partly within the workplace and partly at school, including apprenticeship; 5 = Diploma from Regional Technical College, College of Technology or equivalent; 6 = Bachelor degree; 7 = Masters or higher degree; 8 = Other vocational qualification.

Italia
Colonna 86: 1 = Nessun titolo di studio; Licenza elementare; scuola media inferiore non completata; 2 = Licenza di scuola media inferiore; Licenza di avviamento professionale; qualifica professionale o altro diploma di scuola media superiore che non permettete l'accesso all'universita; 3 = Diploma di scuola media superiore; 4 = Colonna 87 = 5/6/7; 5 = Altro
Colonna 87: 1 = Nessuna formazione post-scolastica o professionale; 2 = Diploma di scuola media superiore che non permette l'accesso all'università; 3 = Unicamente in ambiente di lavoro; 4 = Apprendistato; 5 = Diploma universitario - Laurea breve; 6 = Laurea; 7 = Specializzazione post-laurea; Dottorato di ricerca; 8 = Altra formazione post-scolastica

Nederland
Kolom 86; 1 = Al dan niet voltooid kleuter- en basisonderwijs; niet voltooid Middelbaar Algemeen Vormend Onderwijs; klas 3 Hoger Algemeen Vormend Onderwijs of Voorbereidend Wetenschappelijk Onderwijs niet met succes doorlopen (ISCED 0-1); 2 = Voltooid Middelbaar Algemeen Vormend Onderwijs; klas 3 Hoger Algemeen Vormend Onderwijs of Voorbereidend Wetenschappelijk Onderwijs met succes doorlopen (ISCED 2); 3 = Voltooid Hoger Algemeen Vormend Onderwijs of Voorbereidend Wetenschappelijk Onderwijs (ISCED 3); 4 = Kolom 87 = 5/6/7; 5 = Overig
Kolom 87: 1 = Geen beroepsonderwijs of beroepsopleiding; 2 = Voltooid Lager Beroepsonderwijs en Middelbaar Beroepsonderwijs (ISCED 2 or 3); 3 = -; 4 = -; 5 = Voltooid Hoger Beroepsonderwijs (ISCED 5)
6 = Voltooide universitaire opleiding (ISCED 6-7); 7 = -; 8 = Universitair kandidaatsexamen

Portugal
Coluna 86: 1 = Não sabe ler nem escrever; sabe ler e escrever, sem possuir o 1º ciclo do básico (antiga 4ª classe); tem 6 anos de escolaridade; 2 = Completou o 2º ciclo do básico (7°, 8° e 9° anos de escolaridade); 3 = Completou o 3º ciclo do básico (10º, 11° e 12° anos de escolaridade); 4 = Coluna 87 = 5/6/7; 5 = Outro tipo de educação geral

Coluna 87: 1 = Sem qualquer outro tipo de educação (apenas ensino geral ou nenhum) ou formação profissional; 2 = Completou um curso (mínimo de um ano) numa escola ou instituto, vocacionado para uma actividade específica; 3 = Completou formação específica (mínimo de um ano) num ambiente de trabalho (sem formação complementar numa escola ou instituto); 4 = Completou formação específica através de um sistema com experiência de trabalho e ao mesmo tempo formação complementar noutro local (qualquer tipo de sistema "desdobrado", incluindo aprendizagem); 5 = Recebeu uma qualificação de terceiro nivel que não é grau universitário; 6 = Recebeu um grau universitário (grau de início - licenciatura ou equivalente); 7 = Recebeu um grau universitário não inicial ou uma qualificação de pós-graduação (mestrado, doutoramento); 8 = Recebeu uma qualquer qualificação profissional não especificada acima

