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EDUCATION AND WAGE INEQUALITY IN EUROPE

A Literature Review

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Preface

"Education and Wage Inequality in Europe – EDWIN" is a two-and-a-half-year research project supported by DG-Research of the European Commission (under the Fifth EU Framework Programme for Research, Contract Number HPSE-CT-2002-00108). The project, which started on November 1, 2002, brings together nine research teams from an equal number of European countries: Finland, France, Germany, Greece, Italy, Norway, Portugal, Sweden and the United Kingdom.

The overarching objective of the project is to enhance the understanding of the relationship between education and wage inequality. The research undertaken within the framework of the project explores the structure and change in wage inequality within and across European countries, using comparable data. Furthermore it seeks to explain the observed patterns and trends within and between cohorts in terms of the interplay between educational expansion and wage inequalities and educational systems and labour market institutions The research is focussed to derive practical implications for economic and social policy. More information on the project is available at EDWIN's web-site www.etla.fi/edwin

This volume of the EDWIN project provides a comprehensive review of the current state of knowledge in each participating country concerning the link between education and wage inequality. By reviewing the existing empirical evidence on this topic it thus draws a baseline for the results that are produced within EDWIN. It should, though, be pointed out that an unfortunate delay in the delivery of a few of the book chapters has caused a discrepancy in the time period covered by the separate national reviews.

On behalf of all participants we would like to thank DG-Research of the European Commission and the Improving the human research potential and the socio-economic knowledge base programme for providing funds to carry out the EDWIN project. We also want to thank Tuula Ratapalo for her excellent work in preparing the final lay-out of this volume for publication.

Helsinki and Oslo, April 2005

Rita Asplund and Erling Barth

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CHAPTER 1

Education and Wage Inequality:
An Introduction to the National Literature Reviews

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In this introductory chapter, we attempt to clarify the relationship between education and wage inequality along several important dimensions. We also summarise some of the main trends that emerge from the main body of this volume, that is, the literature reviews of 10 European countries. The national chapters outline the present education system, review existing empirical evidence on the interdependency between education and wage inequality, and discuss important aspects of the current debate in each of the countries.

1 Introduction

This book presents an overview of the recent empirical literature on education and wage inequality in 10 European countries: Finland, France, Greece, Germany, Italy, Norway, Portugal, Spain, Sweden and the UK. The national chapters include brief discussions of the present education system, overall trends in educational and wage inequality, as well as important aspects of the current debate in each country. The main body of the chapters reviews the existing empirical evidence on the interdependency between education and wage inequality while simultaneously displaying troublesome knowledge gaps. This country-specific evidence is preceded, in Chapter 2, by an overview of the more macro-oriented literature dealing with the role of education for income inequality and its evolution over time.

In this introductory chapter, we attempt to clarify the relationship between education and wage inequality along several important dimensions. Furthermore, we summarise some of the main trends that emerge from the subsequent national literature reviews. Apart from a few recent cross-country comparisons replicated in this chapter, we refer the reader to the country-specific chapters for references to studies on each particular country.

The interplay between education and income is manifold. First of all, higher educated individuals have higher labour market participation rates. Education is also positively correlated with measures of good health, as well as with longer careers in working life. Secondly, the probability of being unemployed is notably lower for persons with higher levels of education. For the employed, there is a positive correlation between working hours and educational attainment levels. All of these factors contribute to the positive correlation observed between education and income, although not all of them can be regarded as a causal effect from education to income. The most fundamental relationship between education and income, however, is the positive interdependence between hourly wages and education. This basic measure of productivity differences between differently educated individuals is also the starting point for any effect of education on income. Except for the macroeconomic chapter (Chapter 2), which explores primarily the aggregate link between education and income, the main focus of the subsequent literature reviews is on the relationship between individual-level education and earnings/wages.

2 Trends in cross-country earnings inequality

A multitude of studies have compared trends in earnings inequality over the past 30 years. In Table 1 we reproduce an overview by Sanders and Ter Weel (2000). The table displays rather divergent trend patterns in the different countries. Nevertheless, the dominating trend in a majority of the covered countries seems to have been decreasing or roughly unchanged earnings dispersion in the 1970s and increasing earnings dispersion in the 1980s, a trend that continued also in the 1990s. Interestingly, a compression is stated as the expected future direction in all the large economies, except Australia.

Table 1. Pattern of changes in earnings dispersion in the 1970s, 1980s and 1990s

Country	1970s	1980s	1990s	Expectations
Australia	-	+	..	Dispersion
Austria	-	+	..	
Belgium	..	+	..	
Canada	0	+	+	Compression
Denmark	..	0/+	..	
Finland	-	0	..	
France	-	-/+	+	Compression
Germany	0	-/0	+	Compression
Italy	-	0	..	
Japan	..	+	..	
Netherlands	0	-/+	0	Compression
Norway	..	0	..	
Portugal	..	+	..	
Spain	--/0	+	+	Dispersion
Sweden	0	0/+	..	
UK	-	++	+/-	Compression
USA	+	++	+/-	Compression

Notes: ++: strong increase; +: increase; 0: no clear change; -: decrease; --: strong decrease; +/-: increase followed by decrease; ..: no information available.

Source: Sanders and Ter Weel (2000).

Similar overall trends, but for a more detailed time horizon, are reported by Acemoglu (2003). His calculations of the logarithmic differences of the 90th and 10th percentiles of the male wage distribution (Table 2) are based on the Luxembourg Income Studies database.[1]

Table 2. Log 90th – 10th wage differentials for male workers in the 1980s and 1990s

Country	Early	Mid-80s	Late 80s	Early	Mid-90s	Late 90s
Australia	..	0.834	0.920	..	..	..
Belgium	..	0.780	0.773	0.762	0.697	..
Canada	..	..	1.116	1.182	1.160	1.254
Denmark	..	..	0.913	1.307	1.096	1.059
Finland	..	..	0.899	0.893	0.862	..
Germany	0.819	0.894	1.186	..	1.043	..
Nether-	0.876	..	0.907	0.864	0.843	..
Norway	..	0.810	..	0.913	1.122	..
Sweden	0.867	..	0.920	0.864	0.880	..
UK	0.930	1.093	..	1.109	1.143	..
USA	1.253	1.409	1.427	1.442	1.551	1.465

Notes: Calculations based on the Luxembourg Income Studies database; CPS for the USA. .. indicates that no information is available.

Source: Acemoglu (2003, Table 1a).

Apart from exploring the trends in cross-country earnings inequality, considerable attention has, in recent years, also been paid to trying to explain the observed diversity in trend patterns across countries. Acemoglu (2003) notes that there is nowadays "a fairly widespread consensus that US wage inequality rose because the relative demand for skills increased faster than the relative supply" (p. F121), and continues by asking why the same technological developments have not raised the skill premium in much of continental Europe. He addresses this question by testing

[1] It may be noted in this context that the 90–10 wage gaps reported by Dupuy and Borghans (2003) for graduates in nine European countries display a totally different pattern, especially when it comes to the UK. Obviously this outcome is primarily due to their focus on graduates but also to the authors' use of calculated equivalent hourly wages.

three commonly offered explanations: (1) the relative supply of skills increased faster in Europe; (2) European wage-setting institutions prevented wage inequality from increasing; and (3) for exogenous or endogenous reasons, technical change has been less skill-biased in Europe. The empirical evidence derived from a version of the relative–supply–demand framework suggests that the first two explanations account for a significant portion of the differences in cross-country inequality trends. In other words, the fact that inequality rose much slower in a majority of European countries compared to the UK and the USA does seem to have been, at least partly, associated with a relatively faster increase in the demand than in the supply of more skilled employees.[2]

All European countries do not fit into this pattern, however, implying that these two 'traditional' explanations offer a reasonable but not an entirely satisfactory explanation for the differential inequality trends across countries. Moreover, the increase in the relative demand for more skilled labour reveals considerable variation across countries, with most of Europe having lagged behind the USA. These aspects motivated Acemoglu (2003) to turn to the role of cross-country differences in technical change and/or in the adoption of new technology. In particular, he developed a simple theoretical model, the basic idea of which is that the wage compression caused by European labour market institutions makes companies more willing to invest in technologies that increase the productivity of also less skilled employees. Put differently, as European labour market institutions push up the wages of the less skilled, European employers may have faced greater incentives to adopt technologies that are complementary to their unskilled workforce. As a consequence, technical change has been less skill-biased in Europe than in the USA. Empirical support for this hypothesis is still missing, though.

A fourth potential explanation for the experienced cross-country differences in the demand for skills relates to different degrees of trade opening. While Acemoglu (2002) notes that this is the simplest explanation, he dismisses it by the same token by arguing that "…the current consensus is that increased international trade played a limited role in the increase in the relative demand for skills of the recent decades" (p. 6). In a recent paper, however, Edwards and Whalley (2002) show for the UK that the relative importance of world prices and technological progress in generating

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[2] Dupuy and Borghans (2003) show that the importance of the supply–demand explanation is strengthened further when the supply and demand effects are cleaned from country-specific differences in the occupational allocation either due to differences in the classification used or the contents of a field of study.

changes in skilled–unskilled wage inequality may be quite different in the short term and in the long term. Hence, they argue, incorrect conclusions concerning the contributions of trade and technology are easily drawn, if the data used are taken to reflect a long-term factor mobile world while, in reality, the data capture a short-term adjustment process where factors and output have not adjusted fully across industries.

A fifth potential explanation is offered by Booth and Zoega (2002), who develop a theoretical model for wage-setting and task assignment of high-ability employees. More specifically, in their world of heterogeneous employees and employers, higher-ability employees raise the average level of talent within a company, for which reason they will be assigned to perform the more advanced tasks. In other words, higher-ability employees confer an externality on the company, giving it some degree of monopsony power. This externality-inducing task assignment behaviour compresses wages within the company as lower-ability employees are paid more, relative to their talent, than are higher-ability employees. The authors argue that this model can also explain the recent increase in wage inequality in some countries: higher-ability employees may have benefited disproportionately from exogenous changes having increased labour market competition, which has resulted in widening wage distributions.

Finally, Hassler *et al.* (2002) draw attention to the importance of observing changes in mobility in addition to inequality when trying to identify the causes of changes in inequality over time and across countries. They develop a theoretical macroeconomic model of income inequality, skill distribution and intergenerational mobility, showing that these phenomena are endogenously determined in equilibrium and also move together as a result of exogenous changes. Their crucial point is that the correlation between changes in inequality and in mobility varies across sectors; while it is positive in the production sector, it is negative in the education sector. Hence, a positive correlation across countries implies that the underlying changes are to be looked for in the production sector (e.g. skill-biased technical change or globalisation). A negative correlation, on the other hand, suggests that the underlying changes originate in the education sector (e.g. reduced public education expenditure).

All in all, this brief look at some recent literature on trends in earnings/wage inequality shows that there are highly diverging opinions about why inequality has developed so differently, not least in the UK and the USA as compared to continental Europe. Evidently, one reason for this lack of consensus is that most of the offered explanations have not been subject to rigorous empirical tests.

3 Education and wage inequality

There are several ways of measuring wage inequality. Different types of wage ratios have typically been used in the literature, such as the ratio of the 90th percentile wage to the median wage or to the 10th percentile wage as in Table 2 above. Measures of overall inequality include the Gini coefficient and the Theil index. In this section, we use the variance of logarithmic wages as our measure of wage dispersion, mainly because it is easily decomposable and much used in several strands of the literature. Consider the following simple Mincer-type wage regression:

$$(1) \quad \ln w_{it} = \alpha + \alpha_t + \beta X_{it} + \delta S_i + u_{it} ,$$

where w is the wage rate, X stands for years of work experience and S measures years of schooling. The error term of the regression (u) involves unobserved skills, stochastic wage components and measurement errors. It is assumed to be uncorrelated with S and X. The error term may contain individual-specific components as well as transitory terms: $u_{it} = \alpha_i + \varepsilon_{it}$.

One commonly used measure of wage inequality is the variance of logarithmic wages at any given point in time. From equation (1) we have

$$(2) \quad \mathrm{var}(\ln w) = \beta^2 \,\mathrm{var}(X) + \delta^2 \mathrm{var}(S) + \beta\delta \,\mathrm{cov}(X, S) + \mathrm{var}(u) ,$$

where we have omitted the subscript t for simplicity. We have used the assumption of no correlation between the error term and the explanatory variables X and S. Under the assumption that the transitory term is uncorrelated with the individual fixed effect, the variance of u may be written: $var(u) = var(\alpha) + var(\varepsilon)$

Let Δ indicate the change in a variable between two points in time. The change in the variance of logarithmic wages between two points in time may then be decomposed into the following parts:

$$\begin{aligned} \Delta \,\mathrm{var}(\ln w) = {} & (2\beta \,\mathrm{var}(X) + \delta \,\mathrm{cov}(X, S))\Delta\beta \\ & + (2\delta \,\mathrm{var}(S) + \beta \,\mathrm{cov}(X, S))\Delta\delta \\ & + \beta^2 \Delta \,\mathrm{var}(X) + \delta^2 \Delta \,\mathrm{var}(S) \\ & + \beta\delta \Delta \,\mathrm{cov}(X, S) + \Delta \,\mathrm{var}(u) , \end{aligned} \quad (3)$$

where the first two terms arise from changes in the returns to work experience and education, while the next two terms arise from changes in the variance of work experience and education. The proceeding term consists of changes in the covariance of education and work experience, and the last term involves changes in the variance of the error term.

4 More inequality in the knowledge society?

All national reviews of this volume document increased educational levels of the population over the latter half of the 20th century. In this section, we consider the effects of increasing educational attainment on wage inequality. This discussion is structured around the decomposition outlined in the previous section.

4.1 Inequality in education

The direct effect of an increase in the average level of education is on the variance of S, which may either increase or decrease. To see this clearly, it may be useful to discuss a simple example of only two educational levels, denoted by 0 and 1. Let p be the proportion of the labour force that has the highest educational level. The variance of S is, in this case, given by $p(1-p)$. From this we can see that an increase in p will *increase* the variance of schooling for p levels below 0.5 and *decrease* the variance of schooling for p levels above 0.5.

As an illustration of the impact of the distribution of education on the variance of wages, we have calculated the variance component related to education for a selected number of European countries at two points in time: 1991 and 2002. In Table 3, we first report the shares of the 25 to 64-year-old population with, respectively, upper secondary and tertiary education degrees. These numbers are taken from OECD Education at a Glance 2004. We find that in most countries, the share of the adult population with a tertiary education rose over the investigated decade. The (unweighted) country average increased from 16 to 23 per cent. Likewise, the (unweighted) average share of the adult population with an upper secondary education increased from 36 to 43 per cent. We also report for each country a measure of the average return to an additional year of schooling as reported in Harmon *et al.* (2001) for the year closest to 1995.

Table 3. Share of the 24 to 65-year-old population with upper secondary and tertiary education in 1991 and 2002, and the estimated return to education for the year closest to 1995, for selected European countries

	25 to 64-year old population share (%) with				Return to education
	upper secondary education[1]		tertiary education		
	1991	2002	1991	2002	1995
Austria	61	63	7	14	6.9
Denmark	43	53	18	27	6.4
Finland	35	42	25	33	8.6
France	36	41	15	24	5.5
Germany	60	60	22	23	7.9
Greece[2]	25	34	17	18	6.3
Ireland	24	35	16	25	7.7
Italy	22	36	6	10	6.2
Netherlands	37	42	20	24	6.3
Norway	54	55	25	31	5.5
Portugal	8	11	7	9	9.7
Spain	12	17	10	24	7.2
Sweden	44	49	25	33	4.1
UK	49	57	16	27	9.4
Country mean	36	43	16	23	7.0

Notes: [1] Upper secondary education also includes post-secondary non-tertiary education. [2] 1995.

Source: Education at a Glance (OECD 2004, Table A3.4.a.) (education shares) and Harmon *et al.* (2001) (return to education).

In Table 3, education is defined by means of two indicator variables representing, respectively, upper secondary education and tertiary education (with less than upper secondary education used as the reference category). Since, in this case, the educational level represents a draw from a trinomial distribution, the variance component related to these two educational variables only is given by

$$(4) \quad \mathrm{VC} = a^2 p_2(1 - p_2) + b^2 p_3(1 - p_3) - 2\, ab p_3 p_2 ,$$

where p_i is the share with educational level i, a is the rate-of-return coefficient for upper secondary education and b the rate-of-return coefficient

for tertiary education in a wage equation. The calculated variance components related to the distribution of educational levels are given in Table 4. The first two columns report the calculated variance component under the assumption of a common *fixed return to education* as derived from the educational shares for 1991 and 2002, respectively. More precisely, the returns to education used in the variance component calculation (the *a* and the *b*) are based on the (unweighted) average yearly return of 7 per cent in 1995 reported in the bottom line of Table 3.[3]

Table 4. Education-related variance components calculated from fixed average and country-specific returns to education for selected European countries for 1991 and 2002

	Fixed average return to education			**Country-specific return to education**		
	Variance component 1991	Variance component 2002	Difference 2002 – 1991	Variance component 1991	Variance component 2002	Difference 2002 – 1991
Austria	0.014	0.016	0.002	0.014	0.016	0.002
Denmark	0.023	0.020	-0.003	0.019	0.017	-0.002
Finland	0.028	0.025	-0.003	0.042	0.038	-0.004
France	0.023	0.025	0.002	0.014	0.016	0.002
Germany	0.017	0.017	0.000	0.022	0.022	0.000
Greece	0.026	0.025	-0.001	0.021	0.020	-0.001
Ireland	0.025	0.028	0.003	0.030	0.033	0.003
Italy	0.015	0.020	0.005	0.012	0.015	0.003
Netherlands	0.025	0.025	0.000	0.021	0.020	-0.001
Norway	0.020	0.019	-0.001	0.012	0.012	0.000
Portugal	0.014	0.017	0.003	0.026	0.033	0.007
Spain	0.018	0.031	0.013	0.019	0.033	0.014
Sweden	0.024	0.021	-0.003	0.008	0.007	-0.001
UK	0.021	0.018	-0.003	0.038	0.033	-0.005
Country mean	0.024	0.025	0.001	0.024	0.025	0.001

Note: The fixed-average-return-to-education calculations refer to returns to education that are calculated under the assumption of a common fixed return to education; that is, from the (unweighted) average yearly return of 7 per cent in 1995 reported in the bottom line of Table 3.

Source: Authors' own calculations based on Table 3 and formula (4).

[3] We use 3 years of post-compulsory schooling for the upper secondary level and 6 years for the tertiary level in calculating *a* and *b* in the variance component formula (4).

The first three columns of Table 4 report the variance components related to education when calculated with fixed common returns to education (the average return of 7 per cent per year, see the last row of Table 3). For 2002, Austria – closely followed by Portugal and Germany – shows the lowest variance due to the distribution of education (0.016) while education contributes most strongly to the variance of wages in Spain (0.031), given the skill prices reflected by the average returns to education. With an overall variance in wages ranging from around 0.1 to 0.3 (see e.g. Tsakloglou and Cholezas, 2004) the contribution from the distribution of education constitutes approximately 10 to 15 per cent of overall wage inequality. Over the investigated period, from 1991 to 2002, the change in the distribution of education has been positive in half of the 14 countries under study, and negative or zero in the remaining countries. This clearly illustrates that increasing educational attainment levels may cause both a narrowing and a widening of the wage distribution. The (unweighted) average education-related variance component increased slightly, from 0.024 to 0.025 over the decade, summing up diverging trends across countries.

These calculations, however, also indicate that the contribution from the dispersion of education to overall wage inequality is, in the last resort, rather modest. Furthermore, the contribution from the dispersion of education to differences in wage dispersion across countries appears to be small as well. This is in line with what Ammermüller and Weber report in Chapter 5 of this volume, quoting Devroye and Freeman (2001) who conclude that cross-country differences in the dispersion of skills, as measured by test scores or, alternatively, by years of schooling, hardly explain differences in the dispersion of pay.

Regarding the role of unobserved skills in explaining international differences in wage dispersion, there is a lack of consensus among economists. Nickell (2005), for instance, argues that there is a clear-cut correlation between the two variables. His calculations of simple cross-country correlations between the distribution of earnings and the distribution of skills, as measured in test scores, generate numbers that persistently exceed 0.8. Further support for the opinion that earnings and skills distributions are related has also been provided by Leuven *et al.* (2004).

Finally, there is also a wage effect related to the covariance between schooling and accumulated work experience. Since education is obtained early in the career, increasing the number of graduates probably turns the covariance between schooling and work experience more negative. This effect tends to reduce wage inequality, *ceteris paribus*. This

outcome arises from the fact that it is the younger generation, with lower wages in the first place, that has obtained higher levels of education and, consequently, higher pay. Although empirically important, neither the theoretical nor the empirical literature provides much guidance on this topic.

4.2 The return to education

Additionally, there are indirect effects through changes in skill prices; wage dispersion changes when the relative wages attributed to different levels of education change. Higher educational attainment should lead to a reduction in between-educational-level wage differentials. Barth and Røed (2001) estimated the elasticity of substitution between employees with a higher education and employees with a lower education to be 1.3, using a panel of European countries extending from 1980 to 1995. In order for the labour market to absorb a larger relative supply of higher educated labour, wages will have to drop. But they also estimated that, over the same time period, the relative demand for more educated labour grew by about 5 per cent per year. Hence, the net effect is a question of who the winner is in what Tinbergen (1974) called 'the race between technology and education'. For the period 1980 to 1995, Barth and Røed (2001) reported only small changes in skill prices as measured by the average return to education, suggesting a rather balanced race between supply and demand over that particular period.

The importance of different skill prices is illustrated in the last three columns of Table 4, which report calculations of the educated-related variance component using *country-specific* returns to education as weights rather than the European average as in the first three columns. We find that the levels as well as the ranking of countries in terms of the variance component arising from education change when accounting for cross-country differences in educational returns. Now, Sweden and Norway rank lowest with a variance component of 0.007 and 0.012, respectively, due to compressed wage differentials between differently educated employees. Finland, Ireland, Portugal, Spain and the UK rank as the most unequal countries, mainly because of their relatively high average return to education. Comparing the education-related variance component based on a common fixed return with that obtained when using country-specific returns, reveals that a major part of the international differences in the education-related variance component is due to differences in relative skill prices.

As reported in the EU-funded PURE project (Harmon *et al.*, 2001), the average return to an additional year in schooling has remained fairly stable in Europe since the early 1970s up to the 1990s. In particular, based on a meta-analysis Harmon *et al.* (2001) concluded that the average return to education in the 15 PURE countries seems to have dropped by two percentage points from the 1960s to the 1970s, and to have stayed fairly stable thereafter. Their overall time trend shows only a small increase (of about half a percentage point) from the 1980s to the 1990s. This general pattern is repeated in the national reviews of this volume, although with certain country variation. For France, Abdelkarim and Skalli (Chapter 4) conclude that there was a decline in the return to education over the period from 1970 to the mid-80s, extending even into the 1990s. Le Grand *et al.* (Chapter 10) report for Sweden a strong decrease in the wage premium of education from 1968 to 1991, with the decline having been most pronounced in the 1970s. For Greece, Tsakloglou and Cholezas (Chapter 6) report a decline in the return to education from the 1970s to the mid-80s.

The national literature reviews confirm a rather stable development in average returns to education also in the 1990s. Ammermüller and Weber (Chapter 5), for instance, summarise from several empirical studies that the average return to education in Germany has remained roughly unchanged for a long period of time, with the exception of East Germany where the evolution of educational returns has contributed to higher wage inequality from 1990 to 2000. A stable development in the returns to education is reported also for Norway (Barth and Mastekaasa in Chapter 8), while Sweden seems to have experienced a slight increase in the schooling coefficient from 1991 (4.4 per cent) to 2000 (4.8 per cent) (Le Grand *et al.* in Chapter 10). Furthermore, Dolton and Marcenaro-Gutierrez (Chapter 11) report for the UK that increasing educational differentials contributed to about one-third of the increase in overall inequality from the late 1970s to the mid-90s. The evidence for more recent years points to a relatively flat trend. Also for Portugal the evidence points to a slightly increasing trend in educational returns from 1982 to 1995 (Budría and Nunes in Chapter 9). Brunello *et al.* (Chapter 7), in turn, report declining earnings inequality in Italy from the 1970s throughout the 1980s, followed by an increase in inequality during the first half of the 1990s. The return to education seems, however, to have been only a minor factor behind this development. For Finland, no significant trend in returns to education can be detected over the past few decades (Asplund and Leijola in Chapter 3) while in Greece, there has been a slight increase in the 1990s (Tsakloglou and Cholezas in Chapter 6).

Taken together, all these results suggest that changes in skill prices have exerted minor, if any, influence on the dispersion of wages in Europe over the past 20 years, despite a considerable boom in the average level of education. The conspicuous stability of relative skill prices in a majority of the countries covered in this volume stands out as a major reason for this outcome. On the other hand, when comparing single countries differing in the relative prices of education, we do find that skill prices matter.

The other price that matters in the simple Mincer wage model, outlined in equation (1) above, is the return to work experience. The existing evidence indicates that education and experience are complements in the sense that the wage–experience profile tends to be steeper for individuals with a higher education (see e.g. Willis (1986) and the national reviews of this volume). If this relationship represents a true causal effect, then a higher education of the labour force would imply steeper average wage–experience profiles. This, in turn, would induce higher wage inequality in the society. As will be briefly discussed in the next section, this wage inequality typically arises 'within individuals' once we consider a longer time span.

4.3 Within-group wage dispersion

Finally there is the question of the variance of the error term. As noted above, the error term involves unobserved differences in skills, stochastic wage components such as rewards to job heterogeneity or different types of personnel policies, and measurement errors. It is an open question whether or not this component is more volatile for higher educated groups of employees. As far as we know, this issue is not extensively studied in the literature.

Nevertheless, some results from quantile regressions do suggest that wage dispersion tends to be higher among employees having completed a higher education. Martins and Pereira (2004) found that the average return to education is higher in the upper deciles of the conditional wage distribution in a large majority of the 15 European countries covered in their study. The only exceptions were Greece and Germany. Ammermüller and Weber (Chapter 5 of this volume) present further evidence confirming such a negative relationship for Germany. But overall, the evidence for the other countries seems to support the findings of a positive relationship between the residual wage dispersion and the level of education. For Sweden, Le Grand *et al.* (Chapter 10) report an increase in the residual wage dispersion (as obtained from standard

OLS Mincer wage regressions) from 1991 to 2000. They associate this increase to changes in wage bargaining, work organisation and, possibly, over-education. Dolton and Marcenaro-Gutierrez (Chapter 11) note for the UK that within-group inequality was a major determinant of changes in overall inequality in the period preceding the 1990s. Since then, also this component of UK inequality has been essentially flat, however. Within-group inequality is reported to have been a crucial factor contributing to changes in overall wage inequality also in other European countries, not least in Finland (Asplund and Leijola in Chapter 3).

Obviously there is a multitude of factors that may work in the direction of larger standard errors in wage regressions among individuals with a higher education. The following list provides illustrative examples of such factors.

- There may be a higher dispersion in skill requirements among individuals with a higher education.
- Human and physical capital may be complements in the production processes, thus inducing larger wage differences between organisations differing in their levels of physical capital.
- More autonomous jobs may require more complicated reward schemes, implying larger differences in wages.
- Knowledge-based organisations may, in line with the previous argument, be more frequent users of flexible and/or individual pay schemes.
- Human capital may contain notable amounts of firm-specific skills, implying more frictions in the labour market for higher educated employees and, consequently, larger wage dispersion.
- Individuals with a higher education may take low-skilled jobs, but not vice versa. This implies that the span of possible wages is wider for the higher educated than for the less educated.

Unfortunately, only scattered evidence exists on the influence of these factors on wage dispersion.

5 Two additional dimensions of wage inequality

In the above discussion, we have compared the wage distribution at two points in time or, put differently, of two cross-sections of observations. The relevant wage distributions were obtained by sampling all observations with an identical *t*, and calculating the variance. This is a standard way of measuring wage inequality, as well as for decomposing any changes in the cross-sectional variance into changes in prices and changes in the distribution of labour market attributes. There are, however, two other important dimensions to the issue of wage inequality.

5.1 Fixed individual differences versus transitory shocks

The first dimension concerns the distribution of wages over time experienced by each individual. For any given individual, the variance of wages is given by the same expression as in (2), but since we are now calculating the variance within each individual, it may be written

$$(5)\quad \mathrm{var}(\ln w_i) = \mathrm{var}(\alpha_t) + \beta^2 \mathrm{var}(X_i) + \mathrm{var}(\varepsilon_i),$$

where we disregard any potential correlation between work experience (X) and the time-specific component (α). The last term is simply the within-individual variance of the transitory component of the unobserved error term. In this case, the fixed individual component is, of course, swept out of the calculation.

What is the effect of higher education on the within-individual component of wages? From (5) it is clear that the within-individual component of wages is higher, the higher is the return to work experience. Evidence referred to in Brunello *et al.* (Chapter 7 of this volume), as well as in many other studies across the world (see e.g. Willis, 1986), clearly indicates that the variance of earnings over time is higher for individuals with a higher education, simply because the wage–experience profile is steeper. We face, however, more uncertainty when it comes to the transitory component. As far as we know, it is an open question whether or not the transitory component of the error term is more volatile for individuals with a higher education. Brunello *et al.* (Chapter 7) report that the recent increase in wage inequality in Italy is due to larger differences be-

tween individuals rather than in the transitory component, and attribute the changes in wage inequality to changes in wage institutions rather than to changes in the educational composition of the workforce.

Which are the possible links between transitory wage changes and education? Individuals with a higher education change jobs more often, but have a higher proportion of quits relative to involuntary separations. They have fewer spells of unemployment and spend less time outside of the labour force. There seems to be a popular notion that education also provides a more secure and stable labour market career, which in this setting should be interpreted as a low variance in the transitory component. The fact that high-skilled employees may also do low-skilled work, but not vice versa, adds an 'insurance argument' to the discussion. We also believe that jobs are more heterogeneous among low-skilled than among high-skilled employees, but have no evidence to back this up. Furthermore, it is unclear whether this heterogeneity should affect the fixed or the transitory component of the error term. All in all, the posed question needs to be investigated empirically. This is, in effect, a very important issue to sort out. The assessment and judgment of a given cross-sectional variance in wages is likely to be highly different depending on whether the variance arises primarily from within-individual rather than from between-individual dispersion in wages.

5.2 Equality of opportunity?

The other aspect concerns the inter-generational dimension and, more specifically, the variance of earnings across generations. We may think of this in terms of collapsing the wage equation over time, e.g. by taking individual averages, and then calculating the variance of earnings between generations within the same family. Ignoring, for simplicity, differences in the fixed-time component (there is not much to do about that in any case, since generations cannot change places in time) and assuming that the average level of work experience (ultimately) is the same for both generations, we are left with the following expression:

$$(6)\quad \mathrm{var}(\ln w_w) = \delta\,\mathrm{var}(S_w) + \mathrm{var}(\alpha_w),$$

where subscript *w* indicates that we calculate these terms within each family. If we think, for instance, in terms of father-son-pairs, the variance of logarithmic wages is zero only if there is a perfect correlation between the schooling level of the father and the son (implying that var(*S*) = 0) *and*

that the individual fixed error term is perfectly correlated across generations (implying that var(α) = 0) (recall that the transitory part of the error term disappears when we average over the career of each individual).

Let σ^2_w be the within-family variance of average life-time logarithmic wages, and σ^2_i the variance in average life-time logarithmic wages among all individuals. If one's wage is completely determined by the parents' wages, then $\sigma^2_w = 0$. If one's wage is totally independent of the parents' wages, then $\sigma^2_w = \sigma^2_i$. The ratio of these two variances may thus be used as a measure of the equality of opportunity in a society. Two factors may be strongly influenced by family background. The first relates to potential financial obstacles to acquiring education, which arise from imperfections in the credit market originating from the fact that it is difficult to raise a collateral based on expected human capital only. The second factor concerns the ability for, or the (possibly psychic) costs of, undertaking a lengthy education. Ability, which may be both inherited and 'nurtured', is likely to impact on the costs or the ability of staying in the education system. Different educational systems, capacities, financial systems and modes of labour markets will determine the relative importance of the different routes of inter-generational transmission.

The most extensive studies of the relationship between generations have been done on US data (see e.g. Solon, 1992). There is only a very small literature attempting to make cross-country comparisons of this relationship (see e.g. Björklund and Jäntti, 1997 and 2000). In all national chapters of this volume, for countries in which such studies have been undertaken, there are reports of a strong relationship between parents' education, income and social status, and the educational level of the child. Brunello *et al.* (Chapter 7) note that Italy is among the countries with the least inter-generational mobility, and refer to a theoretical model highlighting the role of individual effort and educational investment in poor families. Asplund and Leijola (Chapter 3), in turn, note that sibling correlations in earnings have been found to be relatively small in the Nordic countries.

For several countries, however, there is some indication that the importance of social background has decreased over the last decades. Ammermüller and Weber (Chapter 5) conclude from several studies that the impact of social background on educational choices seems to have declined over time and cohorts in Germany. This holds true especially for the influence of the father's occupational status prior to the end of the 1970s. The reduction in inequalities related to parents' education is weaker and occurred later. Also Barth and Mastekaasa (Chapter 8) and le Grand *et al.* (Chapter 10) report a decline over time in the influence of

parental background characteristics for Norway and Sweden. Le Grand *et al.* further find that the decline has been strongest for the earliest branch of educational levels, while the trend for higher education is one of weaker decline. Results for Sweden also indicate that the parents' education exerts the strongest influence on children's education, while the parents' income has only a slight (conditional) impact. Also Abdelkarim and Skalli (Chapter 4) find evidence of decreasing importance of socio-economic factors for France. This occurred only up to the early 1980s, though. Since then, this trend has been reversed, one pronounced factor having been increased segregation within higher education due to stronger sorting into the elite schools. For Finland, Asplund and Leijola (Chapter 3) report weak evidence in support of a clear time trend in the inter-generational correlations.

The UK studies summarised by Dolton and Marcenaro-Gutierrez (Chapter 11) suggest that there has been a decline in the impact of cognitive ability, but an increase in the role of parental social class and income over the last decades. But the evidence for the UK is not unambiguous; the influence of parental income on continuing in school increased during the 1980s, but decreased in the 1990s.

While the literature on the return to education has agreed on measures (if not on methods) of the 'price' of education in the labour market, there seems to be a plethora of measures of parental impact on children's education and wages. This also means that we lack good comparative studies and analyses of this issue. This situation is partly due to the fact that there seems to be no agreement on a single comparable measure, and partly to data limitations and differences in the scope of the particular studies performed. More comparative research on this issue is certainly called for.

6 Conclusions

In this introductory chapter, we have attempted to clarify some dimensions of the relationship between education and wage inequality. We first considered that part of overall wage inequality which arises from the distribution of and rewards to education. The dispersion of education seems to contribute with something between 10 and 15 per cent to the overall distribution of wages. Hence, differences in the distribution of skills do not explain very much of the differences in wage dispersion observed across countries. The same appears to hold true over time, since

the impact of the educational boom on the distribution of education goes in the direction of higher wage dispersion in some countries and lower wage dispersion in other countries. Furthermore, as demand has kept pace with the expansion in the supply of higher educated labour, there has been little impact on wage dispersion from changes in relative skill prices (the return to education), at least when looking at the development over the past few decades in the European countries reviewed in this volume.

The remaining effects of changes in educational attainment levels are mediated along other dimensions of the wage distribution. Higher education may result in higher residual wage dispersion. There exists some evidence pointing in this direction, but more research is certainly needed within this field. Moreover, the mechanisms behind this phenomenon are weakly understood and have not been tested empirically.

We continued by reviewing the consequences of more and higher education on intra-personal wage dispersion. A key question is whether the increase in residual wage dispersion, as observed in cross-section analyses over time, reflects a larger dispersion in some individual fixed skill component or a higher variance in transitory wage effects. Related to this issue is the relationship between education and the return to work experience. A higher return to work experience means a higher cross-sectional variance and more variance within individuals, but may leave the dispersion of the average wage level between different individuals unaffected. Also in this field, more research is required.

There is a clear correlation between parents' economic, social and/or educational background and the educational choices as well as labour market outcomes of the children. High correlations imply less equality in opportunity, while small correlations point to more equality of opportunity. There are only a few internationally comparable studies in this field, though. This is mainly due to lack of internationally comparable data, but also to a plethora of methods and measures used within this research field. Again the gains could be high from undertaking careful cross-country comparative analyses.

In sum, our current knowledge on the interplay between education and wage inequality is rather scarce and scattered. Moreover, a large majority of the available evidence is country-specific while cross-country comparative analyses are still mostly lacking.

Literature

Acemoglu, D. (2002), *Cross-country inequality trends.* NBER Working Paper No. 8821.

Acemoglu, D. (2003), Cross-Country Inequality Trends*, Economic Journal* 113(485), F121–F149.

Booth, A.L. and G. Zoega (2002), *If you're so smart, why aren't you rich? Wage inequality with heterogeneous workers.* CEPR Discussion Paper No. 3190.

Barth, E. and M. Røed (2001), Do we need all that higher education?, in Asplund, R. (ed.), *Education and Earnings: Further Evidence from Europe.* The Research Institute of the Finnish Economy ETLA, Series B183, Helsinki.

Björklund, A. and M. Jäntti (1997), Intergenerational income mobility in Sweden compared to the United States, *American Economic Review* 87(5), 1009–1018.

Björklund, A. and M. Jäntti (2000), Intergenerational Mobility of Socio-economic Status in Comparative Perspective, *Nordic Journal of Political Economy* 26(1), 3–33.

Devroye, D. and R. Freeman (2001), *Does Inequality in Skills Explain Inequality in Earnings Across Advanced Countries?* NBER Working Paper No. 8140.

Dupuy, A. and L. Borghans (2003), *Supply and Demand, Allocation and Wage Inequality: An International Comparison.* IZA Discussion Paper No. 907.

Edwards, T.H. and J. Whalley (2002), *Short and Long Run Decompositions of OECD Wage Inequality Changes.* NBER Working Paper No. 9265.

Harmon, C., I. Walker and N. Westergaard-Nielsen (2001), *Educations and Earnings in Europe, A cross country analysis of the returns to education.* Edward Elgar, Cheltenham.

Hassler, J., J.V. Rodriguez Mora and J. Zeira (2002), *Inequality and Mobility.* Harvard University. Mimeo.

Leuven E, H. Oosterbeek and H. van Ophem (2004), Explaining International Differences in Male Skill Wage Differentials by Differences in Demand and Supply of Skill, *Economic Journal* 114(April), 466–486.

Nickell, S. (2005), The LoWER Lecture: Employment, Unemployment and Low Pay, in Marx, I. and W. Salverda (eds), *Low-wage Employment in Europe. Perspectives for Improvement.* Acco, Leuven.

OECD (2004), *Education at a Glance.* Paris.

Martins, P.S and P.T.Pereira (2004), Does Education Reduce Wage Inequality? Quantile Regressions Evidence from 16 Countries, *Labour Economics* 11(3), 355–371.

Sanders, M. and B. ter Weel (2000), *Skill-biased technical change: Theoretical concepts, empirical problems and a survey of the evidence.* MERIT Research Memorandum 2000-012 and DRUID Working Paper 00-8.

Solon, G. (1992), Intergenerational Income Mobility in the United States, *American Economic Review* 82(3), 393–408.

Tinbergen, J. (1974), Substitution of Graduate by Other Labour, *Kyklos* 27(2), 217–226.

Tsakloglou, P. and I. Cholezas (2004), *Earnings inequality in Europe: structure and inter-temporal change.* Athens University of Economics and Business, Department of International and European Economic Studies. Mimeo.

Willis, R. (1986), Wage Determinants: A Survey and Reinterpretation of Human Capital Earnings Functions, Ch. 10 in Ashenfelter, A. and R. Layard (eds), *Handbook of Labor Economics Volume I.* North-Holland, Amsterdam.

CHAPTER 2

A Macroeconomic Perspective on Education and Inequality

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This article attempts to contrast the traditional view of there being a fundamental trade-off between productive efficiency (and/or growth) and social equality against the current knowledge on these matters as mediated by theoretical and empirical analyses reported in the more recent literature of this particular field. An overall conclusion from the subsequent, yet far from comprehensive, overview is that the relationship between inequality and economic growth, as well as the underlying mechanisms, is still far from being well understood. One thing is certain, though: recent empirical evidence has challenged the traditional views that increasing inequality has a positive impact on economic growth, and that redistribution through education subsidies has a negative effect on growth.

1 Introduction[1]

An oft-repeated argument among economists, as well as policy-makers, is that efficiency and equality are incompatible economic phenomena. Increased inequality is stated to enhance economic efficiency, irrespective of whether efficiency is approached from a static or a dynamic angle. A major reasoning behind this traditional view[2] is the contention that widening inequality boosts both private and social returns on educational investment, as well as improves individual incentives to exert effort to attain higher standards of living. In other words, greater reliance on market forces is perceived to provide a more efficient level of investment in education. Accordingly, subsidies to education for redistributive purposes are argued to distort the above tendencies and, thus, to also impede economic efficiency and growth.

This chapter attempts to contrast these arguments against the current knowledge on these matters as mediated by theoretical and empirical analyses reported in the more recent literature of this particular field. An overall conclusion from the subsequent, yet far from comprehensive, overview is that the relationship between inequality and economic growth, as well as the underlying mechanisms, is still far from being well understood. One thing is certain, though: recent empirical evidence has challenged the traditional views that increasing inequality has a positive impact on economic growth, and that redistribution through education subsidies has a negative effect on growth.

2 Aggregate inequality and economic growth

The alleged fundamental trade-off between productive efficiency (and/or growth) and social equality is only poorly documented in the literature. Instead, an overwhelming majority of the empirical evidence re-

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[2] For a discussion of the traditional view that wealth inequality is positively related to investment-driven growth and the justifying arguments, see e.g. Aghion *et al.* (1999). Also see the discussion in Topel (1999). For a recent investigation of policy situations in which equity and efficiency need not trade off against each other, see e.g. Blank (2002).

ported over the past decade or so points to equality having a positive rather than a negative impact on economic growth across countries, with education exerting an important influence on this process (*cf.* Eicher and Turnovsky, 2003). In other words, these studies provide no support for the conventional textbook argument that high or increasing inequality is a necessary condition for more rapid economic growth.

2.1 Some theoretical considerations

The traditional view in economic theory of there being a fundamental trade-off between equity and efficiency has, over the years, been challenged by many new theories attempting to assess the complex relations between inequality and economic growth. This renewed interest in inequality–growth theories is largely driven by the obvious need to reassess the theoretical linkage between equality and subsequent economic growth in order to find convincing explanations for the recent evidence of the relationship being positive rather than negative. These theories – along with existing empirical evidence – have recently been surveyed by e.g. Bénabou (1996), Aghion *et al.* (1999), Bertola (1999) and Zweimüller (2000), and are therefore commented on only briefly in this context.

The theoretical models derived over the past decade have several features in common. In contrast to the traditional view of perfect markets, they introduce some particular element of market imperfections, which under certain initial conditions predicts a negative relationship between inequality and growth. Accordingly, these theories address the inequality–growth relationship only partially, that is, from a more or less restricted perspective. Of the several approaches that can be identified in the inequality–growth literature, three key aspects are worthwhile mentioning here, especially as they link strongly to the assessed effect of investment in education on inequality and growth.[3] These three aspects concern credit market imperfections, the political economy of the welfare state and possible imperfection in the labour market.[4] Moreover,

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[3] The same 'barriers' are taken to shape both the distribution of incomes and the distribution of education for the simple reason that theoretically the two variables are perfectly correlated (see e.g. Checchi (2000) and the references therein).

[4] Other approaches having received growing attention in the literature focus on the socioeconomic instability in the society, and the links between demographic factors, especially fertility, and income distribution and growth. See e.g. Perotti (1996) and the references therein. Also see Ahituv and Moav (2003).

although these theories do establish a negative relationship between inequality and growth, many of them involve counteracting effects, for which reason they predict, in effect, multiple equilibria. In other words, the predicted net impact of reduced inequality on subsequent long-term economic growth is ambiguous and can, in the last resort, be solved only empirically.

Credit market imperfections imply a limited ability to borrow and, thus, limited access to credit. As a consequence, poor households tend to forego investment opportunities also in human capital, although their returns on such investments can be expected to be relatively high.[5] Increased equality through a distortion-free redistribution from rich to poor would, in this situation, enhance economic growth. An offsetting force might arise, however, if the investments require large setup costs in relation to median income in order to achieve and go beyond some critical threshold size. With respect to formal education, analyses of economic growth indicate that secondary education is a far better predictor of economic growth than primary education[6], implying that the country needs to undertake investments beyond primary education. Accordingly, the required redistribution may be so sizable that it hampers overall investment and, as a consequence, generates a negative effect on economic growth.[7]

The political-economy theories build on the idea of majority voting, whereby the degree of redistribution from rich to poor through the political process will depend on the degree of inequality, that is, the relation between the median and the mean income in the economy. More inequality induces more redistribution and more associated tax finance, which creates more economic distortions and, in the end, less growth.[8]

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5 For a comprehensive presentation of empirical evidence on private returns to education, see e.g. Psacharopoulos (1994), Card (1999), Harmon *et al.* (2001, 2003) and Psacharopoulos and Patrinos (2002).

6 See e.g. Barro (1991, 1997, 2000) and Gylfason and Zoega (2003). One potential explanation for secondary education exerting a stronger influence on growth than primary education might be a stronger complementarity between the completed level of formal education and training for secondary, as compared to primary, education (cf. the discussion in Psacharopoulos, 1994).

7 In very poor societies, maximisation of investment in human capital might, therefore, require a concentration of the resources to the rich, implying a positive rather than a negative relationship between inequality and growth. See e.g. Perotti (1993) and Aghion and Bolton (1997) for such models.

8 As will be discussed below in Section 3, the expected impact of education subsidies diverges markedly from that of other redistributive measures.

Also within this framework, however, offsetting effects may arise through the political process depending on, *inter alia*, the distribution of political versus economic power and lobbying activities. This also implies a fundamental distinction between democracies and non-democracies.

