Does Education Reduce Wage Inequality? Quantile Regressions Evidence from Fifteen European Countries*

(February 4th, 2000)

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Abstract: We address the impact of education upon wage inequality by drawing on evidence from fifteen European countries, during a period ranging between 1980 and 1995. We focus on within-educational-levels wage inequality by estimating quantile regressions of Mincer equations and analysing the differences in returns to education across the wage distribution and across time. Four different patterns emerge: 1) a positive and increasing contribution of education upon within-levels wage inequality –the case of Portugal; 2) a positive but stable role of education in terms of inequality – Austria, Finland, France, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland, UK; 3) a neutral role – Denmark and Italy; and 4) a negative impact – Germany and Greece. We thus find that in most countries dispersion in earnings increases with educational levels and that education is a risky investment. These results suggest a positive interaction between schooling and ability with respect to earnings.

Keywords: Returns to Education; Earnings Inequality; Quantile Regressions; Ability; Education Systems; Labour-Market Institutions.

JEL codes: C29, D31, I21, J24, J31

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* This paper was written under the scope of the 15-country 'PuRE - Public Funding and Private Returns to Education' European Commission TSER project. The results reported here that refer to countries other than Portugal were produced by the corresponding PuRE partners. For more information on this project and the member teams, please check www.etla.fi/PURE. We thank participants at the PuRE Paris and Barcelona seminarsand José Vieira for comments and suggestions. The usual disclaimer applies.

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Extended abstract:

Education has long been considered a multipurpose policy tool. A related belief is that increased educational attainment will lead to less wage inequality. Consequently, given the current situation of increasing inequality in most developed societies, of which globalisation is a much-cited culprit, policy-makers have been very keen to demand further public funding for schooling.

However, it might be the case that such an approach proves ineffective. For instance, if education systems are poorly designed, former students may not benefit financially –at the labour market– from the qualifications they acquired at schools. Another possibility is that ability interacts powerfully with schooling, which would imply that a more educated workforce would be associated with more wage inequality.

In this paper, we study this topic –the link between education and inequality– which we find crucial for Western societies. We start by putting forward three channels whereby education impacts upon inequality: *inter- and intra-educational-levels* (between- and within-educational-levels) *earnings differentials* and changes in the distribution of schooling.

We focus on within-educational-levels earnings differentials and suggest that *quantile regressions* should be used for uncovering them. Quantile regressions allow for different impacts of education along the whole conditional distribution of earnings, unlike the more common Ordinary Least Squares estimates, which focus on mean returns.

In the empirical sections, we compare quantile regression results of returns to education based on Mincer regressions from *fifteen European countries* (Austria, Denmark, France, Finland, Germany, Greece, Italy, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom). Each country is covered by approximately a *15-year time-span* (between 1980 and 1995).

Four contrasting patterns emerge:

1) an increasingly positive role of education upon intra-educational-levels inequality, where the best (worst) paid at each educational level reap higher (lower) benefits from education and where such a best-worst differential has increased over time (Portugal);
2) a positive but stable relationship between education and within-levels inequality (Austria, Finland, France, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland and the UK);

3) a neutral impact of education upon within-levels inequality, as there are no sizeable differences in returns to education across the wage distribution (Denmark and Italy); and
4) a negative relationship between returns to education and the wage distribution (Germany and Greece).

These results, which provide a summary assessment of the outcome of the *interaction between education systems and labour-market institutions,* suggest that, in most countries, the dispersion in earnings increases with educational levels. This is the case in eleven out of fifteen countries, whereas in two countries the dispersion of earnings proves stable across different educational levels and in two others earnings are less dispersed for higher educational levels. Given this evidence, and in the context of within-levels inequality, we conclude that education does not reduce wage inequality.

Moreover, if we assume that such characteristics can be proxied by ability then our results say that there is a positive interaction between ability and education: the higher the ability level, the stronger will the impact of schooling be on one's wages. This result supports 'Bell curve' type of arguments which place much emphasis on the role of cognitive ability on economic and social success.

These results also suggest that education is a risky investment. To the extent that prospective students are unaware of the characteristics which will place them at some point along a wide earnings distribution, the financial outcome of their education decision is largely unpredictable. This situation might also correspond to over-education, in the sense that the marginal reward some individuals reap from their schooling is very low or even negative. Such individuals will thus not benefit financially from the costly investments they engage in. Standard OLS returns thus disregard an enormous amount of variety in returns which is underlying the data from most countries. This also implies that drawing on simple OLS returns for policy-making might prove rather elusive and misleading.

In terms of policy-making, we believe that these overall results are useful as they amount to a summary, *ex-post* characterisation of the joint functioning of each country's national education system and labour-market institutions. Should wage equality be considered as a policy goal, a country where such a joint mechanism promotes inequality might wish to pinpoint and reverse the underlying causes.

1. Introduction

Education has long been considered a multipurpose policy tool. One of the goals customarily attached to education policy is that increased educational attainment will lead to less wage inequality. Consequently, and given the current situation of increasing inequality in most developed societies,[3,4] policy-makers have been very keen to demand and support further public funding for schooling activities.[5]

More importantly still, many see education as the *only* tool available for governments to reverse or, at least, slow down the inequality-enhancing impact attributed to globalisation. In fact, regardless of the explanation we choose for such impact of globalisation upon inequality –either trade or technology[6]-, the element of skills is always crucial and must therefore be at the heart of the rise in inequality witnessed in most developed countries.[7]

However, and contrary to this more common approach, one might also very well think of a number of situations where increasing educational attainment will lead to higher, not lower, earnings inequality. Two examples should suffice: 1) poorly designed or outdated education systems, where students are provided with skills in large supply and little demand in the labour market; and 2) elitist educational systems, where some schools which accept only a few candidates (not necessarily the most talented) concentrate all the job-market signalling that prospective employers are interested in.

More fundamentally, ability might play a more important role in terms of the worker's productivity (and pay) at higher educational levels. In fact, if there is a powerful interaction

[3] See OECD (1995) and Table 1.1. It is very clear that the majority of the OECD countries covered have witnessed increasing *income* inequality during the 1980's. Although, there is no evidence on the evolution of inequality during the early 1990's, for most countries we find no reasons to assume that this pattern has changed.

[4] There is a wealth of US-based literature on this issue: among others, see Lee (1999), Gottschalk (1997), Blau and Kahn (1996), Juhn et al. (1993) and Katz and Murphy (1992). For Europe, see Leuven et al. (1997). A more comprehensive and international work is Gottschalk and Smeeding (1997). Finally, a thorough and recent general reference on inequality can be found in Champernowne and Cowell (1998).

[5] See the recent speech of the Portuguese minister of education at a UNESCO conference -Oliveira Martins (1999).

[6] Trade with less-developed countries in goods which are intensive in unskilled labour would, the argument goes, create a downward pressure on the earnings of the unskilled labour force of the developed countries. On the other hand, technological progress would make those workers who are less able to interact with such new technologies less appealing in the labour market. Consequently, their earnings would either fall or increase less than those of the skilled labour force.

[7] We follow the standard view of regarding inequality as bad. See Welch (1999) for a contrasting, non-mainstream approach.

between education and ability, the current process of rising educational attainment would lead, *per se*, to further earnings dispersion.[8] If ability interacts powerfully with schooling, a more educated workforce would be associated with more wage inequality.

In this context of conflicting *a priori* evidence, we believe that it is of the utmost importance to assess empirically the direction of the effective impact of education upon inequality. If education proves to be, after all, a less appealing policy tool in terms of reducing inequality, then the huge investments currently being made should be placed under scrutiny. It might very well be the case that alternative applications of public funds are more effective for placing each society at its preferred situation in terms of the efficiency-equity trade-off boundaries.[9]

Moreover, given the very diverse situation across European countries in terms of both their educational and labour-market institutions –which are those most likely to shape the wage distribution and, thus, wage inequality– one could expect that such a link between education and inequality would adopt different patterns. This aspect could prove rather insightful and informative in the sense that it would suggest different country models to be followed according to the goals in mind.

Given this background, we draw on quantile regression results of Mincer equations from fifteen European countries in order to address the link between education and inequality. Quantile regressions are a technique that allows one to differentiate the contribution of regressors along the distribution of the endogenous variable and not simply at the mean, as with OLS.

We use this feature to assess any differences in terms of the rewards to education for individuals from different portions of the wage distribution and thus conclude on the link between education and inequality. Simultaneously, we provide evidence to answer Card's (1994) question 'Is the labour force reasonably well-described by a *constant* return to education for all workers?' [page 33, author's italics].

[8] See OECD (1997) for a survey of recent developments in schooling attainment.
[9] See Heckman (1999) for a very insightful analysis and evaluation of policy experiments in education in the United States and also an example of the need to assess the effectiveness of education policies. This author suggests that a dislocation of investment from upper to lower educational levels is in need. He argues that as 'learning begets learnings', improving the access and quality of education at early ages will have a strong effect on the individual's life-long prospects.

Our paper goes as follows: in Section 2, a brief presentation of the econometric theory behind quantile regressions is offered. In Section 3, we explain how we use such results to draw conclusions in terms of the (different) impact education might have upon inequality across Europe. Section 4 presents the data-sets used in each country, together with some descriptive statistics. In the following section we compare the differences that emerge among the countries surveyed in terms of returns to years of education. Finally, Section 6 presents a brief summary of the paper and concludes.

2. Quantile regressions

> *'"On the average" has never been a satisfactory statement with which to conclude a study on heterogeneous populations. Characterisation of the conditional mean constitutes only a limited aspect of possibly more extensive changes involving the entire distribution.'*
>
> Buchinsky (1994, page 453)[10]

An ordinary least squares (OLS) regression is based on the *mean* of the conditional distribution of the regression's dependent variable. This approach is used because one implicitly assumes that possible differences in terms of the impact of the exogenous variables along the conditional distribution are unimportant.

However, this may prove inadequate in some research agendas. If exogenous variables influence parameters of the conditional distribution of the dependent variable other than the mean, then an analysis which disregards this possibility will be severely weakened (see Koenker and Bassett, 1978). Unlike OLS, quantile regression models allow for a full characterisation of the conditional distribution of the dependent variable.[11],[12]

[10] An alternative quote might be taken from Mosteler and Tukey, 1977, p. 266, quoted in Mata and Machado (1996): "What the regression curve does is give a grand summary for the averages of the distributions corresponding to the set of x's. […] Just as the mean gives an incomplete picture of a single distribution, so the regression curve gives a correspondingly incomplete picture for a set of distributions".

[11] If the dependent variable is distributed identically around a known function of the regressors, then the distribution of y given x is a translation family. If one 'connects' the different averages of the conditional distribution for different values of x, one gets the mean or OLS regression. One might also connect the points associated with different quantiles of the distribution of y given x for different values of x, thus getting regression quantiles, and all these regressions would be parallel. The information about the impact of different regressors on different measures of localisation would then be the same. However, in most cases, the distribution of y given x is not a translation family. In these cases, different regressions provide different results concerning the way y varies with x. Quantile regressions allow for this to be done, as they may characterise the entire conditional distribution of the dependent variable. It is usually the case that there are information gains from estimating more regressions than simply the mean regression.

The quantile regression model can be written as (see Buchinsky (1994)):

$$(1) \qquad \ln w_i = x_i \beta_\theta + u_{\theta i} \quad \text{with} \quad \text{Quant}_\theta(\ln w_i | x_i) = x_i \beta_\theta$$

where x_i is the vector of exogenous variables and β_θ is the vector of parameters. $\text{Quant}_\theta(\ln w|x)$ denotes the θ th conditional quantile of $\ln w$ given x. The θ th regression quantile, $0 < \theta < 1$, is defined as a solution to the problem:

$$(2) \qquad \min_{\beta \in R^k} \left\{ \sum_{i: y_i \geq x_i \beta} \theta \left| \ln w_i - x_i \beta_\theta \right| + \sum_{i: y_i < x_i \beta} (1-\theta) \left| \ln w_i - x_i \beta_\theta \right| \right\}.$$

This is normally written as:

$$(3) \qquad \min_{\beta \in R^k} \sum_i \rho_\theta (\ln w_i - x_i \beta_\theta),$$

where $\rho_\theta(\varepsilon)$ is the check function defined as $\rho_\theta(\varepsilon) = \theta\varepsilon$ if $\varepsilon \geq 0$ or $\rho_\theta(\varepsilon) = (\theta - 1)\varepsilon$ if $\varepsilon < 0$.[13]

This problem does not have an explicit form but can be solved by linear programming methods. Standard errors are obtainable by bootstrap methods.

The least absolute deviation (LAD) estimator of β is a particular case within this framework. This is obtained by setting θ=0.5 (the median regression). The first quartile is obtained by setting θ=0.25 and so on. As one increases θ from 0 to 1, one traces the entire distribution of y, conditional on x.

We provide a simple example of the usefulness of quantile regressions by considering gender wage differentials in Portugal. We draw on a 1995 sample from *Quadros de Pessoal*, a rich

[12] See Abadie et al (1999) for a recent extension of quantile regressions, considering instrumental variables.
[13] This procedure is basically an extension of the method used for computing simple quantiles of a distribution.

employer-based data-set[14] and run a simple OLS regression of log hourly earnings on a constant and a dummy, taking value one for women and value zero for men:

$$(4) \qquad \ln(w/h)_i = \alpha + \beta . female_i + u_i$$

In this very simple setting, the coefficient associated with this dummy variable can be interpreted as the average pay differential between men and women. Our result (see last row of Table 2.2) indicates that such a differential is -0.27.

However, should one analyse the distributions of earnings for men and women, one realises that the shape of the distributions is very different (see Graph 2.1). For instance, we notice (see Table 2.1) that women's hourly wages peak at the 5.84 and 5.88 classes, with a 5.7% frequency, while the corresponding class for men is 6.2, with only a 4.1% frequency. In Table 2.2 we realise that the gender difference in earnings increases substantially as one moves upward in the deciles of each distribution. While the difference of average hourly wages for the lower 10% of each distribution is –0.058, this figure increases to –0.288 at the fifth class, reaching –0.323 for the last income class.

This succinct analysis shows very clearly that gender differences in earnings go well beyond the fact that men, on average, earn more than women. However, should one consider this issue by simply drawing on OLS estimates, much information contained in the data would be lost. We run an OLS regression for our data and obtained a coefficient of –0.27.

Quantile regressions, on the other hand, enable one to better understand how the two distributions differ. Effectively, the same dummy coefficient, when resulting from this latter type of regression, mimics the differences in pay at different points of the wage distribution. It increases from –0.099 for the first decile, increasing to –0.3 at the median and –0.315 at the top decile.

Summing up, quantile regressions provide snap-shots of different points of a conditional distribution. They therefore constitute a parsimonious way of describing the whole distribution and should bring much value-added if the relationship between the regressors and the independent variable evolves across its conditional distribution. Given the discussion in Section

[14] All firms operating in Portugal are required to fill in a table with extensive information on each worker and on the firm itself. This requirement has been in force since the early 1980's, thus providing an excellent source of

1, namely the suggestion that education might be impacting very differently across the wage distribution, we employ this methodology for the education-earnings relationship.[15,16]

3. Decomposing education-related inequality

We consider three channels through which education might influence wage inequality: within- and between-levels inequality and changes in the schooling distribution. The first channel is due to the differences in mean earnings associated with individuals having different educational levels. Such differences are deeply related to OLS returns to education.

The second channel, within-levels, inequality, has to do with the different degree of dispersion of earnings at each educational level. This channel is better depicted by quantile regressions as we will show below. This is also the link upon which we focus throughout the paper.