United Kingdom
Column 86: 1 = Left full-time education before 15 years of age; 2 = Remained in full-time education to at least 15 years of age, with or without obtaining qualifications necessary for progress to next level (e.g. 'O' level or equivalent); 3 = Remained in full-time education to at least 17 years of age, with or without obtaining qualifications necessary for progress to next level (e.g. 'A' level or equivalent); 4 = Column 87 = 5/6/7; 5 = Other
Column 87: 1 = No professional/vocational qualifications; 2 = Ordinary or General BTEC; RSA; City and Guilds (CGLI) or equivalent; 3 = -; 4 = Ordinary or General BTEC/SCOTBTEC, BEC/SCOTBEC, TEC/SCOTEC, SCOTVEC; ONC; OND; YTS/YT/ET; 5 = Higher BTEC/SCOTBTEC, BEC/SCOTBEC, TEC/SCOTEC, SCOTVEC; HNC; HND; teaching and nursing qualifications without degree; 6 = First degree; other degree level of qualification; graduate membership of professional institute, 7 = Higher degree; 8 = Other professional/vocational qualification

Sweden
Kolumn 86: 1: Förgymnasial utbildning kortare än 9 ar; 2: Förgymnasial utbildning 9(10) ar; enhetsskola, grundskola; 3: Gymnasial utbildning upp till 3 ar; 4: Kolumn 87=5/6/7 5: Utbildning saknas samt ej hänförbar till specifik grupp 9: Ej aktuell
Kolumn 87: 1: Ingen vidare yrkesutbildning; 2: -; 3: -; 4: -; 5: Eftergymnasial utbildning kortare än 3 ar (20-119 poäng); 6: Eftergymnasial utbildning 3ar eller längre (120-poäng); 7: Korskarutbildning; 8: -; 9: Ej aktuell

Suomi Finland
Column 86: 1: Less than primary school - Primary school or part of lower secondary or comprehensive school; 2: Comprehensive school or lower secondary school; 3: Matriculation examination or upper secondary school; 4: Column 87:5/6/7; 5: Another general education programme;
Column 87: 1: No vocational, professional or higher education qualification; 2: Vocational or professional education in a school (minimum duration one year); 3: -; 4: -; 5: Vocational or professional education in a college; 6: Polytechnical vocational or professional education; lower-level university degree (bachelor degree); 7: Higher-level university degree (incl. licentiate in medicine) or postgraduate (doctorate level) degree.; 8: -;

Österreich
Column 86: 1: Kein Pflichtschulabschluß; 2: Pflichtschulabschluß; 3: Lehrabschluß, Abschluß einer BMS, Matura an einer Höheren Schule, Kolleg; 4: Colum 87:5/6/7; 5: -
Column 87: 1: Keine berufliche Ausbildung oder berufliche Schulbildung; 2: Berufsbildende mittlere Schule
3: Berufspratikum; 4: Abschluß einer beruflichen Ausbildung im dualen System (Lehre); 5: Berufsbildende höhere Schule; 6,7 : Universitäts-, Hochschulabschluß, hochschulverwandte Lehranstalt; 8: Sonstiger beruflicher Bildungsabschluß

Annex 2. Labour force concepts

The labour force comprises persons in employment and unemployed persons.

a) Employment. Persons in employment are those who during the reference week did any work for pay or profit, or were not working but had jobs from which they were temporarily absent. Family workers are included but not persons on lay-off. For operational purposes, the notion of "some work" may be interpreted as work for at least one hour.

b) Unemployment. The "unemployed" comprise all persons above a specified age who, during the reference period, were: a) "without work", i.e. were not in paid employment or self-employment, as defined in paragraph 9; b) "currently available for work", i.e. were available for paid employment or self-employment during the reference period; c) "seeking work", i.e. had taken specific steps in a specified recent period to seek paid employment or self-employment'. Persons who had a job to start later are also categorised as unemployed.