In the presence of imperfections in the labour market, for instance those introduced by centralised collective bargaining or efficiency wages, wage compression may be efficiency and growth enhancing in two ways. Wage compression that reduces wage differentials for similar workers across plants of different productivity may decrease efficiency loss due to misallocation of workers across plants or industries. Furthermore, as argued by Moene and Wallerstein (1997), wage compression through centralised bargaining may fuel the process of creative destruction, by forcing out older, less productive production units and stimulating the entry of new plants.[9]

In a later study, Moene and Wallerstein (2001) show, using a theoretical model of voter behaviour, that higher pre-tax income inequality is associated with more political support for redistributive benefits, but with less support for social insurance based welfare policies, conditional on the distribution of the risk of income loss being held constant. In other words, contrary to the dominant view of majority voting producing a negative relationship between income equality and the demand for welfare spending, Moene and Wallerstein (2001) demonstrate, by combining the redistribute and the insurance view of welfare policy, that increased inequality is associated with less – not more – welfare spending on people having lost their labour market income.[10] Taken together, their work implies that wage compression in the labour market, which may be growth enhancing through the process of creative destruction, can enforce income equality also through a strengthening of the political support for spending on welfare policies targeted at the non-employed, that is, those without earnings.

Apart from these theories attempting to explicitly establish a negative relationship between increased inequality and growth, the past decade has also seen – at least a few – theoretical contributions supporting the

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[9] It should be noted, though, that in their theoretical model, Moene and Wallerstein (1997) do not consider wage differentials arising from investment in human capital.

[10] Moreover, based on data from eighteen OECD countries over the period 1980 to 1995, Moene and Wallerstein (2001) obtain support for their prediction of countries with a more skewed income distribution spending less on public provision of insurance against income loss.

traditional view of a positive linkage between inequality and growth (e.g. Grossmann 2003). As remarked by Forbes (2000), who also discusses these contributions at some length, they have received less attention in the literature as the majority of the empirical evidence points to a negative relationship.

All in all, it seems fair to conclude that the various theoretical models derived so far mediate a highly contradictory picture of the relationship between a country's level of inequality and its subsequent rate of economic growth. Indeed, Banerjee and Duflo (2003) state: "…none of the theories give us any confidence that the effect will be properly identified." (p. 281) Moreover, few, if any, of the theories have been subject to rigorous empirical tests.

2.2 Empirical evidence on the relationship between inequality and growth

Next, a selected number of inequality–growth studies are briefly reviewed. The overview focuses on studies having adopted the imperfect credit market or the political-economy (or fiscal policy) framework simply because these two approaches are at the forefront also in the subsequent section dealing with education subsidies. The common point of departure in the reviewed studies is standard reduced-form growth models, where cross-country differences in economic growth are explained by a basic set of variables that are taken to be exogenously given.[11] The technology and institutional frameworks are given once and for all, implying that they are assumed to be independent of the process of development of the economy. Various measures of the distribution of incomes have then been added to these basic regressions.[12] Few attempts have been made to model the underlying mechanisms, that is, to account for the endogenous nature of many of the included explanatory variables

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[11] In this standard 'Barro-type' setting, the dependent variable is the average rate of growth of GDP per capita over a specific period. Among the most frequently used independent variables are initial GDP per capita and some proxy of the initial stock of human capital. See Barro (1990, 1991).

[12] For a recent review of cross-sectional inequality–growth studies using cross-country data and OLS techniques, see Bénabou (2000). As noted by Aghion *et al.* (1999), cross-country comparisons of the determinants of growth using standard reduced-form growth models have been criticised for their *ad hoc* specification and the sensitivity of most of the obtained results. Recently, however, Temple (1999) has assessed them to be a powerful tool.

– not least education – by estimation of structural models (see further Section 4). As will become evident, the empirical literature continues to report highly contradictory results on the relation between inequality and economic growth.

- Alesina and Rodrik (1994) derive a political-economy model of long-run endogenous growth[13], in which conflict over distribution is predicted to be harmful for economic growth. They obtain strong support for their hypothesis that income and wealth inequality are inversely related to subsequent economic growth. Their empirical evidence stands out more strongly for what they call their 'high-quality sample' of 29 OECD and 17 developing countries than for an extended sample including 24 additional developing countries, and more strongly for the 1970 to 1985 than for the 1960 to 1985 period.
- Persson and Tabellini (1994) utilise a theoretical framework similar to that of Alesina and Rodrik (1994) in the sense that also their point of departure is the negative effect on growth of high levels of inequality as caused by the government's inclination to reduce serious conflict over distributional issues by levying higher taxes. Put differently, the negative correlation between initial inequality and long-term growth is seen to arise from high levels of governmental economic intervention provoked by inequality. They obtain support for their theoretical predictions derived from a simplified overlapping generations model by use of cross-country growth regressions based on data for 56 countries over the period 1960 to 1985. Their results are further confirmed by a historical panel data covering nine countries: Austria, Denmark, Finland, Germany, the Netherlands, Norway, Sweden, the UK and the USA.
- Clarke (1995) analyses a broad number of developed and developing countries[14] over the period 1970 to 1988, and reports a negative correlation between initial inequality and long-term growth. Moreover, he shows that this finding is robust across different

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[13] Key references in relation to endogenous economic growth are Romer (1986), Lucas (1988), Barro (1990) and Barro and Sala-i-Martin (1992a). A comprehensive overview of endogenous growth models can be found in e.g. Barro and Sala-i-Martin (1995), Aghion and Howitt (1998), Durlauf and Quah (1999) and Topel (1999).

[14] The total number of observations varied between 56 and 81 countries depending on the estimated model specification.

inequality measures, as well as different specifications of the estimated growth model. More specifically, the negative correlation between inequality and growth stands up against scrutiny with respect to tests concerning problems potentially biasing the results, such as measurement error, endogeneity and reverse causation. This robustness makes the inequality measures differ substantially from most other variables included in growth regressions (*cf.* Levine and Renelt 1992; Lindauer and Pritchett 2002). However, as also stressed by Clarke (1995), a robust partial correlation between income inequality and growth does not determine the actual direction of causality, nor does it tell about the impact of specific income distribution policies.

- Perotti (1996) investigates the relationship between income distribution and growth, with special reference to democratic institutions, based on a data set covering, at most, 67 countries over the period 1960 to 1985. Particular emphasis is paid to two specific aspects. First, concerning the robustness of the obtained positive relationship between equality and growth, he concludes that "…it does not appear to be unduly influenced by outliers or heteroscedasticity." (p. 164). Second, concerning the specific channels through which the prevailing income distribution affects growth, he finds some support for the capital market imperfections explanation, but none for the political economy explanation. The strongest support he obtains for explanations related to socio-political instability and joint education–fertility decisions.
- Deininger and Squire (1998) obtain a significantly negative effect of initial inequality on long-term growth when estimating a simple cross-country growth model from longitudinal data for 55 to 87 countries over the period 1960 to 1992. They, however, note that income inequality is not a robust determinant of future growth, while inequality of assets (proxied by the distribution of land) stays negatively associated with growth also when adding other variables to the growth equation.
- Barro (2000) extends his empirical framework for the determinants of economic growth, derived from the neoclassical growth model (Barro 1991, 1997), to include income inequality, and finds a weak negative, if any[15], overall relation between inequality and

[15] The coefficient is roughly zero when the fertility rate is controlled for. The results are obtained by the use of three-stage least squares (3SLS) techniques.

economic growth based on a panel of about 100 countries over the years 1965 to 1995.

- In contrast to previous findings, Li and Zou (1998) find, using fixed effects estimation techniques, income inequality to be positively related to economic growth based on a panel of 46 countries over the period 1947 to 1994. Moreover, for most of the time the significance of the positive relationship between income inequality and subsequent growth obtained passes the undertaken sensitivity test. They propose a theoretical explanation based on a political-economy model.
- Similar results are reported by Forbes (2000), who states that "in the short and medium term, an increase in a country's level of income inequality has a significant positive relationship with subsequent economic growth." (p. 869). She addresses the much discussed econometric problems of measurement error and omitted-variable bias by using improved data on income inequality and panel techniques for a sample of 45 countries over the period 1966 to 1995, averaged over five-year periods. Based on a model almost identical to that of Perotti (1996), she concludes that the positive relationship between inequality and growth is highly robust across samples, variable definitions and model specifications.[16] Forbes (2000), however, also underscores that since her results are of a short-term nature, they do not necessarily contradict the long-term negative relationship reported in previous studies, but rather complement these previous findings.
- Gylfason and Zoega (2003) estimate an overlapping generations model of education and endogenous growth from their panel data

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[16] It might be mentioned in this context that an earlier version of Forbes' study, as well the study by Li and Zou (1998), were dismissed by Barro (2000) with the motivation that the evidence referred to measurement-error sensitive fixed-effects estimates based on relatively few observations. Also Aghion *et al.* (1999) present strong critiques of Forbes' study. Banerjee and Duflo (2003), in turn, criticise these two studies on several grounds: "…none of the underlying theories give strong reason to believe that the omitted variable problem can be solved by including a country fixed effect in a linear specification…" (p. 268); "…the striking results obtained by those who have estimated the growth–inequality relationship with fixed effects arise from giving a … misleading interpretation…" (p. 290); "…the conclusions of Forbes (2000) and Li and Zou (1998) are not warranted: There is no evidence in the data that increases in inequality are good for growth. In fact, the bulk of the evidence goes in the opposite direction." (p. 293)

covering 87 industrial and developing countries over the period 1965 to 1998. They report a statistically significant, albeit not very strong, inverse relation between inequality and economic growth.

- Banerjee and Duflo (2003) attempt to explain why previous estimates of the relationship between the level of inequality and subsequent growth rates differ so radically from each other. In particular, their use of non-parametric methods on a panel of 45 countries reveals that the growth rate is, in effect, an inverted U-shaped function of net changes in inequality. More precisely, changes in inequality – in whatever direction – are associated with reduced growth in the next period, and the larger the changes, the larger the decline in growth. The initial level of inequality enters with a statistically insignificant coefficient in the short term, and does not affect the strong association between changes in inequality and growth. Banerjee and Duflo (2003) argue that the very different conclusions drawn from the basic linear model are explained by the omission of these non-linearities in the inequality–growth relationship, and not by differences in the control variables, the samples and the lag structures. When it comes to causality, however, they see the interpretation of any of the evidence – theirs as well as previous – causally to run into difficult identification problems not yet solved satisfactorily in the literature. Answering the fundamental question of whether or not inequality harms growth will, they conclude, require evidence from micro data.

A common feature of the above empirical studies is that they use data on the performance of a broad group of countries at vastly different levels of economic development. Generally speaking, the cross-country findings imply that countries with initially lower levels of inequality have tended to grow faster in the long run. The policy implication of this outcome has then been that long-term economic growth can be improved by use of policies aimed at reduced inequality. It may, however, be questioned how relevant these world-wide findings are for the richer countries as a group and, in particular, for single industrialised countries and especially for those with already quite equitably distributed incomes and wealth, such as the Nordic countries. As the following brief presentation will indicate, there is not much evidence available to shed light on these questions and, when available, it mediates a highly contradictory and scattered picture.

- Perotti (1996) concludes that the positive association between equality and growth originates strongly from intercontinental variation. He finds it to be much weaker, and statistically insignificant, for poor countries, and to show up more strongly for democracies than for non-democracies, although this latter effect does not appear to be very robust. He concludes by emphasising that since most democracies are rich countries, a distinction between the income effect and the democracy effect in the equality–growth relationship is virtually impossible.
- Alesina and Rodrik (1994) and Clarke (1995) obtain no support for the hypothesis of the relationship between equality and long-term growth being different in democracies and non-democracies. Persson and Tabellini (1994), in contrast, find the inverse relationship between inequality and growth to hold for democracies only, a finding that lends strong support for the endogenous fiscal policy argument in the political-economy model. This discrepancy in results Alesina and Rodrik (1994) argue to be due mainly to differences in the inequality measures used in their study compared to the Persson–Tabellini study.
- Deininger and Squire (1998) find initial inequality to affect future growth in undemocratic countries only. If only OECD or high-income countries are considered, inequality turns insignificant. This finding is interpreted as lending support for the credit-market hypothesis rather than the political-economy hypothesis.
- When dividing his country panel into poor and richer countries, also Barro (2000) obtains a positive association between increased equality and growth for the poor countries only. For the richer countries, on the other hand, he gets support for the prevalence of a trade-off situation; that is, for higher inequality having a tendency to encourage rather than retard economic growth. He suggests, as a possible interpretation of these results, that credit market constraints are so much more serious in poorer countries that the relationship between inequality and growth turns negative.
- Forbes (2000), in turn, obtains a significantly positive effect of inequality on growth for both poorer and richer countries. Moreover, Forbes (2000) is one of the few studies having used panel data and techniques and, consequently, having been able to shed light on the within-country – as opposed to the cross-country – relationship between inequality and growth. Her preferred estimate of 0.0013, however, indicates that even a 1.3 per cent increase in average annual growth over the subsequent five

years would require a ten-point increase in a country's Gini coefficient, an increase of such a magnitude that she finds it unlikely to occur in a short period of time.

- Rehme (2003) derives a theoretical model, where human capital simultaneously determines growth and income inequality. He estimates the model by use of data averaged over the period 1970 to 1990 for 13 relatively rich countries. The associations between the three economic phenomena are found to be rather weak, but with signs supporting previous evidence. In particular, income inequality (both pre- and post-tax) is negatively related to growth even after control for fertility. All in all, Rehme (2003) concludes that the results indicate that, for the typical rich country, more public spending on education (at a given education technology) generates less inequality and higher growth.
- When plotting World Bank data on the annual rate of growth of GNP per capita from 1965 to 1998 against data on the inequality of income or consumption as measured by the Gini coefficient, Gylfason and Zoega (2003) report (but do not show) that a similar pattern of a positive association between equality and growth emerges for poor as well as rich countries. Based on their estimation results they note that changes in the distribution of incomes exert a stronger influence on economic growth in rich than in poor countries, but they do not elaborate on this finding.
- An alternative to splitting the country sample is to supplement the whole-sample growth model with continental dummy variables (e.g. for Africa, Central and South America and Asia). In doing so, Gylfason and Zoega (2003) obtain no marked change in their overall pattern of growth–equality findings, a conclusion in line with that drawn by Clarke (1995) and Perotti (1996). Deininger and Squire (1998), in contrast, find their significantly negative effect of initial income inequality on long-term growth to turn insignificant when they add regional variables to their cross-country growth model. A similar change in the significance level of the effect of inequality on growth is also reported by, for instance, Alesina and Perotti (1993), Persson and Tabellini (1994) and Birdsall *et al.* (1995). The fact that the negative effect of inequality on growth tends to become insignificant when including regional dummy variables has been interpreted by Forbes (2000) as an indication of an omitted-variable bias problem; that is, the inequality effect actually reflects the impact of omitted variables instead of a direct influence of inequality on growth.

A final aspect that deserves attention in this context is that redistribution-fostered economic growth will hardly leave inequality unchanged. The early literature on the effect of the process of economic development on income inequality was dominated by the so-called Kuznets hypothesis, named after Simon Kuznets (1955, 1963, 1973). More specifically, the Kuznets curve describes the relationship between income inequality and GDP per capita growth as an inverted-U, where inequality first rises and later falls as the economy develops. The cross-country differences in the observed changes in income distributions are, in other words, explained by the fact that the countries are at different stages on their path of economic development. For the developed countries, this inverted U-shaped relation would imply that lower inequality fosters growth, which reduces inequality further. Indeed, this hypothesis seemed to well describe the experience in most OECD countries, including the USA, up to the 1970s.

In line with increasing inequality in the industrialised world over the past few decades, especially in the UK and the USA, most research un-dertaken in the 1990s pointed to a weakening over time in the relevance of – and consequently also the interest in – the Kuznets curve.[17] Barro (2000), in contrast, reports, based on his large country panel, that the Kuznets curve shows up as a clear empirical regularity across countries also in the 1990s, although it can explain little of the variation in inequality across countries or over time.[18] The weak fit of the Kuznets curve he argues to be due to cross-country differences in the adoption of new technologies. Empirical evidence in support of the Kuznets curve is also obtained by Gylfason and Zoega (2003) based on their 87-country panel data.

In this context, it may finally be noted that Aghion *et al.* (1999) state that the recent empirical evidence on the impact of growth on inequality reveals that new theories are needed to properly understand the feedback effect from growth to inequality. The critical question then is whether this feedback ultimately creates a virtuous circle, as indicated by the Kuznets curve, or whether it generates a vicious circle of increasing inequality and, thus, growing redistributive pressures. In particular, they focus their analy-

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[17] Deininger and Squire (1998), for instance, obtain no support for the Kuznets curve from their sample of countries or for the individual countries covered by their data (with the exception of five developing countries). For most countries, the association between the level of income and its distribution is statistically insignificant, and for a few countries (the UK and the USA, among others) it even turns out to be U-shaped instead of revealing an inverted-U shape.

[18] Similar results are reported also by Deininger and Squire (1998) and De Gregorio and Lee (2002).

sis on the way that the growth-fostering phenomena of trade liberalisation, skill-biased technical change and new organisational forms may affect inequality, with the emphasis being on exploring under which circumstances these three factors may account for the absence of a virtuous circle between growth and inequality. In doing so, Aghion *et al.* (1999), however, concentrate on wage inequality instead of income inequality in order to be able to abstract from, *inter alia*, redistributive policies.

3 Aggregate inequality and subsidisation of education

The overwhelmingly positive and statistically significant, although typically not very strong, association between initial income equality and long-term average per capita growth rates documented in a fairly broad number of cross-country studies covering the period from around the mid-60s up to recent years has inspired a search for potential explanations for this lack of clear-cut support for the conventional trade-off argument. Apart from the possibility of there being a direct link between initial inequality and subsequent economic growth, the literature refers to a multitude of specific channels – mainly political but occasionally also non-political ones – through which inequality might influence growth. One of the strongest candidates among these is the argument that the distribution of income and wealth influences investment in education, which in turn affects long-term growth. This, in turn, raises the question to what extent education subsidies should be used for redistributive purposes.

Subsidisation of education has, over the years, been justified on several normative grounds. A common feature of these justifications is that they refer, in one way or the other, to equity and redistribution. Below, three main types of arguments are presented and discussed in some more detail: imperfect capital markets, positive externalities and welfare gains.[19]

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[19] Apart from these, justifications stressing equality of educational opportunities and paternalistic aspects have also been put forth. See further e.g. Lott (1987), Cohn and Geske (1990), Trostel (1996) and Aghion *et al.* (1999).

3.1 Capital market imperfections

One argument in favour of education subsidies relates to the role of capital market imperfections and the detrimental effect of the consequent borrowing constraints on investment in human capital and, in a broader perspective, on growth. Galor and Zeira (1993) derive a model that attributes the persistency in growth differences between economies to differences in human capital, due to credit market imperfections. More specifically, they explore, by use of an equilibrium model of open economies with overlapping generations and inter-generational altruism, the theoretical linkage between credit market imperfections, the initial distribution of income and wealth and a society's aggregate investment in human capital. They demonstrate that in growth models accounting for liquidity constraints, the income distribution will determine the share of the population that can invest in education, an outcome which is shown to be consistent with the relationship between inequality and growth being positive at low levels of income, but negative otherwise, that is, in richer economies.[20] Moreover, in the presence of indivisibilities – i.e. non-convexities – in investment in human capital, these effects are likely to be carried to the long term as well, since the different levels of investment in human capital feed back into the distribution of income and, gradually, also wealth.[21] If so, economic growth can be encouraged by increased equality through education.

Similar outcomes are reported by Aghion *et al.* (1999), who derive a theoretical model where the effect of inequality on growth is analysed for economies with heterogeneous endowments of wealth or human capital across individuals in combination with imperfect capital markets characterised by moral hazard. They demonstrate that within this context inequality may exert a direct negative influence on growth, and show that reduced inequality, through redistribution to the less endowed, can under such circumstances be growth-enhancing.

But the capital market imperfection rationale has been subject to critiques, as well. Dur and Teulings (2001), for instance, put forth two reasons why the widespread use of education subsidies cannot be fully rationalised by the capital market imperfections argument. Their first reason relies on the fact that recent empirical evidence fails in lending sup-

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[20] This result is repeated in a recent paper by Galor and Moav (2004) based on an approach combining the credit-market imperfections view with the classical view.

[21] Piketty (1997) derives similar predictions but without relying on the assumption of there being a fixed-size investment technology (technological non-convexities).

port for the importance of borrowing constraints for educational choices. They thereby refer to work by Cameron and Heckman (1998, 2001), Cameron and Taber (2000), Shea (2000) and Keane and Wolpin (2001).

On the whole, recent evidence instead attributes a major role for educational outcomes to the social background, that is, to the family and the neighbourhood in which the individual has grown up. However, the social background is inevitably linked with capital market imperfections, for which reason both effects are likely to influence educational choices and, thus, the inequality–growth relationship. So far, this outcome has been shown only theoretically, though.[22]

What the empirical research can shed some scattered but highly contradictory light on is the likely impact of inequality on educational attainment. Based on their cross-country data, Deininger and Squire (1998) report a significantly negative impact of inequality on attainment of schooling in the population. Moreover, introduction of continental dummy variables does not eliminate the significance of the inequality coefficient. Checchi (2003) finds that, when controlling for the degree of development, his 102-country panel data extending from 1960 to 1995 suggest that financial constraints (measured by income inequality) are relevant mainly in limiting enrolment rates at the secondary level. Moreover, female participation in education is more strongly conditioned on family wealth, and this concerns all levels of education. Barro (2000), in contrast, while referring to the impact of credit market constraints, reports his country panel data provides no support for income inequality to exert a significant influence on the average years of school attainment at the secondary and higher levels of adult males.

The second reason pointed to by Dur and Teulings (2001) relates to the fact that government subsidies to education are generally much more comprehensive in character than the mere attainment of equality of opportunity would require. A similar line of reasoning is used by Trostel (1996), who argues that the borrowing constraint problem should be solved by the use of government-supported loans instead of subsidies, as the latter "…lower the private cost of education and redistribute income to all publicly educated students,…" (p. 4). The argument that loans rather than subsidies are the most direct way of addressing borrowing constraints is also repeated by Bovenberg and Jacobs (2001). Similar lines of reasoning in relation to liquidity constraints are expressed by de la Fuente (2003) in his

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[22] See e.g. Bénabou (1996), Durlauf (1996) and Fersthman *et al.* (1996). *Cf.* Grossmann (2003).

concluding remarks: "Hence, policies specifically targeted at these problems should be more effective in raising upper-level enrolments than further decreases in already low tuition charges that imply a large subsidy for relatively privileged groups. Indeed, higher tuition fees, coupled with a well designed loan programme and with an increase in means-tested grants, may be an efficient way to provide additional resources to increase the quantity and quality of post-secondary education while at the same time reducing the regressivity of its financing, ensuring equal access to opportunities regardless of socioeconomic background, and improving student motivation to take full advantage of educational opportunities." (p. 49)

3.2 Positive externalities

Spillover benefits from human capital accumulation have been stressed by, *inter alia*, Lucas (1988), Tamura (1991), Barro and Sala-i-Martin (1995) and Aghion and Howitt (1998). The basic hypothesis of endogenous growth models of any investment, including those in human capital, giving rise to positive external effects extending to subsequent generations[23] is the common feature also of a number of studies where the initial income distribution is shown to affect the equilibrium level of investment in human capital and, ultimately, economic growth.[24]

If the acquisition of education generates spillover benefits, then individuals will typically invest in amounts of education, and especially of higher education, that are too low from a social point-of-view. Education subsidies can encourage students to invest amounts closer to the social optimum, and thereby help internalising the externality. The empirical evidence for the existence of positive externalities is, however, still rather weak and increasingly contradictory.[25] Moreover, it has been ques-

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[23] Alternative models to these political-economy-type approaches have also been used in the growth literature. Benhabib and Rustichini (1996), for instance, develop a game-theoretic model for analysing the relationship between the level of wealth, income distribution and growth based on the idea that individuals can appropriate society's resources to their own benefit.

[24] For a comprehensive review of the literature, see Bénabou (1996). For more recent research, see e.g. Bénabou (2002), De Gregorio and Lee (2002) and Gylfason and Zoega (2003).

[25] For studies based on cross-country data, see e.g. Topel (1999), Krueger and Lindahl (1999, 2001), Bils and Klenow (2000), Bassanini and Scarpetta (2001), de la Fuente and Doménech (2002), de la Fuente (2003) and Teulings and Van Rens (2002, 2003). For studies based on regional data, see e.g. Acemoglu ja Angrist (1999), Rudd (2000), Ciccone ja Peri (2002), Dalmazzo and de Blasio (2003) and Moretti (2004).

tioned whether these perceived positive external effects are of such a magnitude that they can warrant as large subsidies as are actually observed (e.g. Trostel 1996).

3.3 Welfare gains

In the absence of capital market imperfections and externalities, market forces are taken to drive the economy towards an optimal level of investment in education and subsidisation of such activities would only create distortions, not least in the distribution of income. Indeed, as education subsidies are likely to favour high ability people[26], the redistribution would favour higher income people and, thus, increase rather than decrease inequality.

Recent research has, however, demonstrated that this perspective overlooks the fact that income taxation discourages investments in human capital.[27] Trostel (1996) shows that education subsidies can correct for these distortions and, consequently, may be welfare improving. His calculations indicate that subsidising education is efficient up to a fairly high rate, that these results are not dependent on how the subsidies are financed, and that the consequent welfare effects are quite large. While the welfare effects are calculated for an economy with no imperfections except for a proportional income tax and a tuition subsidy, Trostel (1996) concludes by noting that the welfare gains and/or optimal subsidy rates are likely to be even larger in the presence of market imperfections, growth enhancing externalities, or a progressive income tax.

Bovenberg and Jacobs (2001), in turn, analyse to what extent education subsidies can help remove the distortions in human capital accumulation induced by redistributive policies in the form of progressive in-

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[26] A seminal contribution to the by now huge literature on the ability bias in the return on educational investment is the study by Angrist and Krueger (1991).

[27] Apart from the research briefly presented below, also the contributions by, for example, Lommerud (1989) and Van Ewijk and Tang (2000) may be mentioned in this context. In both papers, the government resorts to education subsidies in order to avoid distorting human capital accumulation. In Lommerud (1989), this need arises from the government's taxation of labour income in an attempt to internalise the negative externalities from status seeking. In Van Ewijk and Tang (2000), it is caused by the government's use of progressive taxes in order to punish wage demands of unions and to stimulate employment.

come taxation.[28] They conclude by investigating to what extent their model can explain the present level of education subsidies to higher education in eight OECD countries: Canada, Denmark, Finland, Germany, Italy, the Netherlands, Sweden and the USA. Broadly speaking, their findings indicate that the calculated optimal levels of education subsidies are quite close to the actually observed ones, implying that a large part of the actual subsidies to higher education can be justified on efficiency grounds. This finding might be interpreted in support of public subsidies for higher education being efficient in lowering the income risk and the consequent risk of under-investment associated with higher education (by lowering the cost of the investment) (see e.g. Dutta *et al.,* 1999).

Dur and Teulings (2001) build their analysis on the theoretical work of Alesina and Rodrik (1994) and Persson and Tabellini (1994) briefly referred to above. As noted earlier, the main point of departure in their political-economy models is that a dispersed pre-tax distribution of income increases the political support for governmental intervention in the form of higher marginal tax rates[29], which tend to reduce incentives and, consequently, also growth. Accordingly, in order to enhance growth within such a framework, policies should be directed at achieving a flatter pre-tax income distribution. Dur and Teulings (2001) derive a general equilibrium model suggesting that subsidies to education may serve this goal, their rationale being that differences in inequality might be driven by the level of human capital, rather than by marginal taxes. They argue that their hypothesis is consistent with the fact that "the wide differences in inequality in disposable income between both sides of the Atlantic are largely driven by differences in the dispersion of pre-tax income" (p. 5).

Finally, it is noteworthy that in line with Trostel (1996) and Bovenberg and Jacobs (2001), also Dur and Teulings (2001) abstract from capital market imperfections and positive external effects. Just like Bovenberg and Jacobs (2001) they also account for the progressivity of the income tax schedule, but take workers to be imperfect rather than perfect substitutes in production. Accordingly, in the Dur–Teulings model, education

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[28] Alstadsaeter (2003) analyses, by use of a simple partial model, whether or not a progressive tax system might introduce distortions also in an individual's choice of educational type (and not only in his choice of educational level – a by now well-studied field of research), inducing him to choose more of the educational type with a higher consumption value. Empirical evidence for Norway lends support to these predictions. As noted by the author, a next step would be to introduce into the model the impact of educational subsidies in the form of tuition fees.

[29] Empirical evidence in support of such political pressure being present in democracies has recently been provided by Milanovic (2000).

subsidies not only correct tax distortions arising from redistributive policies, but also generate positive distributional effects by compressing the wages of skilled and unskilled labour through an increase in the relative supply of skilled workers.

All in all, the theoretical work on the welfare improving redistributive effects of education subsidies briefly reviewed above seeks to find an optimal income distribution policy mix to entail the trade-off between two distortions working in opposite directions: the over-investment tendency induced by education subsidies and the disincentive effect of income taxation on human capital accumulation. One challenge facing this field of research is that the optimal level of subsidies to education from a redistributive point-of-view is not easily determined, but the joint outcome of the various effects that investments in human capital exert on the distribution of income. In their theoretical model, Dur and Teulings (2001), for instance, account for three key parameters measuring such effects: the degree of substitutability between skill types in production, the price elasticity of educational attainment, and the degree of complementarity between education and ability in skill formation. The direct effect works through the complementarity between education and ability and tends to raise inequality. The two indirect general equilibrium effects, in contrast, work in the opposite direction; they contribute to redistribution by raising the human capital of the workforce, which will flatten relative wages due to declining returns to education. Indeed, it is this finding of powerful externality effects on the pre-tax distribution of income that make Dur and Teulings (2001) argue in favour of the use of education subsidies as a redistributive policy tool, and not the relative weight of the two opposite effects. The relative importance of the direct (income) effect versus the indirect (substitution) effect remains, in effect, an open question in their analysis because of the limited availability of empirical evidence on the absolute magnitude of the three parameters in question.

4 Education and aggregate inequality

A recent OECD report (2001a) concludes that "economic inequality goes hand in hand with inequality in educational access and adult literacy" (p. 26). This statement captures a major reason why public spending on education is seen as a highly effective tool for reducing and combating income inequality. Simultaneously, however, a contemporary OECD study (2001b) emphasises that those from socially disadvantaged backgrounds may not always have benefited from the expansion in tertiary

education. This, in turn, shows that the provision of educational opportunities is not necessarily a sufficient tool.

These contentions serve well to highlight how intimately connected education and equality are at the individual as well as the whole-economy level. Moreover, the causality between education and inequality runs both ways. Income and wealth inequality determines the investment in and, hence, the accumulation of human capital and, in the last resort, long-term productivity and growth. This process can be affected through subsidisation of education, as discussed in the previous section. Despite a growing theoretical literature, the empirical evidence on the importance and effectiveness of educational subsidies is still scarce and partial, though.

Simultaneously, an expansion of education feeds back on income inequality in at least two ways, since the distribution of incomes is determined both by the level and the distribution of education across the population. Moreover, the predictions derived from the theoretical literature are highly ambiguous concerning the relation between educational expansion and aggregate inequality.

First, educational accumulation influences the distribution of education across the population. According to development economics, this effect will either increase or decrease income inequality depending on where in the educational distribution the incremental investment occurs.[30] In a developing country with a low-educated population, an increase in the relative size of those with more education may initially raise income inequality, but subsequently lower it as the economy develops. A 'composition' effect evolving in this way is also consistent with the Kuznets curve discussed above.[31] The human capital model, in contrast, predicts an unambiguously positive association between educational and income inequality.[32]

Second, educational accumulation affects the average educational attainment level. Here, the human capital model provides an ambiguous answer in that, for a given distribution of education, the effect of increased average education on income inequality may be either positive or negative, depending on the evolution of educational returns. The devel-

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30 See e.g. Knight and Sabot (1983) and Topel (1999).

31 Apart from the prevailing distribution of income and wealth, and the development stage of the economy, the concentration in the educational distribution of the additional investment is affected by a multitude of other factors as well, not least by the structure and financing of the educational system. The current state of knowledge on these matters is still scarce and scattered, though.

32 See e.g. De Gregorio and Lee (2002).

opment literature, on the other hand, is dominated by the 'wage compression' effect, which implies lower income inequality as the rate of return to education is expected to decline with the increase in the relative supply of educated labour. Indeed, and at odds with theoretical predictions of factor price equalisation, empirical evidence does suggest that an increase in the average educational level will change the relative proportions of differently educated labour and, thus, their relative wages. In particular, a rise in the relative share of the more educated will cause a fall in their relative price due to declining rates of return on higher education and, as a consequence, inequality will diminish. Put differently, the rate of return on additional investments in education declines in the average level of education of the workforce.

There is both country-specific and cross-country evidence in support of the view that an increase in the stock of human capital reduces income dispersion. A standard reference on this issue is Katz and Murphy (1992), who estimate the elasticity of substitution between high- and low-skilled US workers to be 1.4. A recent elaboration of their approach, by Ciccone and Peri (2003), produces elasticity estimates in the range between 1.55 and 1.96.[33] Barth and Røed (2001) estimate the elasticity of substitution between workers with tertiary and non-tertiary education to be 1.3 based on a panel of 15 European countries. A similar value is obtained by Teulings and Van Rens (2002, 2003) based on panel data on GDP per worker, income dispersion and the average years of education for some 100 countries over the period 1960 to 1995. In particular, they estimate a one-year increase in the average level of education of the workforce to reduce the private rate of return on education by 1.5 percentage points, while the corresponding decline in the social rate of return is estimated to be 4 percentage points.

Considerably less attention has been paid to the question how a change in the relative price of skills will influence further investments in education and, as a consequence, the supply of educated labour. Barth and Røed (2001) estimate from their panel of 15 European countries that there has been an average shift in the relative demand for tertiary education of 5 per cent per year over the period 1980 to 1995. Empirical evidence for Sweden and the USA implies that higher returns do stimulate

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[33] Most of the country-specific studies on the sensitivity of the return on education to changes in the average level of education were published in the mid-90s or earlier and only a few of them concern European countries, e.g. Hartog *et al.* (1993) on the Netherlands, Edin and Holmlund (1995) on Sweden, and Katz *et al.* (1995) on France, Japan, the UK and the USA.

the demand for education (see Topel 1999). Does this effect work equally effectively also in the opposite direction, with declining returns having a depressing impact on the demand for education and, thus, the supply of educated labour? Or could it be that complementarities between education and technological progress fuel a continuous increase in the supply of educated labour despite of declining returns? Or are these complementarities likely to offset – partly or fully – the downward trend in educational returns caused by improved average educational attainment in combination with imperfect substitutability between lower- and higher-skilled labour, as suggested by, for instance, Teulings and Van Rens (2002, 2003)? Or are government interventions in the form of increased subsidisation of education called for in order to reverse the nega-tive impact of declining returns on investment in higher education in an attempt to avoid or, at least, mitigate scarcity of a well educated labour force necessary for sustained long-term economic growth?

These are examples of delicate and important questions to which the empirical literature has few answers. Moreover, the available evidence mostly concerns specific issues investigated, at most, for a few single countries and, moreover, typically in isolation from important feedback effects to educational and/or income inequality. This holds even more so for the consequences of the intertwined relationships between education and aggregate equality on economic growth.

A snapshot on the available empirical research based on cross-country data indicates the following. The early evidence on the relationship between education and aggregate inequality has been reviewed by, for instance, Psacharopoulos and Woodhall (1985) and Ram (1989, 1990). A majority of these early studies seems to indicate a positive correlation between educational and income inequality, but a negative correlation between the average level of education and income inequality. In other words, a higher educational level tends to reduce income inequality, while a wider distribution of education across the population is likely to increase income inequality. There are, however, also studies indicating that income inequality is affected neither by the average level of education nor by educational inequality.

Among the more recent cross-country studies focusing on the effects of education on income inequality are Barro (2000), Checchi (2000), De Gregorio and Lee (2002), Gylfason and Zoega (2003) and Teulings and Van Rens (2002, 2003). In his analysis of determinants of inequality based on a large panel of countries, Barro (2000) finds the average years of school attainment at the primary level to be negatively and significantly, those at the secondary level to be negatively but insignificantly, and those at the higher

education level to be positively and significantly related to inequality. These education-induced effects remain roughly unchanged also when adding continent dummies (for Sub-Saharan Africa and Latin America) or measures of population heterogeneity (ethnicity, language, religious affiliation). Moreover, they seem to have changed only marginally over time, which Barro (2000) interprets as a result that contradicts sharply with the view that the increases in income and wage inequality in a number of countries, especially in the UK and the USA, over the past few decades are largely caused by skill-biased technological change; that is, by a technological change having favoured the skilled part of the workforce at the expense of the unskilled.[34] It may also be noted that when supplementing the inequality regression with the ratio to GDP of public expenditure on schooling, the variable comes out with a significantly positive coefficient although schooling attainment is already controlled for. Barro (2000) hypothesises that the outlay variable captures a reverse effect from inequality to education-induced income redistribution.

Checchi (2000) analyses the relationship between inequality in incomes and educational achievement (in terms of both average educational attainment and its dispersion) from a country panel data set covering five-year intervals over the period 1960 to 1995. His results lend support to there being a strong negative linkage between average years of education and income inequality. A significantly negative, although weaker, association is found also between educational and income inequality, suggesting a U-shape rather than the theoretically predicted inverse-U shape for the relation between the two variables. Education is estimated to explain between 3 and 16 per cent of the dispersion in incomes, with the relative contribution of education being higher and, moreover, showing a rising trend in developed countries. The OECD countries stand out in the analysis in the sense that despite improved average educational attainment, inequality in educational achievement has been rising, instead of declining, during the entire period under study. Since 1975, this trend has been accompanied by rising income inequality.

De Gregorio and Lee (2002) investigate the relationship between educational attainment and income distribution from an unbalanced panel data

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[34] A similar conclusion is drawn by Teulings and Van Rens (2002, 2003), while Acemoglu (2002) argues to the contrary. For recent reviews and discussions of this topic, see e.g. Chennels and Van Reenen (1999), Sanders and Ter Weel (2000), OECD (2001b) and Acemoglu (2002). For a discussion and overview of the perceived skilled-bias effects of the ICT- and IT-revolution, see e.g. Soete and Ter Weel (2001).

set covering a broad number of countries at five-year intervals from 1960 to 1990. Their results suggest that countries with higher educational attainment also have a more equal income distribution. Furthermore, educational inequality, measured as the standard deviation of educational attainment of the population, comes out with a significantly positive effect on income inequality. Hence, higher educational attainment and less educational inequality result in a more equal income distribution. De Gregorio and Lee (2002) also find that government social expenditure, measured in relation to GDP, reduces income inequality.[35] They note that this effect could occur through two mechanisms: direct transfers from rich to poor, or improved access for the poor to education activities, especially in the presence of credit market imperfections. Taken together, however, the investigated income and educational factors, albeit important, prove to leave the bulk of the observed cross-country differences in income inequality unexplained.[36] De Gregorio and Lee (2002) argue that the small quantitative effects of educational expansion on income distribution to be due, in part, to the detrimental impact of educational expansion on the equality of educational attainment in the population. Accordingly they point to the importance of following-up the effects of educational expansion policies not only on educational attainment levels, but also on the distribution of education across the population and the workforce.

All in all, our knowledge on the impact of education on income inequality is still scarce and scattered. The skill level of the population, as measured by average educational attainment, seems to play an evident role, whereas that of educational inequality is less clear. This holds even more so for the joint impact of average attainment and its dispersion on income inequality.[37]

Compared to the studies briefly reviewed above, Gylfason and Zoega (2003), as well as Teulings and Van Rens (2002, 2003), move one step further in that they extend their analysis of the effect of education on inequality to also cover the subsequent impact on growth. Indeed, both studies argue that the favourable effects of more and better education on both equality and growth may offer (part of) an explanation for the in-

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[35] It may be further noted that their analysis of the determinants of education shows that social expenditure also helps to explain cross-country differences in the average level of educational attainment and the dispersion of education across the population.

[36] This average cross-country outcome (as calculated for 1990) differs, however, largely both between and within continents (see De Gregorio and Lee 2002, Table A.2).

[37] Checchi (2000) also draws attention to the fact that no measure related to labour market institutions has been considered in this context.

verse relationship between inequality and economic growth reported in the literature over the past few decades.

Gylfason and Zoega (2003) explore empirically the possible relationships and interactions among education, equality and economic growth in a sample of 87 countries over the period 1965 to 1998 in the search for an explanation for the positive association between equality and growth observed from simple scatterplots of the data. The point of departure in their endogenous growth model with overlapping generations is that improvements in the national level of education will enhance both equality and growth. More specifically, more and better education financed by public expenditure is taken to encourage economic growth not only directly, but also through reduced economic and social inequality. A precondition for this interaction between education and equality to arise is that a redistribution of education expenditures from higher education to more basic education increases the total supply of educated people while simultaneously enhancing equality. The key for this situation to occur is diminishing returns to education expenditures. An increasing supply of human capital, in turn, raises the return on physical capital in relation to that on human capital, and these complementarities between human and physical capital will generate further saving, investment and growth. The estimation results obtained from a system of four equations confirm the predictions of their model; that is, education (as measured by the secondary-school enrolment rate) exerts a positive (albeit statistically insignificant) influence on investment in physical capital, and a significantly negative influence on income inequality. Both effects carry on to economic growth, suggesting that the indirect effect of education through increased equality and investment accounts for, on average, about one-fourth of the total effect of education on growth. Their results also indicate that increased inequality in the distribution of income reduces the efficiency (the contribution to growth) of increased investment in education. Moreover, the more educated the population, the stronger the adverse effect of increased inequality on economic growth. The same holds for investments in physical capital.

The analysis by Teulings and Van Rens (2002, 2003) runs much along the same lines in trying to capture the joint effect of the average educational level on GDP and income inequality. More precisely, due to imperfect substitution between workers with different levels of human capital, the effect on GDP of an increase in the average level of education should decline with the level of education. This negative association between the average level of education and the return on education at both the individual and the whole-economy level will reduce wage and income inequality. Simultaneously, skill-biased technological change will raise the return on

education to the extent that the final effect of an increase in the average educational level on growth will be positive. With the average level of education having a positive effect on growth and a negative effect on inequality, the correlation between inequality and growth turns negative. Moreover, their empirical results provide strong support for the negative correlation between inequality and growth to be caused by the co-movement of these economic phenomena with the average level of education. They also interpret their results in support of Quah's (2001) recent questioning of the causal relationship between inequality and growth.

5 Discussion

Needless to say, in the real world economy, the factual effect of education subsidies on the distribution of incomes will depend on the sign and magnitude of a variety of both direct and indirect effects of education subsidies. In addition, the net effect on income inequality of subsidising education is dependent also on the evolution of other potential channels through which the income distribution can be influenced, as well as on eventual feedback effects from changes in income inequality (and/or economic growth) on both the level of education and its dispersion.

As shown above, existing research addresses these complex interactions between education and income inequality only partially, building on simplifying assumptions which, by necessity, lead to rather simple testable hypotheses paying little, if any, attention to potential interactions between education policies and other income inequality affecting phenomena. So far, the main justifications for education subsidies being an efficient policy tool have been approached only separately. In other words, no attempts have been made to integrate capital market imperfections, positive external effects and taxation policies into the same analytical framework.

Future research faces other challenges as well. In addition to seeking an optimal policy design for redistributive purposes with exogenously given education subsidies, also the optimal level of subsidisation in itself would deserve some attention. Finally, a common point of departure in the existing research is that the mean level is considered to be a sufficient measure of the distribution of education. With growing evidence on widening within-educational-group wage and income inequality, this is likely to be an all too restrictive assumption also in this context.

All in all, the negative correlation between inequality and growth and the key role played by education in that context raise the question

through which mechanisms these effects are actually achieved and mediated. Do we know enough about the optimal level – in terms of balanced costs and benefits – of governmental economic intervention in order to efficiently enhance equality and economic growth through education subsidies? Do we know enough about the actual direction of causality? The obvious answer to both questions is – NO!

Literature

Acemoglu, K.D. (2002), Technical Change, Inequality, and the Labour Market, *Journal of Economic Literature* 40(1), 7–72.

Acemoglu, D.J. and J. Angrist (1999), *How Large are the Social Returns to Education? Evidence from Compulsory Schooling Laws*. NBER Working Paper No. 7444.

Aghion, P. and P. Bolton (1997), A Theory of Trickle-Down Growth and Development, *Review of Economic Studies* 64(2), 151–172.

Aghion, P. and P. Howitt (1998), *Endogenous Growth Theory*. MIT Press, Cambridge MA.

Aghion, P., E. Caroli and C. García-Peñalosa (1999), Inequality and Economic Growth: The Perspective of the New Growth Theories, *Journal of Economic Literature* 37(4), 1615–1660.

Ahituv, A. and O. Moav (2003), Fertility Clubs and Economic Growth, in Eicher, T.S. and S.J. Turnovsky (eds), *Inequality and Growth. Theory and Policy Implications*. CESifo Seminar Series, MIT Press, Cambridge, Mass. and London, England.

Alesina, A. and R. Perotti (1993), The Political Economy of Growth: A Critical Survey of the Recent Literature, *World Bank Economic Review* 8(3), 351–371.

Alesina, A. and D. Rodrik (1994), Distributive politics and economic growth, *Quarterly Journal of Economics* 109(2), 465–490.

Alstadsaeter, A. (2003), *Income Tax, Consumption Value of Education, and the Choice of Educational Type*. CESifo Working Paper No. 1055.

Angrist, J.D. and A.B. Krueger (1991), Does Compulsory School Attendance Affect Schooling and Earnings?, *Quarterly Journal of Economics* 106(4), 979–1014.

Banerjee, A.V. and E. Duflo (2003), Inequality and Growth: What Can the Data Say?, *Journal of Economic Growth* 8, 267–299.

Barro, R.J. (1990), Government Spending in a Simple Model of Endogenous Growth, *Journal of Political Economy* 98, S103–S125.