Finally, changes in the distribution of schooling should also be acknowledged as a link between education and inequality. If the labour force is getting more educated (due either to life-long training or, more importantly, to the increasing educational attainment of new cohorts) then the overall level of inequality should also be affected.

Bearing this framework in mind, we distinguish between three possible situations concerning the impact of education upon inequality. These three cases concern only within-levels inequality. In a first situation we consider equal returns across the wage distribution. This would mean that such distributions are identical for all educational levels.

The only difference lies in their position, as they get shifted further to the right (higher mean wages) as the educational level is higher. In this case, education could not be associated with

information for labour-market oriented research. See Section 4 for more information on this dataset.

[15] This methodology proved fruitful in previous similar analyses, namely Machado and Mata (1998) and Hartog et al. (1999) –for Portugal–, Fersterer and Winter-Ebmer (1999) –for Austria– and Garcia et al. (1997) –for Spain.

[16] We assume throughout the paper that the nature of the link between schooling and earnings is a causal one. While theoretically one might certainly point out that schooling is not an exogenous regressor in Mincer equations, empirical results suggest that the extent of the bias in education coefficients is small –see Card (1999). See also the Local Average Treatment Effect (LATE) literature (Imbens and Angrist (1994) and Ichino and Winter-Ebmer (1999)) for a more careful analysis of causality in economic events in general and the education-earnings relationship in particular.

within-levels inequality given that the dispersion of the different conditional wage distributions is always the same.

A second case occurs when returns to education increase as one moves upward in the wage distribution. As the next section will show, this is the most common case across our sample of European countries. This would mean that wage distributions which depend on progressively higher educational levels are more disperse.[17] Here, schooling would have a positive impact upon wage inequality.

Thirdly, the final possible case is that returns to education fall as one considers higher quantiles. Unlike the situations before, intra-education inequality would decrease (as wage distributions conditional on higher educational levels are less disperse).

In a nutshell, our procedure for linking education with earnings inequality involves decomposing the contribution of the first upon the second into three effects: intra-education and inter-education inequality and the distribution changes. The first refers to the progression of the dispersion of conditional distributions of earnings: for instance, if such distributions 'shrink', then this component's contribution is negative (i.e. decreases inequality).

The second effect refers to the extent of the rightward shifts in such distributions as we move upward in the educational levels. This is closely associated with the size of returns to education. Finally, the third effect deals with changes in the educational attainment of the labour force.

As the second effect should always be positive (because returns to education have always been positive so far), the first effect, intra-education inequality (which is associated with the slope of the returns-deciles relationship as derived from regression quantiles) either reinforces or weakens (and eventually reverses) the second effect. If one disregards the third effect, an asymmetry would arise: while a positively-sloped returns-deciles relationship is a *sufficient condition* for concluding that education contributes *positively* to inequality, a negatively-sloped curve is only a *necessary condition* for concluding that education contributes *negatively* to inequality.

[17] In econometric terms, this would be interpreted as evidence of heteroskedasticity. In fact, quantile regressions are also used for tests of such non-spherical disturbances (see Koenker and Bassett (1982)).

Throughout the remaining chapters we will focus on the returns-deciles relationship drawing on data from fifteen European countries.

4. Data-sets description

The results for each country were derived from a specific data-set used by each country's team. Table 4.1 describes such data-sets, including a short characterisation of its nature, the years covered, the number of observations used for each year and also a reference on the procedure adopted for dropping outlier observations.

Most data-sets are household surveys. Some countries have used labour-market oriented surveys (Denmark, France and Switzerland) and an employer-based data-set (Portugal). The number of observations used varies a great deal, ranging from fewer than 2,000 (Finland, Norway and Sweden) to more than 25,000 (Portugal and Spain –for 1995).

There is also some variation in terms of the procedure for dealing with potential outliers. Some countries dropped observations whose wages were below their minimum wage or social security contribution levels (France and Austria), while others used all information (Denmark). Switzerland trimmed its data-sets by dropping 0.5% of the observations at each end of the wages distribution. Most countries dropped observations with zero earnings (and zero hours worked). These differences should be understood bearing in mind the different nature of the data-sets and the different degrees to which the data-sets were 'ready to use' when made available to the research teams.

The years for which a country snap-shot is available are centred around 1980, 1985, 1990 and 1995 (see Table 4.2). However, there are still some differences in the length of the coverage, ranging from a 24-year period in the case of French results (1970-1993) and six years for Spain (1990-1995). There are also some countries for which data is available only from the late 1980's onward (Finland and Ireland) or for the 1990's (Spain and Switzerland).

Table 4.3 provides descriptive statistics for each data-set/year used in the empirical part of the paper. An important observation which is to be found is the increasing schooling attainment of

the working populations across the countries surveyed.[18] Moreover, all countries have averages of at least 10 years of schooling. The exception is Portugal, with figures substantially lower (from 4.9 to 6.5 years of schooling). Switzerland, Ireland, Netherlands, UK and Denmark boast the highest averages (12 of more years of schooling in 1995). Aside from Portugal, Italy, Greece and Spain have the lowest figures, reaching a maximum of 10 years in the last year.

Average experience has followed a less consistent path, as it is seen to decrease in some countries (Austria, Greece, Italy, Portugal and UK) and increase in others (Denmark, Finland, Ireland and Switzerland). There seems to be some convergence process, as the former countries are those with high average experience levels (more than 20 years) while the latter have the low figures (less than 20 years).

Descriptive statistics (means and standard deviations of log wages and three deciles of wages) are also reported for the dependent variable used by each country. These are gross for all countries except Austria, Greece and Italy, which use net figures. Comparisons, either within or between countries, are difficult on account of the differences in currencies and inflation rates.[19]

Table 4.4 draws on these last data to present two inequality measures: the ratio between the different deciles of total earnings distribution and the difference between the 9^{th} and 1^{st} deciles of the log earnings distribution. Concerning the ratio between the 9^{th} and the 1^{st} deciles of the earnings distribution, most countries exhibit values between 2 and 2.5. There are a few exceptions however, most notably Ireland (3.68 in 1987 and 4.74 in 1994), Portugal (increasing from 3.46 in 1982 to 4.58 in 1995).[20] Sweden, in 1981, and Norway, in 1991, are the only countries having figures below 2 (1.97 and 1.99, respectively).[21]

As to the time trend displayed by the figures, we see that, for both measures and for every country except France, inequality increases.[22] Although time periods are somewhat different, we

[18] The exception is Spain, between 1994 and 1995, but one should bear in mind that the data-sets used in each year are different
[19] France is an exception, as its wages were computed at constant prices.
[20] Spain (from 3.26 in 1990 to 3.94 in 1995) and the UK (from 2.58 in 1980 to 3.33 in 1995) also boast high inequality figures.
[21] The log ratio measure provides the same results in terms of the direction of change.
[22] This also applies to Italy between 1980 and 1984 and to Switzerland between 1995 and 1998.

find these results to be in line with those of Table 1.1.[23] It is interesting to note the positive correlation between schooling attainment and inequality.

5. Empirical results

In this section we present the results obtained for fifteen European countries. Following this, we offer an assessment of the different situations we find in terms of the link between education and inequality. It will be seen that the overall panorama of this link is very diverse across these countries.[24]

All the results described below were obtained by regressing the following version of the Mincer equation[25]:

$$\log yh_i = \alpha_\theta + \beta_\theta .educ_i + \delta_{\theta 1}.\exp_i + \delta_{\theta 2}.\exp_i^{\,2} + u_i ,$$

where i = 1, …, N (N being the number of observations for each year), θ = .1, .2, …, .9 is the quantile being analysed, *yh* is the hourly gross wage,[26] *educ* is the number of schooling years[27] and *exp* corresponds to Mincer experience (age minus schooling minus school starting age). Only men working full time (35 hours or more per week) were considered.[28] Each country was considered in four separate years, which were as close as possible to 1980, 1985, 1990 and 1995.

Below we provide a summary description[29] of each country's results:

Austria (Graph 5.1): lower quantiles are associated with lower returns to education; overall returns are falling; the slope of returns/quantiles relationship has changed somewhat, as returns to lower quantiles have fallen while those of higher quantiles have remained unaltered.

[23] The only clear exception is Portugal, for which we notice a clear rise in inequality, while Table 1.1 suggests that there were no significant differences in that period. This is due to the fact that Table 1.1 focuses on income, not wage, inequality. Rodrigues (1994), who decomposes income inequality into different sources, finds that if one were to concentrate only on gross wages, one would find rising inequality.
[24] See Asplund and Pereira (1999) for an extensive survey of recent research in returns to education across Europe.
[25] This was also the version adopted throughout in the PuRE project.
[26] Results from Austria draw on net wages.
[27] For most countries only information on the highest level achieved was available. Extra school attainment above the school years associated with the degree are disregarded.
[28] The situation for women was disregarded on account of the extra complication of potential selectivity biases.
[29] The complete results are displayed in Table 5.1.

Denmark (Graph 5.2): lower quantiles are only moderately associated with lower returns to education (especially for 1982 and 1995); overall returns are increasing; the slope of returns/quantiles relationship has not changed – there is a parallel upward shift of the curve.[30]

Finland (Graph 5.3): upper quantiles are associated with higher returns to education; overall returns are falling; the slope of returns/quantiles relationship has remained unchanged.

France (Graph 5.4): lower quantiles are associated with lower returns to education; overall returns are falling; the slope of returns/quantiles relationship has not changed –there is a parallel downward shift of the curve.

Germany (Graph 5.5): lower quantiles are associated with higher returns to education; overall returns are increasing; the slope of returns/quantiles relationship has remained stable.

Greece (Graph 5.6): lower quantiles are associated with higher returns to education; overall returns are decreasing; the slope of returns/quantiles relationship has become slightly steeper as returns to the lower deciles have increased more than have those of the higher deciles.

Ireland (Graph 5.7): lower quantiles are associated with lower returns to education, although this is not very clear for 1987; overall returns are falling; the slope of returns/quantiles relationship has changed slightly as returns to the bottom deciles have fallen by more than have those of the higher deciles.

Italy (Graph 5.8): upper and lower quantiles are similar; returns exhibit a u-shaped pattern; overall returns are increasing; the slope of returns/quantiles relationship has remained stable.

Netherlands (Graph 5.9): lower quantiles are associated with lower returns to education; overall returns are falling; the slope of returns/quantiles relationship has not changed significantly –there is a parallel downward shift of the curve, except for a stronger decrease at lower deciles.

[30] The comparison between 1982 and 1986 is insightful in terms of the extra information provided by quantile regressions. Although median returns are the same in both years, returns in 1986 prove to be more disperse than in 1982.

Norway (Graph 5.10): lower quantiles are associated with lower returns to education; overall returns are increasing; the slope of returns/quantiles relationship has not changed significantly – there is a parallel upward shift of the curve.

Portugal (Graph 5.11): lower quantiles are associated to lower returns to education; overall returns are increasing; the slope of returns/quantiles relationship has changed markedly –returns to lower quantiles have fallen while returns to upper quantiles have increased.

Spain (Graph 5.12): lower quantiles are associated to lower returns to education; overall returns are increasing; the slope of returns/quantiles relationship has not changed –there is a parallel upward shift of the curve.

Sweden (Graph 5.13): upper quantiles are clearly associated with higher returns to education; overall returns are decreasing; the slope of returns/quantiles relationship has changed slightly – returns to lower quantiles have fallen slightly more than have returns to upper quantiles; returns to lower quantiles are particularly low (2%-3%).

Switzerland (Graph 5.14): upper quantiles are associated with higher returns to education; overall returns fall slightly; the slope of returns/quantiles relationship has changed slightly – returns to upper quantiles have remained stable while those of lower quantiles have fallen.

United Kingdom (Graph 5.15): upper quantiles are associated with higher returns to education; overall returns are increasing; the slope of the returns/quantiles relationship has remained stable.

We present in Table 5.2 and Graph 5.16 the returns to education (in percentage terms) for the lower and top deciles and for the first and last year considered by each country (approximately 1980 and 1995, although there are a few exceptions). It can be seen that returns differ greatly across the fifteen countries surveyed (and the 15-year period considered). They range between 12.6% (Portugal, 1995) and 4.1% (Sweden, 1995).

Considering as a threshold between large and small an 8% return, the high-return countries are Austria, Finland, Ireland, Portugal and Switzerland, while the low-return countries are Denmark,

France, Greece, Italy, Norway and Sweden.[31] There is thus some evidence of convergence in returns to education as returns to high-return countries have been falling, whereas the opposite occurs for low-return countries.[32,33]

Some results obtained from the quantile regressions run for each country are presented in Table 5.3. The first column presents the difference between OLS returns to education estimates at those years. The panorama here is very diverse: Denmark, Greece, Italy, Norway, Portugal and the UK have increasing returns, while Austria, Finland, Germany, Ireland, Sweden and Switzerland have falling returns. The greatest increase is Italy (2.1%) while the biggest fall is Ireland (-2.7%). There might be some convergence phenomenon as the high-return countries see such returns fall while the opposite occurs for the low-return countries. The exceptions in this process are Sweden and Portugal.

The following two columns refer to the differences in returns to education for the same quantiles between 1980 and 1995. Column 2 [Q(.1|95)-Q(.1|80)], which considers returns to the first decile, measures how different the pay-off to education for the low-earnings individuals became in the 15-year period under consideration. Austria, Finland, Germany, Ireland, Portugal, Sweden and Switzerland have negative figures here. This result suggests that, for these seven countries, *the role of education for the less attractive to the labour market has been eroded during the last two decades*. Moreover, it is insightful to compare the evolution of returns at the mean (OLS) and at the first decile (QR) and notice that, in most countries (the exceptions are Finland, France, Italy and the UK), the former returns (OLS) always exceed the latter.

The same computations (the difference between 1995 and 1980 results) were applied to the top quantile (column 3). Here we find negative figures for Finland, France, Germany, Ireland, Sweden and Switzerland. This means that, in these countries, returns to education have fallen across those individuals who reap the highest earnings at each educational level. On the other hand, if we compare columns 2 and 3, we see that returns to the bottom quantile have fallen by more (or increased by less) than their top quantile counterparts in all countries except for France, Germany, Italy and the UK. This means that, for the majority of countries, *the downward (upward) pressure in returns to education at the bottom quantile is stronger (weaker) than at the*

[31] Netherlands, Spain and the UK have values above or below this threshold depending on the year considered.
[32] The only exceptions are Portugal and Sweden.
[33] See the last rows of table 5.2 where the coefficient of variation of OLS returns falls from 0.31 to 0.26 from the first to the last years considered.

top quantile. Moreover, with respect to the evolution of OLS and Quantile Regressions returns, returns at the ninth decile have increased by more (or decreased by less) than those at the mean in every country (except Denmark and France).

In columns 4 and 5, we compare different quantiles in the same year (and not the same quantiles in different years, as before). Except for Germany and Greece, the return for the top quantile is always larger than the return for the lower quantile. Moreover, taking into account column 5, we see that the difference in returns across the earnings distribution is always higher in 1995 than in 1980 (except for France, Germany, Greece, Italy and the UK).[34] This means that the different role of education upon wages across the wage distribution has become more acute, in the sense that the richer (at each educational level) are benefiting increasingly more from it than the poorer. We may thus conclude that, in some European countries, returns to education have fanned out.

Following upon this, one must conclude that these fifteen countries exhibit different situations. However, a few similarities among them may be found and used in order to draw the countries together into some specific types.