Unemployed persons can be classified by reason for unemployment into four major groups: 1) job-losers are persons whose employment ended involuntarily and immediately began looking for work; 2) job-leavers are persons who quit or otherwise terminated their employment voluntarily and immediately began looking for work; 3) re-entrants are persons who previously worked, but were inactive or on compulsory military service before beginning to look for work; 4) first job-seekers are persons who have never worked in a regular job.

c) Unemployment rates. Unemployment rates represent unemployed persons as a percentage of the labour force.

d) Employees. Employees are defined as persons who work for a public or private employer and who receive compensation in the form of wages, salaries, fees, gratuities, payment by results or payment in kind; non-conscript members of the armed forces are also included.

f) Full-time / part-time distinction. The distinction between full-time and part-time work should be made on the basis of a spontaneous answer given by the respondent. It is impossible to establish a more exact distinction between part-time and full-time work, due to variations in working hours between Member States and also between branches of industry. By checking the answer with the number of hours usually worked, it should be possible to detect and even to correct improbable answers, since part-time work will hardly ever exceed 35 hours, while full-time work will usually start at about 30 hours.

Annex 3. Data

Table 12. Unemployment male rates by educational levels and years.
Percentage of the labour force

	Lower	Medium	High	Total	Lower	Medium	High	Total	Lower	Medium	High	Total
	Austria				Danmark				Finland			
1992	n.a.	n.a.	n.a.	n.a.	9,6	9,2	4,5	8,5	n.a.	n.a.	n.a.	n.a.
1993	n.a.	n.a.	n.a.	n.a.	11,0	12,0	6,2	10,6	n.a.	n.a.	n.a.	n.a.
1994	n.a.	n.a.	n.a.	n.a.	10,0	7,4	4,5	7,3	n.a.	n.a.	n.a.	n.a.
1995	6,1	3,5	2,2	4,0	8,1	5,2	4,7	5,7	25,1	18,1	7,8	18
1996	8,5	4,8	3,1	5,4	8,2	5,4	3,4	5,6	22,5	15,5	6,9	15,7