Barro, R.J. (1991), Economic Growth in a Cross Section of Countries, *Quarterly Journal of Economics* 106, 407–444.

Barro, R.J. (1997), *Determinants of Economic Growth: A Cross-Country Empirical Study*. MIT Press, Cambridge, MA.

Barro, R.J. (2000), Inequality and Growth in a Panel of Countries, *Journal of Economic Growth* 5, 5–32.

Barro, R.J. and X. Sala-i-Martin (1992), Public Finance in Models of Economic Growth, *Review of Economic Studies* 59(4), 645–661.

Barro, R.J. and X. Sala-i-Martin (1995), *Economic Growth*. McGraw-Hill, New York.

Barth, E. and M. Røed, (2001), Do we need all that higher education?, in Asplund, R. (ed.), *Education and Earnings. Further Evidence from Europe*. The Research Institute of the Finnish Economy, Series B183, Helsinki.

Bassanini, A. and S. Scarpetta (2001), *The Driving Forces of Economic Growth: Panel Data Evidence for the OECD Countries*. OECD Economic Studies No. 33, 2001/II.

Bénabou, R. (1996), Inequality and Growth, *NBER Macroeconomics Annual* 11, 11–74.

Bénabou, R. (2000), Unequal Societies: Income Distribution and the Social Contract, *American Economic Review* 90(1), 96–129.

Bénabou, R. (2002), Tax and Education Policy in a Heterogeneous Agent Economy: What Levels of Redistribution Maximize Growth and Ef-ficiency?, *Econometrica* 70(2), 481–517.

Benhabib, J. and A. Rustichini (1996), Social Conflict and Growth, *Journal of Economic Growth* 1(1), 129–146.

Bertola, G. (1999), Macroeconomics of Distribution and Growth, in Atkinson, A.B. and F. Bourguignon (eds), *Handbook of Income Distribution, Volume 1*. North-Holland, Amsterdam.

Bils, M. and P.J. Klenow (2000), Does Schooling Cause Growth? *American Economic Review* 90(5), 1160–1183.

Birdsall, N., D. Ross and R. Sabot (1995), Inequality and Growth Reconsidered: Lessons from East Asia, *World Bank Economic Review* 9(3), 477–508.

Blank, R.M. (2002), *Can equity and efficiency complement each other?* NBER Working Paper 8820.

Bovenberg, A.L. and B. Jacobs (2001), *Redistribution and education subsidies are Siamese twins*. Tilburg University, CentER Discussion paper No. 2001-82.

Cameron, S.V. and J.J. Heckman (1998), Life Cycle Schooling and Dynamic Selection Bias: Models and Evidence for Five Cohorts of American Males, *Journal of Political Economy* 106(2), 262–333.

Cameron, S.V. and C. Taber (2000), *Borrowing Constraints and the Returns to Schooling*. NBER Working Paper No 7761.

Cameron, S.V. and J.J. Heckman (2001), The Dynamics of Educational Attainment for Black, Hispanic, and White Males, *Journal of Political Economy* 109(3), 455–429.

Card, D. (1999), The Causal Effect of Education on Earnings, in Ashenfelter, O. & D. Card (eds), *Handbook of Labor Economics, Volume 3*. Elsevier, Amsterdam.

Checchi, D. (2000), *Does Educational Achievement Help to Explain Income Inequality?* WIDER Working Papers No. 208.

Checchi, D. (2003), Inequality in Incomes and Access to Education: A Cross-Country Analysis (1960-95), *Labour* 17(2), 153–201.

Chennels, L. and J. van Reenen (1999), *Has Technology Hurt Less Skilled Workers? An Econometric Survey of the Effects of Technical Change on the Structure of Pay and Jobs*. Institute for Fiscal Studies, working paper series W99/27.

Ciccione, A. and G. Peri (2002), *Identifying Human Capital Externalities: Theory with an Application to US Cities*. IZA Discussion Paper No. 488.

Ciccone, A. and G. Peri (2003), Skills' Substitutability and Technological Progress: U.S. States 1950-1990. CESifo Working Paper No. 1024.

Clarke, G.R.G. (1995), More evidence on income distribution and growth, *Journal of Development Economics* 47, 403–427.

Cohn, E. and T.G. Geske (1990), *The economics of education*. Pergamon Press, New York. (3rd ed.)

Dalmazzo, A. and G. de Blasio (2003), Social Returns to Education: Evidence from Italian Local Labor Market Areas. IMF Working Paper WP/03/165.

De Gregorio, J. and J-W. Lee (2002), Education and Income Inequality: New Evidence from Cross-Country Data, *Review of Income and Wealth* 48(3), 395–416.

De la Fuente, A. (2003), *Human capital in a global and knowledge-based economy, part II: assessment at the EU country level. Final Report*. Instituto de Análisis Económico (CSIC).

De la Fuente, A. and R. Doménech (2002), *Human capital in growth regressions: how much difference does data quality make? An update and further results.* CEPR Discussion Paper No. 3587.

Deininger, K. and L. Squire (1998), New ways of looking at old issues: inequality and growth, *Journal of Development Economics* 57(2), 259–287.

Dur, R.A.J. and C.N. Teulings (2001), *Education and Efficient Redistribution.* CESifo Working Papers No. 592.

Durlauf, S. (1996), A Theory of Persistent Inequality, *Journal of Economic Growth* 1, 75–93.

Durlauf, S.N. and D.T. Quah (1999), The new empirics of economic growth, in Taylor, J. & M. Woodford (eds), *Handbook of Macroeconomics*. North-Holland, Amsterdam.

Dutta, J., J. Sefton and M. Weale (1999), Education and Public Policy, *Fiscal Studies* 20(4), 351–386.

Edin, P-A. and B, Holmlund (1995), The Swedish Wage Structure: The Rise and Fall of Solidarity Wage Policy?, in Freeman, R.B. and L.F. Katz (eds), *Differences and Changes in Wage Structures*. University of Chicago Press, Chicago.

Eicher, T.S. and S.J. Turnovsky (eds)(2003), *Inequality and Growth. Theory and Policy Implications.* CESifo Seminar Series, MIT Press, Cambridge, Mass. and London, England.

Fersthman, C., K.M. Murphy and Y. Weiss (1996), Social Status, Education, and Growth, *Journal of Political Economy* 104, 108–132.

Forbes, K.J. (2000), A Reassessment of the Relationship Between Inequality and Growth, *American Economic Review* 90(4), 869–887.

Galor, O. and J. Zeira (1993), Income Distribution and Macroeconomics, *Review of Economic Studies* 60, 35–52.

Galor, O. and O. Moav (2004), From Physical to Human Capital Accumulation: Inequality in the Process of Development, *Review of Economic Studies*. (forthcoming)

Grossmann, V. (2003), *Risky Human Capital Investment, Income Distribution, and Macroeconomic Dynamics.* IZA DP No. 955.

Gylfason, T. and G. Zoega (2003), *Education, Social Equality and Economic Growth: A View of the Landscape.* CESifo Working Paper No. 876.

Harmon, C., I. Walker and N. Westergaard-Nielsen (2001), *Education and Earnings in Europe. A Cross Country Analysis of the Returns to Education.* Edward Elgar Publishing.

Harmon, C., H. Oosterbeek and I. Walker (2003), The Returns to Education: Microeconomics, *Journal of Economic Surveys* 17(2), 115–155.

Hartog, J., H. Oosterbeek and C. Teulings (1993), Age, Wages and Education in the Netherlands, in Johnson, P. and K.F. Zimmermann (eds), *Labour Markets in an Ageing Europe*. Cambridge University Press, Cambridge.

Katz, L.F. and K.M. Murphy (1992), Changes in Relative Wages, 1963–1987: Supply and Demand Factors, *Quarterly Journal of Economics* 107(1), 35–78.

Katz, L.F., G.W. Loveman and D.G. Blanchflower (1995), Changes in the Structure of Wages in Four OECD Countries, in Freeman, R.B. and L.F. Katz (eds), *Differences and Changes in Wage Structures*. University of Chicago Press, Chicago.

Keane, M.P. and K.I. Wolpin (2001), The Effect of Parental Transfers and Borrowing Constraints on Educational Attainment, *International Economic Review* 42(4), 1051–1103.

Knight, J.B. and R.H. Sabot (1983), Educational Expansion and the Kuznets Effect, *American Economic Review* 73, 1132–1136.

Krueger, A.B. and M. Lindahl (1999), *Education for Growth in Sweden and the World*. NBER Working Paper 7190.

Krueger, A.B. and M. Lindahl (2001), Education for Growth: Why and for Whom? *Journal of Economic Literature* 39, 1101–1136.

Kuznets, S. (1955), Economic Growth and Income Inequality, *American Economic Review* 45, 1–28.

Kuznets, S. (1963), Quantitative Aspects of the Economic Growth of Nations, *Economic Development and Cultural Change* 11(2), 1–80.

Kuznets, S. (1973), Modern economic growth: findings and reflections, *American Economic Review* 45, 1–28.

Levine, R. and D. Renelt (1992), A Sensitivity Analysis of Cross-Country Growth Regressions, *American Economic Review* 82(4), 942–963.

Li, H. and H. Zou (1998), Income Inequality is not Harmful for Growth: Theory and Evidence, *Review of Development Economics* 2(3), 318–334.

Lindauer, D.L. and L. Pritchett (2002), What's the Big Idea? The Third Generation of Policies for Economic Growth, *Economía* 3(1), 1–39.

Lommerud, K.-E. (1989), Educational Subsidies when Relative Income Matters, *Oxford Economic Papers* 41, 640–652.

Lott, J.R., Jr. (1987), Why is education publicly provided? A critical survey, *Cato Journal* 7, 475–501.

Lucas, R.E., Jr. (1988), On the Mechanics of Economic Development, *Journal of Monetary Economics* 22(1), 3–42.

Milanovic, B. (2000), The Median-Voter Hypothesis, Income Inequality, and Income Redistribution: An Empirical Test with the Required Data, *European Journal of Political Economy* 16(3), 367–410.

Moene, K.O. and M. Wallerstein (1997), Pay Inequality, *Journal of Labor Economics* 15(3), 403–430.

Moene, K.O. and M. Wallerstein (2001), Inequality, Social Insurance, and Redistribution, *American Political Science Review* 95(4): 859–874.

Moretti, E. (2004), Estimating the social return to higher education: evidence from longitudinal and repeated cross-sectional data, *Journal of Econometrics*. (forthcoming)

OECD (2001a), *The Well-being of Nations: The Role of Human and Social Capital*. Paris.

OECD (2001b), *Education Policy Analysis*. Paris.

Perotti, R. (1993), Political Equilibrium, Income Distribution, and Growth, *Review of Economic Studies* 60(4), 755–776.

Perotti, R. (1996), Growth, Income Distribution, and Democracy: What the Data Says, *Journal of Economic Growth* 1(2), 149–187.

Persson, T. and G. Tabellini (1994), Is Inequality Harmful for Growth? *American Economic Review* 84(3), 600–621.

Piketty, T. (1997), The Dynamics of the Wealth Distribution and the Interest Rate with Credit Rationing, *Review of Economic Studies* 64, 173–189.

Psacharopoulos, G. (1994), Returns to Investment in Education: A Global Update, *World Development* 22(9), 1325–1343.

Psacharopoulos, G. and M. Woodhall (1985), *Education for Development: An Analysis of Investment Choices*. Oxford University Press, New York.

Psacharopoulos, G. and H.A. Patrinos (2002), *Returns to Investment in Education: A Further Update*. World Bank Policy Research, Working Paper 2881.

Quah, D. (2001), *Some simple arithmetic on how income inequality and economic growth matter*. LSE. Mimeo.

Ram, R. (1989), Can Educational Expansion Reduce Income Inequality in Less-Developed Countries? *Economics of Education Review* 8(2), 185–189.

Ram, R. (1990), Educational Expansion and Schooling Inequality: International Evidence and Some Implications, *Review of Economics and Statistics* 72(2), 266–273.

Rehme, G. (2003), (Re-)Distribution of Personal Incomes, Education, and Economic Performance across Countries, in Eicher, T.S. and S.J. Turnovsky (eds), *Inequality and Growth. Theory and Policy Implications*. CESifo Seminar Series, MIT Press, Cambridge, Mass. and London, England.

Romer, P.M. (1986), Increasing Returns and Long-Run Growth, *Journal of Political Economy* 94(5), 1002–1037.

Rudd, J.B. (2000), *Empirical Evidence on Human Capital Spillovers*. Federal Reserve Board, FEDS paper 2000-46 (October).

Sanders, M. and B. ter Weel (2000), *Skill-Biased Technical Change: Theoretical Concepts, Empirical Problems and a Survey of the Evidence*. Maastricht University, MERIT RM2000-012.

Shea, J. (2000), Does Parents' Money Matter? *Journal of Public Economics* 77(2), 155–184.

Soete, L. and B. ter Weel (2001), Computers and Employment: The Truth about E-Skills, *EIB Papers* 6(1), 133–150.

Tamura, R. (1991), Income Convergence in an Endogenous Growth Model, *Journal of Political Economy* 99(3), 522–540.

Temple, J. (1999), The New Growth Evidence, *Journal of Economic Literature* 37(1), 112–156.

Teulings, C.N. and T. van Rens (2002), *Education, Growth and Income Inequality*. CESifo Working Paper No. 653 (4).

Teulings, C.N. and T. van Rens (2003), *Education, Growth and Income Inequality*. CEPR Discussion Paper No. 3863.

Topel, R. (1999), Labor Markets and Economic Growth, in Ashenfelter, O. & D. Card (eds), *Handbook of Labor Economics, Volume 3*. Elsevier, Amsterdam.

Trostel, P.A (1996), Should Education be Subsidized?, *Public Finance Quarterly* 24(1), 3–24.

Van Ewijk, C. and P.J.G. Tang (2000), *Efficient Progressive Taxes and Education Subsidies*. CPB Netherlands Bureau for Economic Policy, CPB Research Memorandum 170.

Zweimüller, J. (2000), Redistribution, inequality and growth, *Empirica* 27, 1–20.

CHAPTER 3

Education and Wage Inequality in Finland:
A Review of the Empirical Evidence

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This article reviews existing empirical evidence on the interplay between education and wage inequality in Finland. The overview departs from an outline of the Finnish education system with the emphasis being on educational inequality. It then turns to labour market outcomes, as measured by wage and earnings inequality, and the role of education as well as several education-related phenomena in this context.

The empirical literature suggests that there still exist potential sources of inequality in the Finnish education system despite its reliance on several fundamental principles of equality. Another main conclusion is that surprisingly little is, in effect, known about the effects of education on wage inequality and the channels through which these effects are mediated. Finally, our knowledge on the contribution of education to income inequality and its changes over time is practically non-existent.

1 Introduction[1]

This chapter reviews existing empirical evidence on the interplay between education and wage inequality in Finland. The overview departs from an outline of the Finnish education system from the viewpoint of educational inequality and its sources. While the Finnish schooling system builds on essentially three fundamental principles of equality, a review of the empirical literature on equality in education reveals that there still exist potential sources of inequality. Moreover, this concerns all three aspects of equality, that is, quality of education, measured by learning results and assessed with respect to socio-economic background, gender and region, as well as equal opportunities to pursue higher education after mandatory basic education.

The review then turns to labour market outcomes, as measured by wage and earnings inequality, and the role of education in this context. Apart from education *per se*, several education-related phenomena are also touched upon, such as social background, unemployment, regional mobility, work experience and training. An overall conclusion is that surprisingly little is, in the last resort, known about the contribution of education to wage inequality and the channels through which these effects are mediated. Most knowledge has been accumulated on individual returns to investments in education, but simultaneously the available evidence for the past ten years or so is confusingly mixed. Our knowledge on the contribution of education to income inequality and its changes over time is practically non-existent.

2 The education system

2.1 A brief outline of the current system[2]

The Finnish education system begins with basic education in comprehensive schools, which is compulsory for everyone. It includes primary

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1 Financial support from the European Commission (FP5, contract HPSE-CT-2002-00108) is gratefully acknowledged.

2 The description of the education system is based on Ministry of Education (2003a), unless stated otherwise.

school and lower secondary school, and takes nine years to complete. School usually starts in the same year a child turns seven, and it is mandatory for the child to attend school until age sixteen, or completion of the basic education. Before primary school, many children receive pre-primary education in day care facilities or schools, but this is not a requirement.

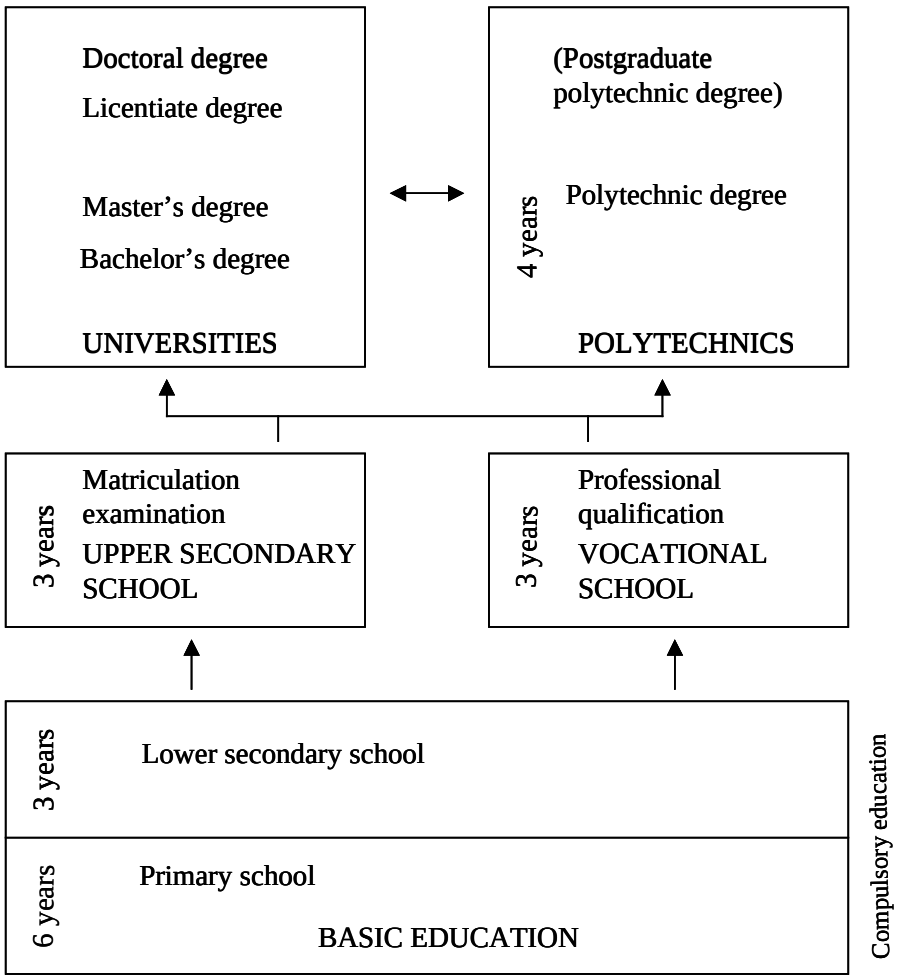
At secondary level, there are two kinds of schools. Upper secondary schools provide education that prepares students for the matriculation examination and studies at tertiary level. It takes two to four years to complete upper secondary school. Vocational schools offer study programmes that provide the students with about 75 different professional qualifications. On average, they take 3 years to complete. All secondary level education grants eligibility for education in institutions of higher learning.

There are two types of institutions of higher learning: universities and polytechnics. Universities are traditional academic institutions, with close connections between scientific research and teaching. Lower (Bachelor's) and higher (Master's) academic degrees, as well as further education leading to Licentiate and Doctoral degrees, are offered. The average time to complete a Master's degree is six years, but no time limit is enforced. There are 20 universities in Finland, spread across the country according to population distribution. Ten of the universities are multidisciplinary institutions, and the other ten consist of three technical universities, three schools of economics, and four schools of arts.

Polytechnics emphasise their connections to work and practice. The research conducted in polytechnics involves co-operation with private and public enterprises and often assists in regional development (Ministry of Education, 2003b). There are 29 polytechnic institutions in Finland. The degrees awarded are professional higher education degrees, equivalent to Bachelor's degrees from universities. The polytechnic programmes usually take four years to complete. Currently, postgraduate studies leading to a Master's degree are available in some fields in polytechnics.

Subsequent to the Bologna process harmonising the structure of university degrees in Europe, a two-cycle degree structure with an obligatory Bachelor's degree will be applied in universities, starting from the academic year 2005–2006 (Ministry of Education, 2003c). The decision on the structure of polytechnic degrees is pending. It is likely that either a two-cycle system will be adopted, or the transition from polytechnics to second-cycle programmes in universities will become more flexible than it is today.

Figure 1. The Finnish education system



Source: Ministry of Education (2003a).

Half of the working age population attends some kind of adult education, according to the most recent adult education survey undertaken by Statistics Finland (1999). Adult education takes place either informally or within the vocational adult education system. Informal adult education involves open colleges, workers' institutes, and other organisations whose courses people attend at their own expense and on their own time. Some of these institutions receive public funding, but their curricula are not regulated by government education policy. Vocational adult education includes further education programmes in vocational schools and universities, education supplied by employers, and courses organised

by private education providers but paid for by employers. Adult education policy aims to improve employment and provide employees with abilities to deal with the demands of the modern working life. The differences between age groups in educational experience remain high in the Finnish society, and adult education has been a tool to equalise these differences and help the ageing workforce to keep up with the developments and changes happening in work places. Information technology and computer skills are the most popular subjects within employer-sponsored education and training (Statistics Finland, 1999). In this review, adult education will be touched upon in a later section (Section 7) mainly with respect to employer provided training. A major reason for leaving out informal adult education is that little, if anything, is known about its possible effects on income and wage inequality.

Figure 1 presents the structure of the current education system in Finland. In subsequent sections, basic education refers to primary and lower secondary schools, secondary education includes upper secondary school and vocational education, and the terms 'higher education' and 'tertiary education' are used interchangeably.

2.2 Financing education

The education system in Finland is publicly funded and run. Municipalities are responsible for providing pre-primary and basic education and upper secondary schools. Vocational education is co-financed by the government and local authorities. Universities are state-owned institutions with constitutional autonomy. Polytechnic institutions are mainly funded by municipalities and foundations.

Financial aid to secondary and tertiary level students is administered and paid for by the Social Insurance Institute of Finland (KELA). Financial aid includes three components: study grants, housing supplements and student loans guaranteed by the government. A university student can receive up to 650.56 euros per month in financial aid. Of this amount, 259.01 euros are for the study grant, the housing supplement can be 171.55 euros at its maximum, and a student can take out a loan worth 220 euros per month. The housing supplement covers 80 per cent of rent up to 214.44 euros per month (KELA, 2003). In order to receive the full student financial aid, a student is allowed to earn up to 505 euros per month while receiving government aid. In months when they do not get assistance, the income limit is 1,515 euros. In order to qualify for full financial aid for the nine-month academic year, a student's gross earnings can be up to 9,090 euros a year. In effect, the income is monitored

across the calendar year, and all students are required to return any excess government assistance received if his/her work income exceeds this limit by the end of the year (KELA, 2003).

The social security system in Finland provides strong incentives to continue in further education after the basic education, since anyone younger than 18 is not eligible for benefits during unemployment (Ministry of Labour, 2003). Applying for and/or accepting secondary education or training required by the government unemployment agency has been a prerequisite for the receipt of unemployment benefits by young people aged 18 to 24 since 1997.

2.3 Equality of educational opportunity

Equality by gender, region, and socio-economic background are fundamental principles of the Finnish basic education system (Ministry of Education, 2003a). All basic, and most higher education, is public in Finland, and thus free of charge to the student and his/her family. Previously, equality was considered quantitatively, and the distribution of schools and access to them were measures of equality. Nowadays, equal quality of education for everyone is the goal, and individual learning results are the measure of interest (Jakku-Sihvonen, 2002). The ideal of educating everyone regardless of their social status was visible in the very early developments of an education system in Finland, and the beginnings of today's basic education system in the 1960s. Equality in educational opportunity was significantly improved during the 1970s.

Principle of equality

The development of the education system in Finland since the early 19th century has involved three simultaneous lines: *expansion*, *increase,* and *integration* (Lampinen, 2000). The respective ideological viewpoints to educational policy have been those of *nationalism*, *economic growth,* and *equality*. Leijola (2004) provides a description of the development of the Finnish education system with special attention to the principle of equality. Here, equality issues are addressed at each level of the current education system, from pre-primary to tertiary education.

Empirical research on inequality in education in Finland has mainly examined cross-sections or cohorts of students in a certain level or field of education. Most studies find some inequality due to socio-economic background. Concerns over regional inequality are also often raised. Strong selection among schools at a local level is a potential source of

inequality, but school-level differences do not necessarily seem to determine individual success or learning results. Most of the work cited here evaluates the education system, with the principle of equality as the point of departure. The role of socio-economic background for inequality in the labour market will be dealt with in a later section (Section 4).

Pre-primary education

Every child has the right to participate in pre-primary education for a total of 700 hours before entering primary school. Municipalities are responsible for providing pre-primary education, and it is free of charge to families. Participation in pre-primary education has increased rapidly since the early 1990s, and the participation rate was 70 per cent in 1998 (Statistics Finland, 2003). According to the Ministry of Education (2003b), 75 per cent of six-year-olds received pre-primary education in 2003.

In 1998, 94 per cent of pre-primary education took place in day care centres, and the remaining 6 per cent in comprehensive schools. Every child younger than school age is entitled to public day care organised by the municipality either in a day care centre (public or private) or by a family care provider. The public day care fees depend on family income, and vary between 18 and 200 euros per month per child (Ministry of Social Affairs and Health, 2003). Parents taking care of their children at home or buying child-care services from a private provider receive a subsidy for their expenses. The pre-primary education is included in the day care fees.

Those children who are being cared for by family care providers or by their parent(s) at home are less likely to enter pre-primary education. When the larger proportion of pre-primary education is connected to public day-care, an alternative child-care arrangement presents a potential source of inequality. Children in Finland may start their primary school with different initial capabilities. Some have attended the 700 hours of pre-primary education, while others may not have been exposed to interaction in a group or teaching situations.

Research on the equality of pre-primary education is virtually non-existent in Finland. International comparisons of participation are also difficult because the commonly accepted definition for participation in pre-primary education concerns children aged 3 to 6 (Statistics Finland, 1998). In Finland, although provided in day care centres, formal pre-primary education usually occurs during the year immediately preceding the beginning of school. Children cared for elsewhere until five years old may enter a day care centre in order to receive pre-primary education.

Basic education

While pre-primary education is voluntary, primary and lower secondary schools constitute the mandatory basic education of Finnish children. Jakku-Sihvonen (2002) examines the ability of the Finnish schooling system to reach the goal of equality in basic education. Her main research question is whether there are differences between lower secondary schools in school-specific learning results and students' attitudes towards learning. She considers equality between genders and different socio-economic backgrounds, as well as regional equality.

The data in the study is derived from national assessments of the national curriculum framework. Tests were administered in different subjects to students in the ninth grade, i.e. the last year of basic education, in 1998 to 2001. The tests were given to a nationally representative sample of students, and Jakku-Sihvonen (2002) created a meta-data set from the individual test scores. In her data, each school gets a school-specific performance score, which tells in percentage terms how well the students in the school did on average compared to the maximum score. The schools are then ranked according to the average scores, and schools in the highest and the lowest quartile are used in the comparison of learning results. Distributions of individual test scores within the upper and lower quartiles show that there are students who go to a lower quartile school and do well in the tests, and vice versa. However, the differences in subject-specific tests between the upper and lower quartile schools vary between 13 and 21 percentage points. The difference is highly significant, and translates into a deviation of one or two numerical grades out of ten in each school's average. Jakku-Sihvonen (2002) concludes that a difference as great as this can create inequality in the students' opportunities to pursue further education after lower secondary school, given that the national assessment test scores predict grades in the students' final reports.

Jakku-Sihvonen (2002) also examines inequality in school-specific learning results between boys and girls, and finds that girls perform better than boys in both upper and lower quartile schools. The differences are not as pronounced in the upper quartile; while upper quartile girls perform better in language subjects, boys receive results as good as this or better in science and mathematics. In the lower quartile, girls perform better in all subjects.

The national assessment tests include questions about how important students find a particular subject, whether they enjoy studying it, and how they feel they are succeeding. In general, girls' attitudes towards school and learning have been found to be more positive than boys'.

Similarly, students who perform better, generally have a more positive attitude. Accordingly, Jakku-Sihvonen (2002) finds that there are differences between the upper and lower quartile schools in the average attitude scores. Between boys and girls, she finds a statistically significant difference in attitudes only in the lower quartile schools. Her conclusion is that the psychological learning atmosphere may differ according to the performance level of the school. Moreover, it seems that a low level of the school's average performance may increase the risk of gender inequality to the disadvantage of boys.

In order to investigate regional inequality in learning results, Jakku-Sihvonen (2002) divides the country into three regions: the Capital city area, Northern Finland, and other districts. First, she finds that the distribution of the upper and lower quartile schools is uneven in Finland. There are fewer upper quartile schools in the Northern part of the country than would be expected if the distribution were random. She observes a North-South gradient both among the upper and the lower quartile schools: for the upper quartile schools, the average performance increases from north to south, but decreases for lower quartile schools. This leads to polarisation of learning results across schools, especially in the capital city area. There, the best schools are very good and the poorest performing schools include the worst in the country. The differences between the three regions in average scores are statistically significant, and Jakku-Sihvonen (2002) concludes that there is evidence for regional inequality in learning results.

Looking at boys' and girls' performances in the regional setting, no gender-specific differences appear in the upper quartile schools in the capital city region, and differences in boys' and girls' performances in the lower quartile are smaller than in other parts of the country (Jakku-Sihvonen, 2002). Thus, Jakku-Sihvonen concludes that the region-specific operating environment is connected to learning results. Furthermore, it seems that inequality in terms of some aspect of the goals of equality tends to hinder achievement of the other equality goals. In the Northern and other districts where the school-specific averages are lower, differences between boys and girls are greater than in the capital city area, while the capital city area with higher average scores in turn exhibits greater differences between schools.

Despite these results, the Finnish basic education stands out as one of the most equal in learning results in international comparisons. In the PISA 2000 study, the Finnish students were the best among over 30 countries participating in reading literacy tests with the smallest variation in the scores. Furthermore, among students with the poorest reading

skills, the Finnish students scored the best with even a bigger difference. Similar results were reported for mathematics and science. It is also noteworthy that the effect of students' socio-economic backgrounds on performance is among the smallest in Finland (Välijärvi, 2003). Välijärvi (2003) offers the general consensus on the importance of equality in education in the society as one explanation for Finland's success in the international comparisons. In addition, no selection into different educational tracks occurs in basic education in Finland, and students of different skill levels are taught together. According to Välijärvi (2003) this promotes equality in learning results.

Secondary level education: Upper secondary schools

According to the Board of Education (2003), 55 per cent of students completing basic education in 1999 entered upper secondary school the following year and 35 per cent entered vocational education. Three per cent entered 10th grade, a voluntary arrangement for those students whose school leaving reports or skills do not enable them to enter the next level of schooling or the labour market. Seven per cent of students did not continue schooling the following year. The fact that upper secondary school is the choice of more than half of the students finishing basic education is in accordance with the general goal of Finnish education policy to increase the average level of education of the population.

The available evidence on notable regional differences in learning results and polarisation of school performance in the capital city area has prompted further investigation of the selection process of students into schools. Upper secondary schools admit students based on a 'cream-skimming' process among the applicants. The lowest grade point averages granting admission to the most popular upper secondary schools are very high (above 9 on the scale from 4 to 10), while there is virtually no screening for the least popular schools. Kuusela (2003) examines the factors creating differences in learning results between upper secondary schools. Kuusela's (2003) data includes matriculation examination results for the years 2000 to 2002, a measure of the average level of education of parents of upper secondary school students, parents' unemployment rate, average household income, and the share of households residing in tight living quarters.

Socio-demographic factors have a significant effect on the differences in performance in matriculation examinations, and they operate through a selection mechanism. The selection mechanism is twofold. First, there is regional selection as families' material and non-material resources to support their children's education differ regionally (Kuusela, 2003). The second selection is spontaneous, and refers to the choice of school.

Some children attend the closest school to their home, while others choose another school. According to Kuusela (2003), those who transfer to a school other than their local school between the 6th and 7th grade, i.e. when moving from primary to lower secondary school, perform better, on average, in lower secondary school than students who choose their local school. Spontaneous selection is stronger among students heading for upper secondary school because school specialisation is more common in higher levels, and upper secondary education is considered more relevant with respect to further studies and career.

It is found that half of the observed differences between schools can be explained by socio-demographic factors, of which mothers' education serves as a proxy in Kuusela's (2003) analyses. The effect of mothers' education is the greatest in large urban areas, where there are several upper secondary schools to choose from and greater variation in the educational attainment of parents. Thus, the variation in learning results that otherwise would occur within schools becomes between-school variation (Kuusela, 2003). In municipalities that only have one upper secondary school, the socio-demographic factors do not come out as significant. However, despite the selection of the best students into the best schools, especially in the capital city area, Kuusela (2003) does not find any evidence for this affecting an individual student's success or learning results. It is worth noting, though, that selection does create some potential sources for inequality in education, despite the fact that individual results are not determined by the school-specific average results. Upper, and in some cases also lower secondary schools, which specialise in some subjects, e.g. sports, arts or music, select their students to some extent based on skills in their special fields. Such hobbies can be exclusive to students from more affluent families.

Kirjavainen and Loikkanen (1995) study the effects of school resources on learning results in upper secondary schools, and also find that parents' educational level has a significant effect on average matriculation examination results in schools. They also find that the proportion of female students in a school is associated with better matriculation examination results, which can be seen as further evidence for girls' more positive attitudes towards learning, and that reflects on the results. Interestingly, Kirjavainen and Loikkanen's regional results show that schools in urban regions do worse than schools in less urban regions. They do not treat the capital city area separately, however, as Kuusela (2003) does, which may explain this somewhat contradictory result. There seems to be a threshold level in the size of the urban area, above which polarisation occurs, while the average results catch up to or surpass the national average. The two studies are also several years apart, and this development may have taken place after

the first study. Kirjavainen and Loikkanen (1995) find no evidence for the effect of teachers' experience or education on matriculation examination results. Neither are teaching expenditures per student found unambiguously significant in determining the schools' results. This is not surprising, considering that virtually all upper secondary schools in Finland are public with nationally set curricula. Education and qualifications required of teachers are uniform, so drastic differences in characteristics of teaching staff are not likely to occur across schools.

Evidence on the connection between parents' and children's education is strong and abundant, and also a potential source of inequality. Attributing this inequality to the education system is not straightforward, though. Parental education can be considered a characteristic of the socio-cultural environment of the student, to which also the general level of education and attitudes towards education in the community contribute. Kuusela (2003) conducted a survey among the principals of a sample of schools whose good results in matriculation examinations he was not able to explain with statistical analyses. A close-knit community and communication between school and families were among the explanations they gave (Kuusela, 2003). Such positive environmental and cultural factors seem to decrease the effect of family background in determining the academic performance of upper secondary school students.

The fact that the socio-economic background still is the most powerful explanatory factor for the differences in upper secondary school performance of students and the between-school differences could be seen as a relic of the early days of the national education system. The early upper secondary school was primarily the school for upper class students. Today the equality in access to upper secondary school has improved but the socio-economic background continues to influence the outcome of the education.

Secondary level education: Vocational education

There is an increasing trend for young people to acquire 'double' education at the secondary level. Students, on average, start at universities four years after completing upper secondary school (Government of Finland, 2003), and they often pursue a second (vocational) degree at the secondary level. This may in some fields ameliorate their chances in the competition for university entrance, but is in other cases a clear inefficiency. This is also noted by Nurmi (1998) in a study on students entering tertiary education. Hämäläinen (2003) finds further evidence for the inefficiency regarding secondary and tertiary level education. Of university graduates, 30 per cent already hold some other degree, either from sec-

ondary or tertiary level (Hämäläinen, 2003). These individuals are more likely to end up in jobs that do not match their university degrees. Consequently, they rather seem to follow the lifetime earnings profile of the secondary level graduates, suggesting that vocational education is an obstacle to realising the returns of higher education.

2.4 Higher education

The development of higher education

The first university in Finland was founded in 1640 in Turku, then the capital city. It remained the only institution of higher education until the early 20th century. In 1828 it was moved to Helsinki, which had become the capital at this time. The system expanded by gaining new multidisciplinary universities starting with Turku (1920) and Oulu (1958). The network was built based on regional development objectives, and now universities are distributed across the country.

The regional higher education policy has decreased the regional differences in attainment of higher education, and created new economic, technological, and cultural capital to university regions. Another factor has been the link between the development of society and higher education policy. In the 1940s and 50s there was a rapid increase in the number of university graduates, the focus being on traditional humanistic fields as well as natural sciences. Development of the welfare state in the 1960s and 70s increased the demand for social sciences and employees in public services. After this, the focus shifted to fields promoting technological and economic development.

Polytechnic institutes were introduced to the Finnish educational field in the 1990s. The increase in the numbers of upper secondary school graduates contributed to the need of a new higher education track, as the universities could not absorb all of them. It was decided in 1991 that first polytechnic institutes were to be launched as an experiment, which was to last until 1999. Twenty-two vocational institutes were granted permission to start new programmes as temporary polytechnic institutes, which were to offer degrees comparable to but separate to university degrees. Permanent polytechnic status was granted to institutions in several waves during the 1990s, and the current network took its shape at the beginning of the 21st century. Together, universities and polytechnics are now able to take in 60 to 65 per cent of the number of new upper secondary school graduates each year (Lampinen, 2000).

The current discussion on the connection between higher education policy and the economy at large deals mainly with the ability of the university system to produce graduates to enter the labour force efficiently. Goals of providing half of the students of each age cohort with a higher education degree and concern for over-education seem to take turns in the analysis of the current development. Equality remains an issue, not so much in terms of physical accessibility as before, but in terms of socio-economic characteristics of the student body, as well as financing one's studies and employment outcomes after graduation. However, the emergence of polytechnic institutes has increased the regional availability of higher education in Finland. This optional track of higher education could also ease the competition for places in tertiary level education.

Entrance examinations

There are two main sources of inequality in higher education. First, the selection of students among applicants occurs in most universities and fields in entrance examinations. In 2003, the average entrance rate among applicants to universities who took the entrance examinations was 40 per cent (KOTA online database). The possibility to prepare for the examinations differs and may create inequality. Second, the financing of studies at university level may put students in unequal positions. Financial assistance from family is not available to everyone, and working while studying may limit the public support a student is entitled to. Issues of financing one's studies are dealt with in Section 3 below.

The qualification process for entrance to universities differs across institutions and fields of study. The general rule is that an applicant receives points towards qualification based on the matriculation examination results and an entrance examination. The examinations cover the upper secondary school curriculum and usually some additional literature, and/or in some cases material distributed in the exam situation. Interviews and tests of suitability for the field in question are applied in some fields and institutions (e.g. pedagogics, social work). Universities are free to set the requirements for entrance. Co-operation in the entrance examination procedure takes place between universities. For example, the same exam is taken at one institution, and can qualify the applicant for studies in several universities (e.g. biology in five, engineering and architecture in eight universities). In some fields and universities, outstanding results in the matriculation examination can grant 'free' entry without having to take the entrance examination (e.g. mathematics, physics and chemistry in the University of Helsinki). In polytechnic institutes, interviews and suitability/aptitude tests are more common, as the educa-

tion is more closely related to professional qualifications. Matriculation examination results are accounted for, as in the entrance process to universities.

Universities: Preparation courses

Preparation courses provided by private organisations are an increasingly popular way of preparing for the rigorous entrance examinations to universities. Participation requires money for fees and materials, and preparing for entrance exams, whether attending a course or not, often prevents a student from working full time, and he/she may need family financial assistance. This creates inequality between prospective students. The costs of attending a preparation course can be hundreds, or even thousands of euros, depending on the field and provider of the class.

Ahola and Kokko (2000) report results from a survey among applicants to Finnish higher education programmes in business. They find a clear difference in the participation in preparation courses in favour of those from families with high educational and socio-economic status. Of applicants with fathers who hold a higher education degree, 40 per cent attended a preparation course; while of those whose fathers only have received basic education, 20 per cent attended a preparation course (Ahola and Kokko, 2000). There is a clear advantage from a preparation course: 47 per cent of applicants who had, in addition to reading the books required in the entrance examination, taken a course, were accepted. The acceptance rate of those who only studied the books was 17 per cent (Ahola and Kokko, 2000). Intermediate strategies, including cramming with previous years' entrance exam problems, produced outcomes in between these two extremes.

Moreover, there seems to be a connection between educational and socio-economic background and the effectiveness of a preparation course. Applicants from white-collar families who took the course had a 49 per cent acceptance rate, while only 22 per cent of those who did not attend were accepted. For blue-collar applicants, the course yielded a 27 per cent acceptance rate, and 20 per cent of them entered universities without a preparation course (Ahola and Kokko, 2002). Thus, not only are applicants from wealthier and more highly educated families more likely to take preparation courses, but they also benefit from them more than do applicants with lower socio-economic status and less educated parents. This creates a source of inequality based on economic resources, as well as regional inequality: Private providers of preparation courses generally operate in large (university) cities.

Polytechnics: The second best choice?

Nurmi (1998) examines the relationship between polytechnics and universities in his work *Keiden koulutusväylät? (Whose Tracks?)*. Selection into different educational paths is a central theme is his work, but he also touches upon the issue of equality in his discussion of the socio-demographic backgrounds and career goals of students. His data come from a 1994 survey, which was administered on applicants to polytechnics and universities in the Häme province in the fields of economics, social work, and technology. At this point, polytechnics still operated on a temporary basis, and this track had not fully established its position in the educational field. Nurmi (1998) applies principal components analysis in order to explore the effects of family background, previous education, and personal orientation regarding status or profession.

Nurmi (1998) finds that students from families with higher incomes and education are more likely to pursue higher education in general. The role of polytechnic institutions as the second choice in case of poor results in that particular year's university entrance examinations, and the fact that students with highly educated white-collar parents are more likely to switch from polytechnics to universities than students with blue-collar background, make polytechnics more likely to be the school of higher education for students from blue-collar families.

Nevertheless, Nurmi (1998) finds that the selection that occurs before the decision to apply to a polytechnic or a university has more effect on the student bodies of higher education institutions than the entrance examinations themselves. Both tracks seem to prefer students from families of higher socio-economic status and educational capital in their qualification procedures. Nurmi expects status orientation to be associated with university studies, and task orientation to be a characteristic of polytechnic students. Status orientation, i.e. a student considering the organisational position and salary of the potential future occupation obtained through the chosen education, was significant in identifying the university-bound individuals among the pool of applicants. Task orientation, against expectations, did not turn out to be a significant factor in choosing the polytechnic track. Thus, family background and the traditional connection between university education and high socio-economic status drive the decision to enter higher education, and seem to be more closely associated with university education than polytechnic education.

Polytechnic graduates are faced with a more uncertain labour market. This form of education is relatively new, and the niche for graduates in the labour market remains somewhat undefined. According to Statistics

Finland, marked differences exist in the average earnings of graduates from universities and polytechnic institutions (Partanen, 2002). Engineers with a university degree completed in 1996/1997 earned on average 27,500 euros in 1998, while engineers with a polytechnic degree from the same year earned 24,200 euros. The difference was larger for business graduates, the average earnings being 25,000 and 18,000 euros, respectively. Interestingly, Nurmi (1998) finds that while educational capital in the family (parents' education) was important for entering higher education in general, in polytechnics, high socio-economic background improved the entrance rate among business students by less than among engineering students, and was not statistically significant. Less inequality in entrance to polytechnic education in business would seem to be associated with more inequality in wages across the two tracks of higher education. This may imply an emergence of segregated fields in the labour markets for those with university and polytechnic degrees.

3 Financial aid to students and equality

The student financial aid system was born in 1969 when the government began guaranteeing and providing interest subsidies for student loans. Prior to this, loan guarantees and small grants had been available for a limited number of talented and poor students. University studies had to be financed by family funds or by working. The new student loan system was aimed at equalising the opportunity to study; parental income or wealth no longer played a role in qualifying for financial aid (Blomster, 2000). A study grant was added to the financial aid to students in 1972, and in 1977 a system much like the current one took shape. In addition to the study grant and the loan, there was also a housing supplement available to students living in rented housing and with no family. There was a time limit of seven years for financial aid.

Much like today, there was pressure for improving the financial situation of students, as well as for making the financial aid system more efficient in the 1980s. In 1992, the system was remodelled to consist of a study grant double the previous amount, a housing supplement, and a market-based student loan with a government guarantee. The time limit for aid became 55 months, and the upper limit for income from work was lowered to encourage full-time studying (Blomster, 2000). The current income restrictions took effect in 1998, making the system more flexible and tolerant to working while studying.

The current financial aid system still exhibits some inequality. Financial assistance from family does not affect the amount of financial aid, and thus those who have to work because no family funds are available may receive less financial aid despite the larger need. Second, in large cities, the capital city region especially, housing expenditures are higher than in other parts of the country. In addition, subsidised student housing is scarcer in large cities and many students have to rent from the private, and more costly, markets. This leads to regional inequality in the housing supplement. Third, lack of capital against which to borrow, and uncertainty of employment opportunities and earnings after graduation may put students with poorer socio-economic backgrounds in a worse position in the markets for student loans. They may end up taking larger loans than those whose families are better off, and taking bigger risks relative to those with family funds as an insurance against uncertainty.

In 2003, a new system was proposed where student aid would consist of a loan guaranteed by the government. After graduation, the payments of the loan capital would be deductible in taxation. Such a tax subsidy system would leave only the interest on the loan payable by the student and encourage a faster graduation. Legislation on this reform is yet pending, as it is connected to a profound reform in the degree structures and study times in Finnish universities. The tax subsidy system addresses the inequality issues better than pure market-based loans. An insurance component in the system against uncertainty is needed, however, because real benefits from the subsidy will require subsequent employment.