Bearing these results in mind, we defined four groups of countries –see Table 5.3. In the first group, which includes only Portugal, returns increase markedly along the conditional wage distribution and this trend has become more pronounced in recent years. Moreover, the returns to the top deciles have been increasing while the opposite has taken place for the bottom deciles. Not only is the role of education increasingly more important for the top deciles, for the bottom deciles the importance of that role has fallen in the 15-year period covered.

Our second type is formed with Austria, Finland, France, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland and the UK. As mentioned above, returns in these countries increase with the wage distribution. However, and contrary to the previous type, there has been no clear increase in dispersion going on: the slope of the returns-deciles curve has not changed significantly.[35,36] Therefore, although education also contributes to further inequality in this set of countries, its influence has not been increasing as clearly as in the previous group.

[34] Portugal is the most extreme case as such difference more than doubles, jumping from 3.7% to 8.9%.
[35] This conclusion does not fully apply to Austria and Sweden, where we see falling returns for those at the lower deciles while returns to upper quantiles remain unaltered. These two countries could also be placed in the first category.

In the third group, Denmark and Italy, returns are approximately the same along the conditional wage distribution. This means that, in Denmark and Italy, the educational impact on inequality should be light, as only the effect of inter-education inequality (related to positive returns to education) is present.

Finally, in a fourth type made up of Germany and Greece, we observe higher returns for those at the bottom deciles of the conditional earnings distribution –the slope of the returns-quantiles relationship is negative. This contrasts with the previous three situations, where the relationship was clearly positive (or horizontal). Education, in these countries, reduces intra-education inequality, as the contribution of education upon the less labour-market attractive is stronger than upon the most attractive. Nevertheless, as mentioned in Section 3, it may happen that the inter-education inequality effect dominates, thus resulting in an overall positive effect of education upon inequality.[37]

It should also be mentioned that out of the four countries which do not follow the predominant pattern of increasing returns in the conditional distribution, the results for two of them (Italy and Greece) are based on net wages. This should result in a less steep returns-quantiles profile as progressive taxes should contribute to smoothing returns at higher quantiles.

The overall information present here is summarised in Graph 5.17. Here we restrict our analysis to the situations facing each country in 1980 and 1995 (or the closest years available). On the x-axis we consider returns to the first decile, while the y-axis depicts returns to the ninth decile. Each point corresponds to the case of each country in one of such years. Results for each country are then connected and a small arrow indicates the direction of the 'movement', from the beginning of the 1980's until the mid-1990's.[38]

A 45º-degree line was also included, representing the loci where point estimates of the returns to the first decile and to the ninth decile are equal. This line also separates the graph in two halves. The top, left-hand-side part includes those countries whose returns to education are higher for the

[36] This situation corresponds to the case of the USA –see Buchinsky (1994).
[37] See Tsakloglou and Antoninis (1999) for an analysis of the impact of public education upon inequality in Greece. The authors conclude that such impact is negative, especially in terms of the primary and secondary levels. Their approach is very different from the one taken in this paper, as they focus on education-related government transfers to households, and not on education-related wage income.
[38] When the years were three or more years different from these, the true years were inserted next to the corresponding point.

highest decile than for the lowest.[39] All countries surveyed can be found in this sub-set, except for Germany[40] and Greece. Denmark and Italy are also close enough to the border that each country's returns at each year are statistically equal.[41]

All the remaining countries, which in the previous classification were placed in the first two groups, can be found in the upper left part of the graph. These countries thus have returns to education which are higher for the top deciles than for the lower deciles.

Another piece of information displayed in this graph is the trend in returns to education at each extreme of the distribution of earnings. Positively-sloped segments correspond to situations where the returns to both the ninth and the first decile are moving in the same way, either increasing or falling. This is the case of all countries, except for Austria, France and Portugal. For these three countries returns at different parts of the distribution are moving in opposite directions.[42]

However, differences in France are not statistically significant, while in Austria only the returns to the first deciles are statistically different. This leaves us with Portugal as the only country where returns at each end of the distribution are moving in opposite ways. The returns at opposite quantiles of the distribution are diverging because the lowest returns (for the bottom decile) are falling, while the higher returns (to the highest decile) are getting even higher.[43]

An interesting way to interpret these overall results is to assume that the only unobserved variable is ability (or motivation) and the education decision is exogenous (not influenced by ability). If this were so, then an OLS regression would produce returns to education for individuals with mean unobserved ability. On the other hand, the results from quantile regressions provide estimates for returns to education for individuals at different percentiles of the ability distribution.

[39] The threshold for statistical difference of point estimates adopted was one standard deviation.
[40] Results for the first period (1984) are not statistically different, however. In this year returns to the lowest quantile were not significantly higher than those of the highest quantile.
[41] This is not true for Denmark in 1995, when returns to the top quantile are higher than returns to the lower quantile. We opted to include this country in this sub-set as the difference is small and the situation applies for 1980.
[42] The returns for Finland and Sweden (only for the ninth decile) are also not significantly different.
[43] It could be argued that Austria should also be included in the first group, as the returns/deciles relationship is not positively sloped as for the second group countries. However, since the relationship is not significantly negatively shaped, we opted for classifying Austria as we did.

To the extent that this assumption holds, the contrasting results obtained must be explained by differences in the way that the education system and/or the labour market of each country deal with individuals with different abilities or by differences in the degree of interaction between schooling and ability. It is then the case that in countries of the third and fourth types (zero- and negatively-sloped returns-deciles curves) the functioning of such institutions[44] compensates for the lower ability of some individuals so that there is no such interaction.

On the other hand, such mechanisms are not in place in countries of the first and second types (positively-sloped returns-deciles curves), who represent a overwhelming majority in our sample.[45] In this case, and given the assumptions above, there is a positive interaction between schooling and ability, whereby schooling exacerbates ability-related differences. This is a result in line with those of 'The Bell curve' (Herrnstein and Murray (1995)) where cognitive ability is seen as the main force explaining social and economic differences.

6. Conclusions

The link between education and inequality is tackled in this paper by considering results from quantile regressions of Mincer/wage equations from fifteen European countries across an approximately fifteen-year period (from 1980 until 1995).

We use this methodology after decomposing the effect of education upon inequality in three terms: inequality due to within- and to between-educational-levels earnings differentials (prices) and to changes in the distribution of schooling (quantities). The first term is associated with the positive returns to education which entail that, on average, more educated individuals earn more, while the second term deals with the different dispersions of conditional distributions of earnings across different educational levels.

By running Mincer equations with the quantiles regression technique, we perceived four different situations. The first case was that of Portugal, where not only do returns increase with the quantiles of the conditional earnings distribution, but the relationship has become more acute

[44] The above-mentioned institutions might comprise specific wage-bargaining systems, special training or vocational systems at the upper secondary level and minimum wage laws.

over time. This suggests a positive and increasing impact of education upon inequality, in the sense that within-levels inequality exists and has been increasing.

In a second case (Austria, Finland, France, Ireland, Netherlands, Norway, Spain, Sweden, Switzerland and the UK) a positive but stable relationship was found. The third group included Denmark and Italy, for whom returns are very similar across the distribution, a result which means that education has neither increased nor decreased inequality. Finally, in a fourth case, Germany and Greece, the returns-quantiles profile is negative, which suggests that, as far as within-levels inequality is concerned, education reduces inequality.

Overall, these international differences provide a summary assessment of the outcome of the *interaction between education systems and labour-market institutions* in each country in terms of wage inequality. Our results prove that such a process works differently across the fifteen-country sample of European countries considered.

However, for a majority of such countries (Austria, Finland, France, Ireland, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the UK), one sees very clearly that the dispersion in earnings increases with the educational levels. In these countries difficult-to-measure *individual-specific characteristics* (e.g., motivation or ability) play a larger role in earnings than in the remaining countries.

If we assume that such characteristics can be proxied by ability then our results say that there is a positive interaction between ability and education: the higher the ability level, the stronger will the impact of schooling be on one's wages. This result supports 'Bell curve' type of arguments which place much emphasis on the role of cognitive ability on economic and social success.

On the other hand, to the extent that prospective students are unaware of their own endowments of such characteristics, this result implies that the risk associated with educational investments is greater in those countries. This is also associated with over-education, in the sense that the marginal reward some individuals reap from their schooling is very low or even negative.

[45] A possible explanation of these results is that there is some interaction between experience and education which takes place at higher wages. This possibility was tested in the case of Portugal but no evidence was found to support it.

In terms of policy-making, these overall results should be useful as they amount to a summary characterisation of the joint functioning of each country's national education system and labour-market institutions. Should wage equality be considered to be a political goal, a country where such joint mechanism promotes inequality might wish, *on both efficiency and equity grounds,* to pinpoint and reverse the underlying causes.

7. References

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Table 1.1 - Changes in market income inequality

Country	Years Change	Market Income Inequality
UK	1981-91	+++
USA	1980-93	+++
Sweden	1980-93	+++
Australia	1980-81	+
Denmark	1980-90	+
New Zealand	1981-89	+
Japan	1981-90	+
Netherlands	1981-89	+
Norway	1982-89	+
Belgium	1985-92	+
Canada	1980-92	+
Israel	1979-92	+
Finland	1981-92	+++
France	1979-89	0
Portugal	1980-90	0
Spain	1980-90	na
Ireland	1980-87	+
West Germany	1983-90	+
Italy	1977-91	-

Designation:	Interpretation:	Range of change in Gini
-	small decline	-5% or more
0	zero	-4% to +4%
+	small increase	5% to 10%
++	moderate increase	10% to 15%
+++	large increase	16% to 29%

Source: Gottschalk and Smeeding (1997), table 4, page 666

Table 2.1 - Gender distribution of hourly earnings

Income Class	Men		Women	
	%obs	tot%	%obs	tot%
5.2	0.0%	0.0%	0.0%	0.0%
5.24	0.0%	0.0%	0.0%	0.0%
5.28	0.0%	0.0%	0.0%	0.0%
5.32	0.1%	0.1%	0.1%	0.1%
5.36	0.2%	0.3%	0.1%	0.2%
5.4	0.3%	0.6%	0.2%	0.4%
5.44	0.3%	0.9%	0.2%	0.6%
5.48	0.3%	1.2%	0.2%	0.8%
5.52	0.3%	1.5%	0.2%	1.0%
5.56	0.5%	2.1%	0.3%	1.3%
5.6	0.8%	2.8%	0.5%	1.8%
5.64	3.5%	6.4%	1.9%	3.7%
5.68	3.2%	9.6%	1.5%	5.2%
5.72	5.1%	*14.7%*	2.0%	7.2%
5.76	3.6%	18.3%	1.7%	8.9%
5.8	4.5%	*22.8%*	2.0%	*10.9%*
5.84	5.7%	28.5%	1.9%	12.8%
5.88	5.7%	*34.2%*	2.5%	15.3%
5.92	5.6%	39.8%	2.3%	17.6%
5.96	4.2%	*44.0%*	2.8%	*20.4%*
6	3.5%	47.5%	3.0%	23.4%
6.04	3.5%	**51.1%**	3.3%	26.7%
6.08	3.2%	54.3%	3.1%	29.8%
6.12	3.0%	57.2%	3.0%	*32.8%*
6.16	2.9%	*60.1%*	3.2%	36.0%
6.2	2.7%	62.8%	4.1%	*40.1%*
6.24	2.6%	65.4%	3.3%	43.4%
6.28	2.6%	68.0%	3.2%	46.6%
6.32	2.2%	*70.2%*	2.8%	49.5%
6.36	2.0%	72.1%	2.7%	**52.2%**
6.4	2.1%	74.2%	2.4%	54.6%
6.44	1.6%	75.8%	2.6%	57.1%
6.48	1.4%	77.3%	2.3%	59.4%
6.52	1.4%	78.7%	2.2%	*61.6%*
6.56	1.5%	*80.2%*	2.1%	63.7%
6.6	1.1%	81.3%	1.9%	65.6%
6.64	1.2%	82.5%	1.9%	67.4%
6.68	1.1%	83.6%	1.9%	69.3%
6.72	1.0%	84.6%	1.8%	*71.1%*
6.76	0.9%	85.5%	1.7%	72.8%
6.8	0.9%	86.3%	1.8%	74.6%
6.84	0.8%	87.1%	1.4%	76.0%
6.88	0.6%	87.7%	1.4%	77.5%
6.92	0.8%	88.5%	1.4%	78.8%
6.96	0.9%	89.4%	1.4%	*80.3%*
7	0.7%	*90.1%*	1.4%	81.7%
7.04	0.7%	90.8%	1.3%	83.0%
7.08	0.7%	91.6%	1.2%	84.1%
7.12	0.7%	92.3%	1.2%	85.4%
7.16	0.6%	92.9%	1.1%	86.4%
7.2	0.7%	93.5%	1.1%	87.6%
7.24	0.5%	94.1%	0.9%	88.5%
7.28	0.5%	94.6%	0.9%	89.4%
7.32	0.5%	95.0%	0.8%	*90.2%*
7.36	0.4%	95.5%	0.8%	91.0%
7.4	0.4%	95.9%	0.8%	91.8%
7.44	0.4%	96.3%	0.7%	92.5%
7.48	0.3%	96.6%	0.5%	93.0%
7.52	0.3%	96.9%	0.5%	93.5%
7.56	0.2%	97.1%	0.5%	94.1%
7.6	0.3%	97.4%	0.4%	94.5%
7.64	0.2%	97.6%	0.5%	95.0%
7.68	0.2%	97.8%	0.4%	95.3%
7.72	0.2%	98.1%	0.4%	95.7%
7.76	0.2%	98.3%	0.4%	96.1%
7.8	0.2%	98.4%	0.3%	96.4%
7.84	0.1%	98.5%	0.3%	96.7%
7.88	0.2%	98.7%	0.3%	97.0%
7.92	0.1%	98.8%	0.2%	97.2%
7.96	0.2%	99.0%	0.3%	97.5%
8	0.1%	99.2%	0.2%	97.8%
8.04	0.1%	99.3%	0.3%	98.0%
8.08	0.1%	99.4%	0.2%	98.2%
8.12	0.0%	99.4%	0.2%	98.4%
8.16	0.1%	99.5%	0.1%	98.6%
8.2	0.1%	99.5%	0.2%	98.7%
8.24	0.0%	99.6%	0.1%	98.9%
8.28	0.0%	99.6%	0.1%	99.0%
8.32	0.0%	99.6%	0.1%	99.1%
8.36	0.1%	99.7%	0.1%	99.2%
8.4	0.0%	99.7%	0.1%	99.3%
8.44	0.0%	99.8%	0.1%	99.4%
8.48	0.0%	99.8%	0.1%	99.5%
8.52	0.0%	99.8%	0.1%	99.5%
8.56	0.0%	99.8%	0.1%	99.6%
8.6	0.0%	99.9%	0.0%	99.6%
8.64	0.0%	99.9%	0.0%	99.7%
8.68	0.0%	99.9%	0.0%	99.7%
8.72	0.0%	99.9%	0.0%	99.7%
8.76	0.0%	99.9%	0.1%	99.8%
8.8	0.0%	99.9%	0.0%	99.8%
8.84	0.0%	99.9%	0.0%	99.8%
8.88	0.0%	100.0%	0.0%	99.9%
8.92	0.0%	100.0%	0.0%	99.9%
8.96	0.0%	100.0%	0.0%	99.9%
9	0.0%	100.0%	0.0%	99.9%
9.04	0.0%	100.0%	0.0%	99.9%
9.08	0.0%	100.0%	0.0%	99.9%
9.12	0.0%	100.0%	0.0%	99.9%
9.16	0.0%	100.0%	0.0%	100.0%
9.2	0.0%	100.0%	0.0%	100.0%

Notes: Right tail of the distribution not described
Bold and underlined: modal class; Italics: classes associated with each decile
Source: *Quadros de Pessoal* , 1995 sample.