1997	8,0	4,7	2,3	5,1	6,9	4,1	3,1	4,6	21,4	15,2	5,7	14,9
1998	10,1	4,6	2,3	5,4	5,4	3,6	3,1	3,9	18,4	14,0	5,2	13,0
1999	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	France				Germany				Greece			
1992	9,8	6,6	4,0	8,2	8,8	4,7	3,2	4,9	3,9	7,9	4,2	5,0
1993	13,3	8,3	6,2	9,7	11,3	6,2	3,7	6,5	4,9	8,2	4,6	5,8
1994	15,4	9,6	7,2	11,2	14,0	7,3	4,6	7,6	5,2	8,9	4,5	6,2
1995	14,2	8,4	7,1	10,1	12,9	6,7	4,3	7,1	5,5	8,8	4,6	6,4
1996	14,9	9,4	6,3	10,7	14,3	8,1	4,9	8,3	5,2	8,5	4,7	6,2
1997	15,9	9,5	6,9	11,1	15,8	9,5	5,2	9,4	5,4	9,0	4,6	6,4
1998	15,2	8,8	6,3	10,5	n.a.	n.a.	n.a.	n.a.	6,5	9,5	4,3	7,2
1999	16,1	8,7	5,9	10,5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Ireland				Italy				Netherlands			
1992	20,8	10,4	5,5	15,3	7,0	7,6	3,6	6,9	8,8	3,3	2,3	4,1
1993	21,4	11,7	6,7	15,9	8,2	8,4	2,9	7,8	10,7	4,4	3,8	5,4
1994	20,0	11,3	5,9	14,8	9,8	8,6	4,1	9,0	12,9	5,5	4,8	6,6
1995	17,1	9,1	4,8	12,3	10,1	9,0	4,3	9,3	10,9	5,4	4,5	6,2
1996	17,7	8,5	4,5	11,9	10,5	9,6	4,7	9,7	8,2	3,8	3,8	5,3
1997	15,6	7,4	3,7	10,5	10,9	9,4	5,3	9,8	6,8	3,3	3,1	4,4
1998	n.a.	n.a.	n.a.	n.a.	10,3	9,3	5,2	9,6	n.a.	n.a.	n.a.	n.a.
1999	n.a.	n.a.	n.a.	n.a.	9,7	8,7	5,1	9	n.a.	n.a.	n.a.	n.a.
	Portugal				Spain				Sweeden			
1992	3,8	3,2	1,0	3,5	14,8	13,3	8,1	13,7	n.a.	n.a.	n.a.	n.a.
1993	4,8	6,0	2,0	4,7	20,4	17,9	11,8	18,7	n.a.	n.a.	n.a.	n.a.
1994	6,3	6,8	3,0	6,1	21,7	20,8	13,1	20,2	n.a.	n.a.	n.a.	n.a.
1995	6,8	8,5	4,8	6,8	19,6	18,4	12,6	18,2	10,8	10,6	3,8	8,9
1996	6,6	9,0	4,3	6,7	19,5	17,5	12,4	17,8	12,4	12,0	5,3	10,6
1997	6,3	7,7	3,1	6,2	17,9	16,0	12,0	16,4	14,3	11,9	5,4	11,2
1998	4,2	4,5	2,2	4,0	15,3	13,9	10,1	14	12,5	10,7	5,4	10,0
1999	4,5	4,8	3,7	4,4	12	11,2	8,3	11	11,6	8,5	4,8	8,4
	Switzerland				United Kingdom							
1992	n.a.	n.a.	n.a.	n.a.	15,5	10,6	4,9	11,7				
1993	n.a.	n.a.	n.a.	n.a.	16,6	11,5	5,7	12,5				
1994	n.a.	n.a.	n.a.	n.a.	15,9	10,4	5,3	11,5				
1995	n.a.	n.a.	n.a.	n.a.	13,9	9,4	5,0	10,2				
1996	6,6	2,8	3	3,5	13,7	8,4	5,0	9,8				
1997	8,6	3,5	4	4,5	11,7	7,4	3,7	8,2				
1998	4,7	3,3	2,2	3,3	n.a.	n.a.	n.a.	n.a.				
1999	5,7	2,6	1,3	2,8	n.a.	n.a.	n.a.	n.a.				