4 Inequality in earnings and family background

The previous sections have highlighted the notable changes over the past decades in the education system, as well as in the system of study grants and loans guaranteed by the state. Compulsory education was entirely reorganised with the ambition to provide free education of equal quality to all children irrespective of the economic situation and the dwelling location of their family. The expansion in the number of gymnasiums and universities, in combination with increased educational subsidies, made higher education available, in principal, to anyone.

These considerable attempts to implement equal opportunity norms in the Finnish education system can be expected to have reduced the impact of family background on children's economic and social status dur-

ing adulthood. More precisely, one would presume that the degree of equality of opportunity has improved considerably over time, and that public interventions have played a major role in this context. There is, however, not much evidence available so far to shed light on these issues.

Österbacka (2001) calculates inter-generational and sibling correlations in earnings from Finnish quinquennial censuses covering the period 1970 to 1995. Her estimates indicate that the inter-generational correlation in economic status is rather low: about 0.14 between children and their fathers and even lower, or some 0.05, between children and their mothers. In other words, inter-generational mobility is relatively high in Finland, and in case inter-generational influences operate, then the child's economic status during adulthood is more closely associated with the father's than with the mother's economic status. Children's earnings seem to be slightly more strongly correlated with family earnings (a correlation of 0.18) than with the fathers' or the mothers' status taken separately. Throughout, daughters' earnings are less closely associated with the economic status of their family than are sons' earnings. Put differently, the economic status of daughters during adulthood seems to be less dependent on their family background. Why this is so remains an open question, although the author puts forth a few alternative, hypothetical explanations.

Österbacka (2001) also tests for the existence of non-linearities in the inter-generational correlations by dividing the children into five groups depending on their parents' earnings quintiles. Broadly speaking, the results suggest that children of richer parents tend to have higher earnings, whereas the earnings of children of poorer parents are likely to be lower, showing higher variation and much less dependency on parental earnings. Furthermore, a decomposition of the inter-generational correlation according to the fathers' and children's observable and unobservable characteristics indicates that the unobserved and, especially, the observed characteristics of the father exert a strong influence on a child's economic status during adulthood. The father's occupational status stands out as an observable of considerable importance for family resemblance, whereas education turns out to play a surprisingly moderate role in this context.

Attempts have also been made to explore the trends of and the mechanisms behind the inter-generational correlation of earnings (Österbacka, 2003a). The evidence in support of the prevalence of a clear time trend in the inter-generational correlation is weak, however, which might be due to the key mechanisms behind the correlation having outweighed each other. In particular, Österbacka (2003a) finds that the reduction in family-background dependence generated by the expansion of the wel-

fare state has, in effect, had a minor impact on the heritability of income generating traits. This suggests that other factors have offset the effect of the expanding welfare state. Among these other factors, she mentions the genetic and social behaviour aspects associated with the heritability of income generating traits, and the fact that the Finnish society is extremely homogeneous.

The sibling correlations reported by Österbacka (2001) imply that the brother correlation is substantially higher (0.26) than the sister correlation (0.11), with the overall sibling correlation being close to 0.13. A major reason for this difference in sibling correlations is that the variation in the family component of the sibling correlation is much higher for brothers while the variation in the individual component is much higher for sisters. This outcome lends further support for the above conclusion that family background is less important for the economic status during adulthood for women than for men.

The brother and sister correlations differ also in relation to family earnings. More precisely, brothers from poor and rich families seem to have more in common with their respective family background than do brothers from middle-earner families, whereas the opposite pattern emerges for sisters. Österbacka (2001) also notes that the sibling correlations are driven by factors uncorrelated to parents' earnings rather than by inter-generational correlations. This also offers an explanation for the comparatively low brother correlations in the Nordic countries as compared to the USA (Björklund *et al.,* 2002). More specifically, the brother correlation ranges between 0.14 (Norway) and 0.26 (Finland) in the Nordic countries, but exceeds 0.40 for the USA.

Apart from inter-generational correlations of earnings, there is also the possibility of inter-generational correlations between other measures of economic and social status. There is growing evidence on a tendency of poverty being transferred from one generation to the next (Heikkilä, 1990; Parikka, 1994; Kangas and Ritakallio, 1996). Forma *et al.* (1999) provide evidence suggesting that children having experienced financial problems in their childhood tend themselves to face a higher risk of having financial problems during adulthood, and also of becoming long-term unemployed. Interestingly, receipt of social assistance in the form of a supplementary benefit was found to be a substantial risk-increasing factor in this context. Further support for unemployment showing a non-negligible correlation across generations is provided by Österbacka (2003b). When exploring whether the connection between parents' and children's unemployment is causal (inheritable) or spurious (due to e.g. constraints and tastes), she finds that both elements are present in the case of men, but only a spuri-

ous effect in the case of women. This outcome is well in line with the finding of the inter-generational correlation being weaker for daughters than for sons. The prevalence of a spurious effect means that the inter-generational connection cannot be broken by merely reducing the unemployment risk of one generation. In addition, measures need to be undertaken in order to improve the abilities of the young people at risk and, in that way, mitigate the influence of constraints and attitudes.

5 Inequality in earnings and education

This section reviews existing empirical evidence on the rewarding in the Finnish labour market of individual investment in formal education. It relies heavily on a previous review of the literature within this research field (Asplund, 1999). As will become evident, the past few years have produced only limited new evidence on this issue.[3]

5.1 Average returns to years of schooling

Broadly speaking, the average return to education has declined substantially over the past decades. The decline was particularly strong in the 1970s, and continued at a slower pace up to the mid-1980s. The average return to education has remained roughly unchanged since the latter half of the 1980s with the most recent, albeit still scarce, evidence pointing to an upward rather than a downward trend.

A common feature of the studies having reported average returns to education is that they estimate conventional Mincerian earnings equations with the natural logarithm of the sample individuals' earnings regressed on their acquired education and a varying set of other key explanatory variables. Major differences between the studies arise not only from crucial differences in the estimated model specifications but also from the use of differing definitions of variables, diverging data sets and differently defined samples of individuals. Differences in the employed estimation techniques, on the other hand, seem to play a much smaller role. Table A1 of the Appendix provides a summary of the data, model specifications and estimation methods used in the reviewed studies.

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[3] The emphasis will be on these more recent studies, as Asplund (1999) provides a comprehensive review of those published in 1999 or earlier.

The information on education used in the various studies comes from register data, compiled by Statistics Finland, on the formal education attained by each individual. The registered degree, however, only shows the single highest level of education completed by the individual. These levels have then been turned into 'normal' years of full-time schooling needed for completion of respective degree level, using the Finnish Standard Classification of Education. No information is available on the actual years spent in schooling. This stereotype key has been utilised – in a more or less strict manner – when turning educational degree levels into the years of schooling variable for which estimates are gathered in Table 1.

Table 1. Estimated average returns to years of schooling

	Year	All	Men	Women
Ingberg (1987)	1980	0.091	0.093	-
Asplund et al. (1996a)	1987	0.070	0.074	0.064
Asplund (1993a)	1987	0.086	0.088	0.080
Asplund (2001)[a)]	1984		0.095	0.079
	1987		0.090	0.078
	1989		0.090	0.082
	1991		0.092	0.091
	1993		0.086	0.088
	1995		0.089	0.095
Uusitalo (1999; recruits in 1970)	1975-90		0.089	
Ability-corrected return			0.074	
Uusitalo (1999; recruits in 1982)	1994		0.091	
Ability-corrected return			0.079	

		Private sector		Public sector	
		Men	Women	Men	Women
Asplund et al. (1996a)	1987	0.074	0.049	0.079	0.073
Asplund (unpublished)	1987	0.088	0.066	0.099	0.089
	1989	0.105	0.057	0.087	0.100
	1991	0.093	0.068	0.089	0.110
	1993	0.076	0.074	0.082	0.093
Asplund (2001)[a)]	1993	0.092	0.077	0.080	0.095

Notes: All estimates are statistically significant at the 1% level. See Table A1 of the Appendix for more detailed information. (a) The estimates for men refer to full-time employed men.

The existing evidence on average returns to additional years in schooling is unambiguous in the sense that most of the reported estimates point to an annual return of 9 to 10 per cent[4] for men, and 8 to 9 per cent for women. If, however, contrasting the estimates for the early 1980s to those for the mid-90s, the average return to an additional year in school reveals a weakly declining trend for men, but a slightly increasing trend for women. This diverging trend in male and female returns to schooling in the mid-90s seems to relate to the deep recession that the Finnish economy suddenly plunged into in the early 1990s, with the female average return rising to much the same level as the male average return. Possibly these opposite-signed changes are, at least in part, attributable to a more profound re-structuring of the female than of the male labour market. Unemployment rates exploded from 1991 onwards first in the main export industries, which are strongly male-dominated, and spread gradually to female-dominated industries and sectors causing the unemployment rate of women to start increasing later, but faster, compared to that of men. As a consequence, in the mid-90s female unemployment was more severe than male unemployment. This, coupled with the risk of unemployment being heavily biased towards low-skilled, low-paid people[5], suggests that the rise in the return to years of schooling among women was primarily the outcome of relatively more low-skilled, low-paid female workers becoming unemployed during the recession years. A stronger rise in both hourly wage and average education levels between 1991 and 1993 among employed women compared with employed men lends further support to this hypothesis, but provides no definitive explanation to the obtained findings.

Table 1 further indicates that the recession years might have affected male employees differently depending on their sector of employment. More precisely, when comparing full-time male employees the estimated rate of return to an additional year of schooling was significantly higher in the private than in the public sector. This advantageous outcome for private-sector men disappears, however, when extending the sample to all men instead of men employed on a full-time basis. For women, on the other hand, the average return to schooling has persistently been significantly higher in the public sector irrespective of whether the analysis concerns all women or merely full-time employed women.

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4 After the log-returns reported in Table 1 have been turned into normal per cent by using the antilog formula $100*(e^a - 1)$, where a is the parameter estimate.

5 See e.g. Asplund and Lilja (2000).

Longer-term trends in average returns to additional schooling years are, so far, available only from educational information produced by Vatt (2004). Figure 2 displays the average returns estimated separately for men and women. Compared to the estimates reported in Table 1, these returns are substantially lower and this holds for both men and women. Another notable difference is the constant and rather large gender gap in the average returns to extra years in school. Possible explanations for these diverging estimates reported by Vatt (2004) are the following: the dependent variable is monthly earnings instead of hourly wages; the key adopted for transforming educational levels into years of schooling (not reported); the use of age as a proxy for accumulated work experience; and restriction of the sample to those who were employed for at least six months during the year in question.

Figure 2. Average returns to years of schooling, 1990 to 2001

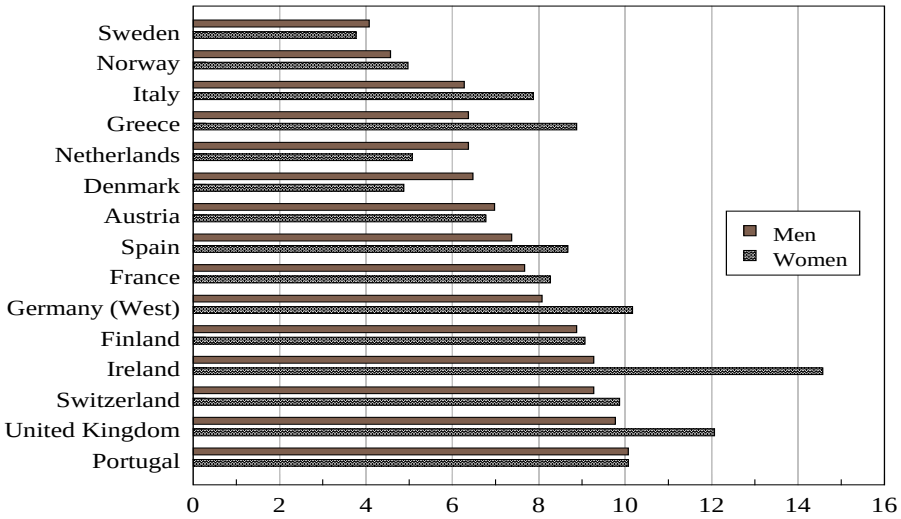
Note: The estimates are obtained from regressing monthly earnings (of individuals having been employed for at least six months during the year) on years of schooling, age and age squared, using income distribution data.

Source: Vatt (2004).

Compared to average returns to additional years in schooling estimated for other European countries, on a comparable basis, Finland is – or at least was still in the mid-90s – located among the top-ranking countries among both men and women (Figure 3). When it comes to trends

over time, Finland was noted to belong to the category of countries characterised by no clear-cut trend.[6] In the case of Finland, this outcome was due to the weakly opposite trends discernible for men and women.

Figure 3. Average returns (%) to additional years of schooling in 15 European countries in 1995 (or the year closest to it)



Source: PURE (2001), Harmon *et al.* (2001, 2003).

5.2 Average returns to schooling across the wage distribution

The average return to schooling discussed in the previous section provides an estimate of the economic benefit from investing in an additional year of schooling for the sample individuals earning the mean wage. This mean-wage-level average return, however, is not necessarily the same across the whole wage distribution, but may, instead, vary considerably depending on where in the wage distribution the individual is situated. In other words, there might be even substantial variation in returns surrounding this traditionally reported average return. This can be tested for by estimation of average returns to an additional year in schooling for

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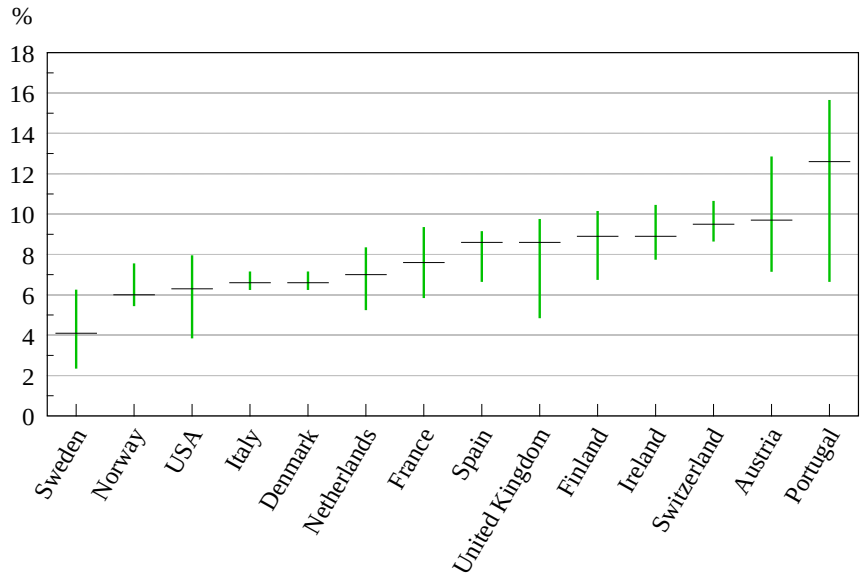
[6] For more details, see PURE (2001) and Harmon *et al.* (2001, 2003). Also see Psacharopoulos and Patrinos (2002) for an international comparison of private returns to education with estimates included also for Finland.

different points along the wage distribution by use of so-called quintile regression techniques. By comparing the average returns estimated for the different parts of the wage distribution with that of the 50th percentile (the conventional average return), it is possible to draw at least some inferences about the influence of additional schooling on wage inequality.

Figure 4. Average returns to years of schooling and the dispersion around them measured by the average return within the 10th and the 90th decile of the male wage distribution, 1995 (or the year closest to it)



Source: Martins and Pereira (2004).

The available evidence for Finland indicates that the dispersion around the conventional average return to years of schooling for full-time men (estimated to be 0.089) amounted to 3.3 percentage points in 1993 (Martins and Pereira, 2004). In other words, the average return to schooling estimate was some three percentage points higher (or 0.101) for those at the top of the wage distribution compared with those at the bottom of the wage distribution (0.068), with the average being closer to the former, i.e. the top-ranking return (Figure 4). Put differently, despite a similar amount of education (the average years of schooling in the sample), the economic benefit from the investment, measured in terms of wages, varies quite markedly. Moreover, this interval calculated for Finland is close to the European mean, with several countries being

characterised by either much wider or much narrower intervals. However, there seems to be no clear correlation between the size of the average return to years of schooling and the size of the dispersion surrounding it.

5.3 Returns to educational degrees

Existing evidence on between-educational-group wage inequality as measured by marginal returns to educational degrees relative to a certain reference group (usually those with only a basic education) is displayed in Table A2 of the Appendix.[7] The wage premium to additional investments in education seems to have declined at all degree levels up to the mid-80s, albeit at a slower pace in the 1980–85 period than in the 1975–80 period. During the latter half of the 1980s, the decline stopped at the lower end of the educational scale, and was even slightly reversed at the very top of the educational scale.[8] The deep recession in the early 1990s seems, however, to have put an end to this stable or even increasing trend – the wage premiums estimated for the first half of the 1990s point to a slight weakening in the rewarding of educational investment at practically all educational levels. All in all, the marginal return to education was at all degree levels significantly lower in the early 1990s than in the early 1970s.

From the numbers displayed in Appendix Table A2 it may also be concluded that this overall pattern seems to have been largely repeated among both men and women. A totally different pattern is, however, provided by Jäntti *et al.* (2000) based on income distribution survey data. In particular, when making a distinction between primary, secondary and higher level education, they find that the marginal return to both secondary and higher level degrees, compared with a primary education, declined from 1978 all the way up to 1997. The only exception is a sudden

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[7] Note that the educational degree levels actually accounted for in the estimations vary slightly across studies. Comparison of results across studies is, however, more impaired by differences in the set of other personal and job-related characteristics added to the estimated wage model.

[8] Roughly the same trend is reported for the private sector by Vainiomäki and Laaksonen (1995). A similar trend is also displayed by Helo and Uusitalo (1995) when relating the earnings of those with a university degree to the earnings of those having merely taken the matriculation examination. They also show that the size of this university-degree wage premium varies considerably across educational fields. This is evident also from their calculated *internal* rates of return to different university-level educational fields.

but temporary peak in the latter half of the 1980s that the authors have no explanation for. The decline in wage premiums has been more conspicuous among women, especially when it comes to secondary education. Higher-level degrees are noted to have been persistently less beneficial for women than for men, and their pecuniary value has declined slightly more than for men. It is not possible to state why these results differ so markedly from those in Appendix Table A2, since Jäntti *et al.* (2000) do not provide details on the sample construction, the model specification or the estimation technique. Possible explanations might be a less detailed educational level classification, a simple model accounting only for age differences in addition to education, and the dependent variable being gross monthly earnings overlooking differences in the number of working hours. On the other hand, these are features that their estimations share, by and large, with at least some of the other reviewed studies.

Separate analysis of the private and public sectors points to certain noteworthy sectoral differences in the development of the marginal returns to educational degrees between 1987 and 1993 (see Table A3 of the Appendix). In particular, while the educational-induced wage differentials among men in private-sector employment declined remarkably during the deep recession in the early 1990s, their female counterparts experienced increasing returns especially to university degrees. In the public sector, in contrast, both men and women saw a continuous, albeit moderate, decline in educational returns since the late 1980s. By 1993, these different time trends had resulted in a situation with small, if any, differences in educational returns across sectors and genders (Asplund, 1998a).

Evidence indicating a narrowing in wage differentials between differently educated employees since the early 1980s up to the mid-90s has also been reported for non-manual workers engaged in manufacturing. A declining trend was discernible among both men and women (Asplund, 1996, 1998b), and especially within fast growing industries (Asplund and Vuori, 1996)(Table A4 of the Appendix).

A closer look at the return-to-educational-degrees profile as such reveals that the pattern is roughly the same for men and women. More precisely, the economic incentives to continue in education are conspicuously weak at the lowest end of the educational scale[9], but improve substantially higher up, displaying an approximately linear dependence

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[9] This pattern is repeated across the major industry branches of manufacturing, trade, business services and public-sector basic services (Salonen, 2001).

between wages and additional schooling. When accounting for the fact that the number of years normally required for completing a degree varies at the different educational levels, the wage premium from acquiring a higher degree changes but shows no clear tendency to fall short of the wage premiums of lower degrees even when assigning above-normal number of years for completing, say, an MA-level university degree (Asplund, 2001).

In sum, the existing evidence on marginal returns to educational degrees implies that the education-induced changes in relative wages across educational groups have varied in both magnitude and direction over the past decades. These changes in between-educational-group wage inequality have no doubt affected the development of overall wage inequality. There is, however, some evidence attributing most of the observed increase in overall wage inequality to the changes that have occurred within groups with similar education and experience rather than to changes between these groups (see Eriksson and Jäntti, 1997; Uusitalo, 1999). Uusitalo (1999, 2002) also makes an attempt to explain these changes in wage inequality between and within age and education group by means of a single-index model augmented with supply effects. He concludes that supply and demand factors seem to explain the changes in age and education related wage differentials reasonably well, but fail to offer an explanation to the changes having occurred within groups of similar age and education.

5.4 Returns to educational degrees completed after labour market entry

Kruhse-Lehtonen (2000) is to our knowledge the only study for Finland trying to quantify the economic benefits to individuals from completing an educational degree after labour market entry, that is, in adulthood. More specifically, she estimates the returns to education for individuals who go back to school after the age of thirty in order to acquire an additional degree in the same or in a different field of study.

In brief, Kruhse-Lehtonen (2000) finds that those who decided to acquire a new degree after the age of thirty had typically had lower earnings and experienced more unemployment compared to their counterparts with similar characteristics. Consequently, they are likely to have faced lower opportunity costs for continuing their education. This, in turn, points to negative selection into adult education. The author hypothesises that a potential motive for their acquisition of a new degree is that they wish to compensate for their weaker innate earnings capacity. In view of this, it is, however, a little depressing that the results indicate that

their pre-degree situation of comparatively lower earnings and higher unemployment risk tends to continue also after the new degree.

Comparison of the alternative outcomes indicates that it is more profitable to acquire more education within the same field as compared to acquiring a new degree at the same level as the previous one, but in another educational field. Obviously one major reason for it being more beneficial, as measured by wage gains, to remain within one's field of study relates to the skills obtained through work experience.

5.5 Mechanisms underlying changes in educational returns

In addition to investigating the average level and trend of the return to education, it is of crucial importance to also understand the mechanisms underlying the observed pattern. Obviously the outcome is not simply due to differences and changes in relative earnings, but also to variations in the composition and characteristics of the individuals making up the educational groups that are compared. Such compositional changes arise from both supply- and demand-driven factors. Our current knowledge on these matters is, however, so far very limited.

Education, ability and schooling choice

Only a few studies have attempted to adjust the estimated return to education for differences in individual ability, and the possibility of the observed distribution of individuals across educational levels being the outcome of individual choice rather than random selection into schooling of varying length.

Uusitalo (1999) investigates two male cohorts having performed their military service in, respectively, 1970 and 1982. When adding a set of ability measures[10] to the wage equation, he obtains significantly lower returns to education compared to traditional ability-unadjusted estimates. For the 1970 sample, the estimate drops by 1.5 percentage points, and

[10] The ability measures are constructed from the Finnish Defence Force Basic Ability Test, which is taken by all new recruits at the beginning of their military service (for selection of the rookies that are given officer training). The test consists of three sub-tests measuring verbal ability, analytical reasoning and mathematical reasoning (for more details, see Uusitalo, 1996). The estimations for the 1970 sample are based on 'raw' ability measures while the estimations for the 1982 sample are based on pre-test schooling-adjusted ability measures.

for the 1982 sample by slightly less, or 1.2 percentage points (*cf.* Table 1 above).[11] Hence, part of the estimated educational returns does seem to capture individual differences in innate ability. This ability bias, however, turns out to be relatively small, leaving the average return to additional schooling years at a comparatively generous level.

In his schooling choice approach, Uusitalo (1999) departs from a random coefficient model of earnings determination, which allows schooling choices to vary across individuals due to differences in their returns to education and because of their differing rates of substitution between schooling and future earnings. While the first phenomenon may arise from differences in ability, the latter is related to variation in access to funds and/or tastes for schooling. The instruments used are standard. For the 1970 sample, Uusitalo (1999) experiments with father's schooling and income as instruments. The 1982 sample offers a slightly broader set of possible instruments: father's and mother's schooling and earnings as well as residence in a university city, all information for 1980. These instruments are grouped in four different ways, and returns to schooling are reported for each of them with the earnings equation specified in four different ways. The various estimation techniques used generate ability-adjusted[12] return-to-schooling estimates ranging from 0.052 to 0.112, with the ability-adjusted OLS estimates varying between 0.077 and 0.083. The extreme estimates relate to specifications with parents' schooling being used as an instrument (alone or interacted with some other instrument) and/or included as an exogenous variable in the earnings equation. Since the parents' schooling turns out to affect both the son's schooling decision and his future earnings, it is dismissed as a valid

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[11] The ability-unadjusted point estimates reported by Uusitalo (1999) are slightly higher than those obtained in other studies for the whole male population. Most likely the (fairly minor) difference in estimated returns is a combination of differences in the underlying population, the definition of variables and the model specification used. For instance, the rate of return estimate for the 1982 sample reported by Uusitalo (1999, Table 2, p. 49) drops from 0.091 to between 0.083 and 0.087 when using calculated work experience (time elapsed since last degree) instead of potential experience, and depending on whether regional variables (describing the residential environment of the sample men in 1980) and the father's and mother's schooling and earnings (in 1980) are included or not.

[12] The estimates are adjusted for ability bias by the inclusion of ability measures both in the earnings equation and in the schooling decision equation.

instrument.[13] The university city stands out as a more credible instrument, but generates significantly higher estimates than the OLS estimates as the university city instrument obviously reflects to a larger extent the average return to a university year than to a schooling year in general.

Faced with this mixed evidence on the variation of educational returns across individuals, Uusitalo (1999) attempts to capture the potential effects of individual selection into schooling of different length by interacting years of schooling with ability and family background measures. In brief, the results suggest that educational returns do, on average, increase with ability (especially with math ability). The strong effect of ability on the variation in returns to schooling and thus on schooling choice, is noted to be the outcome of the combined effect of lower costs and higher returns for individuals with higher ability (mainly to convert human capital absorbed in school into marketable skills valued at the workplace). The substantial effect of family background, on the other hand, is found to origin solely in its effect on the discount rate. On the whole, though, observable heterogeneity turns out to leave a significant part of the individual variation in returns to schooling unexplained.

Uusitalo (1999) goes deeper into the question of schooling choices and the impact on these of various personal characteristics and family background by estimating earnings equations *for different educational levels* using a simple selectivity correction model. The focus is on the selection point by which students are faced after completed general upper secondary education (Gymnasium) giving them the matriculation diploma. The schooling investment decision is assumed to be driven by the different rewarding of skills depending on the job performed, for which reason rational individuals can be expected to choose the educational level that leads to the occupation where their skills are best rewarded. The 1982 male sample is consequently restricted to those close to 6,900 recruits who have a recent high-school diploma and no further education at the time of entering military service. The results indicate that cognitive and non-cognitive test scores, as measured from ability and personality tests

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[13] Uusitalo (1999, Table 5, p. 25) faces similar problems with his 1970 sample, where the father's income turns out to affect both the son's schooling decision and his future earnings. The very high rates of return to schooling reported based on this sample (estimates ranging from 0.124 to 0.157 compared to an OLS estimate of 0.081) are therefore to be interpreted not as an average return to schooling for the underlying population but as the *marginal* return that a son from a low income family would have obtained from an additional schooling year, had he decided to continue in school. *Cf.* the discussion in Harmon *et al.* (2001).

administered by the Finnish Army, explain relatively little of the *within* educational level variation in earnings. The effects of test scores are found to differ only marginally also between different educational levels, which points to minor differences in skill prices across educational levels. The main conclusion to be drawn concerning schooling choice is that neither the (non-)cognitive skills nor family background provide a clear-cut pattern; only a few characteristics stand out as statistically significant and most clearly for the choice of a university education. Put differently, individual skills and family background do not seem to cause clear self-selection into different educational levels.

A different approach is adopted by Kruhse-Lehtonen (2000), who uses the comprehensive school reform introduced in the 1970s as an instrument for correcting the estimated return to years of schooling for possible endogeneity bias. The reform roughly imitates an experimental setting, as it was introduced gradually over a period of five years. During this process, certain age groups divided into two categories depending on the youngster's municipality-of-living at the time of the introduction of the reform: one category of students belonging to the old system and another following the new regime. The constructed instrument was given the form of an interaction term between the year-of-birth and the municipality-of-living variables. In brief, the results indicate that the school reform had a weak positive impact on the educational attainment and earnings of women, but no effect whatsoever on the length of schooling and earnings of men. When using the predicted values of this schooling equation as instruments, the rate of return estimate for women more than doubled, from an OLS estimate of 0.085 to IV estimates ranging from 0.186 to 0.243[14] (because of the insignificant schooling equation estimates of men, rates of return estimates were not calculated for men). Obviously, the large size of the IV estimates is, at least partly, explained by the fact that the comprehensive school reform changed both the length and the quality of primary education, as well as the socio-economic selection, since the reform aimed at providing each and every student the same basic education and equal opportunities to continue in education.

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[14] The difference between the OLS estimate and the IV estimates was even larger for an alternative measure of completed years of schooling. In particular, when the years-of-schooling variable was calculated not by assigning each educational degree level a certain 'normal' number of years for completion, but by subtracting the year of birth plus seven (age of school start in Finland) from the year when the highest degree attained was completed, the OLS estimate was only 0.023 while the IV estimates ranged between 0.165 and 0.305.

Education and cohorts

Evidence on the rate of return to education across cohorts has been reported in essentially three studies. A few attempts have also been made to explore potential reasons for the observed trend in returns over time.

Kruhse-Lehtonen (2000) analyses changes in returns to education across cohorts and over time from quinquennial census data for the period 1970 to 1995. Her results state that the pooled-data OLS estimates of the average return to years of schooling vary between 0.082 (monthly earnings) and 0.085 (annual earnings) for women while the corresponding estimates for men are, respectively, 0.092 and 0.101. When including two interaction terms, viz. 'cohort times years-of-schooling' and 'year times years-of-schooling', all four estimates drop to 0.073. These interaction terms are of particular interest in this context, since they enable cohort, time and age effects to be separated. Thus it is found, *inter alia*, that the time effect was largest for 1970, declined up to 1985, increased by 1990, and came down below the 1990 level by 1995. It is noteworthy that the major changes in the centralised wage bargaining system show a similar time trend, suggesting that labour market institutions might offer part of an explanation for the observed changes in the average return to years of schooling in Finland. Indeed, similar conclusions are drawn by Eriksson and Jäntti (1997) and Uusitalo (1999).

However, conspicuous differences remain in the observed trends for men and women also after control for time effects. In particular, while the estimated returns to years of schooling reveal a continuously declining trend towards younger cohorts among men, there is considerably more fluctuation in the estimates for older-cohort women in combination with a peak in the estimates for middle-cohort women. A common outcome for the two genders nevertheless is that the young cohorts seem to be less rewarded for their investments in education compared to their older counterparts. There are at least three potential explanations for this finding, all of which relate to educational expansion, viz. the 'inflation-of-degrees' hypothesis, which received some support in the Eriksson and Jäntti (1997) study, the 'worsened-quality-of-education' hypothesis, and the 'deterioration-in-ability' hypothesis. Kruhse-Lehtonen (2000) chooses to test, by use of instrumental variable techniques, whether the ability distribution between cohorts has changed due to the expansion of the education system. Her attempts to purge the years-of-schooling estimates from eventual ability-induced self-selection effects, however, provide no support for differences in unobservables explaining the older

cohorts' higher returns to education. This outcome she attributes primarily to inappropriate instrumental variables, though.

Clearly lower returns to education for younger than for older cohorts are also reported by Uusitalo (1999), who uses income distribution survey data for the years 1977 to 1995 to estimate years-of-schooling returns from cross-section regressions by age groups. His results are reproduced in Table 2, where the rows, columns and the diagonal display the results when holding constant the cohort, the year and the age, respectively. Uusitalo (1999) concludes that the finding of the youngest

Table 2. Returns to years of schooling by cohort and gender

Birth cohort	1977	1983	1989	1995
Men:				
1967 – 72				0.0333
1961 – 66			0.0507	0.0534
1955 – 60		0.0554	0.0723	0.0902
1949 – 54	0.0514	0.0703	0.0874	0.0760
1943 – 48	0.0750	0.0877	0.0971	0.0964
1937 – 42	0.0952	0.0994	0.1082	0.0854
1931 – 36	0.1093	0.1047	0.1143	0.0949
1925 – 30	0.1314	0.1117	0.1137	
1919 – 24	0.1214	0.1129		
1913 – 18	0.1180			
Women:				
1967 – 72				0.0472
1961 – 66			0.0639	0.0699
1955 – 60		0.0575	0.0780	0.0790
1949 – 54	0.0594	0.0786	0.0804	0.0807
1943 – 48	0.0774	0.0763	0.0844	0.0800
1937 – 42	0.0865	0.0840	0.0795	0.0728
1931 – 36	0.0936	0.0912	0.1058	0.0753
1925 – 30	0.0903	0.0719	0.0868	
1919 – 24	0.0853	0.0931		
1913 – 18	0.0953			

Note: Cross-section regressions by age group with control for region (12 dummies) and industry (9 dummies).

Source: Uusitalo (1999, Tables 3a and 3b, p. 115).

cohort having persistently received the lowest return to schooling seems to be neither a cohort nor a time effect. Another major finding is that the returns to years of schooling appear to be lowest for 1995 and that this outcome is not changed when controlling for cohort or age effects. From the comparatively robust estimates along the diagonal, the author further hypothesises that the age effect is the dominating one, but notes that an interaction between the cohort and the time effect might cause a similar pattern.

Results pointing in the same direction are also reported by Salonen (2001), who estimates marginal returns to educational levels for three birth cohorts using employment statistics data pooled over the years 1987 to 1997. The differences in returns between the three cohorts under study are especially outstanding when comparing higher education degrees (Table 3).

Table 3. Returns to educational degree levels by cohort

Birth cohort:	**1936 – 45**	**1946 – 55**	**1956 – 65**
Primary	-0.044		
Lower secondary	ref.	ref.	ref.
Upper secondary	0.116	0.071	0.103
BA-level	0.204	0.167	0.162
MA-level or more	0.386	0.351	0.318

Note: Pooled OLS regressions by birth cohort with control for occupation, occupational status, age and gender.

Source: Salonen (2001, Table 17, p. 58).

The estimates given in Tables 2 and 3 display the advantage of older over younger cohorts when it comes to the economic benefit from investing in education, but provide a mixed (Table 2) or no (Table 3) picture about the development over time of the cohort gap. A more clear-cut pattern emerges from a study by Brunello *et al.* (2000), who explore the evolution of the so-called college wage gap in 10 European countries based on data for two cohorts of male employees. The older cohort comprises males born between 1940 and 1949 while the younger cohort embraces males born between 1950 and 1959. The two time points compared refer to the early to mid 1980s and the mid to late 1990s.

Not surprisingly, the results for Finland indicate that the college-to-high-school wage gap is larger for the older than for the younger cohort, a feature that Finland shares with several other European countries. Considerably more outstanding is the much larger increase (between the

two points in time under study) in the college wage gap of the older cohort as compared to the younger cohort. Apart from Finland, such a pronouncedly positive trend in the college wage gap for the older cohort is obtained only for Italy and Portugal. On the whole, the findings of the study by Brunello *et al.* (2000) reveal that the growth in the college wage gap in Europe has not been limited to the younger cohort, as argued in previous studies of the Anglo-Saxon countries.

Education and occupational status

The returns to years of schooling and educational degrees are almost halved, for both men and women, when including controls for the individual's occupational status (e.g. Asplund, 1993a, 2001; Asplund *et al.*, 1996a, 1996b). Moreover, this effect has been found to reflect the positive influence that education has on an individual's occupational chances rather than occupational attainment having a tendency of weakening the earnings effect of the acquired formal education (Asplund, 1993a). This is also to be expected for countries like Finland where formal education contains a large amount of occupation-specific skills and the possession of a given educational degree is even a prerequisite for certain occupations. Simultaneously highly varying returns to human capital endowments across occupational categories indicate that occupation has a marked influence on the sensitivity of the individual's earnings to the possession of and changes in crucial personal characteristics.[15]

Asplund (1996, 1998b) estimates the average return to an additional year in schooling for non-manual workers in manufacturing, and notes that it has remained roughly unchanged over the investigated 15-year period (1980 to 1994). Separate analysis for men and women points to minor variations in average returns also across genders – around 6 per cent for men and about one percentage point less for women, but only in the 1980s.[16] In the early 1990s, the average return to an additional year in schooling

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[15] Asplund (1993a) estimates the average return to years of schooling to be significantly higher for non-manual workers than for manual workers: for men(women) in upper-level non-manual jobs the average return is estimated at 7.4(6.6) per cent, for those in lower-level non-manual jobs at 6.5(4.6) per cent and for male manufacturing workers at 4.0 per cent. The corresponding estimate for women is insignificantly different from zero, as are the estimates for both men and women in non-manufacturing manual jobs.

[16] Asplund (1993a) also reports a significantly lower average return to additional years in schooling for women in private-sector non-manual jobs. In the public sector, in contrast, the difference in educational returns is insignificant between men and women in non-manual jobs.

dropped permanently to around 4 per cent per annum among female non-manual workers, while it remained at the 6 per cent level for their male counterparts, thus widening the gender gap in the rewarding of investment in education to nearly two percentage points. A further distinction by non-manual worker category reveals similar trends for the male-dominated categories of upper-level and technical non-manual workers and the female-dominated category of clerical non-manual workers.

Asplund and Vuori (1996) compare non-manual workers in high-tech and other fast growing industries with those in slowly growing industries. For the former category a further distinction is made between different-sized establishments.[17] The results suggest that the average returns to additional schooling years have not differed significantly between fast and slowly growing industries over the period 1980–1994, not even in the deep recession years in the early 1990s. Substantial variation in educational returns is rather found *within* industrial categories, not least between different-sized establishments, but only in the early 1990s; the differences in returns to education across different-sized establishments estimated for the 1980s are statistically insignificant, implying that, prior to the 1990s, non-manual workers were on average equally rewarded for their educational endowments irrespective of the size of the establishment in which they were working.[18]

Education and income taxes

As the income tax system in Finland is strongly progressive, it might be that wage and salary earners are more concerned about their return to educational investments measured by means of net (after-tax) rather than gross wages. When turning from gross to net wages the estimated average rate of return to an additional year of schooling drops by some one and a half percentage points for both men and women (from about 9 per cent to some 7.5 per cent for 1993). As is evident from Figure 5, the wage premium to a secondary education degree as compared to a basic education turns insignificant for both genders while, not surprisingly, the wage premiums of higher education degrees fall quite significantly when adjusting for the individuals' income tax burden.

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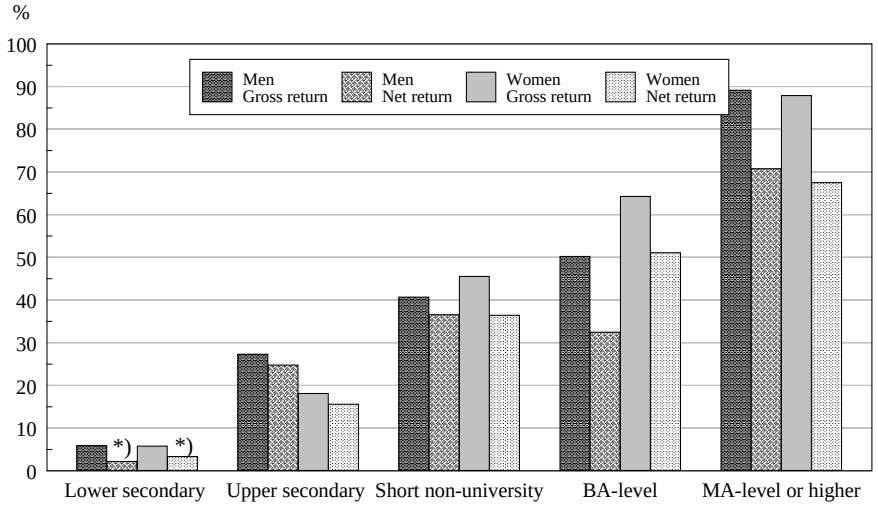
[17] Too few observations in some of the establishment-size categories prevented reasonable estimates to be obtained for the slowly growing industry category.

[18] This is in line with the finding of no significant differences in educational returns across different-sized plants reported in Albæk *et al.* (1996).

Figure 5. Gross versus net returns to educational degrees, 1993



Note: The results refer to full-time employed men but all (full- and part-time) employed women. The reference group is those with a basic education only. *) indicates that the estimate is insignificant at the 5% level.

Source: Asplund (2001).

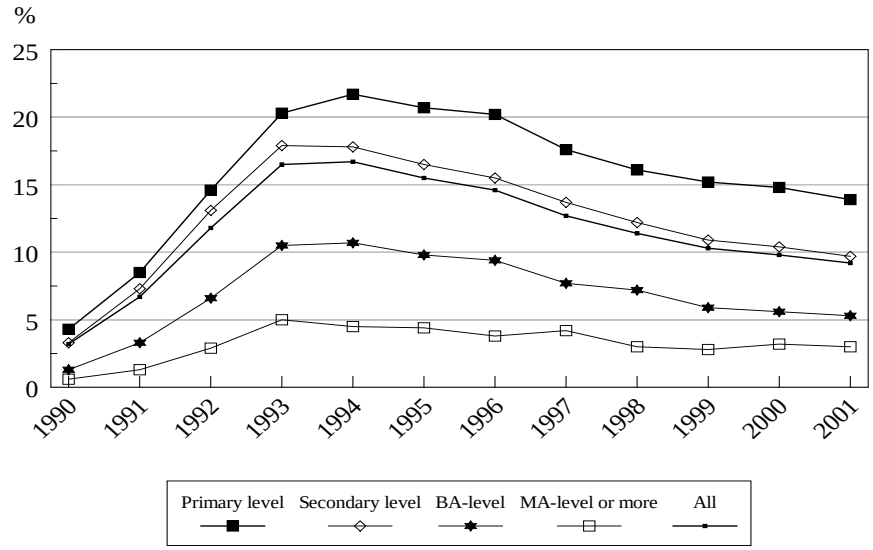
Education and unemployment

The risk of becoming unemployed varies markedly with the level of education (Figure 6). The conventionally estimated rates of return on investments in education should, therefore, actually be adjusted for this reality. In addition to the unemployment risk, however, also the effects of the unemployment benefit system should be accounted for, as it may offset at least part of the impact of different unemployment risks.

Interestingly, such an adjustment exercise changes the conventionally estimated returns to education only marginally in the case of Finland. As shown in Figure 7, this is the outcome of the unemployment benefit system more or less outweighing the improved employment prospects that are generally associated with a higher education.[19] The differences between the adjusted and unadjusted returns to education are much larger for most other countries covered in the study by Barceinas-Paredes *et al.* (2001) due to notable cross-country variation in unemployment rates be-

[19] Calculations of the private internal rate of return for 2000 reported by Hämäläinen and Uusitalo (2003) also reveal a notable rise when accounting for differences in unemployment risks and an almost equally large decline when further accounting for income transfers including unemployment benefits.

Figure 6. Unemployment rates by educational level, 1990 – 2001



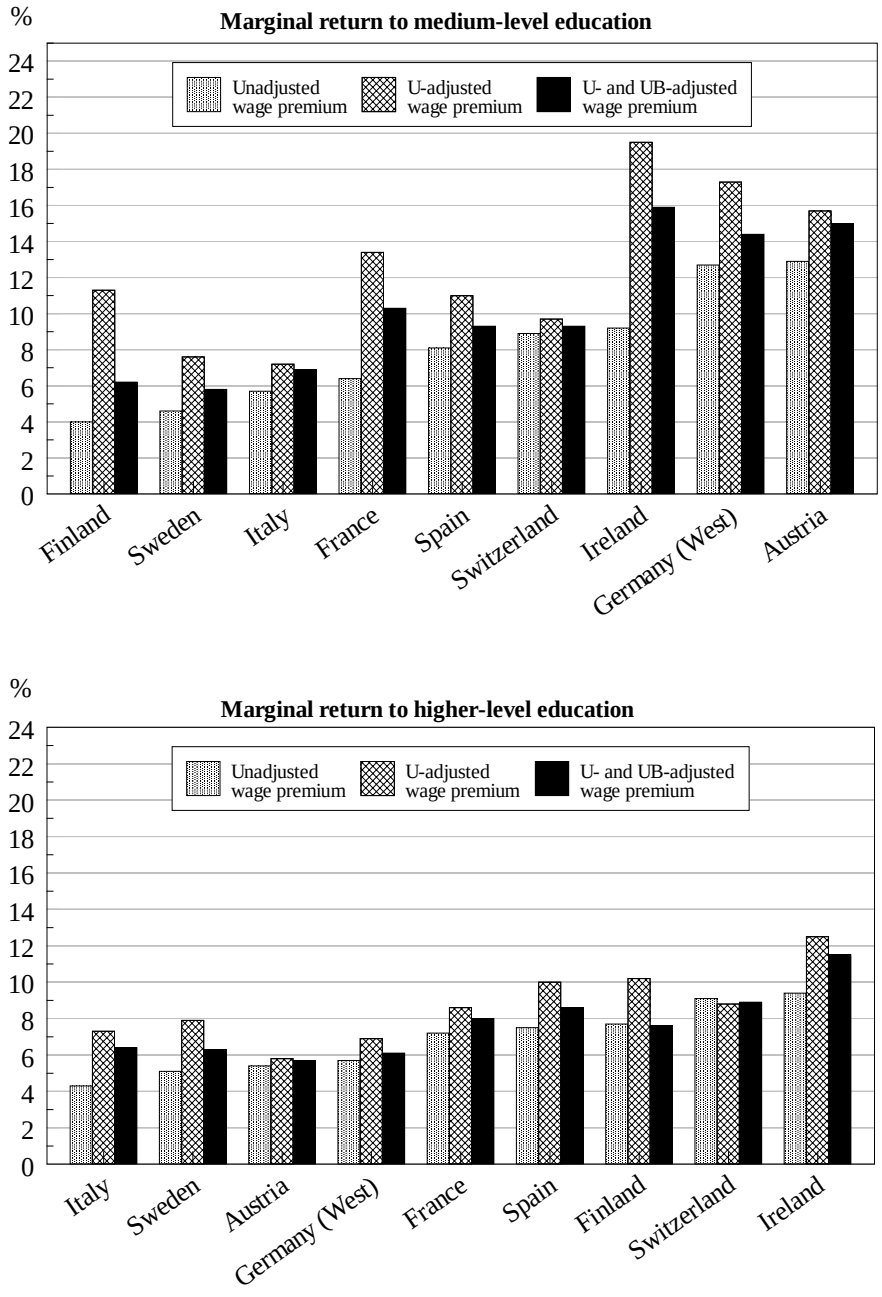
Source: Vatt (2004).

tween differently educated individuals, as well as in the generosity of the unemployment benefit system.