Graph 2.1 - Distribution of log hourly earnings, Portugal, 1995, Men and Women

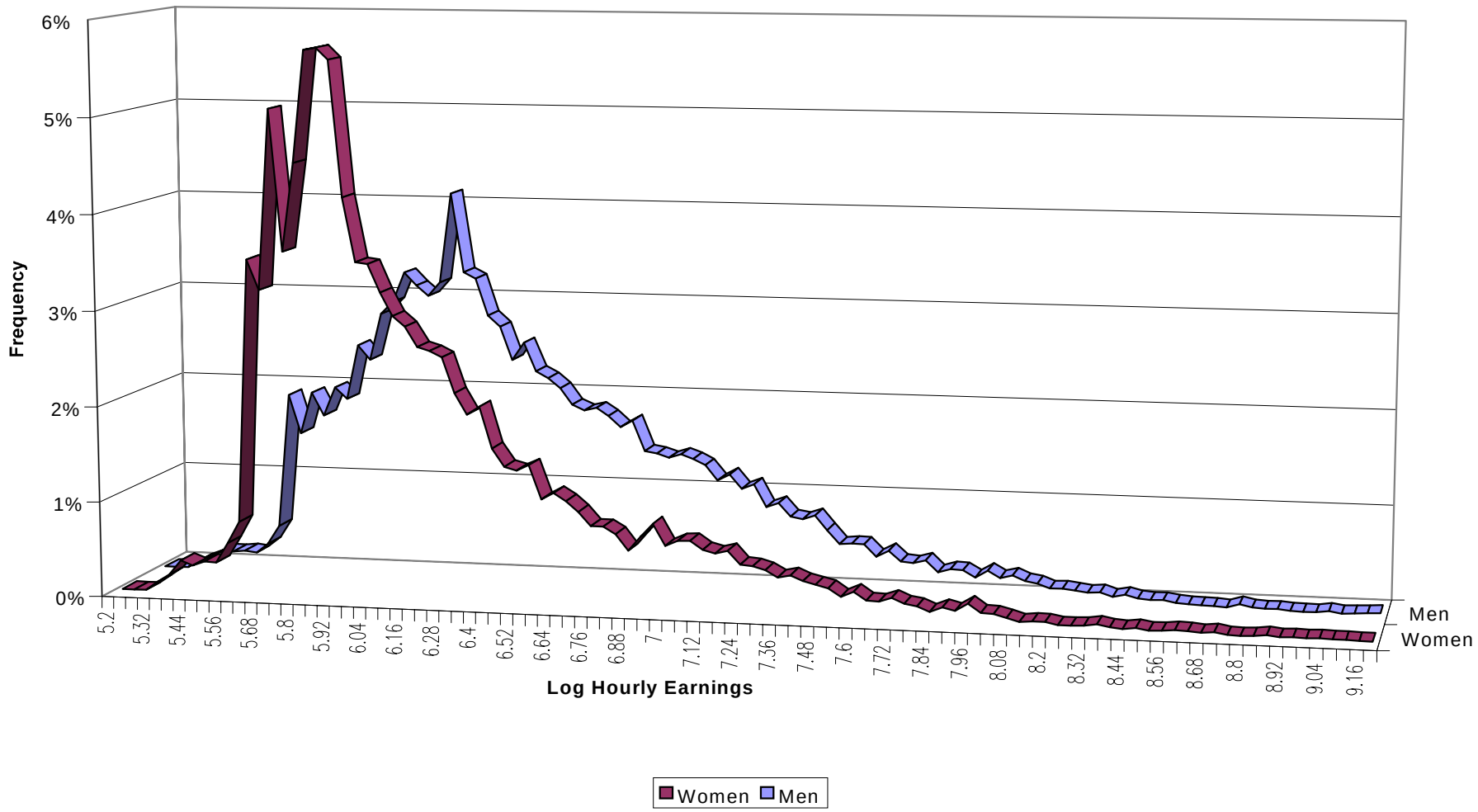


Table 2.2 - Comparison between OLS and Quantile Regressions - Application to gender wage differentials

income	men				women				total diff.	female
classes	hwage	stdev	c.var. (1)	nobs	hwage	stdev	c.var.	nobs	(2)	dummy (3)
1	5.655	0.101	0.018	2799	5.596	0.085	0.015	1882	-0.058	-0.099
2	5.875	0.049	0.008	2791	5.727	0.028	0.005	1880	-0.148	-0.177
3	6.019	0.036	0.006	2794	5.816	0.021	0.004	1883	-0.203	-0.232
4	6.144	0.034	0.005	2795	5.887	0.021	0.004	1878	-0.258	-0.277
5	6.260	0.037	0.006	2794	5.973	0.031	0.005	1880	-0.288	-0.300
6	6.406	0.047	0.007	2795	6.090	0.037	0.006	1881	-0.316	-0.332
7	6.589	0.060	0.009	2796	6.235	0.045	0.007	1881	-0.354	-0.377
8	6.817	0.075	0.011	2793	6.426	0.069	0.011	1880	-0.390	-0.397
9	7.115	0.102	0.014	2795	6.753	0.128	0.019	1881	-0.362	-0.315
10	7.747	0.381	0.049	2794	7.424	0.380	0.051	1880	-0.323	
All (4)	6.463	0.612	0.09	27946	6.193	0.542	0.09	18806	-0.270	-0.270

Notes:
(1) - Coefficient of variation (ratio between standard deviation and mean)
(2) - Difference between women's and men's hourly wage.
(3) - Coefficient obtained in quantile regression (OLS for last row) for 1st, 2nd, …, 9th deciles
(4) - All individuals (no income classes)

Legend: hwage - mean log hourly wage; stdev - standard deviation; nobs - number of observations.

Source: Quadros de Pessoal, 1995 sample.

Table 4.1a - Data-sets description

Country	Data-set	Description	Years	Obs.	Outliers cleaning procedure (1)
Austria	Mikrozensus	1% Household Survey (net wages)	1981 1985 1989 1993	9889 8120 7878 7175	Employees with wages below minimum Social Security contribution level (US$ 320 at 1993 level) Employees below 15 or above 65 years
Denmark	LLMR	Longitudinal Labour Market Register (0.5% sample)	1980 1985 1990 1995	4099 4212 4352 4416	None
Finland	Labour Force Survey	Cross-section labour force survey	1987 1989 1993	1888 2089 1175	Extremely high and low earners Zero earnings and zero hours
France	FQP	Cross-section household survey	1970 1977 1985 1993	15297 14227 12245 4606	Wages below minimum wage and extremely high wages
Germany	GSOEP		1984 1986 1991 1995		
Greece	EOP	Household Budget Survey (net wages)	1974 1988 1994	2267 1860 2096	Zero earning and zero hours, more than 84 hours per week, aged below 14 or above 64, primary sector
Ireland	ESRI	Cross-section household data	1987 1994	1895 1903	
Italy	SHIW	Cross-section household-based dataset	1980 1984 1989 1995	1730 2200 4114 3441	Observations without earnings (missing or equal to zero)

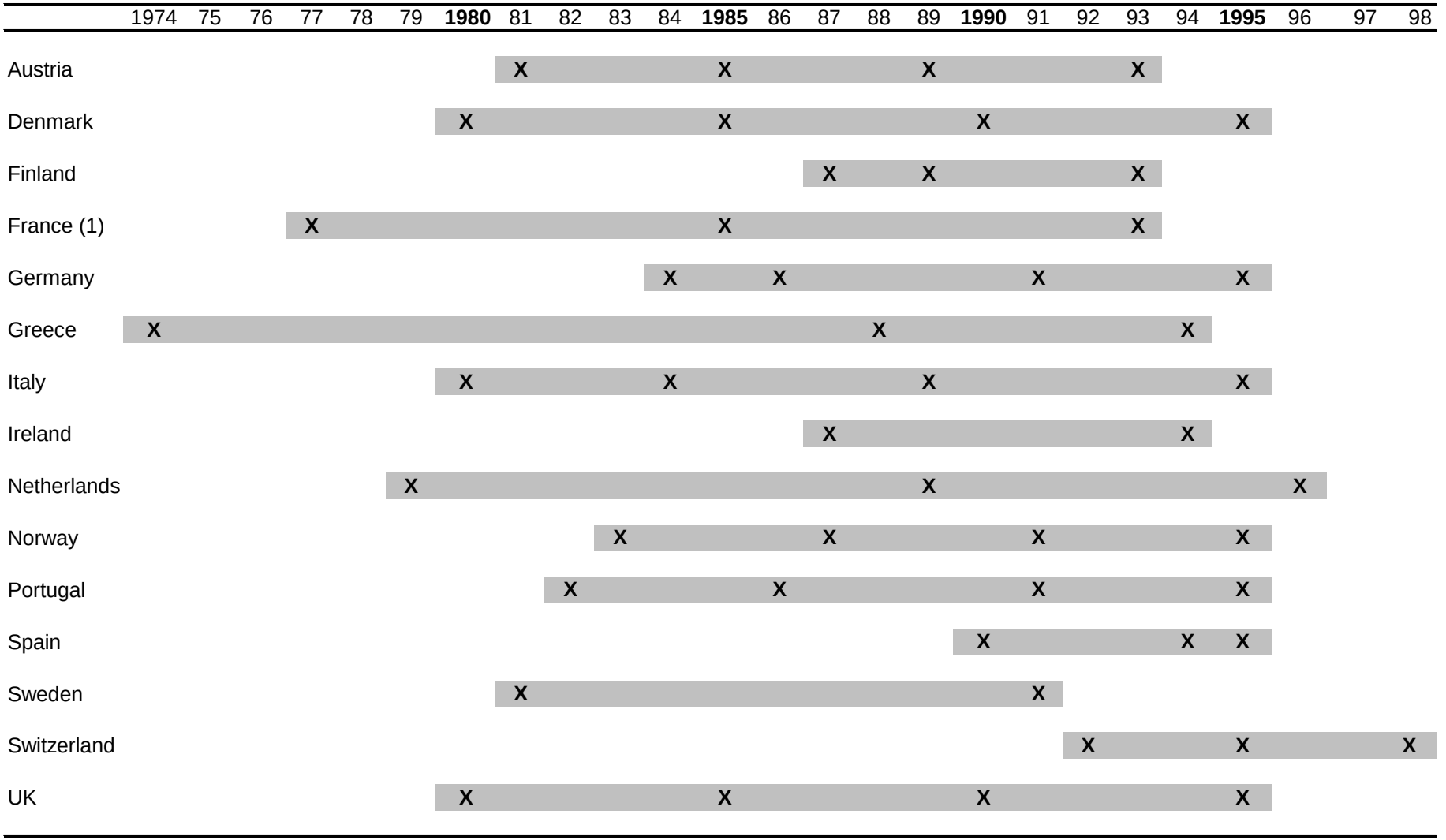
Notes: (1) - Observations which were dropped

Table 4.1b - Data-sets description

Country	Data-set	Description	Years	Obs.	Outliers cleaning procedure (1)
Netherlands	Structure of earnings survey	Cross-section employer-based dataset	1979 1989 1996	40726 12555 49805	Unknown (Statistical agency's responsibility)
Norway	Level of living survey		1983 1987 1991 1995	1037 970 901 870	Earnings below 20 NOK and above 1000 NOK
Portugal	Quadros de Pessoal	Cross-section employer-based data-set	1982 1986 1991 1995	27019 26595 27952 28055	Zero earning and zero hours
Spain	Household Budget S. ECHP Wage Structure S.		1990 1994 1995	9714 2181 118005	
Sweden	Swedish Level of Living Surveys	Cross-sectional data (representative of Swedes)	1981 1991	1658 1508	Zero earnings
Switzerland	Swiss Labour Force Survey	Cross section of the adult population permantently resider in Switzerland	1992 1995 1998	3388 6334 3275	0.5% at the bottom and the top of the wage distribution
UK	Family Expenditures Survey	Longitudinal household survey focused on expenditures	1980 1985 1990 1995	2883 2526 2425 2183	Zero earnings and zero hours Hourly earnings below 1 GBP

Notes: (1) - Observations which were dropped

Table 4.2 - Time span covered by each country's results



Legend: **X** indicates year for each results are presented; the shaded area marks the time-span covered

Notes: (1) Results for France include also 1970.

Table 4.3a - Descriptive statistics

Country	Years	Educ. (1)	Exp. (2)	Log Wage (3)		Wage		
				Mean	St.Dev.	1st dec.	5th dec.	9th dec.
Austria	1981	9.5	22.2	3.99	0.34	37.5	50.0	81.3
	1985	9.7	21.4	4.16	0.34	43.7	62.5	97.5
	1989	9.8	21.3	4.35	0.34	52.6	75.0	118.7
	1993	10.1	21.3	4.57	0.35	65.8	93.8	150.0
Denmark	1980	11.5	18.6	4.42	0.34	59.1	80.7	127.1
	1985	11.7	18.9	4.62	0.33	71.5	97.5	151.4
	1990	11.9	19.2	4.92	0.35	94.6	131.6	214.9
	1995	12.0	19.4	4.97	0.36	96.5	138.4	230.4
Finland	1987	11.0	17.7	3.81	0.37	29.9	43.6	73.7
	1989	11.1	18.4	4.02	0.37	36.1	53.8	90.9
	1993	11.4	19.5	4.16	0.38	41.9	62.1	106.1
France (4)	1970	9.8	21.8	10.61	0.46	13.2	21.6	45.1
	1977	10.5	20.2	10.87	0.42	17.9	28.8	53.8
	1985	11.3	19.1	10.91	0.39	19.2	29.7	53.7
	1993	11.4	21.9	10.92	0.39	19.8	29.8	54.1
Germany								
Greece	1974	7.82	23.41	3.57	0.55			
	1988	9.89	21.55	6.11	0.47			
	1994	10.14	21.87	6.93	0.64			
Ireland	1987	11.5	20.4	1.48	0.52	2.2	4.4	8.3
	1994	12.4	23.8	1.74	0.61	2.5	5.9	11.9
Italy	1980	8.8	24.3	1.24	0.42	2.2	3.6	5.2
	1984	9.2	23.6	1.84	0.39	4.4	6.5	9.4
	1989	9.8	22.9	2.26	0.32	6.5	9.4	13.9
	1995	10.1	22.9	2.52	0.41	7.8	12.5	20.8

Table 4.3b - Descriptive statistics

				Log Wage (3)		Wage		
Country	**Years**	**Educ. (1)**	**Exp. (2)**	**Mean**	**St.Dev.**	**1st dec.**	**5th dec.**	**9th dec.**
Netherlands	1979	11.5	20.3	2.88	0.43	11.4	16.4	33.7
	1989	11.7	19.6	3.01	0.37	13.8	19.6	32.9
	1996	12.5	20.0	3.23	0.46	15.5	24.9	43.8
Norway	1983	11.2	21.3	3.96	0.30	37.9	51.7	78.2
	1987	11.5	19.8	4.31	0.32	51.4	73.6	109.2
	1991	11.9	21.8	4.53	0.30	68.4	92.0	136.2
	1995	12.2	20.9	4.65	0.33	71.4	101.1	158.0
Portugal	1982	4.9	25.1	4.58	0.52	56	92	194
	1986	5.3	26.0	5.35	0.56	118	191	471
	1991	5.9	25.3	6.06	0.59	228	379	979
	1995	6.5	24.5	6.42	0.61	318	531	1456
Spain (5)	1990	7.3	25.0	14.37	0.46	555.8	924.6	1809.8
	1994	9.8	24.8	7.61	0.49	1104.5	1955.5	3813.6
	1995	8.8	26.0	7.30	0.52	761.0	1410.3	2998.6
Sweden	1981	10.7	21.7	3.67	0.30	29.0	37.0	57.0
	1991	11.8	21.5	4.45	0.31	61.0	81.0	127.0
Switzerland	1992	13.1	19.3	3.57	0.39	23.1	34.4	58.1
	1995	13.2	19.8	3.60	0.40	23.9	35.9	60.3
	1998	13.3	20.3	3.63	0.38	25.1	36.8	60.8
UK	1980	11.0	24.8	1.79	0.40	3.8	5.9	9.8
	1985	11.4	23.8	1.87	0.44	3.9	6.3	11.2
	1990	11.9	23.1	1.98	0.48	4.1	7.1	13.0
	1995	12.3	22.6	2.00	0.49	4.1	7.3	13.5

Notes: (1) - Average education years in each sample (2) - Average years of experience
(3) - For all countries except Austria, Italy and Greece the dependent variable was log gross wages.
(4) - Log Wages refer to yearly earnings. Wages refer to hourly wages (assuming 1760 hours worked per year). All results are in 1980 francs.
(5) - Results for 1990 are based in yearly earnings. Hourly wages for that year were computed assuming 1760 hours worked per year.