Table 13. Male unemployment in low and medium levels of education by age. Averages of disposable period for each country
Percentage of labour force

	Austria	Switzerland	Germany	Denmark	Spain	Finland	France	Greece	Ireland	Italy	Netherlands	Portugal	Sweden	United Kingdom
Low														
15-19	7.2	7.0	7.3	7.5	40.8	55.3	27.5	15.1	34.5	30.6	15.1	10.0	21.1	21.5
20-24	12.0	6.4	17.4	10.0	27.7	46.2	28.7	12.1	32.7	21.7	14.7	9.4	26.8	24.2
25-29	9.8	3.1	17.7	10.8	21.9	18.4	17.5	6.8	26.6	11.3	13.3	5.2	23.1	17.9
30-34	8.0	6.3	16.8	9.0	17.8	22.4	12.7	4.4	23.1	7.2	12.1	5.4	16.0	16.4
35-39	10.1	7.6	15.1	5.8	14.7	15.4	11.0	3.7	21.4	5.6	10.6	3.4	10.3	15.3
40-44	8.4	8.4	13.7	5.8	12.6	15.3	9.1	3.3	19.1	4.1	6.9	3.5	11.0	12.2
45-49	6.1	3.3	12.8	5.3	11.2	16.1	8.8	3.3	16.8	3.6	7.1	2.8	8.7	9.9
50-54	8.7	5.9	13.3	5.9	12.1	12.4	9.2	3.5	14.5	3.6	8.8	3.6	7.7	12.4
55-59	7.5	6.9	20.0	5.4	13.6	21.8	9.1	3.1	11.5	4.0	6.3	4.6	8.0	13.7
60-64	2.3	7.1	11.9	4.3	8.3	6.1	3.3	2.2	7.5	2.4	2.1	3.2	13.7	13.7
Total	8.2	6.4	14.3	0.0	16.9	21.9	12.8	4.7	20.7	8.3	10.8	5.0	12.3	16.0
Medium														
15-19	5.2	7.4	11.0	18.7	42.4	41.4	27.7	34.5	25.8	35.4	9.7	20.0	47.1	18.8
20-24	6.5	5.4	9.7	6.3	30.1	28.2	18.5	22.9	17.0	27.5	8.5	15.1	18.4	16.5
25-29	4.5	3.3	7.1	4.3	18.6	17.1	9.9	9.3	11.6	11.6	5.0	5.2	11.3	11.7
30-34	3.6	3.3	6.7	3.0	11.0	12.1	7.1	4.8	7.7	4.8	4.0	2.8	10.7	9.3
35-39	3.8	2.3	7.0	2.8	8.9	11.4	5.7	3.2	7.6	2.2	3.5	3.7	9.4	9.0
40-44	3.6	2.3	7.2	3.9	6.7	11.4	5.1	2.8	7.5	1.7	2.7	1.0	8.8	7.7
45-49	4.1	3.1	7.4	5.2	7.0	13.3	5.6	3.3	6.3	1.5	2.6	1.3	8.0	7.9
50-54	4.6	2.3	7.8	4.7	6.9	14.9	5.7	3.3	6.2	1.7	2.7	2.2	8.2	9.6
55-59	6.2	2.1	13.7	6.3	10.2	19.9	7.2	4.0	5.8	1.6	2.2	5.7	8.7	10.7
60-64	3.0	2.9	7.8	4.7	10.2	0.0	1.7	3.1	6.5	0.9	2.3	1.6	7.6	11.8
Total	4.4	3.1	8.1	0.0	15.4	15.7	8.2	8.3	11.1	8.2	4.4	5.3	10.7	10.8
Change (in %)														
15-19	-27.8	5.7	50.7	149.3	3.9	-25.1	0.7	128.5	-25.2	15.7	-35.8	100.0	123.2	-12.6
20-24	-45.8	-15.6	-44.3	-37.0	8.7	-39.0	-35.5	89.3	-48.0	26.7	-42.2	60.6	-31.3	-31.8
25-29	-54.1	6.5	-59.9	-60.2	-15.1	-7.1	-43.4	36.8	-56.4	2.7	-62.4	0.0	-51.1	-34.6
30-34	-55.0	-47.6	-60.1	-66.7	-38.2	-46.0	-44.1	9.1	-66.7	-33.3	-66.9	-48.1	-33.1	-43.3
35-39	-62.4	-69.7	-53.6	-51.7	-39.5	-26.0	-48.2	-13.5	-64.5	-60.7	-67.0	8.8	-8.7	-41.2
40-44	-57.1	-72.6	-47.4	-32.8	-46.8	-25.5	-44.0	-15.2	-60.7	-58.5	-60.9	-71.4	-20.0	-36.9
45-49	-32.8	-6.1	-42.2	-1.9	-37.5	-17.4	-36.4	0.0	-62.5	-58.3	-63.4	-53.6	-8.0	-20.2
50-54	-47.1	-61.0	-41.4	-20.3	-43.0	20.2	-38.0	-5.7	-57.2	-52.8	-69.3	-38.9	6.5	-22.6
55-59	-17.3	-69.6	-31.5	16.7	-25.0	-8.7	-20.9	29.0	-49.6	-60.0	-65.1	23.9	8.7	-21.9
60-64	30.4	-59.2	-34.5	9.3	22.9	-100.0	-48.5	40.9	-13.3	-62.5	9.5	-50.0	-44.5	-13.9
Total	-46.3	-51.6	-43.4	**PENDENT**	-8.9	-28.3	-35.9	76.6	-46.4	-1.2	-59.3	6.0	-13.0	-32.5

Table 14. Male unemployment in medium and high levels of education by age. Averages of disposable period for each country
Percentage of labour force