Education and migration

Traditionally, migration has been viewed as a force that equalises regional disparities in resources and capital. Empirical evidence from most countries, however, suggests that, in reality, the opposite trend prevails, especially with respect to economic activity and human capital. Migration occurs from areas with high unemployment to areas with better employment prospects. Ritsilä (2001) finds that a high per capita income growth rate and a high proportion of highly educated inhabitants tend to increase net in-migration to a region. As migration is selective in nature, such that individuals with a higher education are more prone to move than those with less education, this leads to further concentration of human capital. Abundant supply of highly educated labour makes these regions attractive to enterprises and offer circumstances favourable to economic growth. In booming regions, wages are higher than in lagging regions where jobs are scarce and unemployment high. This cycle can be described as a cumulative causation process, a kind of chicken-and-the-egg problem. It is disputed whether people follow the jobs or vice versa. The interdependence of education, migration, and regional wage inequality has not been studied much in Finland, however, although selective migration, concentration of economic activity, and regional divergence in wages are evidently taking place.

Figure 7. Marginal returns to medium- and higher-level educational degrees, adjusted for differences in unemployment rates (U) and unemployment benefits (UB), mid-90s



Source: Barceinas-Paredes *et al.* (2001).

Economic growth in Finland is heavily concentrated in a few large centres, most of them located in the southern part of the country. The Helsinki metropolitan area in the province of Uusimaa is the largest and fastest growing centre of economic activity. In 2003, the province's share of total GDP was 35 per cent (ETLA, 2004). The growth centres continue to exhibit positive net migration rates at the expense of remote areas that lose population and jobs. And as already noted, an additional feature of these migration flows is that those with a higher education are more prone to move than are individuals with less education (e.g. Ritsilä, 2001; Susiluoto, 2003). The concentration of a highly educated population in the Helsinki metropolitan area has occurred simultaneously with the growth in ICT and the technological orientation of higher education (Castells and Himanen, 2001). This is an illustrative example of clustering in an industry contributing to wage inequality triggered by migration and education.

It is worth noting that the flow of the higher educated actually starts already before they become higher educated because most institutions of higher learning are located in growth centres. The existing evidence for Finland on the economic role of the student and graduate populations for the regional economy is ambiguous, however. Susiluoto (2003) concludes that the presence of a university in a region does not significantly improve the efficiency of the regional economy. A contemporary study (Chakrabarti, 2004), in contrast, demonstrates a strong linkage between universities and social capital contributing to the performance of local industries. Intuitively it could be expected that if the specialisation of local universities corresponds to that of the regional economy, then the attachment of the student population to the local labour market is, indeed, a factor that affects economic growth and regional wage differentials. Moreover, being able to offer well-matched jobs to local graduates should help the region to maintain its positive net migration and thereby enhance the growth of human capital and wage levels within the region.

In addition to a high education, the propensity to move increases also with young age and unemployment. According to Laakso and Loikkanen (2004), employment and income of migrants improve fast after migration. Lankinen (2002) reports faster growth rates for income and employment among those who recently migrated to the Helsinki metropolitan area compared to those who lived there before. This outcome can be explained by the young age of migrants and the selectivity characterising migration. On the other hand, migrants tend to be employed in industries more susceptible to economic downturns. This can be attributed to the clustering of rapidly growing industries, such as information and communication technologies (ICT), in the region, and their role in attracting in-migrants.

6 Inequality in earnings and work experience

The accumulated work experience has variably been captured by the individual's potential or actual years of work experience, occasionally by his or her age. Accordingly the estimated earnings effects vary when it comes to magnitude, as well as interpretation.

Brunila (1990) obtains very modest, if any, wage effects for age from her 1975 and 1985 samples. This also holds for the 1970 and 1982 samples of recruits analysed by Uusitalo (1999). Eriksson and Jäntti (1997) distinguish between eight age groups in their estimations of earnings equations for the years 1971, 1975, 1980, 1985 and 1990. Their estimates indicate that the increasing parts of the age-earnings profiles have become steeper while the declining parts have become flatter, except in the last year (1990) studied. In addition, the age differentials are found to have widened substantially since the early 1970s. Moreover, these results change only marginally when including employees younger than 25 years (Eriksson, 1994) or when using monthly earnings instead of annual earnings (*cf.* Eriksson and Jäntti, 1996). Uusitalo (1999), on the other hand, notes that the wage effects of age, as measured by a continuous age variable and its square, have remained surprisingly stable from 1977 to 1995. Moreover, this pattern is repeated among both men and women. Salonen (2001), finally, shows that the age–earnings profile varies quite markedly across major industries. His cohort analysis of the period 1987 to 1997, in turn, reveals rapidly rising earnings for the youngest cohort (born between 1956 and 1965), roughly flat age–earnings profiles for the middle-aged cohort (born between 1946 and 1955) and even declining earnings levels for the oldest cohort (born between 1936 and 1945).

Table 4 reports estimates for the wage effects of the individuals' total years actually (self-reportedly) or potentially (age minus schooling years minus age of school start) spent in working life. The experience acquired in working life has, on average, been rather weakly reflected in the wages of Finnish employees.[20] Among men, the wage advantage arising from increasing work experience has persistently been approximately equally

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[20] As in the case of returns to education, the decline in the estimated wage effect of work experience is negligible when adding controls for other personal and job-related characteristics, except for occupational status dummies (see e.g. Asplund, 1993a; Asplund *et al.*, 1996a). Uusitalo (1999) treats (potential) work experience as an endogenous variable by use of age and age squared as instruments, whereby the estimated coefficient for the experience variable declines and turns insignificant.

Table 4. Estimated average wage effects of actual and potential work experience

		Experience			Experience squared/100		
	Year	**All**	**Men**	**Women**	**All**	**Men**	**Women**
Asplund et al. (1996a)[a]	1987	0.018	0.026	0.009	-0.024	-0.039	-0.010[i]
Asplund et al. (1996a)	1987	0.016	0.025	0.008	-0.024	-0.039	-0.009[i]
Asplund (1993a)[b]	1987	0.015	0.019	0.013	-0.020	-0.029	-0.017
Asplund (2001)[c]	1984	-	0.029	0.014	-	-0.046	-0.018
	1987	-	0.028	0.014	-	-0.045	-0.021
	1989	-	0.025	0.009	-	-0.035	-0.008[i]
	1991	-	0.032	0.017	-	-0.051	-0.023
	1993	-	0.038	0.008	-	-0.059	-0.004[i]
	1995	-	0.037	0.026	-	-0.057	-0.036
Uusitalo (1999; recruits in 1982)	1994	-	0.014 [e]	-	-	-	-

Private sector	**Year**	**Men**	**Women**	**Men**	**Women**
Asplund (1998a)[d]	1987	2.1	1.4	-0.034	-0.021[i]
	1989	2.4	1.2	-0.037	-0.016[i]
	1991	2.5	1.2	-0.038	-0.012[i]
	1993	2.5	2.9	-0.034	-0.053

Public sector	**Year**	**Men**	**Women**	**Men**	**Women**
Asplund (1998a)[d]	1987	2.2	1.1	-0.033	-0.006[i]
	1989	1.3	1.6	-0.018[i]	-0.021
	1991	2.8	1.0	-0.048	-0.008[i]
	1993	2.8	1.7	-0.045	-0.020[i]

Notes: [i] indicates insignificance at the 5% level. Experience years refer to *actual* years in working life unless indicated otherwise below. (a) Explanatory variables are: first row, schooling years, second row, four indicators for educational degree levels, and a gender dummy in the wage equation for all employees. (b) In addition to five indicators for educational degree levels, the wage equation is supplemented with a broad set of other personal and job-related characteristics. (c) Explanatory variables are years of schooling and *potential* experience. (d) Account is made for differences in educational degree levels (five indicators) as well as for various other personal and job-related characteristics, not occupational or industrial status, though. (e) Experience is calculated as the number of years after graduation. None of the wage equations control for tenure.

strong irrespective of the sector of employment. Moreover, the rewarding of the work experience accumulated by male employees seems to have improved markedly in the early 1990s while, at the same time, the curvature of their experience–wage profile turned much more steeper. The work experience accumulated by female workers, in contrast, has constantly been only moderately reflected in their wages, and this holds for both sectors.[21]

Experiments with work experience given the form of a linear spline (thereby following Stewart, 1983) instead of the conventionally used concave shape display quite an unexpected, but fairly similar overall pattern across genders and sectors. Instead of rising steeply, the experience profiles tend to decline or remain approximately unchanged for the first five years in working life. The rising trend starts only during the next five years representing 5 to 9 years of work experience. These years seem to be the most important ones especially for women in private-sector employment and men in public-sector employment. The next ten years give a further push up the wage scale, most strongly for men in private-sector employment. After 20 years of work experience, the experience–earnings profile stays flat towards the end of working life. This lack of a declining trend with increasing work experience is repeated across genders and sectors and emerges irrespective of the activity level of the economy.[22]

For non-manual workers in manufacturing, finally, the rewarding of actual work experience seems to have weakened substantially over the 15-year period 1980 to 1994 (Asplund, 1996). In other words, the wage position of the inexperienced workers entering a manufacturing job has strengthened relative to their more experienced colleagues. The overall trend has been much the same among upper-level, technical and clerical non-manual workers (Asplund, 1993b). Comparison of male and female non-manual manufacturing workers, in turn, displays a huge gender gap in the wage impact of work experience, a gap that has expanded further in the early 1990s (Asplund, 1998b). The experience–earnings profiles look completely different also when comparing non-manual workers employed in fast growing and slowly growing manufacturing industries. In particular, the former category has persistently faced a significantly higher and also more steeply rising wage effect from increasing work experience (Asplund and Vuori, 1996). Common to both categories, how-

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[21] Asplund (2001) shows that the use of potential instead of actual years in working life produces an upward-biased estimate for female employees, but the difference in the two estimates is statistically insignificant.

[22] For more details, see Asplund (1998a).

ever, is that they have seen a steady decline in the estimated wage effect, albeit of a highly different magnitude. The experience–earnings gap between the two industry categories was, as a consequence, notably larger in the early 1990s than in the early 1980s. This trend was further strengthened by a weak recovering in experience-induced wage effects in the fast growing manufacturing industries in the mid-90s.[23]

Accounting for the individuals' seniority (years with the current employer) not only adds to the drop in the estimated wage effects of work experience but also changes the interpretation of the estimate of the experience variable. Now the estimated wage effect of work experience reflects the influence of the (general) work experience acquired before entering the current employment relationship. On the whole, though, the general impression is that the experience–earnings profiles change only marginally when adjusting for the wage impact of seniority, often interpreted as capturing the firm-specific training acquired in working life. This finding is, on the other hand, not surprising in view of the small overall wage effect of work experience and the minor overall role of seniority (see Asplund, 1999).

Results covering the boom years in the late 1980s indicate that the role of longer seniority for wage growth was much more important among public-sector employees, although the effect was quite strong also among women employed in the private sector. The deep recession in the early 1990s seems, however, to have fundamentally reversed this pattern. More precisely, by 1993 the seniority-induced growth in female wages had disappeared in both sectors at the same time as the rewarding of their general work experience boosted (*cf.* Table 4 above). Men in private-sector employment, in contrast, faced the opposite change with the length of the current employment relationship exerting an increasing influence on their wage growth.

Although interesting as such, these wage effects of work experience can say nothing about whether, and to what extent, the experience accumulated in working life affects the relationship between wages and the acquired education. Indeed, surprisingly little attention has been paid to the crucial question of whether education, apart from offering an initial labour market advantage, actually turns into a permanent advantage that, moreover, increases with the time spent in working life. To our knowledge, there exists no direct evidence on this aspect for Finland; only indirect evidence reported in a recent study of education and earnings

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[23] Asplund and Vuori (1996) report corresponding results also for different-sized establishments.

growth (Brunello and Comi, 2003). Based on data from 11 European countries, including Finland, the two authors find, *inter alia*, that employees with a tertiary education tend to have steeper experience profiles than employees with an upper secondary or a compulsory education. This result, which contrasts with previous theoretical and empirical evidence, points to the need to explore in more detail the interplay between education and work experience from a wage inequality point-of-view.

7 Inequality in earnings and employer-sponsored training

Few databases contain information about the individuals' participation in employer-sponsored training. Statistics Finland compiles, as part of the Labour Force Survey, data on a regular basis about the extent of in-service training defined as off-the-job training financed wholly or partly by the employer.[24] More precisely, the sample individuals are asked whether they have participated in employer-financed training courses outside the workplace and for how many days in total during the past 12 months.

As can be seen from Table 5, a steadily growing share of employees participate in training, but the length of the training received has generally and persistently been of a short-term nature extending over a total of only 4 to 5 training days per year, on average.

These average figures, however, conceal substantial variation in the incidence of training when it comes to educational attainment, as well as to age, gender, socio-economic status, branch of activity and firm size. Indeed, Table 6 reveals a remarkable concentration of employer-financed training to the well-educated employees, as well as to those high up in the hierarchy. The table also shows that women participate in training more often than men, but their training is generally of much shorter duration compared to that of their male colleagues.[25] This points to there being notable differences in the type of training which men and women

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[24] Another noteworthy data set is the Adult Education Surveys but to our knowledge, there are no empirical studies of the effects on earnings of the various modes of adult education, including employer-sponsored training, covered in these surveys.

[25] The gender differences are negligible when using the median instead of the average number of training days.

tend to receive. No such detailed information is available, though. Analyses of the wage effects of training, however, support the contention of differences in the content of the training in which men and women typically participate. In particular, the evidence points to marked wage effects of the training received by male employees but minor, if any, wage effects of the training received by female employees, especially if employed in the public sector (see Asplund, 1999). Moreover, the deep recession in the early 1990s seems to have weakened the effect on female wages not only of longer seniority but also of employer-provided training, with the trend being the opposite for their male counterparts. The estimated gender differences in wage effects are roughly maintained when using information on the total number of training days instead of a simple indicator measuring participation or not in employer-sponsored training (Asplund, 1993a).

Table 5. Participation in in-service training, 1982–2002

	Number of employees having participated in in-service training (´000)	Share of all employees, %	Total number of training days (´000)	Training days per participant (median)	Training days per participant (mean)	Training days per employee
1982	565	28.6	4,125	n.a.	7.3	2.1
1983	569	28.5	4,324	n.a.	7.6	2.2
1984	626	30.6	4,632	n.a.	7.4	2.3
1985	652	31.5	4,629	n.a.	7.1	2.2
1986	667	32.7	4,669	n.a.	7.0	2.3
1987	693	34.4	4,505	n.a.	6.5	2.2
1988	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1989	907	43.8	5,442	4.0	6.0	2.6
1990	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1991	788	41.7	5,358	5.0	6.8	2.8
1992	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1993	684	41.4	4,241	4.0	6.2	2.6
1994	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
1995	759	44.4	4,934	4.0	6.5	2.9
1996	761	44.3	5,175	4.0	6.8	3.0
1997	744	41.6	5,357	5.0	7.2	3.0
1998	781	42.0	5,155	4.0	6.6	2.8
1999	838	42.9	5,477	4.0	6.5	2.8
2000	869	43.3	5,301	4.0	6.1	2.6
2001	916	44.8	5,679	4.0	6.2	2.8
2002	899	44.2	5,394	4.0	6,0	2.6

Source: Statistics Finland, In-service Training 2002, Education 2003:4.

Employer-financed in-service training activities in Finland are notable also from a European perspective. According to the second Continuous Vocational Training Survey (CVTS), complied by Eurostat, Finland ranks high up when measuring training intensity by the number of course hours per participant and even more so when comparing the share of course hours in total working hours across Europe.[26] While Eurostat has published a number of descriptive analyses and comparisons of company behaviour when it comes to the provision of training, no econometric analyses of the data seem to have been performed yet. This also holds for the Finnish database underlying the information on Finland included in the CVTS.

Table 6. Participation in in-service training by educational attainment level, socio-economic status and gender, 2002

	Percentage share having participated in in-service training during the year			Average number of training days per participant and year		
	All	Men	Women	All	Men	Women
Primary education	26.4	23.9	29.3	5.4	6.0	4.9
Secondary education	37.3	34.9	39.8	5.3	5.9	4.6
Tertiary education	62.5	61.4	63.3	6.7	7.3	6.2
Upper white-collar	61.7	60.6	63.2	6.9	7.1	6.7
Lower white-collar	49.0	47.7	49.5	5.9	8.1	5.2
Blue-collar	26.3	26.8	25.4	4.5	4.8	3.9
Age 15 – 24	23.8	22.7	24.9	6.4	8.3	4.7
25 – 34	44.1	43.5	44.7	6.5	7.5	5.4
35 – 44	50.6	45.9	55.3	6.2	6.8	5.7
45 – 54	47.4	43.1	51.3	5.6	5.6	5.7
55 – 64	40.9	36.8	44.5	5.2	5.3	5.2
15 – 64	44.2	41.0	47.3	6.0	6.6	5.5

Source: Statistics Finland, In-service Training 2002, Education 2003:4.

[26] See Nestler and Kailis (2003) and also the references therein. For additional international comparisons, see e.g. OECD (2003a, 2003b).

8 Inequality in incomes and education

Finally it may be noted that there is little evidence on the impact of the average level and dispersion of educational attainment on income inequality and its development over time (*cf.* the discussion in Chapter 2 of this volume). In brief, the available evidence for Finland suggests the following.[27]

Differences in educational degree levels seem to explain only a small portion of the total effect of education on income inequality as measured by household disposable incomes (Suoniemi, 1998).[28] Depending on the year and the used measure, the effect is of the magnitude of 10 to 20 per cent. In other words, most part of the impact of education on income inequality arises from within-educational-group inequality despite the fact that the role of between-educational-group inequality strengthened slightly during the first half of the 1990s compared to the trend that dominated in the 1980s.[29]

Unfortunately, the most recent decomposition results concern the year 1994. This seems to be partly due to a shift in Finnish income inequality research from decompositions of income distribution measures to the calculation of Gini coefficients, which do not allow for decompositions into between and within effects equally straightforwardly and logically as income distribution measures. Another major reason put forth for the lack of systematic research on the effects of education on income inequality in Finland is the fact that most of it occurs within educational groups, as noted above. Accordingly, changes in the relative shares of educational groups, as well as in their average incomes, are likely to have a minor impact on the development of income differentials. Empirical evidence in support of this contention is not available, though.

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[27] The reported findings are based on information provided by Ilpo Suoniemi and Risto Sullström, which is gratefully acknowledged.

[28] It may be noted that the results pointed to in this section do not change notably when income inequality is measured by consumption expenditures instead of disposable income.

[29] Similar results have been reported by Riihelä and Sullström (2001), who investigate income differentials and inequality within major regional areas over the period 1971 to 1998.

Slightly more, and also more recent information exists on the impact of education on the trend in income inequality. When comparing the trend in the deep recession years of 1990 to 1994 with that of the boom years 1996 to 1999, Suoniemi (2002) finds that the earnings of the different educational groups have typically had only a small influence on the observed growth in income inequality. The minor change in between-educational-group income inequality is noted to be due to the fact that the income effects of earnings, employment status and income transfers have largely outweighed each other. The increase in unemployment in the deep recession years resulted in wage compression. The concomitant increase in income transfers caused a decline also in income differentials. During the boom years, on the other hand, the most notable change in income dispersion resulted from rapid growth in the incomes of the highest educated due to an explosion in capital incomes that, furthermore, led to increased income differentials within the group. The simultaneous improvement in the employment situation of the less educated, however, gave rise to a counteracting effect, for which reason the changes in earnings came to increase income inequality only marginally.

All in all, the impact of education on income inequality tends to be substantially smaller in size than its effect on earnings inequality. There are several reasons for this to occur. First, the earned income makes up only a certain portion of the total income. Second, taxation and income transfers smooth income differentials. Third, the income differentials concern primarily households rather than single individuals.

9 Conclusions and discussion

Quality of education, measured by learning results and assessed with respect to socio-economic background and gender, as well as region, and the equal opportunity to pursue higher education after mandatory basic education are the principles of equality in the Finnish schooling system. Based on this review of the empirical literature on equality in education, there still are some potential sources of inequality regarding all three aspects of equality (Table 7).

Table 7. Inequality in the education system in Finland

Education level	Characteristics	Inequality	References
Pre-primary	Voluntary, public and free (700 hrs), participation rate 75%	May create inequality in initial capabilities at start of primary school	
Primary	Mandatory, public and free, classes 1 to 6 (ages 7 to 12)	Girls perform better, socio-economic background associated with learning results, some regional diffferences, specialisation of schools and selection	Jakku-Sihvonen (2002), Välijärvi (2003)
Lower secondary	Mandatory, public and free, classes 7 to 9 (ages 13 to 15)		
Secondary	Upper secondary schools and vocational schools, public and free	Strong selection into upper secondary schools, differences between schools in learning results; Vocational and professional degrees associated with lower earnings and higher risk of unemployment	Kuusela (2003), Kirjavainen and Loikkanen (1995), Uusitalo and Hämäläinen (2003)
Tertiary	Universities and polytechnic institutions, mainly public and free	Inequality enforcing factors are entrance examinations, preparation classes, socio-economic background, financial assistance from family	Ahola and Kokko (2000), Nurmi (1998)

More precisely, selection stemming from socio-economic factors, and regional variation in them, seem to continue to be a key source of inequality in the Finnish schooling system. First, in basic and upper secondary education, significant differences in school performance in national assessments have been shown to exist. Second, the transition phases between levels of education are crucial. Upper secondary schools select their students based on grades, and universities and polytechnics give entrance examinations to applicants. A family background of higher education and socio-economic status is associated with better outcomes in the assessment of learning results in basic and upper secondary education, as well as better success in entrance examinations to higher education. Inequality within institutions or regions is not of an alarming magnitude. However, inequality between schools and regions may be increasing and a source of inequality in the labour market. Potential interactions between the three kinds of inequality can be identified, and offer a field for future empirical research.

The current discussion on the connection between higher education policy and the economy at large deals mainly with the ability of the university system to produce graduates to enter the labour force efficiently. Equality remains an issue, not as much in terms of physical accessibility as before, but in terms of socio-economic characteristics of the student body, financing one's studies, and employment outcomes after graduation. However, the emergence of polytechnic institutes has increased the regional availability of higher education in Finland. This optional track of higher education is also a way to ease the competition for places in tertiary level education.

The considerable attempts made to implement equal opportunity norms in the Finnish education system can be expected to have reduced the impact of family background on children's economic and social status during adulthood. More precisely, one would presume that the degree of equality of opportunity has improved considerably over time, and that public interventions have played a major role in enhancing this development. There is not much evidence available to shed light on these issues, though. One unambiguous finding, however, is that the inter-generational correlation is clearly weaker for daughters than for sons.

A higher education not only secures the individual a higher entry wage, but also guarantees a more advantageous life-cycle wage profile and a lower unemployment risk as compared to the less educated. In doing so, education contributes to the between-group wage inequality that prevails in the labour market. But the empirical evidence in support of these hypotheses reveals occasionally even substantial knowledge gaps. This concerns especially the interdependencies between education and unemployment, on the one hand, and initial education and working life education and training, on the other. Moreover, most evidence for Finland on the earnings effects of human capital endowments extends only to the mid-90s. And in case more recent evidence is available, it mediates a surprisingly mixed picture.

Some evidence points to notable – and growing – wage inequality within educational groups, which indicates that investments in further education are associated with a substantial wage risk. In other words, individuals tend to face considerable uncertainty with respect to the actual economic benefit that they can reap from their investment in a higher education. The existing knowledge on this aspect of education and wage inequality is, however, still too limited to allow reliable conclusions to be made. For this reason it is also impossible to say anything about the relative importance of the between-group and within-group effects and, hence, about their net effect on overall wage inequality and its development over time. In other words, the scope for further research within the field of education from a wage inequality point-of-view is broad and compelling.

Literature

Ahola, S. and A. Kokko (2000), Takuulla tavoitteeseen. Kasautuuko hyväosaisuus valmennuskursseilla? (Guaranteed entrance. Does success cluster in preparation classes?), *Yliopistotieto* 1/2000, 55–58.

Albæk, K., M. Arai, R. Asplund, E. Barth and E. Strøjer Madsen (1996), *Employer Size-Wage Differentials in the Nordic Countries*. Centre for Labour Market and Social Research, Working Paper 96-03, Århus.

Asplund, R. (1993a), *Essays on Human Capital and Earnings in Finland*. The Research Institute of the Finnish Economy ETLA, Series A 18, Helsinki.

Asplund, R. (1993b), *Teollisuuden toimihenkilöiden palkat ja inhimillinen pääoma (Earnings and Human Capital of Non-manual Industrial Workers)*. The Research Institute of the Finnish Economy ETLA, Series B 89, Helsinki.

Asplund, R. (1996), Är humankapital en lönsam investering? (Is human capital a profitable investment?), in Lundholm, M. (ed.), *Utmaningar för den offentliga sektorn (Challenges for the public sector)*. Nordic Economic Research Council, Report 6, Uppsala.

Asplund, R. (1998a), Private vs. Public Sector Returns to Human Capital in Finland, *Journal of Human Resource Costing and Accounting*, 3(1), pp. 11–44. Additional results referred to in the text are given in Discussion papers No. 607 published by The Research Institute of the Finnish Economy ETLA, Helsinki.

Asplund, R. (1998b), The Gender Wage Gap in Finnish Industry in 1980–94, in Persson, I. and C. Jonung (eds), *Women's Work and Wages*. Routhledge, London.

Asplund, R. (1999), Earnings and Human Capital: Evidence for Finland, in Asplund, R. and P. Telhado Pereira (eds), *Returns to Human Capital in Europe – A Review of the Literature*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Asplund, R. (2001), Finland, in Harmon, C., I. Walker and N. Westergaard-Nielsen (eds), *Education and earnings in Europe: A Cross Country Analysis of the Returns to Education*. Edward Elgar Publishing Ltd., Cheltenham.

Asplund, R. and S. Vuori (1996), *Labour Force Response to Technological Change*. The Research Institute of the Finnish Economy ETLA, Series B118, Helsinki.

Asplund, R., E. Barth, C. le Grand, A. Mastekaasa and N. Westergård-Nielsen (1996a), Wage Distribution Across Individuals, in Westergård-Nielsen,

N. (ed.), *Wage Differentials in the Nordic Countries*, in Wadensjö, E. (ed.), *The Nordic Labour Markets in the 1990s, Part 1*. North-Holland, Amsterdam.

Asplund, R., E. Barth, N. Smith and E. Wadensjö (1996b), The Male–Female Wage Gap in the Nordic Countries, in Westergård-Nielsen, N. (ed.), *Wage Differentials in the Nordic Countries*, in Wadensjö, E. (ed.), *The Nordic Labour Markets in the 1990s, Part 1*. North-Holland, Amsterdam.

Asplund, R. and R. Lilja (2000), Has the Finnish Labour Market Bumped the Least Educated?, in Borghans, L. and de Grip, A. (eds), *The Overeducated Worker? The Economics of Skill Utilization.* Edward Elgar Publishing Ltd., Cheltenham.

Barceinas-Paredes, F, J. Oliver-Alonso, J.L. Raymond-Bara and J.L. Roig-Sabaté (2001), Unemployment and Returns to Education in Europe, in Asplund, R. (ed.), *Education and Earnings. Further Evidence from Europe.* The Research Institute of the Finnish Economy ETLA, Series B183, Helsinki.

Björklund, A., T. Eriksson, M. Jäntti, O. Raaum and E. Österbacka (2002), Brother correlations in earnings in Denmark, Finland, Norway and Sweden compared to the United States, *Journal of Population Economics* 15, 757–772.

Blomster, P. (2000), *Yliopisto-opiskelijoiden toimeentulo ja opintotuki 1990-luvun Suomessa (Livelihood and financial aid of Finnish university students in the 1990s).* The Social Insurance Institute of Finland KELA, Studies in social security and health 56, Helsinki.

Board of Education (2003), *Koulutuspolitiikan linjauksia (Course of education policy).* http://www.stat.fi/tk/he/edufinland/educ.html

Brunello, G. S. Comi and C. Lucifora (2000), *The College Wage Gap in 10 European Countries: Evidence from Two Cohorts.* IZA Discussion Paper No. 228.

Brunello, G. and S. Comi (2003), Education and Earnings Growth: Evidence from 11 European Countries, *Economics of Education* 23(1), 75–83.

Brunila, A. (1990), *Naisten ja miesten palkkaerot vuosina 1975 and 1985 (Female–male wage differentials in 1975 and 1985).* The Labour Institute for Economic Research, Report 30, Helsinki.

Castells, M. and P. Himanen (2001), *Suomen tietoyhteiskuntamalli (The Finnish model of the information society).* WSOY, Helsinki.

Chakrabarti, A. (2004), Building Social Capital and Learning Environment in University-Industry Relationships, *International Journal of Learning and Intellectual Capital* 1(1), 19–36.

Eriksson, T. (1994), Unemployment and the Wage Structure – Some Finnish Evidence, in Eriksson, T., S. Leppänen and P. Tossavainen (eds), *Proceedings of the Symposium on Unemployment*. Government Institute for Economic Research, VATT Publications 14, Helsinki.

Eriksson, T. and M. Jäntti (1996), *The distribution of earnings in Finland 1971–1990*. Åbo Akademi University, Meddelanden från Ekonomisk–Statsvetenskapliga fakulteten vid Åbo Akademi, Turku.

Eriksson, T. and M. Jäntti (1997), The Distribution of Earnings in Finland 1971 – 1990, *European Economic Review* 41, 1763–1779.

ETLA (2004), *Regional Database*. http://www.etla.fi/index.php?did=47

Forma, P., M. Heikkilä and E. Keskitalo (1999), *Mikä on kohtuullinen minimi? Vähimmäisturvan taso konsensusmenetelmällä arvioituna (What is a reasonable minimum? The minimum supplementary benefit level evaluated by means of the consensus method)*. Stakes, Research reports 240, Helsinki.

Government of Finland (1995), HE 172 – 1995 vp. Hallituksen esitys Eduskunnalle laiksi työmarkkinatuesta annetun lain muuttamiseksi. (Government bill to the Senate to change the law on unemployment benefits). http://www.finlex.fi/linkit/he/19950172

Government of Finland (2003), *Työllisyystyöryhmän loppuraportti. (Report of the employment taskforce)*. Publications of the Prime Minister's Office 5/2003, Helsinki.

Harmon, C., I. Walker and N. Westergaard-Nielsen (2001), *Education and Earnings in Europe. A Cross Country Analysis of the Returns to Education*. Edward Elgar Publishing Ltd., Cheltenham.

Harmon, C., H. Oosterbeek and I. Walker (2003), The Returns to Education: Microeconomics, *Journal of Economic Surveys* 17(2), 115–155.

Heikkilä, M. (1990), Köyhyys ja huono-osaisuus hyvinvointivaltiossa. *(Poverty and Deprivation in a Welfare State)*. National Board of Social Welfare 8/1990 and Statistics Finland, Helsinki.

Helo, T. and R. Uusitalo (1995), *Kannattaako korkeakoulutus? Kustannus-hyöty -analyyttinen arvio korkeakoulutusinvestointien tuotoista Suomessa 1975-1990 (Is university education profitable? A cost-benefit analysis of the returns to investments in university education in Finland in 1975 to 1990)*. The University of Turku, The Research Unit for the Sociology of Education, Research Reports 24, Turku.

Hämäläinen, U. (2003), *Ylikoulutusta korkeakoulutettujen työmarkkinoilla? (Overeducation in the labour markets for the highly educated?)*. The Labour Institute for Economic Research, Report 87, Helsinki.

Hämäläinen, U. and R. Uusitalo (2003), Koulutus kannattaa – laski sitä miten päin tahansa (Education pays no matter how calculated), *Talous & Yhteiskunta (Economy & Society)* 4/2003, 2–6.

Ingberg, M. (1987), *The Effects of Schooling and Experience on Earnings in Finland: Some Preliminary Results*. Pellervo Economic Research Institute, Working Papers 6/1987, Espoo.

Jakku-Sihvonen, R. (2002), Differences between school-specific results in terms of equality in education, in Jakku-Sihvonen, R. and J. Kuusela (eds), *Evaluation of the equal opportunities in the Finnish comprehensive schools 1998–2001*. National Board of Education, Evaluation 11/2002, Helsinki.

Jäntti, M., T. Kirjavainen and H.A. Loikkanen (2000), Suomalainen koulutus taloustieteen näkökulmasta: koulutuksen tehokkuus, tuotto ja rooli sukupolvien välisessä taloudellisessa liikkuvuudessa (Finnish education from an economics perspective: the efficiency, return and role of education in inter-generational economic mobility), in Raivola, R. (ed.), *Vaikuttavuutta koulutukseen (Effectiveness into education)*. The Academy of Finland, Publications 2/00. Edita, Helsinki.

Kangas, O. and V-M. Ritakallio (eds)(1996), *Kuka on köyhä? Köyhyys 1990-luvun puolivälin Suomessa (Who is Poor? Finnish Poverty in the mid-1990s)* Stakes, Research Reports 65, Helsinki.

KELA (2003), *Opintotuki (Financial aid to students)*. http://193.209.217.5/in/internet/suomi.nsf/NET/040601145115IL?openDocument

Kirjavainen, T. and H.A. Loikkanen (1995), *School Resources and Student Achievement: Evidence from Finnish Senior Secondary Schools*. Government Institute for Economic Research, Discussion Papers 91, Helsinki.

KOTA online database. Ministry of Education. http://www.csc.fi/kota/kota.html

Kruhse-Lehtonen, U. (2000), *Education and Self-Selection*. Helsinki School of Economics and Business Administration. Licentiate Thesis.

Kuusela, J. (2003), *Lukioiden tuloksiin vaikuttavista tekijöistä (On the factors affecting the success of upper secondary schools)*. Board of Education, Stencil 13/2003, Helsinki.

Laakso, S. and H.A. Loikkanen (2004), *Kaupunkitalous. Johdatus kaupungistumiseen, kaupunkien maankäyttöön sekä yritysten ja kotitalouksien sijoittumiseen (Urban Economics. Introduction to urbanisation, urban land use and location of firms and households)*. Gaudeamus, Helsinki.

Lampinen, O. (2000), *Suomen koulutusjärjestelmän kehitys (The development of the education system in Finland)*. Gaudeamus, Helsinki.

Lankinen, M. (2002), *Muuttoliike ja kunnan talous (Migration and municipal economy)*. City of Helsinki Urban Facts, Research 2002:3, Helsinki.

Leijola, L. (2004), *The education system in Finland – Development and equality*. The Research Institute of the Finnish Economy ETLA, Discussion Papers No. 909, Helsinki.

Martins, P.S. and P.T. Pereira (2004), Does Education Reduce Wage Inequality? Quantile Regressions Evidence from 16 Countries, *Labour Economics* 11(3), 355–371.

Ministry of Education (2003a), *Koulutus – Koulutuspolitiikka Suomessa* (*Education – Education policy in Finland)*. http://www.minedu.fi/opm/koulutus/index.html

Ministry of Education (2003b), *Koulutus – Yleissivistävä koulutus* (*Education – General education)*. http://www.minedu.fi/opm/koulutus/yleissivistava_koulutus.html

Ministry of Education (2003c), *Report on the Finnish implementation of the Bologna Declaration and the Prague Communiqué*. August, Helsinki.

Ministry of Education (2004), *Koulutuksen historia – kirkon kouluista virtuaaliverkkoihin (History of education – From church schools to virtual networks). http://www.minedu.fi/opm/kouluts/koulutuksen_historia.html.*

Ministry of Labour (2003), *Työnhakijapalvelut – Työmarkkinatuen rajoitukset alle 25-vuotiailla (Services for job-seekers – Restrictions on unemployment benefits for those under 25)*. http://www.mol.fi/tyonhakijapalvelut/tyomarkkinatukinuoret.html

Ministry of Social Affairs and Health (2003), *Child daycare and early childhood education*. http://www.stm.fi/Resource.phx/eng/subjt/famil/dayca/index.htx

Nestler, K. and E. Kailis (2003), *Working time spent on continuing vocational education in enterprises in Europe*. Eurostat, Statistics in Focus, Theme 3 – 1/2003.

Nurmi, J. (1998), *Keiden koulutusväylät? Laveneva korkeakoulutus ja valikoituminen (Whose tracks? Broadening higher education and selection)*. The University of Turku, The Research Unit for the Sociology of Education, Research Reports 43, Turku.

OECD (2003a), *Education at a Glance 2003*. Paris.

OECD (2003b), *Employment Outlook 2003*. Paris.

Parikka, R. (1994), Pitkä varjo – huono-osaisuus historiallisena jatkuvuutena (The long shadow – deprivation as an historical continuity), in Matti, H. and K. Vähätalo (eds), *Huono-osaisuus ja hyvinvointivaltion muutos (Deprivation and the Change of the Welfare State)*. Gaudeamus, Helsinki.

Partanen, J. (2002), Osaaminen keskittyy (Concentrating competence), *Stat.fi* 1–2002, 8–9.

Psacharopoulos, G. and H.A. Patrinos (2002), *Returns to Investment in Education: A Further Update*. World Bank Policy Research, Working Paper 2881.

PURE (2001), *PuRE Final Report*. http://www.etla.fi/edwin/Useful_links/PURE

Riihelä, M. and R. Sullström (2001), *Tuloerot ja eriarvoisuus suuralueilla pitkällä aikavälillä 1971–1998 ja erityisesti 1990-luvulla (Income differences and inequality in major regions in the long run 1971–1998 and especially during the 90s)*. Government Institute for Economic Research, Report 80, Helsinki.

Ritsilä, J. (2001), *Studies on the Spatial Concentration of Human Capital*. University of Jyväskylä, Jyväskylä Studies in Business and Economics 7.

Salonen, J. (2001), Iän suuntaiset palkkaprofiilit eräillä toimialoilla ja -kohorteilla (Age-earnings profiles for certain industry branches and cohorts), in Tuominen, E. (ed.), *Muuttuva työ ja eläketurva (Changing work and pension safety)*. The Finnish Centre for Pensions, Helsinki.

Statistics Finland (1998), *Koulutus Suomessa (Education in Finland)*. Koulutus 1998:1, Helsinki.

Statistics Finland (1999), *Adult education and training in Finland*. Education 1998/8, Helsinki.

Statistics Finland (2003), *Education in Finland*. http://www.stat.fi/tk/he/edufinland/educ.html

Suoniemi, I. (1998), *Tuloissa ja kulutuksessa mitatun eriarvoisuuden kehitys Suomessa 1971–1994 (The trend in income and consumption inequality in Finland in 1971–1994)*. The Labour Institute for Economic Research, Report 70, Helsinki.

Suoniemi, I. (2002), Kotitalouksien tulot ja tulonjako 1990-luvulla (Household incomes and income distribution in the 1990s), in Sauramo, P. (ed.), *Kriisistä nousuun: miten kävi kansalaisilla? (From crisis to upturn: what happened to the people?)*. The Labour Institute for Economic Research, Edita Publishing, Helsinki.

Susiluoto, I. (2003), *Effects of ICT on Regional Economic Efficiency*. Helsinki City Urban Facts Office Web Publications 2003:16.

Uusitalo, R. (1996), *Return to Education in Finland*. University of Helsinki, Department of Economics, Research reports Nro 71:1996.

Uusitalo, R. (1999), *Essays in Economics of Education*. University of Helsinki, Department of Economics, Research reports Nro 79:1999.

Uusitalo, R. (2002), Changes in the Finnish Wage Structure: Will Demand and Supply Do?, *The Scandinavian Journal of Economics* 104(1), 69–85.

Vainiomäki, J. and S. Laaksonen (1995), Inter-industry wage differentials in Finland, Evidence from longitudinal census data for 1975–85, *Labour Economics* 2, 161–174.

Vatt (2004), http://taloudenrakenteet.vatt.fi/

Välijärvi, J. (2003), Peruskoulualaisten osaamisen laatu ja tasa-arvo kansainvälisessä vertailussa (International comparison of quality of performance and equality among basic education students), *Talous & Yhteiskunta (Economy & Society)* 4/2003, 7–12.

Österbacka, E. (2001), Family Background and Economic Status in Finland, *Scandinavian Journal of Economics* 103(3), 467–484.

Österbacka, E. (2003a), *Mechanisms behind intergenerational earnings correlation in Finland 1985 – 1995*. Åbo Akademi University, Finland. Manuscript.

Österbacka, E. (2003b), *Is Unemployment Correlated Across Generations? Evidence from Finland*. Åbo Akademi University, Finland. Manuscript.

Table A1. Summary of reviewed studies

Study	Ingberg (1987)	Brunila (1990)	Asplund (1993)	Eriksson (1994)	Helo and Uusitalo (1995)	Asplund (1996)	Asplund and Vuori (1996)	Asplund *et al.* (1996a)	Asplund *et al.* (1996b)
Data used	LFS 1980, HPC 1980	PCD 1975, 1985	LFS 1987	PCD 1970, 75, 80, 85, 90	PCD 1975, 80, 85, 90	TT wage data 1980-94	TT wage data 1980-94	LFS 1987	LFS 1987
Type of data	Cross-section	Cross-sections	Cross-section	Cross-sections	Cross-sections	Cross-sections	Cross-sections	Cross-section	Cross-
Population covered	All, men.	Full-time, full-year. All, men, women.	All, men, women, private vs. public sector, occupational categories.	All	All with either a university degree or merely a matriculation examination.	All non-manuals and 3 sub-groups, mainly manufacturing.	Non-manual industry workers by technological progress and plant size.	All, men, women, private vs. public sector	Men, women
Wage concept	Annual taxable income*	Gross annual earnings	Gross hourly wage	Gross monthly and annual earnings	Annual taxable income**	Gross hourly wage	Gross hourly wage	Gross hourly wage	Gross hourly wage
Estimation method(s)	OLS	OLS	OLS, correction for selectivity bias.	OLS	Tobit	OLS	OLS	OLS	Sample selection correction
Years of schooling	X		X			X	X	X	X
Educational levels		X	X	X	X	X	X	X	
Experience		Age	Actual (self-reported)	Age	Calculated as time elapsed since graduation.	Actual (from employer registers)	Actual (from employer registers)	Actual (self-reported)	Actual (self-reported)
Tenure/OJT			X/X			X/-	X/-	X/-	X/-
Other variables		X	X	X	X	X	X	X	X
No of obs.	4,041/ 2,176	~ 11,000 per year	3,895	~100,000 to 200,000	~ 9,000 to 23,000	~ 10,000 to 15,000 per year	~ 10,000 to 15,000 per year	3,895	1,873/1,974

Notes: All variables indicated are not necessarily included at the same time. LFS = Labour Force Survey; HPC = Household and Population Census; PCD = Population Census Data.
* Inclusive of farming and entrepreneurial income; ** inclusive of entrepreneurial and capital income.

Table A1. (cont.)

Study	Eriksson and Jäntti (1996)	Eriksson and Jäntti (1997)	Asplund (1998a)	Asplund (1998b)	Uusitalo (1999)	Uusitalo (1999)	Jäntti *et al.* (2000)	Kruhse-Lehtonen (2000)
Data used	PCD 1970, 75, 80, 85, 90	PCD 1970, 75, 80, 85, 90	LFS 1987, 89, 91, 93	LFS 1987, 89, 91, 93	Merging of several data sources.	IDS 1977, 83, 89, 95	IDS 1977 to 1997	Various sub-samples of PCD 1970 to 1995.
Type of data	Cross-sections	Cross-sections	Cross-sections	Cross-sections	Cross-sections	Cross-sections	Cross-sections	Cross-sections and panels
Population covered	All	All, males, females	Men, women by sector (private vs. public)	All	Recruits in 1970; recruits in 1982.	All, men, women.	Men, women.	All, men, women.
Wage concept	Gross monthly and annual earnings	Gross monthly earnings	Gross hourly wage	Gross hourly wage	1970 sample: average annual taxable earnings 1975-90; 1982 sample: gross monthly earnings 1994.	Gross monthly earnings.	Gross monthly earnings.	Gross monthly and annual earnings
Estimation method(s)	OLS	OLS	Correction for selection bias.	OLS	OLS, different schooling choice models.	OLS	Pooled OLS	OLS, panel, IV, etc.
Years of schooling			X	X	X			X
Educational levels	X	X	X	X	X	X	X	X
Experience	Age	Age	Actual (self-reported)	Actual (self-reported)	Age, potential & calculated experience	Age	Age	Age
Tenure/OJT			X/X	X/X				
Other variables	X	X	X	X	X, ability	X	year of obs.	X
No of obs.	~ 70,000 to 180,000	~ 70,000 to 180,000	~ 2,500 to 4,000	~ 2,500 to 4,000	~ 1,500 (1970 sample); ~ 22,500 (1982 sample)	~ 3,700 to 34,700	?	Varies depending on sub-sample.

Notes: All variables indicated are not necessarily included at the same time. LFS = Labour Force Survey; HPC = Household and Population Census; PCD = Population Census Data; IDS = Income Distribution Surveys.