Table 4.4a - Inequality computations

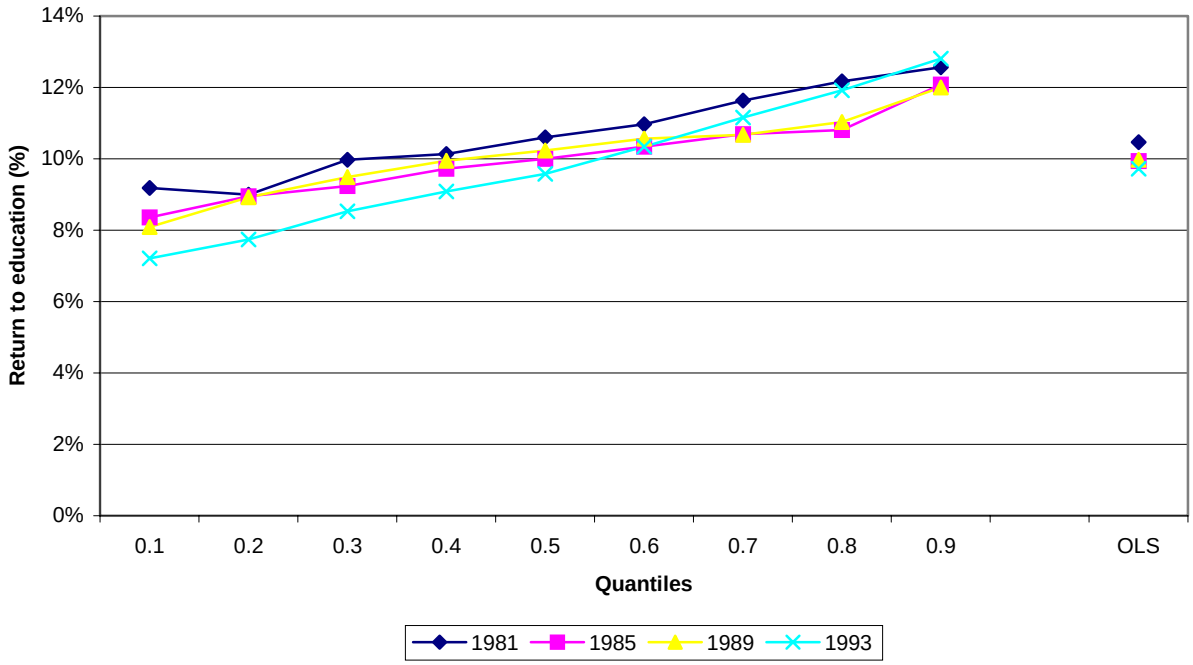
Country	Years	Wage Ratios (1) 9/1	9/5	5/1	Log Wage Diff. (2)
Austria	1981	2.17	1.63	1.33	0.77
	1985	2.23	1.56	1.43	0.80
	1989	2.26	1.58	1.43	0.81
	1993	2.28	1.60	1.43	0.82
Denmark	1980	2.15	1.57	1.37	0.77
	1985	2.12	1.55	1.36	0.75
	1990	2.27	1.63	1.39	0.82
	1995	2.39	1.67	1.43	0.87
Finland	1987	2.47	1.69	1.46	0.90
	1989	2.52	1.69	1.49	0.92
	1993	2.53	1.71	1.48	0.93
France	1970	3.42	2.09	1.64	1.23
	1977	3.01	1.87	1.61	1.10
	1985	2.80	1.81	1.55	1.03
	1993	2.73	1.81	1.50	1.00
Germany					
Greece					
Ireland	1987	3.68	1.86	1.98	0.57
	1994	4.74	2.01	2.36	0.68
Italy	1980	2.38	1.43	1.67	0.87
	1984	2.12	1.44	1.47	0.75
	1989	2.13	1.48	1.44	0.76
	1995	2.67	1.67	1.60	0.98

Table 4.4b - Inequality computations

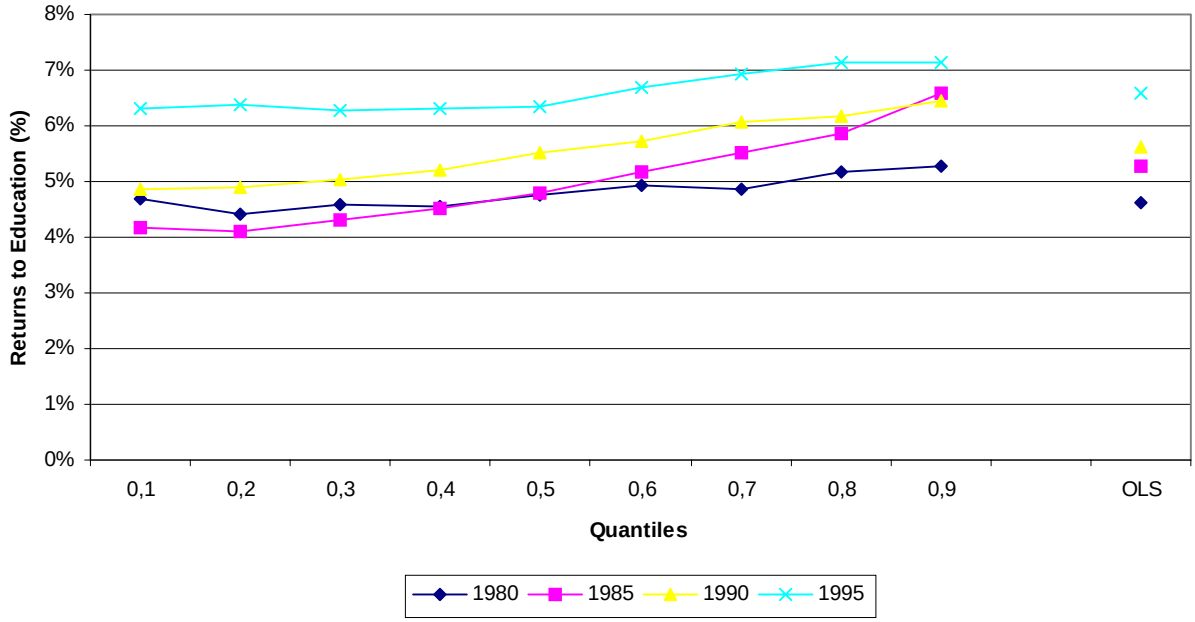
Country	Years	Wage Ratios (1) 9/1	9/5	5/1	Log Wage Diff. (2)
Netherlands	1979	2.96	2.06	1.44	0.47
	1989	2.38	1.68	1.42	0.38
	1996	2.83	1.75	1.61	0.45
Norway	1983	2.06	1.51	1.36	0.72
	1987	2.12	1.48	1.43	0.75
	1991	1.99	1.48	1.34	0.69
	1995	2.21	1.56	1.42	0.79
Portugal	1982	3.46	2.12	1.63	1.24
	1986	3.99	2.46	1.62	1.38
	1991	4.30	2.58	1.66	1.46
	1995	4.58	2.74	1.67	1.52
Spain	1990	3.26	1.96	1.66	1.18
	1994	3.45	1.95	1.77	1.24
	1995	3.94	2.13	1.85	1.37
Sweden	1981	1.97	1.54	1.28	0.68
	1991	2.08	1.57	1.33	0.73
Switzerland	1992	2.51	1.69	1.49	0.92
	1995	2.53	1.68	1.51	0.93
	1998	2.42	1.65	1.46	0.88
UK	1980	2.58	1.66	1.56	0.95
	1985	2.86	1.77	1.61	1.05
	1990	3.17	1.84	1.73	1.16
	1995	3.33	1.85	1.80	1.20

Notes:
(1) - Ratio of Wages corresponding to different deciles (1st, 5th and 9
(2) - Difference of Log Wages between 9th and 1st deciles

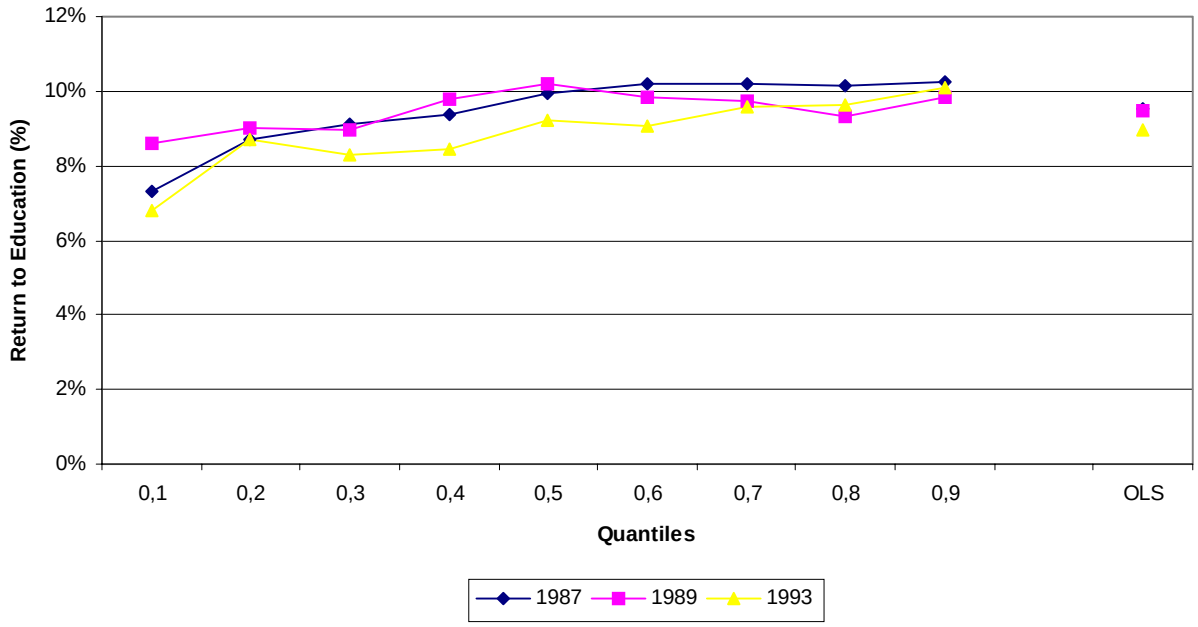
Graph 5.1 - Returns to Education in Austria, 1981-1993
Quantile and OLS regressions



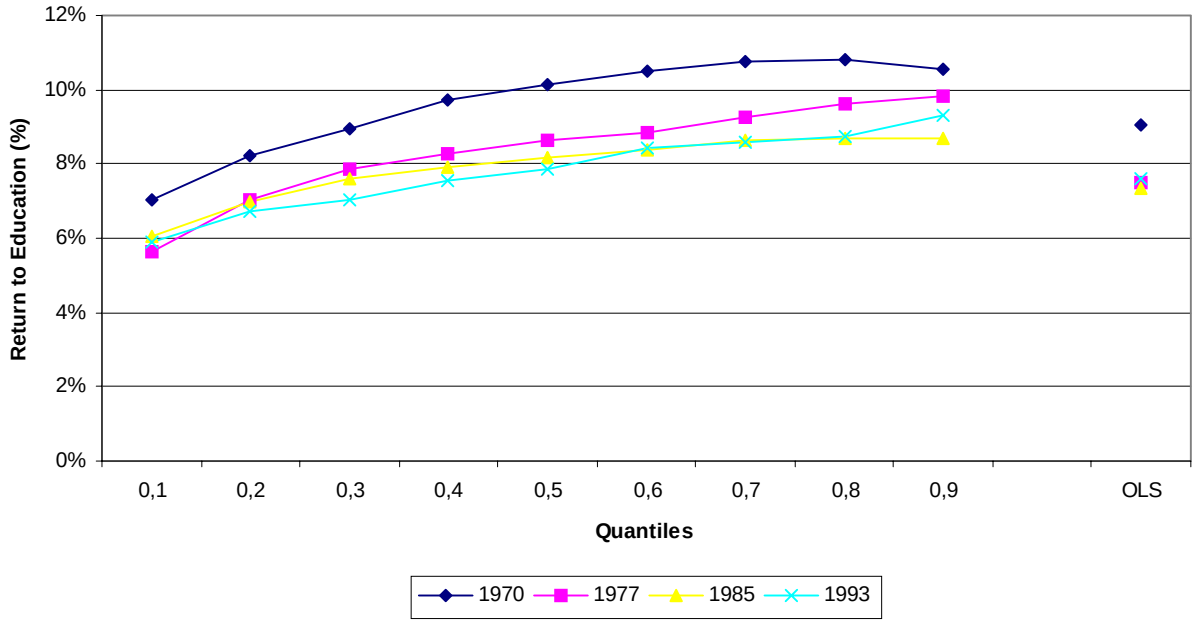
Graph 5.2 - Return to Education in Denmark, 1980-1995
Quantile and OLS regressions