Medium														
15-19	5.2	7.4	11.0	18.7	42.4	41.4	27.7	34.5	25.8	35.4	9.7	20.0	47.1	18.8
20-24	6.5	5.4	9.7	6.3	30.1	28.2	18.5	22.9	17.0	27.5	8.5	15.1	18.4	16.5
25-29	4.5	3.3	7.1	4.3	18.6	17.1	9.9	9.3	11.6	11.6	5.0	5.2	11.3	11.7
30-34	3.6	3.3	6.7	3.0	11.0	12.1	7.1	4.8	7.7	4.8	4.0	2.8	10.7	9.3
35-39	3.8	2.3	7.0	2.8	8.9	11.4	5.7	3.2	7.6	2.2	3.5	3.7	9.4	9.0
40-44	3.6	2.3	7.2	3.9	6.7	11.4	5.1	2.8	7.5	1.7	2.7	1.0	8.8	7.7
45-49	4.1	3.1	7.4	5.2	7.0	13.3	5.6	3.3	6.3	1.5	2.6	1.3	8.0	7.9
50-54	4.6	2.3	7.8	4.7	6.9	14.9	5.7	3.3	6.2	1.7	2.7	2.2	8.2	9.6
55-59	6.2	2.1	13.7	6.3	10.2	19.9	7.2	4.0	5.8	1.6	2.2	5.7	8.7	10.7
60-64	3.0	2.9	7.8	4.7	10.2	0.0	1.7	3.1	6.5	0.9	2.3	1.6	7.6	11.8
Total	4.4	3.1	8.1	0.0	15.4	15.7	8.2	8.3	11.1	8.2	4.4	5.3	10.7	10.8
High														
15-19	0,0	0,0	13,9	0,0	33,1	0,0	0,0	17,6	19,8	0,0	0,0	0,0	0,0	17,2
20-24	8,3	8,3	8,5	5,2	30,9	22,4	16,5	22,5	18,3	17,0	11,7	10,7	8,5	12,9
25-29	4,9	7,9	5,3	5,9	21,1	10,0	8,9	12,8	6,4	21,5	7,4	3,6	4,6	4,8
30-34	3,0	2,7	4,2	3,5	10,4	7,4	5,0	4,6	4,5	4,8	3,4	2,1	4,9	4,3
35-39	1,9	1,7	3,5	2,5	4,9	4,4	4,5	1,9	3,3	1,0	3,6	1,2	5,7	3,1
40-44	2,4	1,2	3,9	2,4	4,1	4,5	3,7	1,8	2,8	0,8	2,4	2,1	5,7	3,5
45-49	1,4	0,6	3,6	3,4	3,4	6,1	3,8	1,4	3,2	0,5	2,3	0,2	4,3	3,8
50-54	0,9	1,9	4,3	2,7	4,2	4,8	4,5	1,5	4,3	0,5	2,3	0,6	3,5	6,7
55-59	2,1	2,0	9,4	5,2	6,4	8,2	5,7	2,0	4,1	0,4	1,3	3,0	5,5	8,1
60-64	3,2	4,1	5,3	5,0	3,9	1,3	3,0	1,4	2,9	0,3	0,7	1,7	4,1	7,4
Total	2,5	2,6	4,8	0,0	11,1	6,4	5,8	4,4	6,0	3,5	3,6	2,0	4,9	5,3
Change (in %)														
15-19	-100,0	-100,0	26,4	-100,0	-21,9	-100,0	-100,0	-49,0	-23,3	-100,0	-100,0	-100,0	-100,0	-8,5
20-24	27,7	53,7	-12,4	-17,5	2,7	-20,6	-10,8	-1,7	7,6	-38,2	37,6	-29,1	-53,8	-21,8
25-29	8,9	139,4	-25,4	37,2	13,4	-41,5	-10,1	37,6	-44,8	85,3	48,0	-30,8	-59,3	-59,0
30-34	-16,7	-18,2	-37,3	16,7	-5,5	-38,8	-29,6	-4,2	-41,6	0,0	-15,0	-25,0	-54,2	-53,8
35-39	-50,0	-26,1	-50,0	-10,7	-44,9	-61,4	-21,1	-40,6	-56,6	-54,5	2,9	-67,6	-39,4	-65,6
40-44	-33,3	-47,8	-45,8	-38,5	-38,8	-60,5	-27,5	-35,7	-62,7	-52,9	-11,1	110,0	-35,2	-54,5
45-49	-65,9	-80,6	-51,4	-34,6	-51,4	-54,1	-32,1	-57,6	-49,2	-66,7	-11,5	-84,6	-46,3	-51,9
50-54	-80,4	-17,4	-44,9	-42,6	-39,1	-67,8	-21,1	-54,5	-30,6	-70,6	-14,8	-72,7	-57,3	-30,2
55-59	-66,1	-4,8	-31,4	-17,5	-37,3	-58,8	-20,8	-50,0	-29,3	-75,0	-40,9	-47,4	-36,8	-24,3
60-64	6,7	41,4	-32,1	6,4	-61,8	13-1	76,5	-54,8	-55,4	-66,7	-69,6	6,3	-46,1	-37,3
Total	-43,2	-16,1	-40,7	15-1	-27,9	-59,2	-29,3	-47,0	-45,9	-57,3	-18,2	-62,3	-54,2	-50,9