Table A2. Estimated marginal returns to educational degrees, all employees and by gender

		Educational degree						
		Basic	Lower secondary	Upper secondary	Short non-university	BA-level	MA-level	Postgraduate
	Year	(9 years)	(11-12 years)	(12 years)	(13-14 years)	(15 years)	(16 years)	(18-20 years)
All employees								
Asplund (unpublished)[a]	1987	ref.	0.048	0.228	0.380	0.500	0.621[c]	
	1989	ref.	0.040	0.204	0.365	0.493	0.620[c]	
	1991	ref.	0.031	0.202	0.402	0.493	0.634[c]	
	1993	ref.	0.033	0.191	0.333	0.434	0.605[c]	
Eriksson and Jäntti (1997)[b]	1971		ref.	0.434	0.673	0.966		1.038
	1975		ref.	0.271	0.449	0.661		0.790
	1980		ref.	0.218	0.409	0.608		0.763
	1985		ref.	0.188	0.372	0.563		0.649
	1990		ref.	0.184	0.361	0.567		0.739
Uusitalo (1999)	1977	ref.	0.090	0.250	0.396	0.515	0.697	0.770
	1983	ref.	0.076	0.228	0.337	0.516	0.637	0.781
	1989	ref.	0.069	0.218	0.388	0.503	0.646	0.751
	1995	ref.	0.051	0.183	0.364	0.366	0.594	0.685
Male employees								
Asplund (unpublished)[a]	1987	ref.	0.080	0.259	0.410	0.450	0.610	
	1989	ref.	0.054	0.219	0.421	0.458	0.624	
	1991	ref.	0.038	0.227	0.433	0.527	0.617	
	1993	ref.	0.019[i]	0.214	0.326	0.360	0.584	

Eriksson and Jäntti (1997)[b]	1971	ref.		0.480	0.715	0.998		1.122
	1975	ref.		0.284	0.466	0.692		0.834
	1980	ref.		0.224	0.405	0.628		0.790
	1985	ref.		0.207	0.394	0.576		0.691
	1990	ref.		0.220	0.406	0.604		0.783
Uusitalo (1999)	1977	ref.	0.100	0.283	0.451	0.564	0.724	0.793
	1983	ref.	0.092	0.261	0.387	0.550	0.661	0.800
	1989	ref.	0.090	0.248	0.418	0.593	0.664	0.754
	1995	ref.	0.064	0.208	0.395	0.313	0.611	0.696
Female employees								
Asplund (unpublished)[a]	1987	ref.	0.018[i]	0.190	0.353	0.507	0.625	
	1989	ref.	0.021[i]	0.179	0.304	0.510	0.606	
	1991	ref.	0.026[i]	0.180	0.369	0.477	0.653	
	1993	ref.	0.042[i]	0.155	0.335	0.480	0.596	
Eriksson and Jäntti (1997)[b]	1971	ref.		0.340	0.624	0.946		1.245
	1975	ref.		0.244	0.428	0.638		1.023
	1980	ref.		0.214	0.421	0.606		0.911
	1985	ref.		0.171	0.358	0.573		0.698
	1990	ref.		0.159	0.321	0.551		0.858
Uusitalo (1999)	1977	ref.	0.072	0.201	0.337	0.465	0.662	0.749
	1983	ref.	0.057	0.177	0.283	0.483	0.601	0.712
	1989	ref.	0.043	0.179	0.349	0.444	0.632	0.805
	1995	ref.	0.027	0.144	0.313	0.387	0.564	0.685

Notes: [a] Also see Asplund (1993a, 2001) and Asplund *et al.* (1996a). [b] The results are approximately the same when using annual and monthly earnings as the dependent variable (see Eriksson and Jäntti, 1996). Including those aged 16 to 24 also leaves the results approximately unchanged (*cf.* Eriksson, 1994). [c] The very small number of postgraduates do not allow a distinction to be made between graduated and postgraduated. An [i] indicates that the estimate is not significantly different from zero, i.e. from the reference category, at the 5% level.

Table A3. Estimated returns to educational degrees by sector and gender

		Educational degree					
		Basic	Lower secondary	Upper secondary	Short non-university	BA-level	MA-level
	Year	(9 years)	(11-12 years)	(12 years)	(13-14 years)	(15 years)	(16 years)
Private sector:							
Male employees	1987	ref.	0.113	0.304	0.562	0.603	0.690
	1989	ref.	0.085	0.299	0.581	0.772	0.824
	1991	ref.	0.077	0.286	0.535	0.730	0.700
	1993	ref.	0.010[i]	0.195	0.361	0.450	0.590
Female employees	1987	ref.	-0.030[i]	0.161	0.325	0.449	0.584
	1989	ref.	0.015[i]	0.181	0.329	0.401	0.535
	1991	ref.	-0.000[i]	0.171	0.332	0.375	0.457
	1993	ref.	0.057[i]	0.185	0.432	0.482	0.712
Public sector:							
Male employees	1987	ref.	0.120	0.288	0.512	0.526	0.700
	1989	ref.	0.037[i]	0.222	0.429	0.418	0.653
	1991	ref.	0.064[i]	0.256	0.457	0.515	0.662
	1993	ref.	0.047[i]	0.228	0.328	0.415	0.658
Female employees	1987	ref.	0.038[i]	0.203	0.370	0.525	0.652
	1989	ref.	0.095	0.255	0.422	0.645	0.751
	1991	ref.	0.095	0.247	0.472	0.596	0.788
	1993	ref.	0.112	0.171	0.415	0.528	0.650

Note: An [i] indicates that the estimate is not significantly different from zero, i.e. from the reference category, at the 5% level.
Source: Asplund (1998a).

Table A4. Estimated returns to educational degrees for all non-manuals in manufacturing and for selected sub-groups

	All non-manual workers			Male non-manual workers			Female non-manual workers			Non-manual workers in fast growing industries			Non-manual workers in slowly growing industries		
	Upper sec. educ.	Short non-univ. educ.	Graduate or higher	Upper sec. educ.	Short non-univ. education	Graduate or higher	Upper sec. educ.	Short non-univ. education	Graduate or higher	Upper sec. educ.	Short non-univ. educ.	Graduate or higher	Upper sec. educ.	Short non-univ. educ.	Graduate or higher
1980	0.134	0.259	0.499	0.145	0.259	0.536	0.126	0.320	0.362	0.137	0.285	0.552	0.052	0.173	0.401
1981	0.121	0.237	0.473	0.134	0.236	0.506	0.107	0.297	0.354	0.122	0.257	0.527	0.034	0.176	0.358
1982	0.126	0.239	0.458	0.152	0.251	0.505	0.108	0.299	0.343	0.109	0.217	0.423	0.034	0.172	0.415
1983	0.128	0.236	0.463	0.141	0.235	0.502	0.114	0.306	0.345	0.132	0.235	0.439	0.062	0.167	0.343
1984	0.125	0.222	0.430	0.151	0.239	0.515	0.100	0.272	0.338	0.125	0.196	0.389	0.086	0.164	0.370
1985	0.124	0.229	0.462	0.160	0.260	0.529	0.094	0.256	0.361	0.112	0.203	0.412	0.016	0.158	0.395
1986	0.114	0.214	0.445	0.162	0.265	0.533	0.081	0.220	0.329	0.086	0.170	0.377	-0.001	0.174	0.325
1987	0.119	0.219	0.453	0.176	0.285	0.546	0.080	0.202	0.360	0.111	0.193	0.398	-0.030	0.165	0.267
1988	0.090	0.179	0.414	0.111	0.203	0.467	0.070	0.187	0.316	0.092	0.157	0.340	0.029	0.212	0.350
1989	0.086	0.157	0.388	0.107	0.173	0.429	0.069	0.191	0.328	0.071	0.140	0.364	0.044	0.215	0.369
1990	0.101	0.184	0.421	0.123	0.217	0.486	0.078	0.170	0.289	0.078	0.149	0.344	0.009	0.117	0.344
1991	0.099	0.178	0.397	0.136	0.226	0.477	0.065	0.157	0.290	0.085	0.152	0.344	0.005	0.092	0.370
1992	0.111	0.185	0.405	0.145	0.230	0.484	0.080	0.183	0.299	0.084	0.139	0.338	0.097	0.246	0.543
1993	0.110	0.184	0.418	0.162	0.250	0.518	0.068	0.165	0.283	0.096	0.145	0.367	0.010	0.093	0.232
1994	0.118	0.188	0.428	0.137	0.217	0.478	0.094	0.188	0.347	0.113	0.192	0.433	0.078	0.151	0.469

Note: The reference category is non-manual workers with a basic education only. Estimation results for non-manual workers having completed the lower level of upper secondary education are not reported since most estimates are either insignificant or even negatively signed.
Source: Asplund (1996, 1998b) and Asplund and Vuori (1996).

CHAPTER 4

Educational and Economic Inequality in France:
A Survey of the Literature

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This article aims at reviewing the literature on economic inequalities in France with special emphasis on the role of educational inequalities. We start by describing the main patterns of income and wage inequality in France. In particular, we show that although these have remained rather stable during the last decade, their levels rank France in a median position in comparison to OECD countries. We then focus on wage inequality and its main determinants, and show that though there is suspicion of demand-side effects, individual characteristics continue to play the most important role; especially human capital endowments. An evaluation of educational inequalities in France is then performed together with a description of the French education system and of the mechanisms of education funding. Though descriptive, the analysis sheds some light on the role of academic and money selection in the observed educational inequalities. It turns out that the main explanation resides in a weak matching between the demand for labour and the supply of qualifications. In terms of economic and educational policies, this has very important implications because of the numerous labour market consequences which are themselves a major cause of the persistence of wage inequality. As shown in the article, there is evidence for a positive effect of educational inequality on unemployment risks, on the precariousness of employment statuses and on over-education, as well as a negative effect on wage mobility.

1 Introduction[1]

There are at least two reasons why it is important to study economic inequalities and their explanatory factors. First, income inequality is often considered as an important determinant of a variety of economic phenomena. One example of these is economic growth which some authors present as a function of income inequality. The well-known work by Kuznets (1955) highlights an inverted U-shaped relationship between national income per capita and income inequality. More recently, Forbes (2000) has shown that a ten point increase in the Gini coefficient yields a 1.3 per cent increase in the average growth rate during the five following years. Another example is individuals' health. A number of studies have, indeed, highlighted the existence of a strong association between individuals' health and their socio-economic status.[2] More interestingly, however, a wide body of literature focuses on the effect of income inequality on health. While there has been unanimity for a long time that such an effect does exist, Mellor and Milyo (2001) show that it does at the aggregate level, not at the individual level.

Second, convergence towards less economic inequalities is often seen as an indicator of social progress. Recently, EU member states have agreed upon a series of performance indicators, one of which being the ratio of the 80th to the 20th percentile of the income distribution. That the level of income is a major determinant of individual well-being is not a new idea. More importantly, however, a large number of studies suggest that it is the position of individuals in the income distribution which matters for happiness and well-being (Frey and Stutzer, 2002).

As underlined by Atkinson *et al.* (2001), any analysis of economic inequality raises three major difficulties. First, not only are there different ways to measure it, each one suffering from specific limitations, but there are also different types of inequality. For instance, most studies focus on income inequality whereas consumption inequality is probably a better indicator of well-being. While the former is based on the resources households have at their disposal at a given time, the latter also reflects their expectations about the future. Therefore, the two measures do not necessarily coincide.

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1 Financial support from the European Commission funded EDWIN project (HPSSE-CT-2002-00108) is gratefully acknowledged.

2 See Smith (1999) for a review of this literature.

Second, economic analysis is still not able to answer the question of what would be the most equitable distribution, nor how it is likely to be reached. Since Rawls (1972), economists agree upon the idea that since inequality is, at least partly, due to factors that are out of individuals' control (unequal initial endowments due to different family backgrounds, for example), it is equitable that redistribution mechanisms are designed to correct these inequalities. Disagreement is strongest about the extent to which redistribution is in conflict with economic efficiency.

Third, although a large body of literature has now been accumulated, both the causes and the consequences of inequality are still a subject of debate. While there is consensus upon the importance of individual heterogeneity as a determinant of economic inequalities, there is a growing literature aiming at identifying general factors, such as globalisation or technical change, that might impact on income distribution within an economy or across economies. For instance, Lindbeck and Snower (1996) argue that new work organisation within firms results in large Taylorian firms being replaced by a large number of small production units, and that this change has resulted in a U-shaped relationship between national income and inequality.

Some authors have even raised the question of whether traditional factors such as individual characteristics have lost some explanatory power. For France, however, Atkinson *et al.* (2001) report that data from the Labour Force Survey covering the period 1990 to 2000 suggest that these factors are still very important. Interestingly, they also observe that there is a greater dispersion of earnings within the two groups at the extreme of the distribution of educational attainments: unskilled and under-educated workers, on the one hand, and tertiary education graduates, on the other.

Education is an important factor in understanding economic inequalities. Indeed, there is a wide body of evidence showing that education is always a profitable investment for individuals, since it systematically allows them to improve their earnings power. As such, it certainly influences earnings inequality. On the other hand, however, it might also be a means for reducing inequality; the larger the number of highly educated individuals, the smaller is the number of individuals at the lower end of the income distribution likely to be. As such, it is a means of avoiding precariousness and poverty. With little extrapolation, one could even argue that it is an equalising device; that is, a policy instrument that a society might use in order to correct inequality in individuals' initial endowments.

The basic idea of this article is that understanding economic inequalities requires evaluation of the efforts exerted towards reducing educational inequality. In other words, while income inequality should theoretically result

in unequal access to education, institutions and educational policies could be designed in order to favour equal access to education and, hence, to limit future income inequality. In fact, the causal association between educational inequality and economic inequality is bi-directional. On the one hand, unequal family background and initial endowments generate educational inequalities and, on the other hand, unequal access to education results in income inequality. Put differently, education is a means by which economic inequality might reproduce itself.

The article is organised as follows. In Section 2, we give a brief description of economic inequality in France. In particular, we claim that, except for the extreme ends of the income distribution, not only are wages the most important component of income but they are also the most important resource for a majority of citizens. This is why, in Section 3, we concentrate on analysing the structure of wage inequality. Although such a structure has a variety of facets, we mainly focus on discussing the distribution of wages, conditional on educational achievements. In Section 4, we describe the French educational system and evaluate the extent to which it has been successful in limiting educational inequalities. In Section 5, the labour market outcome of these is discussed. Some concluding remarks are then made in Section 6.

2 Economic inequalities

2.1 Income and wage inequality

Because income is a composite variable, any analysis of income inequality should pay specific attention to the various types of income. Using the French Family Resources Survey (FRS), Piketty (1997) shows that, in 1994, wages represented 55.8 per cent of the total income households received, while the figure for the earnings of the self-employed was 7.4 per cent. Of the remaining 36.8 per cent, pensions, transfer income and wealth income represented 21.6, 8.5 and 5.2 percentage points, respectively.[3] This is in line with the stylised fact highlighted by Atkinson *et al.* (1995), that in western countries, the proportion of labour income is more than six times that of capital income.

[3] Due to under-reporting, the above figure for capital income is certainly underestimated. In addition, part of firms' capital income is, in general, not distributed to households, who represent a significant proportion of shareholders.

Obviously, the structure of households' income depends on their position in the income distribution. Indeed, as shown by Piketty (1997), the relationship between the level of income and the proportion of wages in it is increasing, except for the highest levels of income. For instance, the first decile of the distribution comprises some of the unemployed, as well as retired individuals with small pensions. For this group, wages represented less than 16 per cent while pensions and transfer income account for more than 80 per cent. Beyond the first decile, the percentage of wages increases continuously. Only for the highest percentiles is the proportion of wages likely to be less than 50 per cent.

Because wages are the most important component of total income and because their weight changes along the distribution of income, it is worth distinguishing between wage and income inequality. In addition, the importance of public-sector employment in France, together with institutional considerations, makes it interesting to distinguish between private- and public-sector distributions as well. Using the 1994 wave of the Annual Wage Declaration Survey (DAS), Piketty (1997) considers the distribution of wages of full-time private-sector employees. He shows that the median wage represented 83 per cent of the mean wage. Likewise, the ratio of the 90^{th} to the 10^{th} percentile suggested that to belong to the 10 per cent of best-paid wage earners, an individual should earn at least 3.2 times what the 10 per cent least well paid receive. In fact, the 10 per cent best-paid wage earners receive 24.4 per cent of the total amount of distributed wages.

Corresponding figures for the public sector are reported by INSEE (1996a). They suggest that while the mean wage is slightly higher in the public than in the private sector, there is less inequality in the former than in the latter. In particular, the ratio of the 90^{th} to the 10^{th} percentile is only 2.6. This is certainly due to various factors such as the difference in wage determination rules and the higher level of centralisation which prevails in the public sector. More specifically, intersectoral comparisons of remuneration levels of equally educated workers or of employees with similar occupations show that labourers and service employees are better paid in the public sector whereas white-collars and highly educated workers are best treated in the private sector. Moreover, within each educational level or occupational category, the wage distribution is more dispersed in the private than in the public sector. Thus, between as well as within group wage variation is higher in the private sector.

Note, however, that when distinguishing between males and females, it turns out that female employees are better paid in the public sector whatever their qualification level is (Fournier, 2001). This suggests that women suffer from less wage discrimination in the public sector.

What about income inequality? According to INSEE (1996b), the ratio of the 90th to the 10th percentile was 5.7 in 1994. That is, 1.8 times the one drawn from the wage distribution. This difference could be partly attributed to the very high unemployment level that prevailed in France in 1994. However, that income inequality is larger than wage inequality is a widely observed phenomenon and is certainly not typically French. Instead, there are three commonly accepted explanations which rely on the larger variability of wealth income, household composition and taxes.

First, the wealthiest 10 per cent of households own 50 per cent of total wealth and earn 50 per cent of total capital income. These figures are to be contrasted to the 10 per cent of the best-paid wage earners receiving 24.4 per cent of total wages. This means that wealth income is much more unequally distributed than wages. Consequently, income inequality is much more pronounced than wage inequality.

Second, while wage inequality measures are estimated on an individual basis, those of income inequality are at the household level and this is what makes the latter sensitive to household composition. While the majority of low-income households are single-person households, receiving small pensions, high-income households comprise in general couples with children, receiving two wages. According to INSEE (1996b), correction for household size results in a ratio of the 90th to the 10th percentile of 4.3.

Finally, while income taxes paid by households whose income is equal to the 90th percentile would on average represent 10 per cent, households whose income is below the 10th percentile would pay no tax at all. This should result in a 10 per cent reduction in the ratio of the 90th to the 10th percentile. Overall, accounting for income tax as well as household composition yields a ratio of the 90th to the 10th percentile of 3.5, which is only slightly higher than the 3.2 drawn from the wage distribution.

2.2 International comparisons

From a qualitative point of view, the French situation is similar to that of other countries. For instance, the difference between income and wage inequality, as well as the role of household composition or taxes as explanatory factors of such a difference is by no way a French peculiarity. Obviously, however, there are cross-country quantitative differences that are due to a variety of economic and institutional factors. Table 1 reports

P90/P10 wage ratios for a number of OECD countries in 1998. The P90/P10 ratio varies between 2.2 for Sweden and 4.6 for the United States. With a ratio of 3.1, France is positioned in the middle of this distribution. Using OECD data for 1990, Piketty (1997) reports a similar ranking, albeit with a slightly more narrow interval of variation, since the corresponding figures for Sweden, France and the United States were 2.1, 3.1 and 4.5, respectively.

Table 1. Wage inequality in some OECD countries, 1998

Country	P90/P10
Sweden	2.2
Finland	2.4
Germany	3.0
France	3.1
UK	3.4
USA	4.6

Source: http://www1.oecd.org/scripts/cde/

Clearly, the complex nature of income makes it difficult to perform similar comparisons of income inequality. It is to allow such comparisons that the Luxemburg Income Study (LIS) has been conducted. Column 2 of Table 2 reports P90/P10 ratios from disposable income distributions, corrected for household size. It clearly shows that the ranking of countries in terms of income inequality is the same as in terms of wage inequality.

Table 2. Income inequality in some OECD countries

Country	P90/P10	Gini coef.
Sweden	2.7	0.220
Finland	2.7	0.207
Germany	3.0	0.250
France	3.5	0.296
UK	3.8	0.304
USA	5.9	0.341

Note: Sweden, Finland, 1987; Germany, France, 1984; UK and USA, 1986.
Source: Column 2: LIS, Atkinson *et al.* (1995), Column 3, LIS, Atkinson (1996).

Of course, one might argue that these rankings might change if inequality is measured differently. Column 3 of Table 2 shows that this is only partly true. Indeed, the ranking based on Gini coefficients rather than P90/P10 ratios results in a very small change that affects the less unequal countries only; namely, Finland and Sweden.

2.3 Trends over time

Another interesting question is that of whether the ranking of countries in terms of wage inequality has been changing over time. Table 3 reports values of the P90/P10 wage ratio for 1980, 1990 and 1998 for a number of OECD countries.[4] It suggests that, with the exception of Finland and France, wage inequality has been increasing, hence showing no sign of convergence. Even in Sweden, one of the least unequal countries, there has been a significant increase during the last decade, which is at least partly due to institutional features such as the decentralisation of the bargaining system during the 1990s.

Table 3. Wage inequality in some OECD countries, 1980, 1990 and 1998

Country	1980	1990	1998
Sweden	2.03	2.01	2.22
Finland	2.47	2.49	2.42
Germany	-	2.76	3.04
France	3.25	3.26	3.05
UK	3.00	3.43	3.44
USA	3.83	4.33	4.55

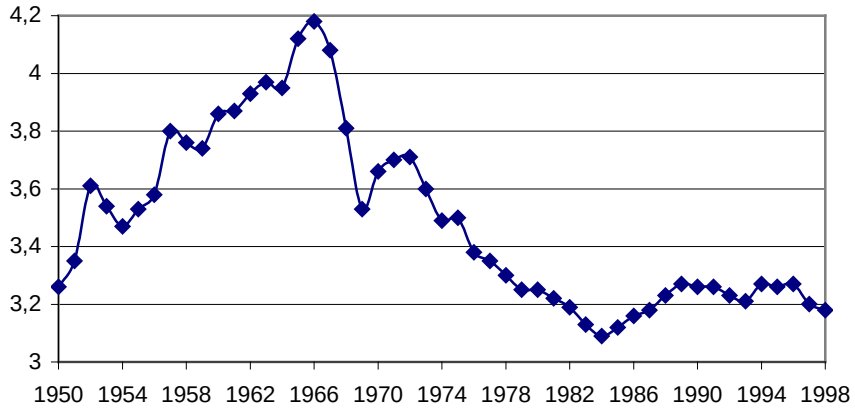
Source: http://www1.oecd.org/scripts/cde/

These figures might, however, be misleading since they are not informative on the evolution that has taken place between observation years. The French case is illustrative enough with respect to this. Figure 1 describes yearly observations of the P90/P10 ratio from 1950 to 1998. It

[4] Using the LIS data, Atkinson (2002) examines the evolution of Gini coefficients from the income distributions of a number of countries between 1970 and 1980 and between 1980 and 1990. For the countries in Table 3, he reports evolutions for wage inequality that are in line with those described in columns 2 and 3 of Table 3.

shows that there are at least three periods to be distinguished. Wage inequality has, indeed, been sharply increasing between 1950, when the P90/P10 ratio was around 3.2, and 1966 when it reached its maximum value of 4.2. Since 1966, wage inequality has been almost continuously decreasing until it reached its level of 1950 in 1982. In contrast, during the 1982 to 1998 period, wage inequality remained rather stable, since the P90/P10 ratio seems to have oscillated around its original value of 3.2.

Figure 1. Wage inequality in France, 1950–1998, P90/P10 wage ratios



Source: Piketty (2001).

Clearly, there is a variety of institutional and economic mechanisms behind these observed patterns, examples of which are tax policies (Piketty, 2003), transfer income and redistributive policies (Bourguignon, 1999), etc. Examining the explanatory power of these issues is, however, beyond the purpose of this review. Nevertheless, one institutional characteristic which deserves specific attention is that of minimum wage, called SMIC in France. It is striking enough that the trend break in wage inequality, which occured in the late 1960s coincides with the so-called *Grenelle* agreement that the French government, unions and employer organisations reached in 1968 and which resulted in a 35 per cent increase in SMIC and a 10 per cent increase in wages. More generally, several authors underline the negative correlation between SMIC increases and wage inequality (Fougère and Kramarz, 2001).[5]

[5] It is in general argued that a SMIC increase spreads along the wage distribution in such a way that it affects wages up to 1.5 times SMIC.

Looking at the other end of the wage distribution, there is clear evidence that the distribution of very high wages has remained stable during the last two decades (Atkinson *et al.*, 2001). One would, therefore, expect a decrease in wage inequality measures for the last twenty years. This is not what Figure 1 suggests, though. It rather highlights a relative stability of wage inequality among full-time workers since the early 1980s. One possible explanation of this apparently paradoxical observation resides in the dispersion of working hours which has in fact widened, hence leading to an increase of overall wage inequality. Indeed, the proportion of part-time workers increased from 7 per cent in 1980 to 17.5 per cent in 2000. In addition, while the proportion of full-time workers earning low wages was 5.1 per cent in 1996, that of part-time workers was 12.8 per cent.[6] Overall, the P90/P10 ratio among part-time workers is around 5, a figure to be compared to the 3.2 index mentioned above for full-time workers.[7] Despite this, Marlier and Ponthieux (2000) show that the proportion of low-wage earners in 1996 was 13 per cent while the corresponding EU average figure was 15 per cent.

It is perhaps worth mentioning that a considerable effort has been exerted by successive French governments to reduce the rate of unemployment of unskilled workers, especially during the 1990s. In general, this consisted in reducing employers' labour costs and, especially, social contributions on low wages. A number of studies (Pisani-Ferry, 2000; Crépon, 2001; Lerais, 2001; Malinvaud, 2001) have shown that such a policy has resulted in the creation of a large number of low-wage jobs. Despite successive SMIC increases, this resulted in an increase of wage inequality, but also in a decrease of income inequality via the impact on employment of household members.

3 The structure of wage inequalities in France

A very popular approach to identifying determinants of wage inequality relies on the estimation of wage equations. The estimated coefficient on

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6 Low wages are defined as wages below two-thirds of the median wage or, equivalently, 1.1 times SMIC.

7 Of course, this should not be a problem if part-time work were the outcome of labour supply decisions of workers. The point, however, is that more than one-third of part-time workers would have preferred to work more (Cette, 1999).

each right-hand side variable provides a measure of the variation in wages which is due to the variation in that variable, all the other variables being held constant. There is a variety of such variables, the impact of which is worth examining. In this section, we will distinguish between employer characteristics, individual demographic characteristics and individuals' endowments of human capital.

3.1 The impact of employer characteristics

Only in the late seventies has applied economics started to examine the effect of employer characteristics on wages. Probably, the most famous stylised facts that have been reported in this literature are the employer-size effect (Brown and Medoff, 1989) and the existence of inter-industry wage differentials (Krueger and Summer, 1988). There is French evidence suggesting that these two effects are important sources of wage differentials in France as well.

Inter-industry wage differentials

Using the 1992 wave of the Labour Costs and Wage Structure Survey (ECMOSS), Arai *et al.* (1996a) show that the weighted adjusted standard deviation of inter-industry wage differentials varies between 0.05 and 0.20, depending on the estimated specification of the wage equation and the industry classification under consideration.[8] They also estimate models with the left-hand side variable being a series of estimated industry fixed effects and the right-hand side variables covering employer characteristics such as union presence or work supervision indicators. Though they highlight no strong correlation, it is not clear whether this is due to economic reasons or to the weakness of the statistical approach.

Plassard and Tahar (1990) also highlight inter-industry wage differentials, which they interpret as efficiency wages, although they use the 1977 FQP survey, which does not allow them to directly test the latter theory. Interestingly, however, their results show that in addition to its direct effect on wages, industry affiliation influences the returns to schooling as well. Indeed, inclusion of industry dummies results in a drop in the returns to schooling from 9 to 6 per cent.

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[8] For the way the weighted adjusted standard deviation is calculated, see Krueger and Summer (1988).

The employer-size effect

Another result reported by Arai *et al.* (1996a) is the existence of a significant employer-size effect. Whether measured in bands or treated as a continuous variable, employer size has a robust impact on wages. The average estimate of the size elasticity of wages is slightly less than 2 per cent.

Using the same data, Arai *et al.* (1996b) analyse the effect of the employer size on seniority-wage profiles. They show that for blue-collar workers, the larger the establishment size, the higher are the returns to seniority in the beginning of workers' careers and the faster is the decrease in these returns to seniority. For the other employee categories, they observe the opposite. They then examine the relevance of several hypotheses as explanations of the observed differences in wage profiles. In particular, they consider the hypothesis of specific human capital by evaluating the effect of firm's expenses on formal vocational training programmes on the size-specific returns to seniority. However, the data seem to suggest that size-related differences in these expenses do not explain the observed differences in seniority-wage profiles.

Whether these effects reflect a true impact of employer characteristics on wages or only the indirect effect of some unobservables, is a traditional source of debate in the empirical literature. They, however, seem to be robust enough to suggest that the demand side of the labour market also influences the distribution of wages.

3.2 Demographic factors

Gender wage differentials

Like in most countries, a woman in France receives lower wages than a man with similar observed characteristics. The average estimate of the gender wage gap reported in the literature is around 16 per cent, but varies widely depending on the samples that are considered, the specification that is estimated and the estimation technique that is used.

Using the 1986 wave of the ECMOSS survey, Lhéritier (1992) measures the gender wage gap per industry and occupation.[9] Controlling for

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[9] The sample comprises full-time workers aged between 18 and 59 and having worked the whole year.

age, tenure, citizenship and employer size, he shows that the gender differential varies between 4.4 per cent for service-sector employees with low qualifications and 39.9 per cent for top managers in the same sector. These figures confirm those obtained in other studies such as Guillotin and Sevestre (1994) (between 6 and 18 per cent) and Plassard and Tahar (1990) (25 per cent for 1977).

Another gender gap analysis is that provided by Sofer (1990), who examines the extent to which the male–female differential is related to the depreciation of women's human capital due to their longer interruptions of activity. Using the 1977 wave of the Training and Qualification Survey (FQP), she restricts the sample to individuals for whom she is able to reconstitute the entire wage career, including the length and characteristics of periods of inactivity and unemployment.

The analysis by Sofer (1990) is, firstly, based on the Oaxaca–Blinder decomposition; that is, on the comparison of two gender-specific wage equations estimated using OLS. In a second step, she estimates other equations in order to precisely examine the role of experience and time spent unemployed as possible explanations of the observed gender wage gap. She finds a discrimination effect varying between 0.7 and 9.3 per cent depending on whether or not the rate of femininisation in one's occupation is taken into account. She concludes that the observed gender gap is not due to a depreciation of women's human capital, but rather to discrimination.

Another study based on the Oaxaca–Blinder decomposition is conducted by Meurs and Ponthieux (2000). Using the Complementary Youth and Careers Survey (EJC) of 1997, they show that the gender wage gap is around 27 per cent.[10] Differences in the duration of the weekly working time account for two-fifths of the estimated gap.[11] Two more fifths are explained by differences in individual endowments and only one-fifth remains unexplained. Restricting the sample to full-time workers results in a gender wage differential of 11 per cent, half of which being due to discrimination.

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[10] The French Labour Force Survey is a rotating panel, with one-third of the sample renewed each year. The Complementary Youth and Careers Survey comprises individuals aged 45 and younger, drawn from the sample of those leaving the Labour Force Survey.

[11] While one-third of women works part-time, the corresponding share among men is 5 per cent only.

Citizenship

Citizenship is also a source of wage dispersion. When this variable is included in wage equations, its effect is systematically significant, suggesting that French citizens receive wages that are, on average, persistently higher than those earned by foreigners endowed with the same observable characteristics. In a recent study, Skalli (2003) distinguishes between three categories of immigrants: those with French citizenship, those from western countries, and those from other countries. Using a pooled sample of full-time male workers from the Labour Force Survey for 1990 to 2000, he shows that, compared to the French, immigrants from western countries benefit from a wage differential of 2.4 per cent, on average. In contrast, immigrants with French citizenship earn on average 8 per cent less. Yet, French citizenship yields an improvement, since immigrants from southern countries not holding French citizenship are, on average, paid 18 per cent less.

Age–earnings profiles

Actually, the first attempt to estimate earnings equations from longitudinal data for France was made by Lollivier and Payen (1990), who used a sub-sample of males aged between 20 and 65 drawn from the DAS surveys for 1967 to 1982. The analysis consists of comparisons of estimated age–earnings profiles for different occupations and for different cohorts. Other estimates of age-earnings profiles are given by Lhéritier (1992). Using the 1986 ECMOSS survey, he estimates a series of earnings equations including various sets of individual and employer characteristics.

Both these papers confirm the prediction of human capital theory; that is, an increasing and concave age–earnings profile. They both also confirm the stylised fact of differently shaped age–earnings profiles across occupational categories: steeper for white-collars than for blue-collars or even intermediate categories.

It is well-known that the shape of age–earnings profiles reflects nothing but the impact of human capital accumulation on earnings. The longer is individuals' experience in the labour market, the higher is the amount of general and specific human capital they accumulate and the more productive they are. As individuals get older, however, the speed at which they accumulate human capital decreases. In addition, the fact that age–earnings profiles differ according to occupations or qualifications reflects nothing but the effect of education on earnings. Indeed, the more educated individuals are, the more likely it is that their starting wage is

higher. This is due to the existence of systematically positive returns to individuals' investments in education. Moreover, the better educated individuals are, the higher is their ability to learn by doing and the faster they are likely to accumulate human capital. This explains why age-earnings profiles are steeper for highly educated individuals.

Using a sample of full-time male employees from the 1990 to 2000 waves of the LFS, Skalli (2003) estimates wage equations for each educational grade and estimates marginal returns to schooling as differences between expected wages from two subsequent educational levels. This allows him to estimate age–earnings profiles for each educational grade. Rank correlation coefficients then suggest that the higher the individuals' educational level, the higher is their expected starting wage and the steeper is their age–earnings profile. This means that education has two distinctive impacts on wages. Not only does it increase starting wages, but it also influences positively the speed at which these will grow during the working career. It is, therefore, an important determinant of wage inequality and as such deserves specific attention.

3.3 The role of education

Estimates of private marginal returns to education aim at measuring the extra money an individual could expect to earn if she/he attended school for an extra year. The French literature shows, however, significant discrepancies since the reported estimates vary from 4.2 to 19.2 per cent with an approximate average of 8 per cent.[12]

Rather than providing the reader with details on these estimates, it is perhaps more interesting to concentrate on how these estimates contrast to those observed in other countries and how they have evolved over time. The literature provides some evidence regarding these two aspects.

Kaukewitsch and Rouault (1998) propose a comparison of wage hierarchies in France and Germany while Bell *et al.* (1996) compare the returns to age and education in France and the UK. Finally, Arai and Skalli (1996) provide a French–Swedish comparison of the distributions across

[12] Potential explanations of the observed differences reside in the period under consideration, the data the analyses are based on, the adopted methodologies and the individual and/or employer characteristics controlled for. Another explanation is that the various potential sources of bias are not always controlled for. (See Guille and Skalli (1999) for details.)

industries of the returns to several characteristics, including gender, education, age and employer size.

The analysis by Kaukewitsch and Rouault (1998) is based on the *Enquête Européenne sur la Structure des Salaires* (EESS). Though the number of years of schooling is not available, interestingly, these data enabled the authors to construct, for each country, five dummy variables describing qualification bands, hence overcoming the problem of non-comparability of the French and German education systems.[13] Another interesting feature in the Kaukewitsch and Rouault (1998) study is the use of the so-called Oaxaca–Blinder decomposition as a means of comparing the country-specific wage distributions, the ingredients of such a decomposition being earnings equations including individual and employer characteristics estimated using OLS.

Kaukewitsch and Rouault (1998) report that gross average hourly wages are 1.25 times higher in West-Germany than in France. The variance of wages is, however, larger in France. In particular, while French young workers earn less than their West-German counterparts, the opposite is observed for older workers.[14] Such a difference in age-earnings profiles is also confirmed by higher returns to age in France.

Regarding occupational levels, it seems that, compared to their French colleagues, German labourers enjoy higher wages while white-collar workers earn less. Moreover, though the gender wage gap is higher in West-Germany, partly because the proportion of part-time female workers is larger, West-German women have better access to intermediate occupation levels.

An appealing feature of the analysis undertaken by Kaukewitsch and Rouault (1998) is the reported difference in the role of education as a determinant of wages. Indeed, they show that the number of workers with extremely low and extremely high education levels is higher in France than in West-Germany. Moreover, it seems that compared to the French *Baccalauréat,* the German *Arbitur* is less necessary for accessing intermediate occupation levels. At the same time, however, returns to qualifications are, on average, higher in France.

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[13] Note that education levels were available only for a small sub-sample of workers. Thus the analysis is mainly based on earnings equations including occupation levels rather than education dummies.

[14] This specific pattern of age-earnings profiles in France is also highlighted by Baudelot and Gollac (1997) and Bell *et al.* (1996).

One characteristic of the Oaxaca–Blinder decomposition is that it completely neglects the role of the residuals from the estimated earnings functions. Thus, individual- and/or country-specific unobservable characteristics are not taken into account. This is the idea underlying the UK–France comparison by Bell *et al.* (1996), where the Juhn–Murphy–Pierce decomposition is the preferred one. Assuming that part of the residuals reflects institutional aspects of respective labour market, the question they address is that of how the distribution of wages would look like if French workers had the individual endowments of British workers, and if the French labour market institutions were similar to those in the UK.

To perform such an analysis, the authors use the 1986 and 1992 New Earnings Survey for the UK and the French ECMOSS survey for the same years. Moreover, the estimated earnings equations are fit by OLS and include only age and five qualification bands, constructed in such a way that education levels are comparable in terms of numbers of years of schooling.[15]

The age-earnings profiles are strikingly different between France and Britain. In France, the earnings of men and women rise steadily with age, until retirement, while in Britain, the profiles assume a distinct hump shape: they peak in the early thirties for women and in the early forties for men.[16] Moreover, the returns to age seem to be lower in France, perhaps because of the higher age of entry to the labour market. Another possible explanation is the existence of the minimum wage (SMIC) since the omitted groups are at the lower range of the age spectrum. This would, of course, mean that while employers in France may hire fewer younger workers than in Britain, these are of higher average quality in France. Accordingly, after this adjustment to the SMIC has been achieved, one would expect to observe smaller differentials between younger and older workers in France.

Regarding education, it seems that returns to jobs with different levels of required qualifications rise steadily for both males and females, in both countries and for both years (1986 and 1992) investigated. How-

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15 Other variables included are comparable industry dummies and a capital city dummy.

16 These results suggest that quite different models are appropriate to describe the labour markets in Britain and France. While in the former, age-earnings profiles are compatible with human capital theory, in the latter, it might be the case that long-term contractual arrangements, perhaps as proposed in the theory of agency, are at work.

ever, the rise in earnings premia for those in qualified jobs relative to those in unskilled jobs, is less steep in Britain than in France. More generally, returns to education are higher in France, particularly for well-educated women.

Synthetic earnings distributions for British male workers are also constructed by applying both observed returns and unobserved characteristics of the French labour market. The results indicate that the application of both influences tends to reduce earnings dispersion in Britain.

The wage structure in France is compared to the Swedish one in Arai and Skalli (1996). Here, however, differences in earnings are not decomposed in terms of differences in returns or in endowments. Rather, thanks to a unique industry classification, inter-industry differentials in the returns to different characteristics can be evaluated and then compared across the two countries. The results are drawn from earnings equations, fit by OLS, where gender, seniority, schooling and employer size are alternatingly interacted with industry dummies. It should, however, be noted that while the 1991 LNU survey[17] used for Sweden provides information about the number of years of schooling, the 1992 ECMOSS survey, on which the French estimates are based, does not. Instead, for the sake of comparability, education grades have been used to evaluate the theoretical number of years of schooling necessary to reach those grades.

The results obtained by Arai and Skalli (1996) indicate that high-wage sectors pay higher returns to schooling and seniority and that the employer-size wage effect is correlated with industry affiliation both in France and Sweden.

Regarding the returns to schooling, it appears that they are higher in France than in Sweden (6 and 4.5 per cent, respectively) and that the rankings of the estimated industry-specific rates are highly correlated between the two countries. This induces the authors to conclude that, although there are a number of institutional dissimilarities between Sweden and France with respect to the private costs of education and education presumably being less heterogeneous in Sweden than in France, the variation in returns to schooling has a striking similarity. Not only is the co-

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[17] The Swedish Level of Living Survey (LNU) is conducted by the Swedish Institute for Social Research (SOFI). It covers a random sample of the Swedish population aged between 18 and 64 and contains around 6,000 individuals. For reasons of comparability, only a sub-sample of 1,496 individuals working in the private non-agricultural sector was used in the analysis.

efficient of correlation between the inter-industry differentials in returns to education in the two countries about 0.50, but also the extreme returns to schooling are found in the same industries in the two countries.

The authors also report results showing that the gender wage gap is highly varying across industries. However, it turns out that these differentials are not systematically correlated across the countries. Obviously, in order to understand the nature of the gender wage gap, it is necessary to examine the importance of cross-industry occupational distributions and the role of occupational segregation, an analysis the authors do not make.

Finally, it seems that the returns to seniority are 9 times higher in France than in Sweden. Moreover, despite the differences in levels, not only are the industry-seniority effects positively correlated across the two countries, but they are also highly positively correlated with the schooling effects. Thus, high-wage industries pay higher returns to schooling and seniority and the pattern of this variation is similar in France and Sweden.

A common feature of the three international comparisons discussed above is that each of them focuses exclusively on the results from a single pair of cross-sections. Thus, nothing can be said about the way the observed similarities or differences evolve through time. Therefore, we should at least examine the stability of the observed patterns for France.

Analyses of the evolution of the returns to human capital necessitate either availability of comparable sets of information observed at different points in time or, perhaps preferably, panel data sets. For this reason, papers reporting trends over time use either pseudo-panel data on the basis of the FQP surveys, or panel data such as those drawn from the LFS or the DAS surveys.

To our knowledge, the first extensive analysis of the evolution of age-earnings profiles through time is that by Baudelot and Glaude (1989), who perform a pseudo-panel analysis based on samples of full-time male employees from the 1970, 1977 and 1985 surveys. Cohorts of workers are distinguished according to the year of their entry into the labour market. Different specifications are then estimated using OLS in order to capture conjuncture and cohort effects. They show that during the period 1970 to 1985, the role of schooling as a determinant of earnings strengthened. Because of an increasing number of individuals with more schooling, the relative position of low-level diplomas depreciated. Even university degrees began to depreciate, at least among high-wage earners. Marginal returns to education decreased, and this decreasing trend was

more pronounced for general than for vocational education. However, these decreasing returns seem to be partly due to economic circumstances. The increase of low wages, particularly the minimum wage (SMIC), has led to less wage dispersion and thus has contributed to the depreciation of the returns to high-level diplomas. Actually, when these economic circumstances are taken into account, marginal returns to education have decreased slowly; they even seem to have remained stable when examining cohorts of workers.

In a sense, the pseudo-panel analysis performed by Goux and Maurin (1994) could be seen as an update of the Baudelot and Glaude (1989) study since they include the 1993 FQP survey as well. Their results show that the rates of return to schooling tend to decrease by, on average, 0.1 percentage point between two subsequent cohorts. Moreover, they estimate earnings functions where the number of years of schooling is replaced by the relative position of individuals in their generation. They then come to the result that the influence of the individual's rank in his generation diminishes faster for the younger generations than it did for those born around World War II.

The authors put forth different explanations for the observed decreasing patterns. It might be the case that firms becoming increasingly flexible give more and more importance to individuals' ability in terms of autonomy and cooperation, than to standard criteria such as education. An alternative hypothesis is unemployment. To be more specific, the increase in unemployment has led to a number of low-educated people being unemployed. The question thus is that of examining whether the wages of the employed reflect their actual human capital or just the destiny of those who could avoid unemployment. Taking this selectivity process into account allows Goux and Maurin (1994) to confirm the hypothesis of decreasing returns to education.

Another interesting interpretation is that suggested by Jarousse (1988). The author shows that the shifts in new enrolments into the various disciplines since the beginning of the decreasing trend of returns confirm the low influx of *Bacheliers* into programmes with the highest values and the persistence of enrolments into declining fields offering the lowest returns. His explanation focuses on the distinctiveness of France's academic system which is extremely segmented. He argues that the increase in the number of options explains the seemingly paradoxical nature of *Bacheliers'* choices for degrees that have low job market value but also require a minimal effort to obtain. He shows that, in fact, the decrease in returns to education is accompanied by a decrease in the amount of time devoted to study.

Evidence about differences in the job market value of different educational streams is reported also by Baudelot and Glaude (1989) and Goux and Maurin (1994). In both papers, a distinction is made between individuals according to the type of education they have chosen. The results highlight a stable hierarchy in the returns to education levels and significant differences in the returns to degrees necessitating the same number of years of schooling but different in type. For example, graduate students holding a *Grande Ecole* degree earn systematically more than graduate university students. Another example is the differential between those having chosen a general educational stream and those who have pursued a specialised one.

Taken together, these results suggest that the returns to education are declining in absolute rather than in relative value since the hierarchy of education levels is stable. Further evidence on this stability is reported by Ponthieux (1997). The question she addresses is why the average young worker earned less in 1995 than in 1991, although being more educated.

Ponthieux (1997) uses the 1991 and 1995 LFS surveys from which she draws a sub-sample of workers aged between 16 and 29 who were at school the preceding year. She then estimates an earnings equation in which educational level dummies are constructed according to whether individuals were employed in 1991 or 1995. These equations are estimated using OLS, but with a correction for selectivity bias as the sample contains only employed beginners.[18] Though the estimated coefficients are systematically lower for 1995 than for 1991, the author explains that a Fisher test resulted in the acceptance of the null hypothesis. Hence, she concludes that the reason why beginners earned less in 1995 than in 1991 does not reside in lower returns to education, but rather in worse insertion conditions in the labour market. In particular, she highlights the increasing role of short-term contracts and the decreasing trend of working time due to the expansion of part-time work.

One should not conclude that Ponthieux (1997) is in contradiction with Baudelot and Glaude (1989) or Goux and Maurin (1994). While she examines changes that have occurred over the 4 years she considers, they analyse differences between generations of workers by observing a time interval of more than 20 years.

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[18] Age is not included in this regression as it is highly correlated with the education variables. Such a correlation is, of course, due to the sample including only beginners in the labour market.