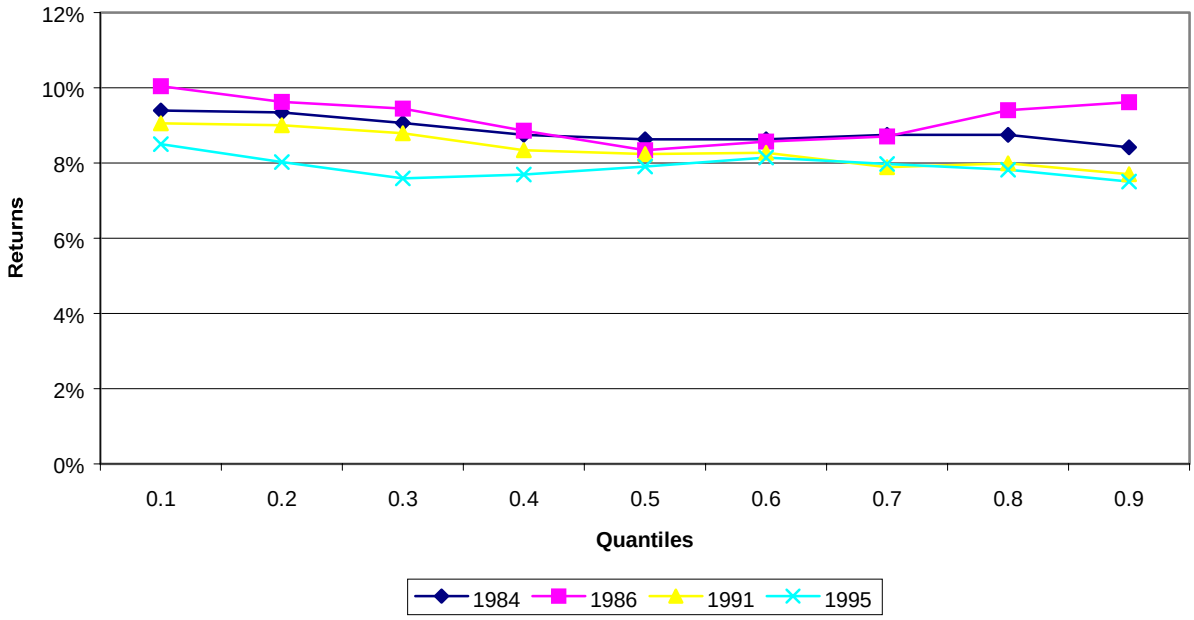
Graph 5.3 - Returns to Education in Finland, 1987-1993
Quantile and OLS regressions



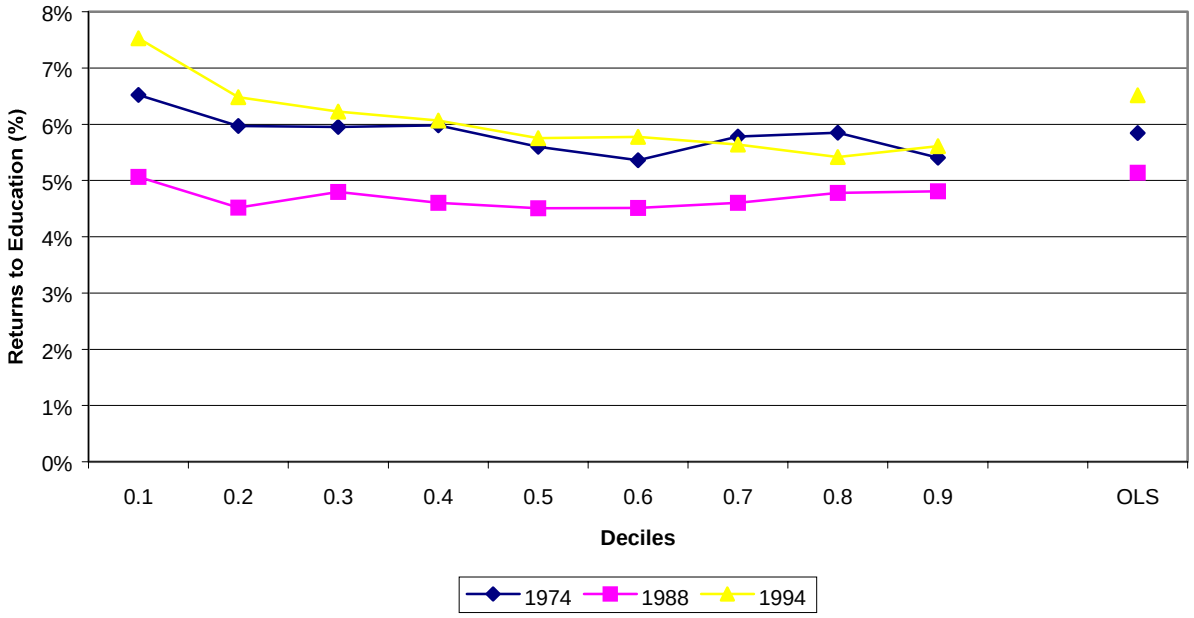
Graph 5.4 - Returns to Education in France, 1970-1993
Quantile and OLS regressions



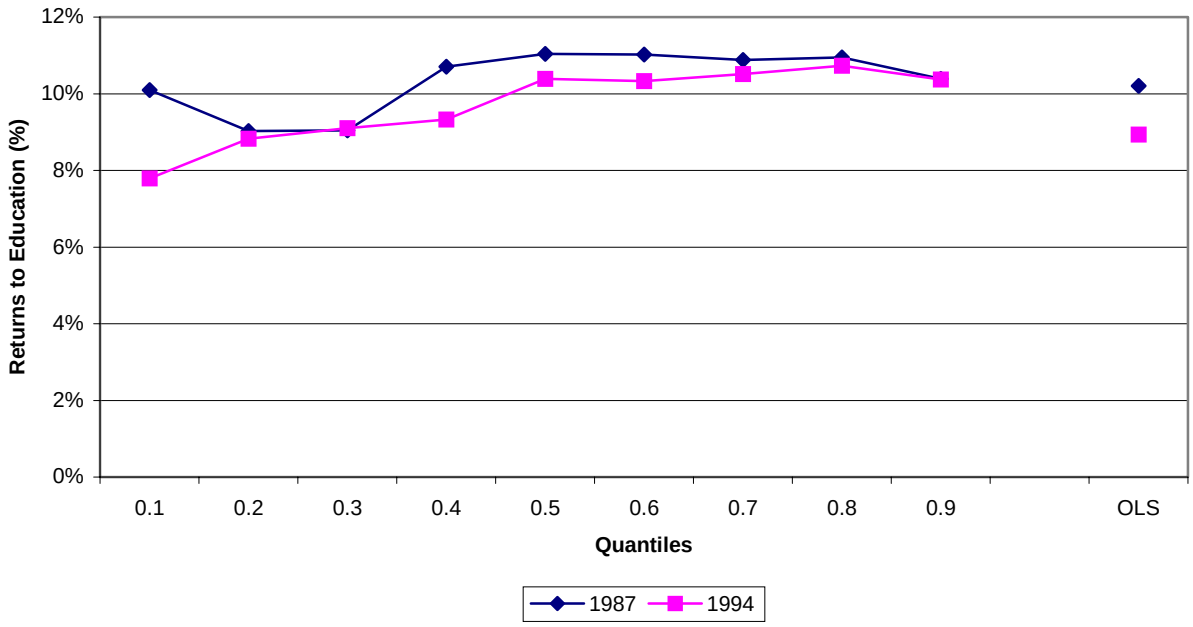
Graph 5.5 - Returns to Education in Germany, 1984-1995
Quantile regressions



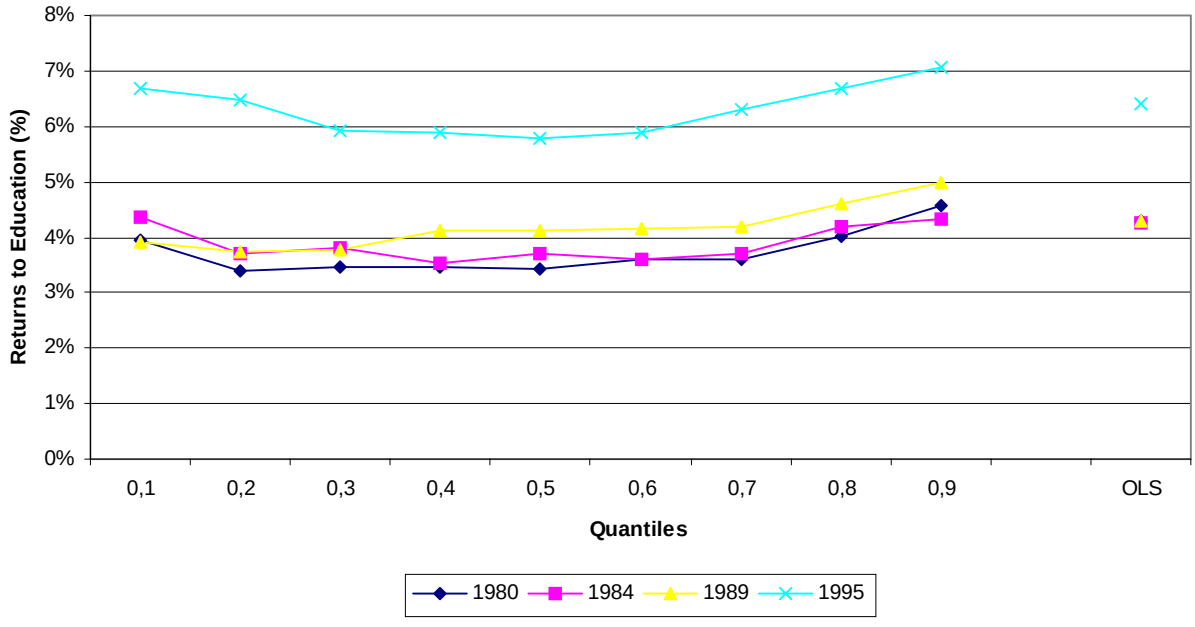
Graph 5.6 - Returns to Education in Greece, 1974-1994
Quantile and OLS regressions



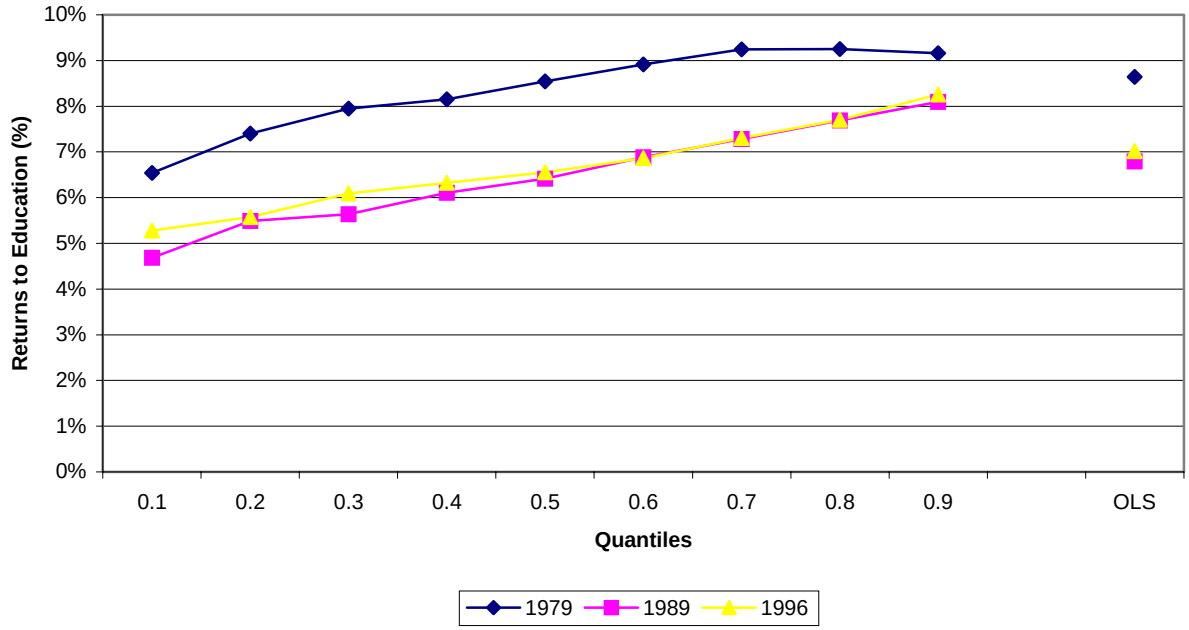
Graph 5.7 - Returns to Education in Ireland, 1987-1994
Quantile and OLS regressions



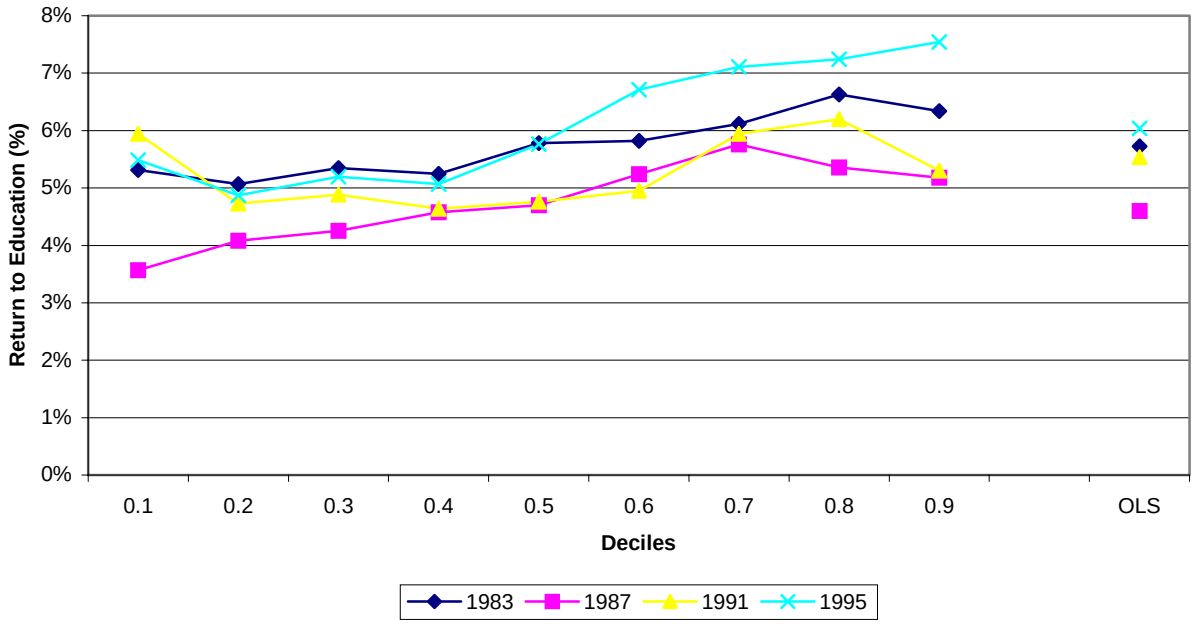
Graph 5.8 - Returns to Education in Italy, 1980-1995,
Quantile and OLS regressions



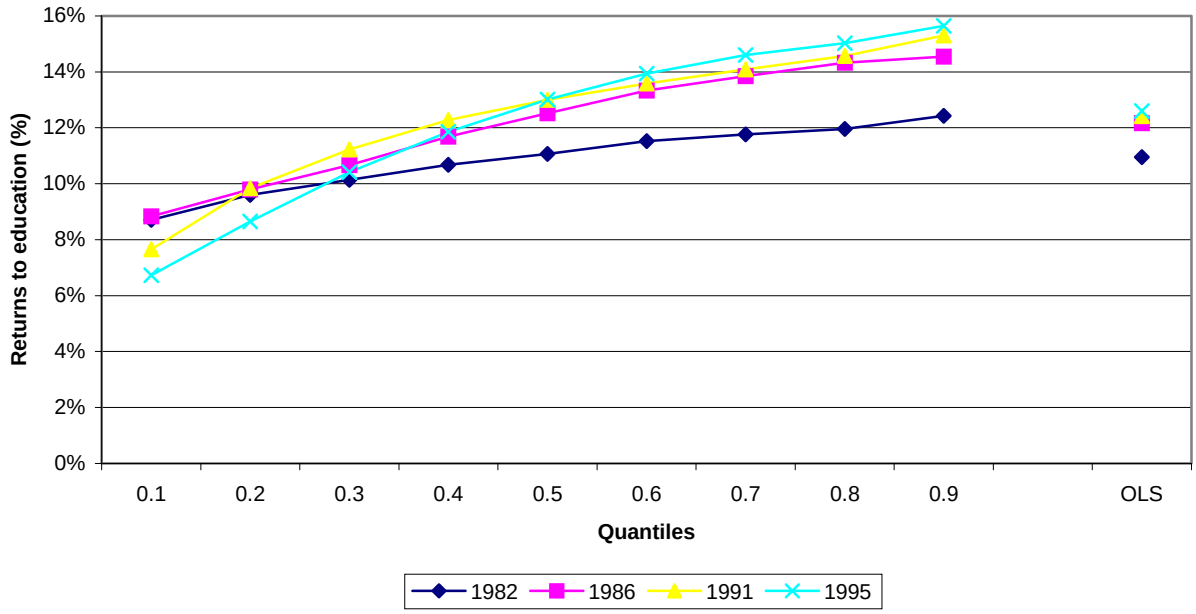
Graph 5.9 - Returns to Education in the Netherlands, 1979-1996
Quantile and OLS regressions