Annex 4. Earnings equations by country.*

Dependent variable:	Yearly gross		Hourly gross		Yearly net		Hourly net	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Austria (95)								
Constant					**9.1716**	**661.8**	4.1158	293.5
Edcat2					**0.1928**	**23.4**	0.1885	22.6
Edcat3					**0.5855**	**39.7**	0.5438	36.4
Experience					**0.0298**	**25.2**	0.0288	24.0
Experience^2					**-0.0005**	**-17.9**	-0.0004	-17.1
R^2 adjusted					**0.26**		0.24	
N					**7481**		7481	
S.E. of regression					**0.2754**		0.2787	
Finland (93)								
Constant	**10.7290**	**161.8**	3.5733	86.5	10.4940	148.1	3.3381	84.7
Edcat2	**0.1548**	**5.5**	0.1290	5.9	0.1212	4.1	0.0953	4.6
Edcat3	**0.6182**	**15.8**	0.5225	16.5	0.5215	13.6	0.4258	14.6
Experience	**0.0699**	**11.3**	0.0381	10.0	0.0699	10.4	0.0381	10.5
Experience^2	**-0.0012**	**-8.9**	-0.0006	-6.8	-0.0013	-8.8	-0.0007	-8.2
R^2 adjusted	**0.34**		0.32		0.27		0.27	
N	**1156**		1156		1156		1156	
S.E. of regression								
France (95)								
Constant			**3.4005**	**476.4**				
Edcat2			**0.1318**	**32.6**				
Edcat3			**0.5492**	**97.9**				
Experience			**0.0334**	**52.5**				
Experience^2			**-0.0005**	**-35.7**				
R^2 adjusted			**0.31**					
N			**28236**					
S.E. of regression			**0.2991**					
Germany (95)								
Constant	**8.2624**	**96.8**	1.2972	15.2				
Edcat2	**0.2140**	**7.3**	0.1979	9.2				
Edcat3	**0.4337**	**13.3**	0.4003	14.6				
Experience	**0.1326**	**23.2**	0.1006	18.6				
Experience^2	**-0.0017**	**-19.5**	-0.0013	-16.3				
R^2 adjusted	**0.41**		0.43					
N	**2107**		2182					
S.E. of regression	**0.49007**		0.35448					
Greece (95)								
Constant					**13.5014**	**290.3**	5.7748	123.0
Edcat2					**0.2977**	**10.2**	0.3101	10.5
Edcat3					**0.5867**	**17.5**	0.6023	17.8
Experience					**0.0707**	**19.2**	0.0726	19.5
Experience^2					**-0.1041**	**-14.5**	-0.1056	-14.6
R^2 adjusted					**0.26**		0.27	
N					**2093**		2096	
S.E. of regression					**0.54052**		0.5456	

Annex 4. Earnings equations by country.(continued)