Also Baudelot and Gollac (1997) are interested in long-term transformations of the age–earnings profiles. Though they do not focus explicitly on education, their results suggest that the returns to human capital are changing significantly. Their analysis is mainly based on the 1970 and 1993 FQP surveys with no sample restriction.[19] Separate OLS estimates are, however, presented for men and women for 1970 as well as for 1993. Interestingly, the results highlight decreasing returns to education for both sexes, but also huge increases in the returns to age. This result reflects radically changing age–earnings profiles. Indeed, the authors show that since 1975, age–earnings differentials started to change significantly in a way such that the earnings of young workers were declining while those of the oldest workers were increasing. Moreover, while the age–earnings profiles are still concave, individuals reach their maximal earnings later and later. Such patterns are observed by the authors both for men and women, for white- and blue-collars, and for the private as well as the public sector.

4 Educational inequality

4.1 The French picture

Like in most OECD countries, enrolment rates have been continuously increasing in France between the 1960s and the mid-1990s. According to the French Ministry of Education, this evolution is due much more to the marked prolongation in the duration of learning than to the arrival of new baby-boom cohorts. The schooling expectancy effect has, in addition, been boosted by the Orientation Law that was promulgated in July 1989, the aims of which were to ensure a minimum qualification level for all young people and to enable access for 80 per cent of them to the high-school degree level (*Baccalauréat*).

However, the period of sustained progress reached its end in the mid-1990s, due to cohort size effects. Consequently, schooling expectancy has stabilised around 19 years for a child entering nursery education. In fact, because compulsory schooling compels pupils to attend school up to age 16, all members of a generation now reach the end of lower sec-

[19] The 1962-1991 DAS surveys are also used by the authors in order to compare wages of those aged between 26 and 30 and those aged between 51 and 60.

ondary education (around age 15). Table 4 describes schooling expectancies of children having entered nursery schools in different years.[20]

Table 4. Schooling expectancy in France since the mid-1980s

	1985-1986	1990-1991	1995-1996	1998-1999	1999-2000	2000-2001
Girls	17.2	18.2	19.2	19.2	19.1	19.1
Boys	17.0	18.0	18.8	18.8	18.8	18.7
Total	17.1	18.1	19.0	19.0	18.9	18.9

Source: French Ministry of Education.

Among the 760,000 young people who completed their initial schooling in 2001, 274,000 (36 per cent) obtained higher education diplomas, 151,000 having attended tertiary education for a long period. Twenty years earlier, the corresponding figures were 110,000 and 45,000, respectively. Table 5 reports rates of access to three educational levels between 1995 and 2001. Column 2 of Table 5 describes the rates of access to upper secondary education. It highlights a rather upward sloping trend although there has been a slight decrease in 2001, probably due to cohort size effects. Overall, approximately 92 per cent of the pupils enter upper secondary schools, either general or vocational. Likewise, column 3 reports rates of access to the high-school degree level. Again, there has clearly been a period of increase between 1995 and 2000, followed by a slight decrease in 2001. On average, more than 68.5 per cent have the opportunity to access higher education. The corresponding figure for 1980 was only 34 per cent. Actually, in 2001, 78.8 per cent of the candidates to the high-school level have been successful. Among those in age to pass the exam, the proportion of pupils who did has been oscillating around 62 per cent since 1995. Column 4 of Table 5 describes the proportion of high-school degree holders who immediately entered tertiary education. Here, the trend seems rather to be downward sloping, but this is mainly due to the higher propensity of secondary education attendees to choose vocational training programmes instead of general ones. Such a choice generally goes with a faster entrance into the labour market.

Despite these reasonable access rates, it should be noted that 12 per cent (94,000) of those who left school in 2001, did so without any diploma. Among these, 56,000 (7.5 per cent of leavers) left before any cer-

[20] See Chauvel (1998) for more details.

tification from the upper secondary level. It is, however, also worth noting that more than twice as many people were in this situation in 1980.

Although estimates from the LFS suggest that the rate of drop-outs has been continuously decreasing since the early 1970s, 7.5 is still a high proportion. Interestingly enough, the panel of secondary school pupils that was conducted in 1989 by the Ministry of Education highlights some characteristics of early school leavers. First, there is no clear relationship between the number of repeated years during primary education and the probability of dropping out without any qualification. While those who repeated once represent 46.8 per cent of the drop-outs, those who repeated twice represent 28.1 per cent. However, the earlier repeats occur in primary school, the higher is the likelihood of dropping out. Second, not astonishingly, the higher the pupils' French and Maths scores at the end of primary education, the less likely they are to drop out. Finally, there is a strong association between parents' occupational status, and the likelihood of dropping out.

Table 5. Rates of access to three educational levels between 1995 and 2001

Years	Upper secondary	High-school degree level	Tertiary education*
1995	91.8	68.5	89.3
1999	93.2	69.7	82.5
2000	93.2	69.9	80.7
2001	92.1	69.0	81.3

* Proportion of high-school degree holders who immediately enter tertiary education.
Source: French Ministry of Education
http://www.education.gouv.fr/stateval/grands_chiffres/

Actually, social origin is an important determinant of pupils' schooling career. Using successive waves of the LFS, one can construct time series for the proportions of 20 to 21-year-old young people who have had access to tertiary education. Not surprisingly, the resulting time series have upward sloping trends. More interestingly, however, a distinction between individuals according to their father's occupational status shows that the higher the latter is, the more highly positioned is the time-series curve. Likewise, according to FQP data, sons of white-collar workers are more likely to pass the high-school degree level than are sons of labourers or service employees. For instance, while 89 per cent of the sons of

white-collars, born between 1974 and 1978, passed the high-school degree, only 46 per cent of the sons of labourers did so. However, the corresponding figures for the cohort born in the 1930s were 30 and 2 per cent, respectively. More generally, inequalities in the access to tertiary education have been decreasing continuously over time.

Thus, significant progress has been made. Yet, important inequalities persist. Another sign of these is the proportion of young people unable to read. According to the French Ministry of Education, 11.6 per cent of young people aged 17 show considerable difficulties to understand what they read while 6.5 per cent cannot even read. The corresponding figure from PISA data is 4.2 per cent and is therefore less pessimistic. From this point of view, France occupies a middle position among OECD countries. It is close to countries like Belgium and the United States, but performs less well than countries like Finland and Great Britain.

There are three potential explanations of these persistent inequalities : the degree of selectivity in the education system, the rules of education funding, and socio-economic inequalities. The rest of this section is devoted to a discussion of these issues.

4.2 The French education system

Figure 2 summarises the main educational streams that pupils may follow during their schooling career, and the corresponding typical numbers of years of schooling. It shows that they are given a first choice between general and vocational training once they have completed their lower secondary education. In 2001, approximately 40 per cent of upper secondary attendees chose vocational training. Up to the high-school degree, pupils face no selection process, since the only requirement to evolve along the chosen stream is graduation from the previous level. Only when entering tertiary education are they likely to face either money or academic selection.[21]

The French higher education system could, indeed, be seen as comprising two sectors. On the one hand, universities impose no selection criteria apart from the *Baccalauréat* degree. Although they mostly offer

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[21] Although there are private primary and secondary schools, their number remains limited compared to the public sector. In addition, they are to a large extent publicly subsidized so the amount of tuition fees remains extremely low compared to actual training costs.

traditional general training programmes, they have exerted significant effort to comply with labour demand needs by offering a variety of vocational programmes as well. On the other hand, the old and prestigious *Grandes Ecoles* impose either academic or money selection criteria, and provide students mostly with vocational training. Besides, students can also attend a number of colleges offering short vocational programmes.

Figure 2. Effective number of years of schooling by educational level in France

<table>
<tr><td colspan="5">Primary : 5</td></tr>
<tr><td colspan="5">Lower Secondary (Collèges) : 4</td></tr>
<tr><td colspan="5">Upper Secondary (Lycées)</td></tr>
<tr><td colspan="3">General or Technological : 3</td><td colspan="2">Vocational : 2 or 3</td></tr>
<tr><td colspan="5">Tertiary</td></tr>
<tr><td colspan="3">Universities</td><td colspan="2"></td></tr>
<tr><td>General</td><td colspan="2">Vocational</td><td>Preparatory Classes: 2</td><td>Short vocational streams: 2 or 3</td></tr>
<tr><td>D.E.U.G.: 2</td><td rowspan="5">Short : 2 or 3</td><td rowspan="5">Long : 4 or 5</td><td rowspan="2">Grandes Ecoles: 3 or 4</td><td rowspan="2"></td></tr>
<tr><td>Licence : 1</td></tr>
<tr><td>Maîtrise : 1</td><td colspan="2" rowspan="3"></td></tr>
<tr><td>DEA : 1</td></tr>
<tr><td>PhD : 3 or 4</td></tr>
</table>

While *baccalauréat* is sufficient for accessing universities, the best *bacheliers* are selected for two further years of training in preparatory classes before application to enter a *Grande Ecole*. Students are then selected among those applicants who have had the highest scores in national competitive exams (*Concours d'Entrée*). Note, however, that only access to *Grandes Ecoles* is selective since students meet no further selection process during their schooling career. This is not true in universities where access to either doctoral programmes or vocational ones depends on the scores students have had during previous years of higher education.

Beside health training where access is again based on selection through a competitive exam at the end of the first year, universities propose traditional long streams of general content: law, economics, science,

literature... Successful students are given a first diploma (*Diplôme d'Etudes Universitaires Générales*) after two years, a second one (*Licence*), one year later and, finally, the college degree (*Maîtrise*), a further year later. The only requirement to access any of these diplomas is graduation from the previous level.

However, the increasing importance of vocational programmes has led not only to an increase in the vocational content of these traditional long streams, but also to compelling students sometimes to within-firm placements. Moreover, new vocational programmes have been created within universities. Short ones last two or three years beyond the *Baccalauréat* (*Diplôme Universitaire de Technologie*, *Diplôme d'Etudes Universitaires Scientifiques et Techniques*). To apply to long ones, a general degree is necessary: the first year of the *DEUG* for an *Institut Universitaire Professionnel* (three years of schooling), the *DEUG* for a *Maîtrise de Science et Technique* (two years of schooling), and a *Maîtrise* for a *Diplôme d'Etudes Supérieures Spécialisées* (one year of schooling). Although they are offered by universities, all these vocational programmes are selective since they are open only to limited numbers of students.

Outside universities, the closed sector comprises first the *Grandes Ecoles*, which are traditionally specialized in three major fields: administration, business and engineering. Schooling lasts between three and four years beyond preparatory classes. Besides, there are specialised schools (Arts, paramedical training…) and short programmes leading to vocational degrees (*Brevet de Technicien Supérieur*), which require two or three years of schooling beyond the *Baccalauréat*. Though less selective than the *Grandes Ecoles*, access to these short vocational streams requires success in an entrance exam, a test or an interview.

This seemingly high segmentation of the French higher education system is, however, only partial. Indeed, university graduates may choose to enter *Grandes Ecoles* though they still need to pass the admission process. Alternatively, there are admission rules that define at which level a traditional *Grande Ecole* student may enter a university. Students having attended short vocational programmes, however, have to pass a special exam to enter a university beyond the first degree (*DEUG*).

To sum up, selection does not seem to be a serious candidate to explaining educational inequalities in France. Indeed, even in tertiary education where some streams are either money or academic selective, individuals are always given the opportunity to adopt non-selective ones. Some authors even argue that the French system is evolving towards a lesser degree of selection. For instance, in an attempt to explain the soaring enrolment rates that France has experienced since the mid-eighties,

Magnac and Thesmar (2002b) explore the explanatory power of increasing returns to education, decreasing investment costs and weaker selectivity of the education system. Using FQP data, they estimate a dynamic model of discrete choice describing individuals' decisions to quit or to keep on attending.[22] They show that neither the returns to schooling nor educational private costs have significant impacts on such decisions. Rather, it is the increasingly weaker selectivity of the education system that explains the observed trends.

4.3 Funding of education in France

In 2001, France devoted 7 per cent of its GDP to the funding of education, implying that the cost of education has reached €1,690 per capita or €6,260 per pupil or student. Actually, the cost per pupil has been increasing by some 2.4 per cent per year on average since the mid-1970s. However, while the cost per primary and secondary school pupil has been sharply increasing (94 and 74 per cent, respectively), the cost per student increased only by some 28 per cent. This is due to the faster increase in enrolment rates as compared to the amount of resources devoted to tertiary education. This ranks France in a rather high position among OECD countries (Esquieu and Jacquot, 1999).

What proportion of these resources is devoted to subsidizing individuals' investment in education? As underlined by Guille (2002), it is difficult to compare national support schemes. First, total expenditures for student support systems vary according to population size, number of students and the proportion of beneficiaries. Second, fees and students' living costs differ considerably from one country to another. While students pay no tuition fees in Germany and the Nordic countries, they would pay up to €3,000 in the UK. With an average of €112, French students pay moderate tuition fees. Likewise, the cost of living also differs across countries; 80 per cent of Spanish students live in their parents' home whereas 60 per cent of the French live by their own.

There have been attempts in the literature to estimate total expenditures incurred by students in order to infer the proportion that is actually covered by support in the EU countries. Daniel *et al.* (1999) provide such estimates for full-time students in the first cycle (2 first years) of tertiary education, living alone in 1997. Their results suggest that while govern-

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[22] For methodological details, see Magnac and Thesmar (2002a).

ment support fully covers total student expenditures (fees plus cost of living) in none of the member countries, students' support is highest in the Netherlands and in the Nordic countries and lowest in southern European countries, with France being ranked in the middle of the distribution. In addition, while specific effort is exerted towards helping students from the poorest socio-economic backgrounds, only in Austria and Sweden do these students benefit from full support.

These kinds of comparisons may, however, be misleading for at least two reasons. First, they do not account for indirect support from governments. In France, for instance, indirect support is non-negligible. The government subsidises students' social security contributions and offers income tax reductions to their parents. It also subsidises their transportation and housing costs as well as meals. According to Eicher (1998), the value of government support would be doubled if the indirect support were accounted for.

Second, these comparisons do not distinguish clearly enough between grants and loans (which students have to reimburse once their education is completed). This is important as only in some countries have there been reforms aimed at increasing students' financial contribution. In general, the amount of tuition fees and student loans are the basic policy instruments. In France, for instance, the only form of financial (direct) aid that undergraduate students are eligible for is the provision of grants on the basis of either socio-economic or academic criteria. In 2001, 19 per cent of the students received such grants.

Overall, significant efforts are exerted in France in order to encourage educational investments. Probably, however, government support is still insufficient to allow young people with poor socio-economic status to perform better than their parents.

4.4 Social origin and educational achievement

So far, we have shown that the distribution of educational achievements may explain part of wage inequality in the sense that differently educated individuals earn different wages. In addition, some of the descriptive statistics reported in Section 4.1 suggested that social origin has an impact on individuals' schooling careers. Examining the strength of this impact is, therefore, necessary in order to precisely describe the whole association between economic and educational inequalities. In the sequel, we report on three papers which we think adequately summarise the French literature with respect to this issue.

Goux and Maurin (1997a,b) investigate the propensity of individuals to mimic their parents' socio-economic status. This effect is then compared to that of education as a determinant of individuals' own socio-economic status. Using a sample of males aged between 25 and 64 drawn from the 1977, 1985 and 1993 FQP surveys, Goux and Maurin (1997a) show that for a given educational level, individuals have a tendency to reproduce their parents' socio-economic status. Moreover, along one's professional career, the effect of educational achievement on own socio-economic status decreases while the effect of parents' socio-economic status becomes more and more detrimental. In another paper, Goux and Maurin (1997b) exhibit that although diplomas become more necessary for individuals to get employed, they are less sufficient for accessing any given socio-economic status than was the case for older generations. In addition, they also show that the higher the qualifications of one's parents, the higher is one's own qualification level.

Interestingly, Goux and Maurin (1997b) argue that economic inequalities are not necessarily the main reason why educational inequalities have not decreased in France despite growing enrolment rates. They rather suggest that a good understanding of the education system or the higher ability of parents with high socio-economic status to help their children are the main explanatory factors. What the authors do not examine, however, is the extent to which these factors, which they label 'cultural inequalities', are correlated with economic inequalities.

Alboudy and Wanecq (2003) analyze inequalities in terms of access to *Grandes Ecoles*. We have already mentioned in Section 4.2 that these constitute a rather closed and selective sector of tertiary education in France. Moreover, a French popular dictum states that the best way to make money is to access a *Grande Ecole*. Alboudy and Wanecq (2003) examine the socio-economic origin of *Grandes Ecoles* attendees. Their analysis is based on a sample of French native males born between 1919 and 1968 who entered a *Grande Ecole* between 1940 and 1980. The sample is drawn from the 1984, 1987, 1990, 1993, 1996, 1999 and 2002 waves of the LFS, where information on father's occupation at the time individuals left school is available. The data suggest that sons of white-collars are much more likely to access a *Grande Ecole* than sons of blue-collar workers. The strength of this socio-economic effect is, in fact, changing over time. Up to the early 1980s, the whole tertiary education system was actually evolving towards chance equalisation and *Grandes Ecoles* were no exception, but the movement has been reversed since the 1980s. According to Alboudy and Wanecq (2003), such a pattern could be given two explanations. First, it might be the case that the increase in the demand for high-

er education has induced *Grandes Ecoles* to strengthen their selection criteria. Second, students with poor family background might find the increasing variety of vocational programmes offered by universities more attractive, while their better awareness of the education system induces sons of white-collars to choose *Grandes Ecoles* rather than universities.

5 The labour market outcome

Occupational status is an important determinant of economic inequalities. Therefore, one way to explore how these are influenced by educational inequality is to examine the link between educational and occupational status. It is well-known that the higher one's education, the lower the unemployment risk (Ashenfelter and Ham, 1979). Education, however, influences occupational status as well. That is, even among the employed, the less educated are more likely to suffer from precariousness and to earn low wages. How likely it is that their occupational status improves over time is, therefore, an important question. Thus, one means of examining how the labour market absorbs the consequences of educational inequality is to address the question of how likely are individuals in precarious jobs to evolve along the occupational hierarchy or along the wage distribution. In this section, we summarize the literature on the influence of education on unemployment, job status and wage mobility.

Another important question is that of the ability of the demand side of the labour market to absorb the increasing supply of qualifications. There is, indeed, evidence that a significant proportion of workers is employed in jobs which they would have been able to occupy even with lower qualifications. One would, therefore, expect these overeducated individuals to earn lower wages than their qualifications would imply and, hence, to benefit from lower returns to education. The issue of over-education is also discussed in this section.

5.1 Unemployment

Between the mid-1970s and the late 1990s, the trend of the unemployment rate has been almost continuously increasing in France. At the same time, the structure of labour demand has changed dramatically. According to the population census, labourers represented 39 per cent of the labour force in 1968, but only 28 per cent in 1996. This has certainly influenced the struc-

ture of unemployment, since it suggests a relative decrease in the demand for the lowest qualifications (see Wasmer, 1999). From a quantitative point of view, the soaring enrolment rates and the longer training durations that France has experienced within the same period, could be seen as indicators of the responsiveness of the education system to labour demand. Qualitatively, however, the question of interest is that of how educational inequalities yield unequal chances with respect to employment.

Using the 1975 to 1997 waves of the LFS, Poulet (1999) considers qualification holders and compares those who left school less than five years ago to older holders. She shows that since the mid-1970s, young school leavers have increasingly suffered from unemployment. The difference between the unemployment rates of the two groups was 5, 12 and 20 percentage points in 1975, 1980 and 1984, respectively. Only since the late 1980s has the unemployment rate of the young started to decrease due to longer training durations and, hence, lower numbers of leavers, as well as to government employment policies. A new break occurred again in 1993, probably due to the decrease in schooling expectancies which started at that time. As a consequence, in 1997, the penalty of young school leavers reached its 1975 level. Meanwhile, their unemployment rate has tripled so that 27 per cent of them were unemployed in 1997. In the same vein, Balsane *et al.* (1996) show that it takes individuals who do not hold a high-school degree much longer to find a stable job compared to high-school or tertiary education graduates. Actually, what their analysis suggests is that the length of the duration between school living and stable employment depends not only on the educational level but also on the field that the new entrants to the labour market have studied.

One characteristic of the 1990s that is worth noting is the relatively high proportion of tertiary education leavers among the young unemployed. To be more specific, while the highly educated are likely to face unemployment only for a while after schooling, the low educated are at the risk of unemployment during their whole working career. Among the low educated, 47 per cent face unemployment during the first four years after they left school, 30 per cent do so between 5 and 9 years, and 20 per cent still between 10 and 19 years after school. In addition, 7 per cent remain unemployed 5 years after they left school while this holds for only 1 per cent of tertiary education leavers.

Although a number of EU countries face similar difficulties in inserting youth people into the labour market, others perform better. Fondeur and Lefresne (1999) distinguish between two groups of countries. While youth unemployment is relatively low in the UK, Sweden and Germany, southern European countries like France, Italy and Spain show important weak-

nesses with respect to the process of labour market insertion. One possible explanation of this is the connection between schools and the labour market which seems to be stronger in northern European countries. In Germany, the link is ensured due to the development of a variety of apprenticeship schemes. In the United Kingdom, secondary and tertiary school attendees are used to hold part-time jobs and/or to take periods of instruction. All these schemes endow students with some labour market experience. The percentage of students involved in such training/employment schemes is 10 per cent in France, 30 per cent in Germany, the UK, the Netherlands and Sweden, and 60 per cent in Denmark.

5.2 Employment status

In 2000, 9.5 per cent of the employed were on a specific labour contract (fixed-term contract, temporary job, training period, etc.). These types of labour contracts represented only 3 per cent in 1983. Obviously, this reflects the development of firms' labour demand adjustment policies aimed at reducing turnover costs. According to the French LFS, females and young workers are more likely to hold these types of jobs, especially if they are unskilled or hold low qualifications. Not astonishingly, more than one-third of them search for another job.

Although Atkinson (1998) argues that these jobs are a vector of social exclusion, it might also be the case that they represent only a temporary step towards a better insertion into the labour market. According to Martin-Houssart (2001), the probabilities of transition from such a precarious job to any state (unemployment, precarious job, stable job) the following year are the same. This is not true for differently educated individuals, however. While more than half of the young with tertiary education diplomas switched from a precarious job in 1999 to a stable one in 2000, less than a quarter of the young holding no qualification did so. The probabilities of transition from unemployment to stable jobs are even more discriminating since the corresponding figures were, 38 and 9 per cent, respectively.

5.3 Wage mobility

Le Minez and Roux (2001) analyse how the first job influences the evolution of wages during one's occupational career. Their results suggest that the starting point has a rather strong effect on the first years of one's working life, and that this effect persists over time. Not surprisingly, in-

dividuals with a low educational level are the most likely to start their working life at the bottom of the occupational hierarchy and, hence, to suffer from low wage and occupational mobility. Interestingly enough, the analysis by Le Minez and Roux (2001) shows that the impact of the starting point on the rest of one's working career has been strongest for those who entered the labour market between 1988 and 1992, a period of high youth unemployment.

Using samples of private-sector full-time employees from the 1967 to 1999 waves of the LFS, Fougère and Kramarz (2001) analyse wage mobility within a two-year horizon. Their results suggest that wage mobility has decreased significantly during the period under consideration. Interestingly, however, it seems that this concerns all workers irrespective of their position in the wage distribution. According to Atkinson *et al.* (2001), such a uniform decrease in wage mobility might explain the apparent divorce between the observed relative stability of wage inequality and workers' feeling that wage inequality is increasing.

5.4 Over-education

Like unemployment and part-time work, over-education could be seen as an indicator of the extent to which the labour market underuses available skills and human capital. Given the growing supply of qualifications over the last three decades, together with relatively high unemployment, one would reasonably expect an increasing proportion of over-educated young school leavers.

Forgeot and Gautié (1997) consider a sample of young workers aged between 18 and 29 drawn from the 1986 to 1995 surveys of the LFS, and show that the proportion of over-educated workers has been increasing during the period under consideration. In particular, while almost one-third of workers in precarious jobs was over-educated in 1995, this was the case for less than one-fifth of full-time workers. Their results also suggest that the longer the previous unemployment spells, the more likely an individual is to be over-educated. In addition, over-education increases the propensity of young workers to quit their current employer. This, however, does not necessarily result in individuals being better matched with their new jobs.

Likewise, according to Nauze-Fichet and Tomasini (2002), the 2001 wave of the LFS suggests that 31 per cent of high-school and tertiary education graduates earned lower wages in 2001 than half of the workers with lower qualifications. This proportion is even higher for women (39

per cent). Education is, however, the most discriminating variable. Indeed, the corresponding figure for short and long tertiary education graduates are 25.4 per cent (20.9 per cent for men vs. 28.7 per cent for women) and 17.6 per cent (10.5 per cent for men vs. 27.7 per cent for women), respectively.

Table 6. Wage and occupation based measures of over-education by gender and qualification

	Over-educated				
	Yes			No	
	Wages	Occupation	Both	Both	Total
Gender distributions					
Men	32.2	55.7	39.5	53.4	47.6
Women	67.8	44.3	60.5	46.6	52.4
Qualification distributions					
Tertiary					
Post-graduates	4.7	28.9	23.4	18.7	16.7
Graduates	17.1	25.9	38.3	13.8	17.5
Short cycle	27.2	27.3	27.7	37.2	33.3
High school degree					
Vocational	30.2	0.0	0.0	20.2	19.2
General	20.8	18.0	10.6	10.1	13.3

Source: Nauze-Fichet and Tomasini (2002).

Obviously, wages are not necessarily the most appropriate indicator of over-education. The analysis by Nauze-Fichet and Tomasini (2002) shows that only for 68 per cent of their sample members do the wage and occupation measures of over-education coincide; 60 per cent are over-educated according to none of the criteria, and only 8 per cent are over-educated according to both criteria. Table 6 reports the over-education measures by gender and qualification. It shows that the gender as well as the educational distributions are significantly different depending on whether over-education is measured on the basis of wages or occupations.

6 Concluding remarks

Many results drawn from the French literature and reviewed in this article deserve specific attention. First, income inequality has been rather stable during the last three decades with France occupying an intermediate position among OECD countries. Second, there is a variety of dimensions through which such inequalities could be analysed. Beside the usual demographic factors such as gender and ethnicity, wages seem to depend heavily on employer characteristics as well. Third, differences in individual endowments of human capital play a crucial role. In particular, there are significant returns to schooling and qualifications, the level of which is also dependent on individual as well as employer characteristics.

Understanding economic inequality in France requires, therefore, that the role of unequal access to education is evaluated. The evidence reviewed here suggests that significant obstacles persist which prevent young individuals with poor socio-economic status to keep on investing in education. Nevertheless, neither does the education system seem to be selective nor does the funding system of education seem to be a serious explanation of such persisting inequality. Probably, however, the funding system should be enriched via the design of new policy instruments such as student loans or, simply, be better targeted to reach those individuals who actually need help from society. It seems, indeed, that since family background is an important determinant of one's educational achievement, the French educational policy has not yet been successful in overweighing its effects.

This is unfortunate as unequal access to education results in economic inequalities reproducing themselves. Indeed, a large body of literature suggests that low educational achievements result in poor labour market outcomes. First, poorly educated individuals face a very high unemployment risk and experience more unemployment spells of longer duration. They are also more likely to be in precarious jobs. Unfortunately, the literature also provides evidence of a declining pattern of wage as well as occupational mobility.

This does not mean that the highly educated are completely protected against precariousness or relatively low wages. Indeed, there is evidence that as the unemployment rate increases, also the highly educated are likely to face the risk of unemployment, albeit to a lesser extent than the poorly educated. One phenomenon which the literature depicts as expanding is over-education; even among the highly educated, some work in jobs that they would have been able to perform even if they had been less educated.

This suggests that one of the main weaknesses of the French system probably resides in its insufficient responsiveness to labour demand. Perhaps future research should be better oriented towards designing quantitative and qualitative policy instruments which may improve the accessibility of the French educational system, as well as the matching between suppliers of qualifications and demanders of labour.

Literature

Alboudy, V. and T. Wanecq (2003), Les inégalités sociales d'accès aux grandes écoles, *Economie et Statistique* 361, 27–52.

Arai, M. and A. Skalli (1996), The Structure of Wages: A French-Swedish Comparison, in *Comparaisons Internationales de Salaires*. Actes du Colloque des 1er et 2 février 1996, INSEE-DARES.

Arai, M., G. Ballot and A. Skalli (1996a), Différentiels inter-sectoriels de salaire et caractéristiques des employeurs en France, *Economie et Statistique* 269, 37–58.

Arai, M., G. Ballot and A. Skalli (1996b), Rendements de l'ancienneté des individus et taille des établissements, *Revue Economique* 47, 623–632.

Ashenfelter, O. and J. Ham (1979), Education, Unemployment and Earnings, *Journal of Political Economy* 87(5), 99–116.

Atkinson, A.B. (1996), Income distribution in Europe and the United States, *Oxford Review of Economic Policy* 12(1), 15–28.

Atkinson, A.B. (1998), Social exclusion, poverty and unemployment, in Atkinson, A.B. and J. Hill (eds), *Exclusion, Employment and Opportunity*. CASE, LSE, London.

Atkinson, A. (2002), La distribution des revenus dans les pays de l'OCDE au vingtième siècle, *Revue française d'économie* 1, 3–31.

Atkinson, A., L. Raiwater and T. Smeeding (1995), *Income Distribution in OECD Countries*. OED, Paris.

Atkinson, A., M. Glaude, L. Olier and T. Piketty (2001), *Inégalités économiques*. Conseil d'Analyse Economique.

Balsane, D., S. Hanchane and P. Werquin (1996), Mobilité professionnelle initiale: éducation expérience sur le marché du travail – un modèle probit à effet aléatoire, *Economie et Statistique* 299, 91–106.

Baudelot, C. and M. Glaude (1989), Les diplômes se dévaluent-ils en se multipliant?, *Economie et Statistique* 225, 3–16.

Baudelot, C. and M. Gollac (1997), Le salaire du trentenaire: question d'âge ou de génération?, *Economie et Statistique* 304–305, 17–36.

Bell, D.N.F., R.F. Elliott and A. Skalli (1996), Wage Structure in Britain and France: An Analysis of the Returns to Education and Age, in *Comparaisons Internationales de Salaires*. Actes du Colloque des 1er et 2 février 1996, INSEE-DARES.

Bourguignon, F. (1999), Distribution et Redistribution: une mise en perspective, *Economie et Prévision* 138–139, 197–202.

Brown, C. and J. Medoff (1989), The Employer Size-Wage Effect, *Journal of Political Economy*, 1027–1059.

Cette, G. (1999), Le temps partiel en France, *Rapport du Conseil d'Analyse Economique, n°19, La Documentation Française*, 9–61.

Chauvel, L. (1998), La seconde explosion scolaire: diffusion des diplômes, structure sociale et valeur des titres, *Revue de l'OFCE* 66, 5–38.

Crépon, B. (2001), *Réduction de charges au niveau des bas salaries*. INSEE. Mimeo.

Daniel, H.D., S. Schwarz and U. Teichler (1999), Study costs, student income and public policy in Europe, *European Journal of Education* 34, 7–22.

Eicher, J.C. (1998), *L'aide aux étudiants en France: quelle logique, quels effets*? Université de Bourgogne, WP 98/061 Iredus-CNRS.

Esquieu, P. and M. Jacquot (1999), *La dépense d'éducation de 1974 à 1996*. INSEE, Données socials - La Société Française.

Fondeur, Y. and S. Lefresne (1999), Les jeunes sur le marché du travail: une comparaison européenne, *La Revue de l'Ires* 31, 5–22.

Forbes, K. (2000), A Reassessment of the Relationship Between Inequality and Growth, *American Economic Review* 90(4), 869–887.

Forgeot, G. and J. Gautié (1997), Insertion professionnelle des jeunes et processus de déclassement, *Economie et Statistique* 304–305, 53–74.

Fougère, D. and F. Kramarz (2001), *La mobilité salariale en France de 1967 à 1999*. Inégalités économiques, Conseil d'Analyse économique.

Fournier, Y. (2001), *Comparaison des salaires des secteurs privé et public*. INSEE, Document de travail de la Direction des Etudes et des Synthèses économiques n°G2001/11, juillet, Paris.

Frey, B. and A. Stutzer (2002), *Happiness and Economics: How the Economy and Institutions Affect Well-Being*. Princeton University Press.

Goux, D. and E. Maurin (1994), Education, expérience et salaire: tendances récentes et évolution de long terme, *Economie et Prévision* 116, 155–178.

Goux, D. and E. Maurin (1997a), Destinées sociales: le rôle de l'école et du milieu d'origine, *Economie et Statistique* 306, 13–26.

Goux, D. and E. Maurin (1997b), Démocratisation de l'école et persistance des inégalités, *Economie et Statistique* 306, 27–40.

Guille, M. (2002), Student loans: A solution for Europe?, *European Journal of Education* 37(4), 417–431.

Guille, M. and A. Skalli (1999), Returns to Human Capital: A Review of the French Empirical Literature, in Asplund, R. and P.T. Pereira (eds), *Returns to Human Capital in Europe: A Literature Review*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Guillotin, Y. and P. Sevestre (1994), Estimations de fonctions de gains sur données de panel: endogénéité du capital humain et effets de la sélection, *Economie et Prévision* 116, 119–135.

INSEE (1996a), *L'évolution des salaires jusqu'en 1994*. INSEE Synthèses, n°4.

INSEE (1996b), *Revenus et patrimoine des ménages, édition 1996*. INSEE Synthèses, n°5.

Jarousse, J.P. (1988), Working Less to Earn More: An Application to the Analysis of Rigidity in Educational Choices, *Economics of Education Review* 7, 195–207.

Kaukewitsch, P. and D. Rouault (1998), Les structures de salaires en France et en Allemagne en 1995: une analyse statistique comparative des hiérarchies salariales, *Economie et Statistique* 315, 3–28.

Krueger, A. and L.H. Summer (1988), Efficiency wages and the inter-industry wage structure, *Econometrica* 56, 259–293.

Kuznets, S. (1955), Economic Growth and Economic Inequality, *American Economic Review* 45, 1–28.

Le Minez, S. and S. Roux (2001), *Quelle différentiations de trajectoire à partir du premier emploi*? INSEE. Mimeo.

Lerais, F. (2001), *Une croissance plus riche en employs*. Premières Synthèses, DARES.

Lhéritier, J.L. (1992), Les déterminants du salaire, *Economie et Statistique* 257, 9–22.

Lindbeck, A. and D.J. Snower (1996), Reorganisation of Firms and Labour Market Inequality, *American Economic Review*, *Papers and Proceedings* 86, 315–321.

Lollivier, S. and J.F. Payen (1990), L'hétérogénéité des carrières individuelles mesurée sur données de panel, *Economie et Prévision* 92–93, 87–95.

Magnac, T. and D. Thesmar (2002a), Identifying Dynamic Discrete Decision Processes, *Econometrica* 70(2), 801–816.

Magnac, T. and D. Thesmar (2002b), Evaluation d'une politique éducative: la montée de la scolarisation en France 1982-1993, *Annales d'Economie et de Statistiques* 65, 1–33.

Malinvaud, E. (2001), *An Aggregation Problem: The Demand for Unskilled Labour*. Document de travail n°2001-22, Crest, Paris.

Marlier, E. and S. Ponthieux (2000), *Les bas salaires dans les pays de l'UE*. Statistiques en Bref, Population et Conditions Sociales, n°11/2000, Eurostat.

Martin-Houssart, G. (2001), *De plus en plus de passages vers un emploi stable*. INSEE Première, 741.

Mellor, M. and J. Milyo (2001), Income Inequality and Health Status in the United States: Evidence from the Current Population Survey, *The Journal of Human Resources* 37(3), 511–539.

Meurs D. and S. Ponthieux (2000), Une mesure de la discrimination dans l'écart de salaire entre hommes et femmes, *Economie et Statistique* 337–338, 135–158.

Nauze-Fichet, E. and M. Tomasini (2002), Diplôme et insertion sur le marché du travail: approches socioprofessionnelle et salariale du déclassement, *Economie et Statistique* 354, 21–43.

Piketty, T. (1997), *L'économie des inégalités*. Editions La Découverte, Collection Repères. (2ème édition, 1999; 3ème édition, 2001; 4ème édition, 2002)

Piketty, T. (2001), *Les hauts revenus en France au 20ème siècle: Inégalités et redistribution 1901-1998*. Editions Grasset.

Piketty, T. (2003), Income inequality in France 1901-1998, *Journal of Political Economy* 111, 1004–1042.

Pisani-Ferry, J. (2000), *Les chemins du plein emploi - in plein emploi*. Rapport du conseil d'analyse Economique, n°30.

Plassard, J.M. and G. Tahar (1990), Théorie du salaire d'efficience et disparités non compensatrices: évaluation à partir de l'enquête FQP, *Economie et Prévision* 92–93, 67–76.

Ponthieux, S. (1997), Débuter dans la vie active au milieu des années quatre-vingt-dix: Des conditions qui se dégradent, *Economie et Statistique* 304–305, 37–52.

Poulet, P. (1999), *Sorties du système éducatif et chômage des jeunes*. INSEE, Données sociales – La société Française.

Rawls, J. (1972), *A Theory of Justice*. Oxford University Press.

Skalli, A. (2003), *Are Successive Investments in Education Equally Worthwhile?: Endogenous Schooling Decisions and Non-linearities in the Earnings-Schooling Relationship*. ERMES, Paris. Mimeo.

Smith, J.P. (1999), Healthy Bodies and Thick Wallets: The Dual Relation Between Health and Economic Status, *The Journal of Economic Perspectives* 13(2), 145–166.

Sofer, C. (1990), La répartition des emplois par sexe: capital humain ou discrimination, *Economie et Prévision* 92–93, 77–86.

Wasmer, E. (1999), Changements de composition de la force de travail: Implications pour les salaire et le chômage, *Economie et Prévisions* 138–139, 77–87.

Appendix of Chapter 4

Most authors interested in the effects of education on earnings use the surveys called *Formation et Qualifications Professionnelles* (FQP) conducted by INSEE, the French National Statistics Institute, among a sample of households drawn from each population census.[23,24]

Indeed, these surveys present very interesting characteristics. First, not only are they the richer ones in terms of initial as well as post-school education and their professional outcomes, but they also contain very detailed information about individuals and their household characteristics and cover the public as well as the private sector.[25] Second, they contain very interesting biographical variables such as individual characteristics, as well as job descriptions five years earlier. Finally, although not concerned with the same individuals, the five FQP data sets that are available (1963, 1970, 1977, 1985, 1993) imply that the same information about the French labour market can be observed for that many points in time.

In contrast to FQP, the other cross-section data sets used in the literature are not directly concerned with education. The *Enquête sur le Coût de la Main-d'Oeuvre et la Structure des Salaires* (ECMOSS) has been conducted by INSEE for the years 1972, 1978, 1986 and 1992.[26] Questionnaires were sent to a sample of establishments from the private non-agricultural sector, within which random samples of individuals were chosen with the wages and characteristics of the sampled individuals described by the employer.[27] Thus, each of the resulting surveys contains two sets of variables. The first one is concerned with the production unit (industry and activity, size, region, etc.) while the second describes individual characteristics (nationality, gender, age, occupation and tenure) as well as some labour contract features.[28]

While the 1986 survey covers about 16,200 establishments and some 680,000 employees, that of 1992 concerns around 14,700 production units and 150,000 individuals. The reason why there are fewer individuals is that the 1992 survey focused with fine detail on employer characteristics (manning, turnover, union activity, labour organisation, product market, etc.).

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23 Training and Professional Qualifications.

24 The periodicity of the population census in France is eight years.

25 Whether they participate or not in the labour force, employees or self-employed.

26 Labour Costs and Wages Structure Survey.

27 The sector of services has been included only after 1972.

28 Only the 1986 and 1992 ECMOSS surveys are used in the papers discussed in this review.

Note, however, that for 1986, there is no information about education while for 1992 a detailed description of diplomas is available.

Another interesting data set is that from the rather recent *Enquête Européenne sur la Structure des Salaires* (EESS) that was conducted in France by INSEE in 1994 and in Germany by the *Statistiches Bundesamt* in 1995.[29] The EESS data cover 9,669,400 West-German workers and 6,648,500 French workers in establishments with more than nine employees from the sectors of industry, commerce, construction and financial services.

The *Enquête Carrière et Mobilité* (ECM), conducted by INSEE for the years 1974, 1981 and 1989, is another data source used in the literature.[30] In the 1989 survey, individuals born between 1930 and 1959 were to fill in a questionnaire about the characteristics of their first job and of their jobs in March 1960, 1967, 1974, 1981 and 1989.

Compared to the numerous cross-section data sets available in France, panels are rather scarce. In fact, the only panel data sets conducted by INSEE and used in the literature are the so-called *Enquête Emploi* (Emploi), where one-third of the sample is renewed each year[31], and the *Déclarations Annuelles des Salaires* (DAS), which is conducted annually since 1967 and covers workers born in October each even year.[32] These workers enter the sample as soon as they get their first job in firms from the private or the semi-public sector so that the sampling rate is about 1/25. It should be noted, however, that while the DAS survey contains fairly rich information on remunerations, it provides no direct measure of human capital.

The *Enquête Budget des Famille* is probably more appropriate for studying income inequality.[33] Four cross-sections are available so far: 1978, 1984, 1989 and 1994. These surveys aim at studying household expenditures and resources. Interestingly, they allow comparison of standards of living, as well as consumption choices of the various categories of households. Detailed information on the types and amounts of resources and expenditures is available. In particular, a distinction is made between consumption of goods and services, and other types of expenditures such as tax payments and insurance. Detailed information on the various income sources is also available.

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29 European Wages Structure Survey.

30 Careers and Mobility Survey.

31 Employment Survey.

32 Annual Declarations of Wages.

33 Family Resources Survey.

CHAPTER 5

Education and Wage Inequality in Germany:
Review of the Empirical Literature

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This article reviews the current state of knowledge on the link between education and wage inequality in Germany. The wage inequality is characterised by its stability, although a more detailed analysis reveals structural differences, especially between East and West Germany. Both the between and within educational levels wage inequality changed little over time, while there are some tendencies of a converging distribution of education. A need for further research is identified in the effects of education on wage inequality in separate cohorts, as well as the direct links between the two distributions in Germany.

1 Introduction[1]

This chapter reviews some empirical evidence on the link between education and wage inequality in Germany. According to human capital theory (Becker, 1964), education is an investment in human capital, which yields a return in the form of enhanced future wages. Due to the positive relationship between education and wages, policymakers think of education as an efficient instrument to reduce wage inequality, especially by improving the position of the least skilled. However, the possible channels of *interaction* between the level and the spread of education and the wage distribution are hardly known.

One major finding of this review is that the German wage inequality is characterised by its stability, although it has increased rapidly in East Germany over the last decade. Concerning education, there has been an educational expansion with an increase in overall educational participation. There seem to be converging trends in educational attainment with respect to gender and social background. According to the existing literature, returns to education and wage inequality within educational levels have hardly changed. A special feature of the link between education and wage inequality is that there seem to be decreasing returns to education over the wage distribution.

A vast literature examines wage inequality and returns to education and the composition of education is well described, in particular in the sociological literature. However, most studies focus on wage inequality between educational levels. Few studies consider *within* educational level wage inequality. Additionally, there is hardly any literature directly *linking* the distribution of wages and the distribution of education.

In the first part of this review, we describe the development of wage inequality in Germany during the last twenty years as reported in the literature. Emphasis is given to East-West and gender differences (Section 2). Later on, we summarise the German literature on educational inequality. In particular, the question is asked whether there is equal access to and provision of education in the German society (Section 3). Thereafter, the link between education and wage inequality is explored on the basis of the empirical evidence available for Germany (Section 4). Finally, we address the scope for further research (Section 5).

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[1] Financial support from the European Commission under the FP5 project 'Education and Wage Inequality in Europe' (HPSE-CT-2002-00108) is gratefully acknowledged. Thanks a lot to Charlotte Lauer for her helpful comments.

2 Wage inequality in Germany

2.1 Data sources

One main data source that is used for the analysis of the German wage inequality is the German Socio-Economic Panel (GSOEP).[2] This is a longitudinal household survey conducted on a yearly basis, in which information on about 12,000 individuals in 6,000 households was collected through interviews starting with the first wave in 1984. As the same persons are interviewed each year, the sample size decreases over time due to drop-outs, raising the concern of attrition bias. From 1990 onward, additional data was collected on about 4,500 individuals in 2,200 households in the East of Germany. This figure had decreased to 3,700 individuals in 1,900 households by 2000. A new sample was drawn in 1998, including 1,900 persons of which 1,500 could be interviewed again in 2000. From there on, an additional sample for the whole of Germany was interviewed, with information on 11,000 persons in over 6,000 households in 2000.

The data are representative of the composition of the population living in Germany with respect to demographic and socio-economic factors. However, the five largest foreign nationalities living in Germany are deliberately over-sampled in order to give a representative picture of these small-sized population groups.[3] Therefore, the GSOEP provides weights for each cross-section to account for their probability of being sampled.

Detailed information is available on an individual's work, net and gross monthly earnings, hours of work, educational and demographic background and further characteristics. Most studies that consider wage inequality or analyse the link to education use gross hourly wages. These determine the price of labour for a fixed unit on the labour market, and are therefore appropriate for a comparison over time and across countries. Gross monthly earnings are also used in some studies, but depend on the hours worked. The impact of taxes and social contributions, as in the net wages/earnings, is deliberately excluded in order to focus on the price of labour on the labour market and not on the labour income of individuals.

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[2] For more detailed information on the GSOEP, see http://www.diw-berlin.de/english/sop.

[3] These include Turks, Spaniards, Italians, Greeks and immigrants from former Yugoslavia.

Two measures of gross monthly earnings are available in the data. One reports average monthly earnings in the preceding calendar year, the other earnings in the previous month. Most studies use the earnings of the previous month, as this information should be more precise than the persons' assessment of their average earnings over the last year. Together with the hours worked per month, the hourly gross wage can be constructed.[4]

An alternative data set used in the literature is the micro data from the Employment Register (IABS) of the Federal Labour Office, which was made available for scientific use in the late 1990s. The data provide information on about 200,000 persons in dependent employment living in Germany and being covered by the social security system, which presents a one per cent random sample. The gross monthly earnings are reported by the employers to the Labour Office, making the IABS a very accurate source of information.