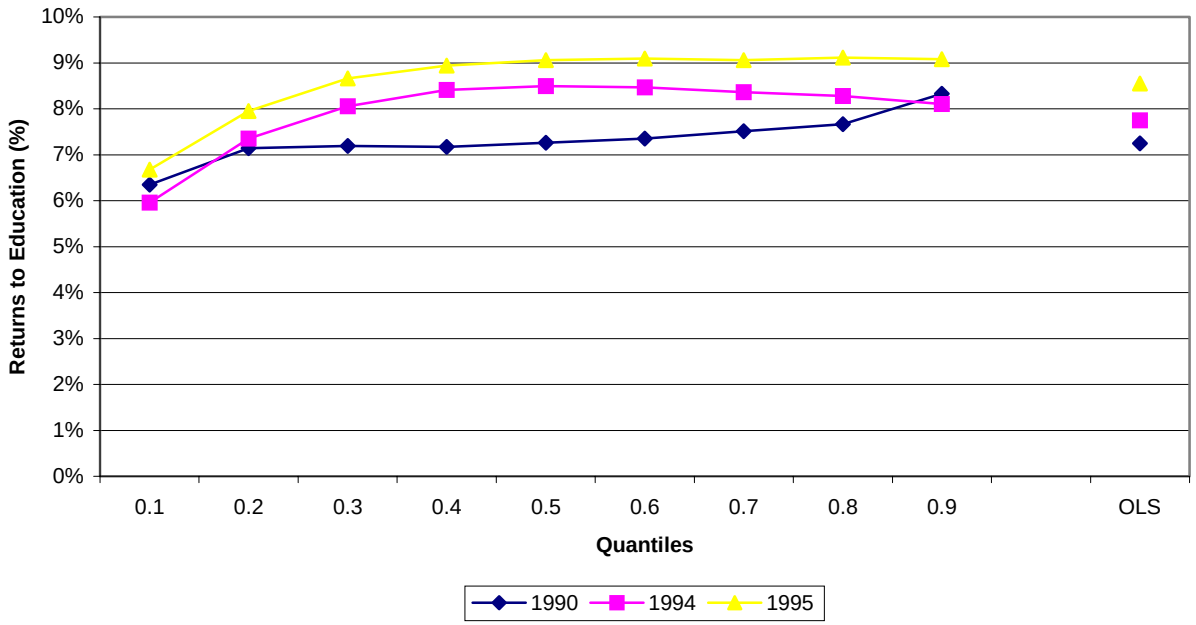
Graph 5.10 - Returns to Education in Norway, 1983-1995
Quantile and OLS Regressions



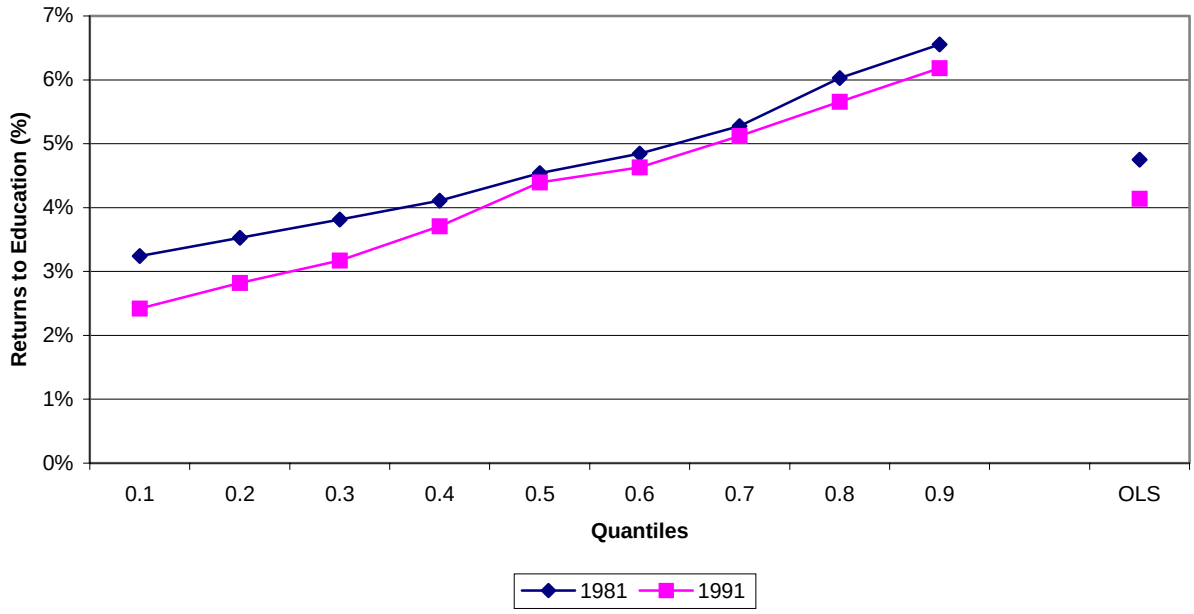
Graph 5.11 - Returns to Education in Portugal, 1982-1995
Quantile and OLS regressions



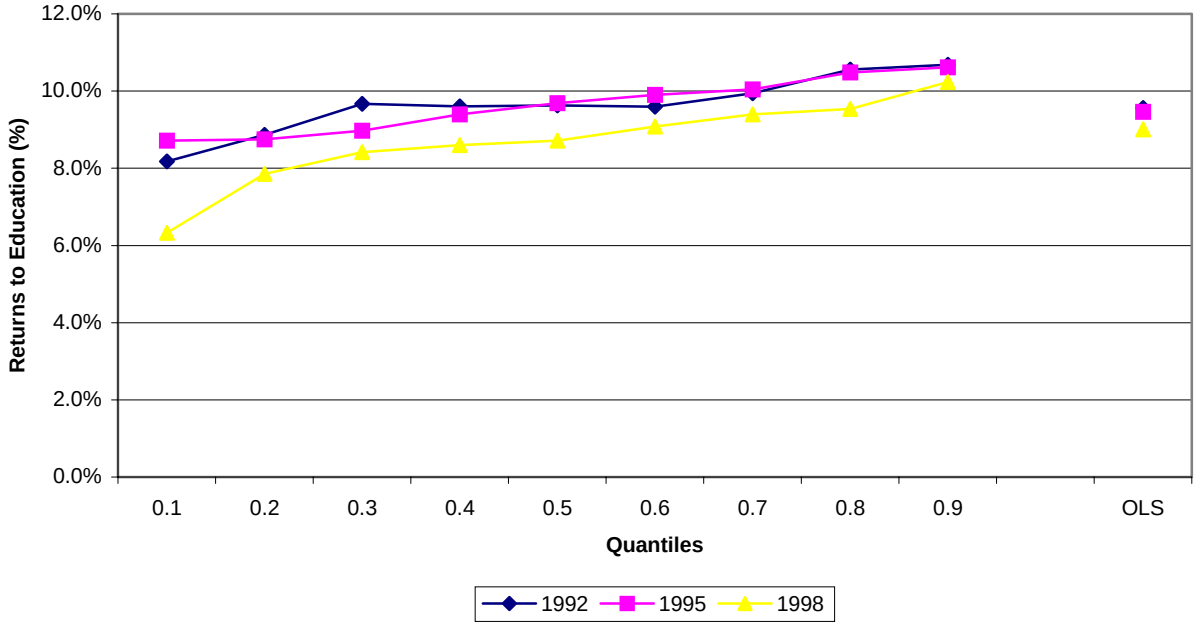
Graph 5.12 - Returns to Education in Spain, 1990-1995
Quantile and OLS regressions



Graph 5.13 - Returns to Education in Sweden, 1981-1991
Quantile and OLS regressions



Graph 5.14 - Returns to Education in Switzerland, 1992-1998
Quantile and OLS regressions



Graph 5.15 - Returns to Education in the UK, 1980-1995
Quantile and OLS regressions

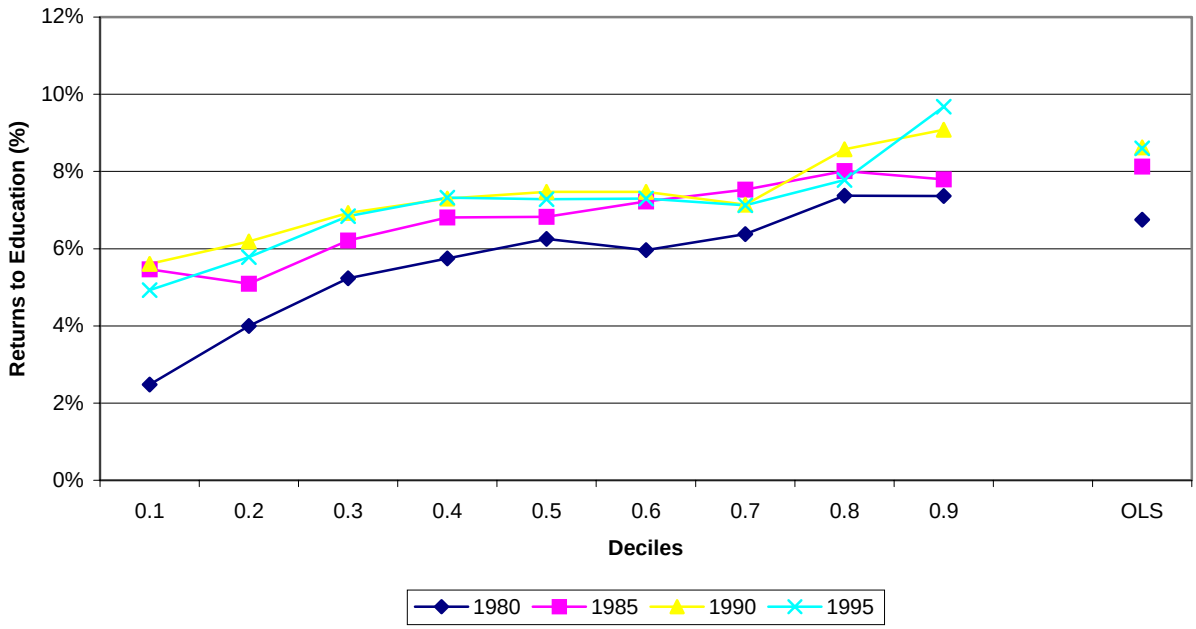


Table 5.1 - Quantile regressions results (coefficients and SE's)

Austria

	1981		1985		1989		1993	
0,1	0,088	0,0048	0,080	0,0032	0,078	0,0047	0,070	0,0034
0,2	0,086	0,0030	0,086	0,0027	0,086	0,0029	0,075	0,0030
0,3	0,095	0,0023	0,088	0,0035	0,091	0,0029	0,082	0,0020
0,4	0,097	0,0035	0,093	0,0023	0,095	0,0020	0,087	0,0028
0,5	0,101	0,0034	0,095	0,0024	0,097	0,0022	0,091	0,0031
0,6	0,104	0,0039	0,098	0,0025	0,100	0,0022	0,098	0,0034
0,7	0,110	0,0050	0,102	0,0029	0,101	0,0031	0,106	0,0042
0,8	0,115	0,0042	0,103	0,0042	0,105	0,0030	0,113	0,0031
0,9	0,118	0,0047	0,114	0,0039	0,113	0,0049	0,120	0,0046
OLS	0,100	0,0019	0,095	0,0020	0,095	0,0023	0,093	0,0021

Denmark

	1980		1985		1990		1995	
0,1	0,046	0,0021	0,041	0,0023	0,047	0,0023	0,061	0,0026
0,2	0,043	0,0021	0,040	0,0019	0,048	0,0018	0,062	0,0020
0,3	0,045	0,0017	0,042	0,0016	0,049	0,0017	0,061	0,0016
0,4	0,044	0,0016	0,044	0,0018	0,051	0,0021	0,061	0,0017
0,5	0,047	0,0015	0,047	0,0020	0,054	0,0021	0,061	0,0021
0,6	0,048	0,0023	0,050	0,0019	0,056	0,0023	0,065	0,0019
0,7	0,047	0,0022	0,054	0,0023	0,059	0,0027	0,067	0,0024
0,8	0,050	0,0031	0,057	0,0031	0,060	0,0032	0,069	0,0024
0,9	0,051	0,0049	0,064	0,0035	0,062	0,0043	0,069	0,0041
OLS	0,045	0,0020	0,051	0,0018	0,055	0,0019	0,064	0,0018

Finland

	1987		1989		1993	
0,1	0,070	0,0061	0,083	0,0061	0,066	0,0067
0,2	0,083	0,0046	0,086	0,0033	0,083	0,0048
0,3	0,087	0,0042	0,086	0,0038	0,080	0,0052
0,4	0,090	0,0036	0,094	0,0043	0,081	0,0042
0,5	0,095	0,0040	0,097	0,0032	0,088	0,0045
0,6	0,097	0,0043	0,094	0,0047	0,087	0,0050
0,7	0,097	0,0047	0,093	0,0043	0,092	0,0048
0,8	0,096	0,0056	0,089	0,0056	0,092	0,0062
0,9	0,098	0,0082	0,094	0,0081	0,096	0,0096
OLS	0,091	0,0037	0,090	0,0035	0,086	0,0042

France

	1970		1977		1985		1993	
0,1	0,0680	0,00155	0,0549	0,00207	0,0588	0,00149	0,0571	0,00203
0,2	0,0789	0,00135	0,0678	0,00125	0,0675	0,00129	0,0652	0,00197
0,3	0,0855	0,00133	0,0759	0,00122	0,0734	0,00097	0,0682	0,00183
0,4	0,0929	0,00128	0,0794	0,00100	0,0763	0,00107	0,0728	0,00188
0,5	0,0968	0,00129	0,0827	0,00106	0,0786	0,00117	0,0755	0,00174
0,6	0,0997	0,00115	0,0850	0,00111	0,0804	0,00108	0,0809	0,00210
0,7	0,1021	0,00131	0,0886	0,00111	0,0828	0,00119	0,0825	0,00216
0,8	0,1025	0,00133	0,0919	0,00123	0,0835	0,00141	0,0840	0,00290
0,9	0,1005	0,00183	0,0938	0,00150	0,0835	0,00157	0,0890	0,00345
OLS	0,0866	0,00100	0,0723	0,00095	0,0710	0,00092	0,0733	0,00156

Table 5.1 - Quantile regressions results (cont.)