Dependent variable:	Yearly gross		Hourly gross		Yearly net		Hourly net	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Ireland (94)								
Constant	**8.0788**	**180.1**	0.1994	3.7	8.0393	214.8	0.1809	3.8
Edcat2	**0.2140**	**8.0**	0.2707	8.4	0.1498	6.7	0.1854	6.5
Edcat3	**0.4485**	**13.0**	0.6449	18.6	0.3415	11.9	0.4962	16.2
Experience	**0.0854**	**23.9**	0.0946	22.2	0.0661	22.2	0.0741	19.6
Experience^2	**-0.0012**	**-18.3**	-0.0013	-16.3	-0.0009	-16.6	-0.0010	-14.2
R^2 adjusted	**0.39**		0.36		0.37		0.32	
N	**1614**		1972		1614		1972	
S.E. of regression	**0.4390**		0.5765		0.3661		0.3186	
Italy (95)								
Constant					**9.0496**	**347.1**	1.7177	80.9
Edcat2					**0.2996**	**19.6**	0.3058	24.5
Edcat3					**0.4677**	**17.7**	0.6647	30.9
Experience					**0.0624**	**28.6**	0.0468	26.3
Experience^2					**-0.0010**	**-22.1**	-0.0007	-19.2
R^2 adjusted					**0.30**		0.37	
N					**3538**		3538	
S.E. of regression					**0.4074**		0.3320	
Portugal (95)								
Constant			**5.6310**	**458.4**				
Edcat2			**0.5488**	**50.7**				
Edcat3			**1.3049**	**80.0**				
Experience			**0.0476**	**47.9**				
Experience^2			**-0.0006**	**-35.9**				
R^2 adjusted			**0.29**					
N			**24196**					
S.E. of regression			**0.4815**					
Spain (95)								
Constant	**14.1259**	**2528.2**	6.6269	1159.6	13.8313	2355.7	6.3324	1056.1
Edcat2	**0.3951**	**121.1**	0.4078	122.2	0.4117	120.1	0.4244	121.2
Edcat3	**0.7066**	**223.9**	0.7245	224.5	0.7405	223.3	0.7583	223.9
Experience	**0.0478**	**114.3**	0.0488	114.0	0.0502	114.1	0.0511	113.9
Experience^2	**-0.0006**	**-79.3**	-0.0006	-79.1	-0.0006	-79.9	-0.0006	-79.7
R^2 adjusted	**0.34**		0.34		0.34		0.34	
N	**118027**		118027		118027		118027	
S.E. of regression	**0.3849**		0.3937		0.40446		0.4131	
Sweden (96)								
Constant	**11.7387**	**244.3**	4.1778	92.1				
Edcat2	**0.1640**	**6.4**	0.1276	5.2				
Edcat3	**0.3849**	**12.8**	0.3078	10.9				
Experience	**0.0236**	**6.5**	0.0247	7.2				
Experience^2	**-0.0003**	**-4.7**	-0.0004	-5.4				
R^2 adjusted	**0.249**		0.2212					
N	**722**		722					
S.E. of regression	**0.2569**		0.2424					
Switzerland (95)								
Constant	**10.3813**	**547.7**	2.7390	136.5	10.1884	588.8	2.5462	137.9
Edcat2	**0.2833**	**19.8**	0.3071	20.3	0.2418	18.5	0.2656	19.1
Edcat3	**0.5908**	**38.4**	0.6250	38.3	0.5057	36.0	0.5399	36.0
Experience	**0.0411**	**30.1**	0.0421	28.9	0.0384	30.6	0.0391	29.1
Experience^2	**-0.0668**	**-22.1**	-0.0664	-20.8	-0.0006	-23.4	-0.0006	-21.8
R^2 adjusted	**0.34**		0.34		0.32		0.32	
N	**6334**		6334		6334		6334	
S.E. of regression	**0.30555**		0.3235		0.2789		0.2976	

*Year of reference between brackets and in bold the equation used for IRR estimation.