Germany

	1984		1986		1991		1995	
0.1	0.090	0.0043	0.096	0.0059	0.087	0.0044	0.082	0.0045
0.2	0.089	0.0030	0.092	0.0030	0.086	0.0038	0.077	0.0053
0.3	0.087	0.0034	0.090	0.0035	0.084	0.0035	0.073	0.0032
0.4	0.084	0.0033	0.085	0.0037	0.080	0.0042	0.074	0.0033
0.5	0.083	0.0036	0.080	0.0036	0.079	0.0047	0.076	0.0033
0.6	0.083	0.0035	0.082	0.0027	0.080	0.0030	0.078	0.0032
0.7	0.084	0.0024	0.084	0.0040	0.076	0.0034	0.077	0.0030
0.8	0.084	0.0044	0.090	0.0053	0.077	0.0059	0.075	0.0037
0.9	0.081	0.0057	0.092	0.0075	0.074	0.0034	0.072	0.0044

Greece

	1974		1988		1994	
0.1	0.063	0.0031	0.049	0.0043	0.073	0.0072
0.2	0.058	0.0024	0.044	0.0032	0.063	0.0043
0.3	0.058	0.0022	0.047	0.0025	0.060	0.0041
0.4	0.058	0.0023	0.045	0.0023	0.059	0.0028
0.5	0.054	0.0024	0.044	0.0020	0.056	0.0027
0.6	0.052	0.0030	0.044	0.0020	0.056	0.0028
0.7	0.056	0.0036	0.045	0.0027	0.055	0.0029
0.8	0.057	0.0042	0.047	0.0034	0.053	0.0034
0.9	0.053	0.0050	0.047	0.0042	0.055	0.0047
OLS	0.057	0.0024	0.050	0.0027	0.063	0.0033

Ireland

	1987		1994	
0.1	0.096	0.0089	0.075	0.0102
0.2	0.086	0.0083	0.085	0.0056
0.3	0.087	0.0066	0.087	0.0048
0.4	0.102	0.0049	0.089	0.0040
0.5	0.105	0.0060	0.099	0.0052
0.6	0.105	0.0057	0.098	0.0055
0.7	0.103	0.0055	0.100	0.0044
0.8	0.104	0.0073	0.102	0.0032
0.9	0.099	0.0087	0.099	0.0049
OLS	0.097	0.0053	0.086	0.0047

Italy

	1980		1984		1989		1995	
0.1	0.039	0.0052	0.043	0.0037	0.039	0.0021	0.065	0.0034
0.2	0.033	0.0035	0.036	0.0026	0.037	0.0017	0.063	0.0024
0.3	0.034	0.0018	0.037	0.0020	0.037	0.0014	0.057	0.0021
0.4	0.034	0.0025	0.035	0.0019	0.040	0.0016	0.057	0.0017
0.5	0.034	0.0018	0.036	0.0019	0.040	0.0018	0.056	0.0015
0.6	0.035	0.0078	0.035	0.0014	0.041	0.0018	0.057	0.0019
0.7	0.035	0.0017	0.037	0.0022	0.041	0.0014	0.061	0.0020
0.8	0.039	0.0022	0.041	0.0021	0.045	0.0020	0.065	0.0026
0.9	0.045	0.0036	0.042	0.0033	0.049	0.0027	0.068	0.0033
OLS	0.042	0.0025	0.042	0.0021	0.042	0.0013	0.062	0.0017

Table 5.1 - Quantile regressions results (cont.)

Netherlands

	1979		1989		1996	
0.1	0.063	0.0006	0.046	0.0011	0.051	0.0014
0.2	0.071	0.0007	0.053	0.0008	0.054	0.0008
0.3	0.076	0.0008	0.055	0.0008	0.059	0.0008
0.4	0.078	0.0008	0.059	0.0009	0.061	0.0007
0.5	0.082	0.0008	0.062	0.0009	0.063	0.0007
0.6	0.085	0.0010	0.067	0.0011	0.066	0.0008
0.7	0.088	0.0009	0.070	0.0012	0.070	0.0008
0.8	0.088	0.0011	0.074	0.0014	0.074	0.0010
0.9	0.088	0.0013	0.078	0.0021	0.079	0.0013
OLS	0.083	0.0004	0.066	0.0008	0.068	0.0006

Norway

	1983		1987		1991		1995	
0.1	0.052	0.0049	0.035	0.0062	0.058	0.0070	0.053	0.0071
0.2	0.049	0.0033	0.040	0.0042	0.046	0.0043	0.048	0.0043
0.3	0.052	0.0031	0.042	0.0037	0.048	0.0031	0.051	0.0042
0.4	0.051	0.0034	0.045	0.0044	0.045	0.0028	0.049	0.0025
0.5	0.056	0.0032	0.046	0.0041	0.046	0.0028	0.056	0.0039
0.6	0.057	0.0032	0.051	0.0037	0.048	0.0036	0.065	0.0044
0.7	0.059	0.0037	0.056	0.0038	0.058	0.0043	0.069	0.0060
0.8	0.064	0.0037	0.052	0.0050	0.060	0.0039	0.070	0.0049
0.9	0.061	0.0064	0.051	0.0060	0.052	0.0071	0.073	0.0080
OLS	0.056	0.0030	0.045	0.0035	0.054	0.0035	0.059	0.0039

Portugal

	1982		1986		1991		1995	
0.1	0.083	0.0012	0.085	0.0012	0.074	0.0009	0.065	0.0010
0.2	0.092	0.0010	0.093	0.0009	0.094	0.0008	0.083	0.0010
0.3	0.097	0.0009	0.101	0.0010	0.106	0.0009	0.099	0.0009
0.4	0.101	0.0009	0.110	0.0009	0.116	0.0009	0.112	0.0009
0.5	0.105	0.0010	0.118	0.0011	0.122	0.0009	0.122	0.0009
0.6	0.109	0.0011	0.125	0.0010	0.127	0.0009	0.131	0.0011
0.7	0.111	0.0011	0.130	0.0012	0.132	0.0011	0.136	0.0012
0.8	0.113	0.0013	0.134	0.0012	0.136	0.0013	0.140	0.0013
0.9	0.117	0.0016	0.136	0.0019	0.142	0.0017	0.145	0.0017
OLS	0.104	0.0009	0.115	0.0009	0.117	0.0009	0.119	0.0009

Spain

	1990		1994		1995	
0.1	0.062	0.0013	0.058	0.0028	0.065	0.0004
0.2	0.069	0.0011	0.071	0.0030	0.076	0.0004
0.3	0.069	0.0012	0.077	0.0029	0.083	0.0004
0.4	0.069	0.0011	0.081	0.0032	0.086	0.0004
0.5	0.070	0.0009	0.082	0.0026	0.087	0.0004
0.6	0.071	0.0012	0.081	0.0032	0.087	0.0004
0.7	0.072	0.0013	0.080	0.0040	0.087	0.0004
0.8	0.074	0.0014	0.080	0.0042	0.087	0.0005
0.9	0.080	0.0019	0.078	0.0040	0.087	0.0006
OLS	0.070	0.0095	0.075	0.0024	0.082	0.0003

Table 5.1 - Quantile regressions results (cont.)

Sweden

	1981		1991	
0,1	0,032	0,0024	0,024	0,0027
0,2	0,035	0,0016	0,028	0,0021
0,3	0,037	0,0018	0,031	0,0022
0,4	0,040	0,0017	0,036	0,0023
0,5	0,044	0,0016	0,043	0,0026
0,6	0,047	0,0020	0,045	0,0025
0,7	0,051	0,0023	0,050	0,0029
0,8	0,059	0,0030	0,055	0,0036
0,9	0,063	0,0041	0,060	0,0044
OLS	0,046	0,0020	0,041	0,0022

Switzerland

	1992		1995		1998	
0,1	0,079	0,0050	0,084	0,0036	0,061	0,0037
0,2	0,085	0,0033	0,084	0,0024	0,076	0,0030
0,3	0,092	0,0028	0,086	0,0022	0,081	0,0022
0,4	0,092	0,0029	0,090	0,0016	0,082	0,0025
0,5	0,092	0,0023	0,092	0,0014	0,084	0,0025
0,6	0,092	0,0025	0,094	0,0018	0,087	0,0023
0,7	0,095	0,0028	0,096	0,0016	0,090	0,0028
0,8	0,100	0,0025	0,100	0,0020	0,091	0,0030
0,9	0,102	0,0046	0,101	0,0026	0,097	0,0036
OLS	0,091	0,0026	0,090	0,0019	0,086	0,0024

United Kingdom

	1980		1985		1990		1995	
0,1	0,024	0,0049	0,053	0,0054	0,055	0,0067	0,048	0,0070
0,2	0,039	0,0041	0,050	0,0046	0,060	0,0047	0,056	0,0056
0,3	0,051	0,0042	0,060	0,0041	0,067	0,0051	0,066	0,0053
0,4	0,056	0,0034	0,066	0,0036	0,070	0,0049	0,071	0,0047
0,5	0,061	0,0036	0,066	0,0046	0,072	0,0051	0,070	0,0042
0,6	0,058	0,0031	0,070	0,0034	0,072	0,0038	0,070	0,0036
0,7	0,062	0,0039	0,073	0,0040	0,069	0,0037	0,069	0,0040
0,8	0,071	0,0039	0,077	0,0051	0,082	0,0043	0,075	0,0049
0,9	0,071	0,0058	0,075	0,0047	0,087	0,0053	0,092	0,0060
OLS	0,065	0,0034	0,078	0,0038	0,083	0,0039	0,083	0,0041

Table 5.2 - Summary of results

Country	Years	1st dec.	9th dec.	OLS
Austria	**1981**	9.2%	12.6%	10.5%
	1993	7.2%	12.8%	9.7%
Denmark	**1980**	4.7%	5.3%	4.6%
	1995	6.3%	7.1%	6.6%
Finland	**1987**	7.3%	10.3%	9.5%
	1993	6.8%	10.1%	8.9%
France	**1977**	5.6%	9.8%	7.5%
	1993	5.9%	9.3%	7.6%
Germany	**1984**	9.4%	8.4%	
	1995	8.5%	7.5%	
Greece	**1974**	6.5%	5.4%	5.8%
	1994	7.5%	5.6%	6.5%
Italy	**1980**	3.9%	4.6%	4.3%
	1995	6.7%	7.1%	6.4%
Ireland	**1987**	10.1%	10.4%	10.2%
	1994	7.8%	10.4%	8.9%
Netherlands	**1979**	6.5%	9.2%	8.6%
	1996	5.3%	8.3%	7.0%
Norway	**1983**	5.3%	6.3%	5.7%
	1995	5.5%	7.5%	6.0%
Portugal	**1982**	8.7%	12.4%	11.0%
	1995	6.7%	15.6%	12.6%
Spain	**1990**	6.4%	8.3%	7.2%
	1995	6.7%	9.1%	8.6%
Sweden	**1981**	3.2%	6.6%	4.7%
	1991	2.4%	6.2%	4.1%
Switzerland	**1992**	8.2%	10.7%	9.6%
	1998	6.3%	10.2%	9.0%
UK	**1980**	2.5%	7.4%	6.7%
	1995	4.9%	9.7%	8.6%
Means	**First Year**	6.3%	8.5%	7.6%
St. Dev.		2.3%	2.6%	2.3%
Coeff. Var.		0.36	0.31	0.31
Means	**Last year**	6.1%	9.2%	7.9%
St. Dev.		1.4%	2.7%	2.0%
Coeff. Var.		0.22	0.29	0.26

Table 5.3 - Comparisons of results at 1980 and 1995

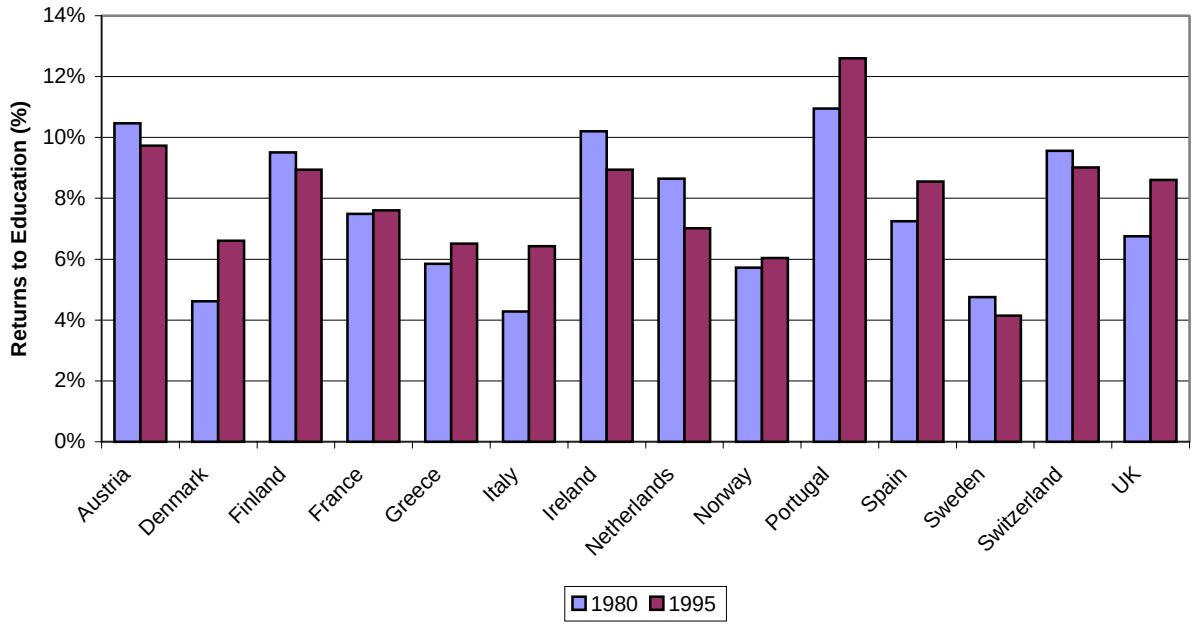
	OLS(95)--OLS(80)	Q(.1|95)--Q(.1|80)	Q(.9|95)--Q(.9|80)	Q(.9|80)--Q(.1|80)	Q(.9|95)--Q(.1|95)
Austria	-0.7%	-2.0%	0.2%	3.4%	5.6%
Denmark	2.0%	1.6%	1.9%	0.6%	0.8%
Finland	-0.6%	-0.5%	-0.2%	3.0%	3.3%
France	0.1%	0.2%	-0.5%	4.2%	3.4%
Germany		-0.9%	-0.9%	-1.0%	-1.0%
Greece	0.7%	1.0%	0.2%	-1.1%	-1.9%
Italy	2.1%	2.8%	2.5%	0.6%	0.4%
Ireland	-1.3%	-2.3%	0.0%	0.3%	2.6%
Netherlands	-1.6%	-1.3%	-0.9%	2.6%	3.0%
Norway	0.3%	0.2%	1.2%	1.0%	2.1%
Portugal	1.6%	-2.0%	3.2%	3.7%	8.9%
Spain	1.3%	0.3%	0.8%	2.0%	2.4%
Sweden	-0.6%	-0.8%	-0.4%	3.3%	3.8%
Switzerland	-0.5%	-1.8%	-0.4%	2.5%	3.9%
UK	1.9%	2.4%	2.3%	4.9%	4.8%

Table 5.4 - Country types

	Slope (1)	Increasing? (2)
Portugal	+	Yes
Austria **Finland** **France** **Ireland** **Netherlands** **Norway** **Spain** **Sweden** **Switzerland** **UK**	+	No
Denmark **Italy**	0	No
Germany **Greece**	--	No

Notes:
(1) - Relationship between returns and wage distributio
(2) - Yes if the curve has become steeper.

Graph 5.16 - Returns to Education in Europe, Men
OLS Regressions



Graph 5.17 - Returns to Education - Quantile Regressions
Results for 1st and 9th deciles and for the years of 1980 and 1995
(reference to country also indicates 1980 result)