Despite the smaller sample size of the GSOEP and a less precise reporting of earnings, the GSOEP has distinct advantages compared to the IABS. It is a representative sample of the whole working population, whereas the IABS excludes all civil servants and self-employed persons apart from apprentices. Moreover, it provides detailed information on the hours worked, while the IABS distinguishes only between full- and part-time. The IABS data do not allow for a distinction between fringe benefits and regular earnings and report the earnings only up to the social security threshold, which implies that about 10 per cent of the highest earnings are not fully reported. Therefore, the GSOEP data are preferred to the IABS data in most studies, especially when distinct parts of the wage distribution are analysed.

2.2 Measures of inequality and methods

Various measures for comparing wage distributions and assessing the absolute degree of inequality are employed in the literature. The most common ones are the ratio of wage percentiles and income inequality coefficients. While the percentile ratios allow us to compare different parts of the distribution to each other (most common are the 50/10, 90/10, 90/50 percentile ratios), the inequality coefficients give a summary measure of

[4] Information on the number of hours worked is available only for the earnings measure of the previous month.

the distribution. The Gini coefficient equals the area between the Lorenz curve and the diagonal, divided by the total area under the diagonal of perfect equality. The Theil indices are alternative measures that have the advantage of complying with the additive decomposability criterion, additionally.

Besides the mere description of wage inequality, its structure and development, several studies also try to explain the observed facts. Therefore, they examine the link to education using various methods and decomposition techniques to pin down the effect of education on wage inequality.

Especially for gender wage differences, but also for changes over time, decomposition methods are employed that break down the overall wage differences into differences caused by the characteristics of the compared groups, the returns to their characteristics, and further terms including the residual effects (Blinder, 1973; Oaxaca, 1973). Therefore, the method allows for a separate consideration of several effects that impact on wage inequality.

2.3 The extent of overall wage inequality

Several studies have described the German wage distribution as relatively compressed and stable over the last 20 years compared to other major economies. This characterisation arose from comparisons with the rapidly rising wage inequality in the USA in the 1980s (Blau and Kahn, 1996; Freeman and Katz, 1992; Gottschalk and Smeeding, 1997). The evidence on the German wage inequality is summarised in Table 1, which gives an overview of the data and methods used in the respective studies.

Abraham and Houseman (1995) observe decreasing percentile ratios in the lower part of the wage distribution between 1978 and 1988 using GSOEP and IABS data. A more detailed analysis of the IABS data, which was available to Abraham and Houseman (1995) only in an aggregated way, shows, however, an increase in percentile differences in the upper part of the distribution for the intermediate education levels (Fitzenberger *et al.*, 2001). Other researchers using the IABS data challenge altogether the view of a relatively stable earnings distribution and describe an increasing spread of earnings for men (Möller and Bellmann, 1996; Möller, 2000). Odink and Smits (2001) also notice a slight increase in the Theil T index, which uses wage shares as weights, for inequality in the wage distribution in the period from 1984 to 1988, but a decrease in the

following period up to 1992. They describe the wage distribution as stable over the entire span of their observations from 1984 to 1997. On the whole, all observed changes over time were quite small and no study mentions a drastic increase in inequality.

In an attempt to resolve the question of the development in the earnings distribution in the 1980s, Steiner and Wagner (1998) analyse both IABS and GSOEP data in the years between 1980 and 1990 and come up with somewhat differing results from the two data sets. While there is no apparent increase in percentile ratios in the GSOEP data, a slight increase in inequality is implied by the IABS data. The authors speak of a relative stability of the earnings distribution in the observed time period, though.

For the 1990s, the percentile ratios reflecting the overall wage inequality in West Germany are described as remarkably stable with a slight increase in the mid-90s (Prasad, 2000), although a more differentiated picture is presented in the following structural analysis.

2.4 Structure of wage inequality

Major topics in the German literature discussed in relation to wage inequality are the different developments in East and West Germany during the 1990s, and gender differentials.

The East-West wage gap

In the 1990s, the development in wage inequality was more heterogeneous than depicted above due to the affiliation of East Germany that moved from a socialist towards a market economy, and thus to market wages. Under socialism, wages were not determined by the forces of demand and supply on the labour market but were artificially compressed, leading to a much denser wage distribution in East than in West Germany in 1990. Several studies analyse the distinct development of wages in East and West Germany separately for each gender. In West Germany, the increase in wage percentile ratios was small and occurred only among men, while wage inequality decreased slightly for women (Steiner and Hölzle, 2000). The same could be observed for the distribution of monthly earnings (Riphahn, 2003). For East Germany, both studies remark a rapid widening of the formerly compressed wage distribution, especially for women. Between 1990 and 1997, the ratio of the 90th to the 10th percentile increased in East Germany from 2.02 to 2.48 for

men and from 2.18 to 2.97 for women, which reflects the faster wage convergence for women towards Western wage levels (Steiner and Hölzle, 2000). By 1999, East-German wage inequality was greater for women than for men, and the female wage inequality had already surpassed that of both men and women in West Germany. For men, wage inequality was still slightly higher in the West, where it also exceeded the wage inequality for females (Riphahn, 2003).

After a rapid convergence of wages in the first years following unification, which benefited mostly low-wage earners and the less educated (Hunt, 2001), the process of convergence came to a halt in 1995 and left a still considerable wage gap of about one-third of Western male wages for East-German men in 1997. The wage gap between East- and West-German women was found to be less sizeable, probably due to a selection process in terms of labour market participation biased towards the best female employees in East Germany (Steiner and Hölzle, 2000).

The gender wage gap

According to Fitzenberger and Wunderlich (2002), who analyse IABS data using quantile regressions, the gender wage gap decreased especially in the lower part of the wage distribution in West Germany in the period from 1975 to 1995. In East Germany, the gender wage gap is described as decreasing from 17.2 per cent in 1990 to an astonishingly low 5.2 per cent in 1997 as a result of the more rapidly increasing wages of women (Gang and Yun, 2001). As this seems mainly to be the consequence of a positive self-selection in female labour market participation, actual gender discrimination probably did not decrease in East Germany with East-German women still facing much higher employment difficulties than men (Hunt, 2002). In West Germany, the gender wage gap decreased as well, from about 43 per cent in the mid-eighties to 36 per cent in the mid-nineties. The reduction is found to be attributable to less discrimination across gender with respect to the returns to education, and to increasing human capital endowment of women (Lauer, 2000).

In East and West Germany, wage inequality appears to be higher for both men and women in the private sector compared to the public sector. However, while West-German earnings rose faster in the private sector, they increased more in the public than in the private sector in East Germany (Riphahn, 2003).

Table 1. Evidence on wage/earnings inequality in Germany

Name of study	Data sets	Sample	Measure	Method	Major results
Abraham and Houseman (1995)	GSOEP, IABS in aggregated form	1978-88 male full-time workers	Monthly earnings	Percentile ratios, variance	Stable earnings distribution 1978-83, decrease in inequality 1983-88, especially lower part.
Steiner and Wagner (1998)	GSOEP, IABS	1980-90 male employees; aged 16-66	Monthly earnings	Percentile ratios	Slight increase for IABS, none for GSOEP data.
Odink *et al.* (2001)	GSOEP	1984-97	Hourly wages	Theil T index	Slight decrease of wage inequality 1984-92, slight increase 1992-97.
Hunt (2002)	GSOEP	1990-94 East Germany; aged 18-60	Monthly earnings	Blau-Kahn decomposition	Decrease in the gender wage gap due to positive self-selection.
Fitzenberger and Wunderlich (2002)	IABS	1975-95 West Germany; aged 25-55	Monthly earnings	Quantile regressions	Decrease in the gender wage gap, especially in the lower part of the wage distribution for low- and medium-skilled females.
Prasad (2000)	GSOEP	1984-97 full-time workers West Germany; aged 17-65	Hourly wages	Stand. dev., coefficient of variation	Overall stable, slight decrease 1984-88, slight increase 1994-97.
Lauer (2000)	GSOEP	1984-97 full-time employees, West Germany; aged 20-60	Hourly wages	Adjusted Blinder-Oaxaca decomposition	Reduced wage gap is attributable to increased human capital of women and less differences in returns.
Steiner and Hölzle (2000)	GSOEP	1990-97 employees, East and West Germany; males aged 19-65, females 19-60	Hourly wages	Percentile ratios	East: high increase for women, slight for men; West: slight increase for men, decrease for women.
Gang and Yun (2001)	GSOEP	1990-97 East and West Germany; aged 20-65	Hourly wages	Adjusted Blinder-Oaxaca decomposition	Strong decrease in the gender wage gap in East, but increasing discrimination.
Riphahn (2003)	GSOEP	1984-99 full-time workers, East and West Germany; aged 18-65	Monthly earnings	Percentile ratios	Increase in inequality for foreigners, men in West and women in East in the 1990s.

Further topics

Another topic that has recently been investigated is the wage inequality among foreigners living in West Germany. The 90/10 percentile ratio for foreigners has increased rapidly, from 1.8 in 1990 to 2.7 in 1997, and has surpassed the ratio for Germans in the West. The dispersion increased especially in the upper part of the wage distribution, implying that an increasing number of foreigners gained access to high-paid jobs (Riphahn, 2003).

3 Inequality in education

Because education is an essential determinant of wages, the distribution of education will affect the distribution of wages. Therefore, before discussing the link between education and wage inequality in Section 4, the focus of this part of the literature review is to answer questions concerning the inequality of education, i.e. whether there is inequality in the provision of and access to education, or in educational attainment.

Since the 1960s, a major objective of the German educational policy has been the policy of 'educational expansion', i.e. to increase the participation in education, especially of the less educated groups in order to reduce social inequalities. Several German studies ask the question whether the German educational policy could manage to achieve this aim. In Section 3.1, some features of the educational system in Germany are explained and the question is asked whether such a system is qualified to reduce social inequality. Some studies on educational inequality are described in Sections 3.2 – 3.4 with respect to the data and methods used and their major results. One important finding, common to most studies, is that the social background of the family still exerts significant impact on the children's educational attainment.

3.1 Background information: the German education system

Generally, nearly all primary and secondary schools in Germany are public. School quality is not supposed to vary significantly by school type (as e.g. private vs. public schools). Since the 1950s, schooling is offered free of tuition for all school types. Tertiary-level education is free of charge with some exceptions like (low) administrational fees or 'social contributions' (*Studentenwerksbeitrag* and *Sozialbeitrag*). Additionally, financial sup-

port is granted to students from low-income families up from the tenth grade.[5] All in all, the German educational system aims at providing *"equal opportunities of educational choice"* (Dustmann, 2001, p. 4).

To describe the features of the education system in more detail, the 16 states (the so-called *Länder*) are responsible for the educational policy. Thus, regional differences in the education system exist. School attendance is compulsory starting from the age of six. After having completed four years of elementary school, at the age of ten, German pupils generally have to choose one of three major types of secondary schools, where secondary school-leaving degrees of different levels can be obtained. The three choices are the *Hauptschule* (where the lowest secondary degree is obtained after five years), the *Realschule* (where an intermediate secondary degree is obtained after six years) and the *Gymnasium* (where the highest level secondary degree, the *Abitur* is obtained after nine years). These schools differ by the abilities requested from the students.[6] Pre-tests on the children's ability are not common. Teachers at elementary schools only recommend which secondary school to choose. The type of secondary school chosen by the students largely determines the (desired) future educational career, e.g. only the *Abitur* degree qualifies students to attend universities.

One major objective of the education policy in Germany is to train students for the specific tasks and skills required by the labour market. This is why *vocational training* plays a central role within the German educational system and, in fact, most students choose the path of vocational training (e.g. instead of aiming to get a 'higher' tertiary-level education).[7] The compulsory duration of full-time school education amounts to nine years. After completion of this general education, students not choosing to pursue further vocational or general full-time studies have to attend part-time vocational training schools for at least three additional years.

The education system in East Germany differs somewhat from that in West Germany. According to Below (1999), in the so-called new *Länder*, i.e. the states of the former German Democratic Republic, the duration from the first year of primary school to the last year of the higher secondary school (the *Gymnasium*) is generally shorter than in the West and takes 12 (instead of 13) years. This is one heritage of the GDR. The state of Brandenburg, where the duration amounts to 13 years, is an exception.

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5 This is regulated in the law of the *Bundesausbildungsförderungsgesetz (BAFöG)*.

6 See Lauer and Steiner (2001).

7 According to Lauer (2004) about 50 per cent of Germans aged 25-65 hold an apprenticeship or another vocational degree in 2000.

3.2 The data sources

The data sets most often used when analysing educational inequality in Germany correspond to the ones described in Section 2.1. Again, the GSOEP is the most popular data set and is used by Blossfeld (1993), Gang and Zimmermann (2000), Dustmann (2001) and the papers by Lauer. Information on education concerns an individual's highest degree of secondary education, vocational training and higher education. Optionally, information on the highest degree obtained in given educational fields can be used in order to derive years of schooling. The GSOEP does not entail information on the subject of study related to an individual's highest degree. Information on social background is available, e.g. the parents' secondary education level and their vocational or academic degree as well as the father's occupational category.

Below (1999) examines the German *Mikrozensus* 1995 census data and Schimpl-Neimanns (2000) uses *Mikrozensus* and *Volkszählungs* census data providing cross-section information on educational participation between 1950 and 1989 at intervals of ten years. Only native West-Germans are included. In addition, data on educational background given in the Occupational and Social Regrouping in the Population supplementary survey to the *Mikrozensus* (*Zusatzerhebung Berufliche und soziale Umschichtung der Bevölkerung*) conducted in April 1971 can be used. The *Mikrozensus* gives information on school attendance including educational degrees. Possible explanatory variables, as the variables used in Schimpl-Neimanns (2000), are gender, age, highest educational and/or occupational degree of the parents, and the household head's (father's) occupational status.

Müller and Haun (1994) and Müller (1994) are based on the General Population Survey in Social Science data (*Allgemeine Bevölkerungsumfrage der Sozialwissenschaften (ALLBUS)*) stemming from seven surveys conducted in West Germany between 1980 and 1991 and covering 19,665 individuals. Information on the father's occupation, parental education and the parents' number of siblings is available.

Bender and Dietrich (2001) use data from a population registration office sample (*Einwohnermeldestichprobe*) of households in 100 representatively selected counties in West Germany to which information from 2,911 computer assisted telephone interviews and personal interviews conducted by the *IAB* is added. Foreigners or Germans who obtained their educational degree abroad are not included in the sample. Henz and Maas (1995) use data from the life course study (*Lebensverlaufstudie*) collected by the Max-Planck Institute for Educational Studies in Berlin for the cohorts of 1919-21, 1929-31, 1939-41, 1949-51, 1954-56 and 1959-61.

The life course study is a retrospective survey including detailed information on family background and educational career. Approximately 350 interviews have been conducted per cohort and gender. The study is supposed to be representative of the West German population (compare Henz and Maas (1995), p. 611). Information on social origin and regional characteristics (rural vs. urban areas and southern vs. northern states) is available.

3.3 Measures of inequality and methods

Inequality indices

Numerous measures of inequality are available, and correspond to the ones summarised in Section 2 (e.g. the standard deviation, the variance, or the coefficient of variation). In a study on the macro level, Ram (1990) suggests the standard deviation as an appropriate inequality index.

Participation in education

One approach to examining educational inequality between social groups is to look at a group's relative participation in education, e.g. at the *ratio* of a group's participation on the overall size of the group. Below (1999) compares 'educational densities' as defined by the proportion of 16 to 19 year-olds participating in education.[8] These ratios are calculated separately for different groups, i.e. groups created by the father's education, and parental occupation by gender and region.

Distribution of degrees

Other studies refer to the sociological 'status-attainment' approach as suggested by Blau and Duncan (1967) according to which the highest educational level attained (measured in schooling years) is regressed on variables describing social origin.[9] An alternative method to analyse education inequality, commonly used in sociological studies, is to compare educational distributions of different social groups (e.g. Blossfeld (1993) and Müller (1994)). Thus the connection of education and, for example,

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[8] Compare this method as discussed in Peisert (1967).

[9] See Müller and Haun (1994) and Mare (1981). This approach is used by Blossfeld (1993).

social origin is analysed by simple percentage comparisons of the distribution of education for children with different social backgrounds. However, by looking at percentage differences, one confounds effects due to changes in the participation in education ('selection effect') and those arising from changes in the absolute size of a social group ('expansion effect').[10] A further problem is the possibility of an omitted variable bias (spurious correlation), e.g. unobserved factors affecting both education and social origin thereby driving the observed correlation.

Transition rates

Some studies use sequential binary choice models to analyse educational inequality. Following Boudon (1974), the attained educational degree is considered to be the result of a sequence of transition probabilities to the next higher educational level. Thus, Blossfeld (1993), Müller (1994), Müller and Haun (1994) and Schimpl-Neimanns (2000) estimate binary logits on the probability whether or not a transition to the next higher educational level takes place. However, this choice-theoretic modelling of educational participation developed for the US case is based on the fact that (in the USA) each time after having completed one educational level, individuals have to decide between two alternatives, i.e. whether they want to attend the next school level or not. This modelling of educational decisions does not really fit the German case. Students in Germany face decisions concerning *various* options, e.g. which school to choose after primary school is a decision with three major outcomes (high, intermediate or low-level secondary school).

Lauer (2002a, 2003) suggests a multinomial logit model. From a choice-theoretical point of view, this would imply that available options are considered simultaneously. Dustmann (2001) models the transition from primary to secondary school using an ordered probit model, where there are three categories corresponding to the secondary school types. Alternatively in Lauer (2002a, 2003), the educational process is decomposed into two steps (secondary and post-secondary level education), where the choices at both levels may be correlated.

Hierarchical (nested) logit models have been developed in order to model the choice between more than two options. These can be used to explicitly model the hierarchical structure of decisions, which is the un-

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[10] See Handl (1984, 1985) and Köhler (1992).

derlying assumption when using sequential logit models.[11] Schimpl-Neimanns (2000) tests whether a more general nested logit model is preferable to a multinomial logit model, and concludes that multinomial logits are most qualified to model educational decisions in Germany.

3.4 Results from existing studies on educational inequality in Germany

There exists a variety of sociological articles on educational inequality in Germany. However, as mentioned above, these studies mostly confine to examining the distribution of education by simple percentage comparisons, e.g. over time or by cohort. Furthermore, only few explanatory variables are considered, for example by looking at educational attainment by the occupational status of the father or the family's sociological class (as created by the parents' occupational status or income, etc.). Some of the more important sociological and economic studies and their major results are summarised below according to the major aspect of educational inequality they are related to. All the studies refer to West Germany only, with the exceptions of Below (1999) and Ram (1990). The data sets, methods and major results are summarised in Table 2.

Inequality in education and social (parental) background

According to Lauer (2002a, 2003), parental education and the father's occupation have a significant impact on educational attainment, where blue-collar workers' children compose the most 'disadvantaged' group and managers' children have the highest outcome. Estimating successive educational stages shows that parental education is important also for post-school educational attainment, though to a lesser extent. Similarly, Lauer (2002b) examines the probability to be enrolled in higher education and finds that social origin (in particular parental education and occupational position) is an important determinant. Furthermore, the probability of being enrolled depends on labour market return expectations, especially on the personal unemployment risk level. A higher probability to be non-employed or employed part-time yields a lower probability to be enrolled in higher education. Expected returns to education (i.e. wages) have a significant impact on educational decisions. Public policy is found to have an influence on enrolments. The expected chance of receiving public financial

[11] Compare Maier and Weiss (1990) for a theoretical discussion.

support (the *BAFöG*) increases enrolments. The proportion of the repayable part and the amount of the *BAFöG* have a significant but limited impact on enrolments.

Looking at individuals born between 1920 and 1966, Dustmann (2001) shows that there is a strong link between the parents' educational and occupational status and the children's *secondary* school choice. The probability that a person completes the highest level in secondary school is highest for males whose father holds an intermediate or high-level secondary school degree. The same effect is weaker (but positive) for the probability that a male person completes the intermediate secondary school. Interestingly, for females the reverse is true: An intermediate or high-level secondary school level of the father exerts the strongest (positive) impact on the probability that the daughter completes the intermediate degree. In the same way, the fact that the father holds a higher-level post-school degree seems to influence the children's decision for a higher secondary school. Also, the father's occupational class has a significant effect on the secondary school decision.

Schimpl-Neimanns (2000) finds that social inequality in educational participation decreases over time. In 1989, social origin still exerted some impact on educational attainment; however, the relationship between social background and education experienced significant changes since 1950. The main part of the reduction in social inequality occurred before the end of the 1970s. Looking at the choice among secondary schools, Schimpl-Neimanns (2000) concludes that the (significant) influence of the father's occupational status decreased over time. The reduction of inequality related to the parents' education is weaker and occurred later. All in all, Schimpl-Neimanns (2000) even concludes that the significant influence of the parents' education on the relative chances to attend the highest level in secondary school compared to the intermediate level did not decrease over the investigated time period. This corresponds to findings by Blossfeld (1993), Müller (1994) and Henz and Maas (1995).

Henz and Maas (1995) show that the father's occupation, the parents' education and the number of siblings determine the educational decision significantly. Again, as a rule of thumb, one can say that the better the father's (family's) occupational (educational) position, the higher will be the child's educational outcome. The number of siblings generally exerts a negative impact on the educational outcome. Furthermore, in their descriptive analyses, Müller (1994) and Müller and Haun (1994) illustrate the general trend of educational expansion, whereby both studies find that the social class of the family seems to have a stronger influence on earlier transitions than on transitions occurring later in the educational career.

Table 2. Selected studies on educational inequality in Germany

Study	Data set(s)	Sample	Additional comments	Method	Major results
Lauer (2004)	German Socio-Economic Panel (GSOEP).	West Germans active in the labour market, aged 25-65, waves 1985 to 2000.	Final educational attainment as a combination of secondary, vocational and higher education.	Distributions of (secondary/ final) attainment (over time, cohort, gender).	Educational expansion. Gender differences, especially by cohort.
Lauer (2002a) and Lauer (2003)	German Socio-Economic Panel (GSOEP).	West Germans born between 1929 and 1968 only (waves 1985 to 1999).	Educational outcome defined as the highest obtained degree based on 5 levels. Explanatory variables: cohort dummies, father's occupation, parental education, gender.	(1) Ordered probit model. (2) Decomposition into school and post-school education (multivariate ordered probit).	Parental characteristics influence educational attainment. Parental education is also important for post-school attainment.
Bender and Dietrich (2001)	Data from a population registration office sample (*Einwohnermeldestichprobe*) of the *IAB* in 100 selected counties.	Cohorts of 1964 /1971 sampled in 1998/1999 (West Germans). Persons having obtained their educational degree abroad are excluded.	The analysis refers to considerations by cohort and by gender.	Descriptive analysis, proportions of individuals having obtained some educational degree.	Educational distribution changed in favour of females. Women generally obtain *higher* secondary degrees.
Lauer (2002b)	German Socio-Economic Panel (GSOEP), regional data from the Federal Office of Statistics (*Statistische Jahrbücher, Fachserien 11 & 14*) and from the Federal Ministry of Research and Education (*Grund- und Strukturdaten*).	West Germans in 1984 to 1997 aged 21-26.	The dependent variable indicates university attendance. Regressors: household income, father's economic situation/occupation, local labour market characteristics, education policy (public expenditures, student-teacher ratio), age, gender, nationality.	Ordered probit model on the probability of being enrolled in higher education.	Parental education and occupation, the coverage of public financial support and labour market expectations are important for the children's educational decision.
Schimpl-Neimanns (2000)	*Mikrozensus* and *Volkszählungs*-census data and a supplementary survey to the *Mikrozensus*.	West Germans only, data for 1950 to 1989 at intervals of ten years.	Information on school attendance/ attained educational degree. Explanatory variables: gender, age, parental education /occupation.	It is tested whether a more general nested logit is preferable to a multinomial logit model.	Multinomial logits most qualified to model education. Social inequality decreases over time.

Below (1999)	*Mikrozensus* data.	The sample refers to 1995.	Ratios are calculated by groups created by the father's education, parental education, gender and region.	Educational densities (proportions of 16-19 year-olds participating in education); odds ratios.	Educational density higher for females, especially in East Germany. Inequalities by social/regional background.
Dustmann (2001)	German Socio-Economic Panel (GSOEP).	West Germans only. Data refer to 1984-1987, individuals aged 21-66.	Explanatory variables: Parents' secondary education, vocational or academic degree, father's occupation, cohort and gender.	Transition from primary to secondary school (ordered probit model, 3 secondary levels).	Strong (but decreasing) link between parental background and the children's education.
Gang and Zimmermann (2000)	German Socio-Economic Panel (GSOEP).	West Germany, wave 1984. Foreigners born in Germany/ having arrived before the age of 16, 17-38 years old. Same age cohort from the German sample.	Alternative dependent variables (years of education, level of schooling, binary variable for vocational training). Explanatory variables: size of the ethnic network, country of origin, parental education.	According to the three types of dependent variables, three models (OLS, probit and a binomial probit) are used.	Impact of father's education stronger than of mother's education. Size of ethnic network, country of origin influence education.
Henz and Maas (1995)	Data from the life course study (*Lebensverlaufstudie*) collected by the Max-Planck Institute for Educational Studies in Berlin.	The data refer to the cohorts of 1919-21, 1929-31, 1939-41, 1954-56 and 1959-61. West Germans only.	Explanatory variables: social origin (father's occupation, parental education, number of siblings), regional characteristics (rural vs. urban areas, southern vs. northern states), cohort.	Logits separate by gender (transition from primary to secondary school, completion of secondary school, completion of a vocational degree).	Father's education, parental education, regional differences and number of siblings are important for the educational outcome.
Müller and Haun (1994) and Müller (1994)	General Population Survey in Social Science *(ALLBUS)*, GSOEP and *Mikrozensus* data.	West German data collected in 1980-92. Census data: cohorts 1920-1950. GSOEP: waves 1984-86.	Six educational categories. Explanatory variables: social class of the family (created by the father's occupation and education), gender.	Descriptive statistics and binary logits whether transition to the next higher educational level takes place.	Social class has a stronger influence on earlier transitions. Gender gap reduces. Social origin less important for younger cohorts.
Blossfeld (1993)	German Socio-Economic Panel (GSOEP).	West Germans included in the waves 1984-1988.	Dependent variables: educational level (7 levels), 4 educational transitions. Independent variables: father's schooling and occupation, cohort dummies and gender.	Educational distributions, OLS regression on educational level and logit models for 4 transitions.	Persisting influence of parental variables (decreasing at the secondary educational level). Converging gender effects.

As Gang and Zimmermann (2000) and Lauer (2002b, 2003) show, the impact of the father's education is stronger than the impact of the mother's education. Comparing the educational attainment of second-generation immigrants and natives in the same age cohort, they find that the size of the ethnic network positively influences educational attainment. There is a significant impact of the country of origin on educational attainment in the second generation. The parents' education influences German children's educational choice, while there is no significant impact for the children of foreigners.

Estimating linear regressions on educational levels, Blossfeld (1993) observes a persisting influence of parental background. Again, looking at the secondary education level, there seems to be a decrease in the impact of social background characteristics. Additionally, the logit estimates on educational transitions indicate that the influence of social background is more important for earlier educational transitions than for later ones.

Gender differentials

Lauer (2004) describes that there are significant gender differences in the distribution of *secondary* education in Germany. Generally, there has been a significant educational expansion among West German women. Some 67 per cent of West German men in the 1929-38 cohort hold a *Hauptschule* degree only, and 70 per cent of the West German women belong to this category. In the 1959-68 cohort, 38 per cent of the men hold *Hauptschule* degrees only while the women (30 per cent in the *Hauptschule* category) have caught up dramatically among the intermediate-level degree holders. In the 'younger' cohort, the proportion of women belonging to the intermediate-level category is significantly larger than the corresponding proportion of men (45 per cent vs. 35 per cent) even if in the 'older cohort', the proportions are about the same (22 per cent vs. 21 per cent). Furthermore, the presence of women in the high-level secondary education group increased noticeably: 8 per cent of the older cohort (compared to 11 per cent for males) and 23 per cent of the younger cohort (compared to 22 per cent for males) hold these degrees. Looking at *final* educational attainment, Lauer (2004) finds that much more women than men had no vocational degree in West Germany in 2000 (19 per cent compared to 12 per cent). However, the gender gap decreased over time. Moreover, the proportion of men holding a tertiary-level degree is much higher than the corresponding share among women. Concerning basic vocational and intermediate qualifications, there seems to be some convergence of the proportions of men and women, as well.

According to Lauer (2002a, 2003), estimating ordered probit models yields higher thresholds for women, i.e. given the family background and cohort, females seem to expect lower returns or higher costs related to education, for which reason their investments in education are lower than those of males. Estimating successive educational stages reveals a strong educational expansion at the secondary school level in particular, a trend that has been stronger for women compared to men.

In a descriptive analysis Bender and Dietrich (2001) examine the difference in educational attainment by gender for the birth cohorts of 1964 and 1971, respectively. They find that the educational distribution has changed in favour of females. According to their study, women generally obtained *higher* educational degrees compared to men in the 1964 cohort. More specifically, 28.4 per cent (38.4 per cent) of all women (men) were in the *Hauptschule* category while most women held a *Realschule* degree (40.6 per cent compared to 31.3 per cent for males) and fewer women (compared to the female proportion with a *Realschule* degree) held an *Abitur* degree (27.6 per cent vs. 25.7 per cent for males). In 1971 the proportions had changed in favour of the *Abitur* group: 20.2 per cent (30.9 per cent) of the interviewed women (men) were in the *Hauptschule* degree group while 38.2 per cent (33.1 per cent) had obtained a *Realschule* degree and 39.4 per cent (33.8 per cent) the *Abitur*. Similarly, Blossfeld (1993), Müller (1994) and Müller and Haun (1994) find that the gender gap in educational attainment has decreased.

Development over cohorts

Comparing the distribution of educational degrees by cohorts gives some idea about the future trend of educational attainment. Lauer (2004) compares an 'old' (born between 1929 and 1938) and a 'young' birth cohort (born between 1959 and 1968) of West Germans active in the labour market. Looking at *secondary* education, the proportion of students leaving school without a secondary degree has decreased slightly (3 per cent and 1 per cent, respectively). There is a clear decrease in the proportion of individuals having a *Hauptschule* degree only (68 per cent and 34 per cent, respectively). While only 21 per cent (9 per cent) obtained an intermediate (high) level degree in the cohort of 1929-38, in the cohort of 1959-68 already 40 per cent (23 per cent) obtained these degrees. Concerning *final* educational attainment, Lauer (2004) shows that there is a remarkable decrease in the proportion of persons holding no vocational degree. While 27 per cent of the individuals in the cohort of 1929-38 did not hold such a degree, only 10 per cent of the 1959-68 cohort belong to this category. Looking at the shares of individuals holding a basic voca-

tional degree, one can see that there is a tendency that relatively fewer persons hold a lower secondary school degree and a basic vocational degree (39 per cent in the old and 25 per cent in the young cohort) while the proportion of persons having an intermediate secondary school degree and a basic vocational degree increases (11 per cent in the old and 21 per cent in the young cohort). Furthermore, across cohorts there is a clear increase in the proportion of persons belonging to the intermediate qualification category (12 per cent in the older cohort and 25 per cent in the younger cohort) and to the tertiary-level degree group (10 per cent in the older cohort and 20 per cent in the younger cohort). Within the latter group, the increase in the number of persons holding a university degree has been significantly higher compared to the growth in (lower tertiary) *Fachhochschule* degrees. All in all, there is a clear trend of an expansion of higher educational degrees.

When investigating the effects of the cohort variables, Dustmann (2001) finds tendencies of convergence over cohorts (and thus over time); the impact of parental background on children's secondary school choice decreases, with the convergence being stronger for females than for males. One consequence is that the gender differential in high-level secondary school attendance seems to have disappeared for the youngest cohort. Müller (1994) and Müller and Haun (1994) find that examinations of educational attainment by cohort reflect the general expansion in educational participation. Additionally, the influence of social origin seems to be of smaller importance for the younger cohorts than for the older cohorts and this effect is stronger for women than for men. According to Henz and Maas (1995), the cohort effects illustrate the trend towards higher general educational degrees. Concerning the transition to secondary school levels, social background becomes less important for younger cohorts. For females, social background factors also lose their importance for vocational degrees.

Regional differences and East Germany

Below (1999) reports that the overall educational density increased significantly over time. According to his analysis, the educational density was higher for females than for males, especially in the East German states (the so-called new *Länder* states), in 1995. However, children of blue-collar workers, low-qualified or low-educated parents are still underrepresented in higher education. This disadvantage most notably affects males, particularly in states known for a 'conservative' educational policy (Bavaria and Mecklenburg-Western Pomerania). At the same time, children of non-blue-collar worker families, or whose parents are better educated, do not

seem to be influenced significantly by the state's educational policy. In Western Germany, the children of public servants have the highest educational density. Their educational density ranges from 63 per cent (Schleswig-Holstein) to 87 per cent (Hamburg), while that of blue-collar workers' children ranks from 33 per cent (Bavaria) to 66 per cent (Bremen). The children of self-employed and white-collar workers experience a higher educational density than blue-collar workers' children but a lower density compared to the children of public servants. All in all, Below (1999) concludes that significant inequalities with respect to social and regional background still exist, although one can observe some tendencies of adjustment.

Concerning regional effects, Henz and Maas (1995) find significant differences among rural and urban areas, as well as between northern and southern states (in favour of the south). Regional differences decrease over cohorts, and for the youngest cohort the difference in educational decisions is insignificant. Looking at vocational education of females, the ratio between urban and rural areas even turns around in favour of the rural areas.

4 The link between education and wage inequality

As described in the introduction, education as an investment in human capital is an important determinant of wages and their distribution. The link between education and wages has been studied intensively. However, the evidence on the effect of education on wage inequality remains ambiguous. After reviewing the literature on wage inequality and educational inequality, this section intends to establish their link, especially to shed light on the question how education affects the inequality of wages.

According to Martins and Pereira (2004), education has an impact on the distribution of wages in three ways, each of which we will look at separately. First of all, the price of skills acquired by education and reflected in the returns to education has an impact on the spread of wages. These inter-educational-level wage differentials have been extensively analysed over a long time period and will only be recapitulated briefly. Furthermore, wage dispersion also exists within educational groups. Only few studies consider this aspect; they are rather recent and constitute the focus of this review. Finally, the distribution of education within society changes, which affects the wage distribution through the returns to education. The studies referred to are summarised in Table 3.

4.1 Wage inequality between educational levels

The positive relationship between education and earnings is well established in the empirical literature. Skill prices defining the wage differentials between workers with different levels of education are thereby determined by the supply of and demand for skills on the labour market. Private returns to education relate the investment in an additional year of education to the higher wages that the investment will result in.

Methods

The part of wage inequality between individuals that is due to differences in the completed levels of education can be analysed in terms of the returns to education. In the basic Mincer equation (Mincer, 1974), which is the most prominent wage equation and derived from the human capital theory (Becker, 1964), log hourly wages are regressed on years of schooling, labour market experience, experience squared and other individual-characteristic variables. The parameter of the schooling variable obtained from using OLS regression techniques represents the return to an additional year of schooling. The higher the return to education is, the higher is the wage inequality for a given distribution of education, because the effect of differences in education on wages intensifies.

Results

Private returns to education in Europe were the subject of the EU-funded project 'Public Funding and Private Returns to Education' (PURE). In a contribution to the evidence available for West Germany, Lauer and Steiner (2001) show that the return to a year of schooling in the standard Mincer equation is about 8 per cent for men and 10 per cent for women. For the period 1984 to 1997, this figure stayed remarkably stable. According to one of the estimated earnings functions, the skill premium of university graduates relative to the unskilled even decreased slightly between 1984 and 1990 (Steiner and Wagner, 1998). From 1984 to 1997, no apparent increase in educational premia is visible according to another wage function (Prasad, 2000). The approximate stability of the returns to education between employees with different amounts of formal education is taken as a partial explanation for the observed stability of wage inequality in Germany during the last two decades.

For East Germany, a wage regression performed by Steiner and Hölzle (2000) shows a declining wage differential between university

graduates and unskilled workers in the period 1990 to 1997. Therefore, the observed rise in wage inequality cannot be due to a greater differential between the wages of differently educated workers. A decomposition of the inequality of male wages in East Germany between 1990 and 2000 shows, however, that the returns to education are a major explanatory factor of the increasing wage inequality, together with the firm size premium (Gang and Yun, 2003).

Table 3. Evidence on the education–wage inequality link

Authors	Data sets	Sample	Measure	Method	Major results
Fitzenberger *et al.* (2001)	IABS	1976-1984, male full-time employees, aged 25-55.	Monthly earnings	Quantile regressions	Little differences between lower quantiles and mean; no change over time.
Steiner and Wagner (1998)	GSOEP, IABS	1980-90, male employees, aged 16-66.	Monthly earnings	Earnings equations (OLS)	Decreasing inequality within education groups for GSOEP, not for IABS data.
Martins and Pereira (2004)	GSOEP	1984, 86, 91, 95, West Germany.	Hourly wages	Quantile regressions	Negative (reducing) impact of education on wage inequality.
Schnabel and Schnabel (2002)	GSOEP	1996, full sample and siblings sample, West Germany, aged 17-56.	Hourly wages	Mincer (OLS), fixed-effects, correlated random-effects	Importance of family background; favourable background leads to lower returns and higher wages
Lauer and Steiner (2001)	GSOEP	1984-97, West German employees, aged 30-60.	Hourly wages	Mincer equation (OLS)	Overall returns to education stay remarkably stable; higher returns for women; returns for technical college highest, high school lowest.
Prasad (2000)	GSOEP	1984-97, full-time workers, West Germany, aged 17-65	Hourly wages	Quantile regressions	Positive impact of education on wage inequality for univ. degree, negative for other workers.

The lasting good position of the low-skilled workers in Germany, at least when it comes to relative wages, is often explained by their flexible skill formation. The apprenticeship system, which most low-skilled workers have passed through, consists of vocational training in firms and formal schooling supplied by the state. This structure may allow for a fast adaptation of the apprenticeship system to shifts in the demand for skills, leaving the low-skilled workers in Germany less vulnerable to such shifts (Abraham and Houseman, 1995).

4.2 Wage inequality within educational levels

Empirical evidence shows that wages not only differ between workers with different levels of education but also within narrowly defined educational groups. This within-educational-level wage inequality may be due to unobserved skills or other characteristics of workers. In order to understand the link between education and wage inequality and to assess possible effects of changes in the distribution of education, it is important to observe how the variation of wages due to education changes along the conditional wage distribution. This allows us to assess more completely the effect of education as an instrument to reduce wage inequality.

Methods

OLS estimates only provide information on the returns to education at the mean of the conditional wage distribution. However, the returns to education may be quite unequal along the conditional wage distribution. This is the case if wages are not distributed identically around a known function of schooling. Therefore, quantile regressions that can be solved by linear programming methods are employed to estimate the returns to education and other determinants of wages at specific quantiles of the conditional distribution of the dependent wage variable (Bushinsky, 1994). As the educational groups are unequally represented in the different parts of the wage distribution, with many low-skilled workers in the lower part and high-skilled in the upper part, the returns to education at the different percentiles of the wage distribution give inference on within-educational-level wage inequality.

Results

Two recent studies analyse the wage inequality within educational levels in Germany by applying quantile regressions to GSOEP data. Martins and

Pereira (2000) consider the time span from 1984 to 1995, but base their analysis on only four data points (years of observation). Their quantile regressions estimate the standard Mincer equation, with log hourly gross wages as the dependent variable and the number of schooling years, labour market experience and experience squared as the independent variables.

The second study (Prasad, 2000) has distinct advantages because it considers every year between 1984 and 1997 and uses dummies for educational achievement instead of schooling years, which facilitates the consideration of the quantile regressions for the separate educational groups. Log hourly gross wages are regressed on three educational dummies, labour market experience, experience squared, tenure in a firm, a dummy for German citizenship and interaction variables between the dummy and all other explanatory variables.

The results of the two studies are comparable. According to Martins and Pereira (2004), the returns to education for the full sample of employees decrease when moving up along the wage distribution. Employees at the tenth percentile of the wage distribution have higher marginal returns to education than employees at the 90th percentile. The analysis of Prasad (2000), which includes dummies for three educational groups, allows for a more differentiated view. For the highest educational group, university graduates, the relationship between the wage distribution and the return to education is positive, contrary to the results of Martins and Pereira (2004). However, for the other two educational groups, employees with vocational training and with an apprenticeship, the relationship is again negative. As these two groups constitute the majority of employees, the results of the two studies are not necessarily opposing each other. The differences between the lower and upper quantiles are quite small, though, and appear to fall slightly over time.

Two further studies apply quantile regressions to German wage data that reach up to the year 1990 (Fitzenberger, 1999; Fitzenberger *et al.*, 2001). However, they draw on right-censored IABS data that allow for very limited inferences on the returns to education in the upper quantiles. In the lower half of the wage distribution, the percentile differences apparently changed little and did not greatly differ from the mean of the distribution.

The observed negative relationship between the wage distribution and the returns to education for two of the three educational groups, as well as for the whole sample, indicates that employees in the upper part of the distribution have lower returns to education than employees at the bottom. Wage inequality within educational groups would decrease with higher educational attainment because the spread of wages diminishes for higher

educational levels, and was even observed to decrease over time. According to Martins and Pereira (2004), this is a necessary condition for a negative (reducing) impact of higher educational attainment on overall wage inequality, which also depends on the part of the distribution where the educational 'upgrading' occurs and the magnitude of the returns to education.

These results comply with a recent paper on the heterogeneous returns to education in Germany, which concludes that workers with a more favourable family background earn higher wages and have lower returns to education (Schnabel and Schnabel, 2002). The relatively lower returns to education for the upper part of the wage distribution imply that for these people an additional year of education yields lower net benefits, be it for a lower increase in wages or higher marginal costs of education. According to the model developed by Schnabel and Schnabel (2002), however, the employees with a favourable family background and higher earnings have lower marginal costs of education than the employees with less-educated parents and lower wages.

The low-wage earners seem to benefit more from education than the high-wage earners, except for the group of university graduates. An educational expansion might, therefore, not lead to increasing wage inequality but rather to a further decrease in Germany. A comparison to other countries shows that this position is quite unique. Of the fifteen countries analysed by Martins and Pereira (2004), only Greece and Germany feature a negative relationship while 11 countries feature a positive relationship.

The estimated standard errors of the OLS wage regression performed by Steiner and Wagner (1998) support the presumption of declining earnings inequality within educational groups between 1984 and 1990 for the GSOEP data but not for the alternative calculations with IABS data. Despite the promising outlook of a negative effect of an educational expansion on wage inequality, a paper investigating the effect of family background and gender on returns to education using GSOEP data shows that, so far, especially the middle class has benefited from a broader access to higher education in West Germany (Schnabel and Schnabel, 2002).

4.3 Changes in the distribution of education and its effects on the wage distribution

As mentioned above when discussing the linkage between education and wage inequality, another aspect is the analysis of changes in the distribution of education and the effect on the wage distribution. Changes in the distribution of education in Germany have been described in Section 3

of this literature review. Now, the focus is on how these changes have affected the distribution of wages.

Data sources

In order to conduct a cross-national study, Devroye and Freeman (2001) use cross-country information on test scores as reported by the OECD International Adult Literacy Survey (IALS) and earnings information reported in the OECD Employment Outlook. The IALS has been conducted by asking the same questions (in the official language of each country) to adults in twelve countries. Major fields that the questions refer to are document literacy, prose literacy and quantitative literacy. The countries considered in the study are Belgium, Canada, Germany, Great Britain, Ireland, the Netherlands, New Zealand, North Ireland, Sweden, Switzerland, and the USA, where the major focus is given to a comparison between the USA, Germany, the Netherlands and Sweden. In addition to the IALS data, similar information on the USA from the 1992 National Adult Literacy Survey (NALS) is used.

In another cross-country analysis, Bedard and Ferrall (2003) use data on eleven countries (including West Germany), where information on test score dispersions comes from the First (1962) and Second (1982) International Mathematics Examinations (IME) while the data documenting the cohort's wages later in life are from the Luxembourg Income Study (LIS) and national panel studies that they do not specify in detail. The IME data includes information on the following countries: Australia, Belgium, Finland, France, West Germany, Japan, the Netherlands, Sweden, Ontario, the UK, and the USA.

As described above, Dustmann (2001) uses West German data from the GSOEP waves 1984-1987. Only individuals at least 21 and less than 66 years of age are considered. Additionally, in order to compare the educational distribution with the wage distribution, IABS data (compare Section 2) are used.

Methods

Devroye and Freeman (2001) conduct their analysis at the aggregate level. Their study examines coefficients of variation in IALS test scores in order to illustrate inequality in skills. Also, test scores are considered separately by within-country score quintiles and earnings quintiles. A two-stage regression analysis is conducted in order to assess the influence of the distribution of skills on the cross-country distribution of earnings. In

a first stage, log earnings are regressed on skills (test scores) and other explanatory variables (gender, immigrant status, age and age squared) for each country. Next, the coefficients on skills and the residual variances are examined in order to find out what a country's distribution would look like given another country's skill distribution. Additionally, Devroye and Freeman (2001) examine standard deviations of log earnings separately by skill bands in the middle part of the test score distribution. Another way of analysing the cross-country differences is to compare the dispersion of earnings by narrow test score categories across countries. Finally, Devroye and Freeman (2001) estimate a linear regression model; log earnings are regressed on categorical variables indicating an individual's position in the distribution of test scores, where score intervals of different sizes are considered.

Bedard and Ferrall (2003) examine Gini coefficients as summary measures of wage and test score dispersions, where test scores of thirteen year-olds in 1962 and 1982 and the same cohorts' wages later in life are analysed. In addition they draw Lorenz curves on these distributions.

Apart from examining educational attainment at the micro level, as described in Section 3, Dustmann (2001) links the distributions of wages and education through parental influences. The modelling of the influence of parental background has been described above (Section 3). In order to find out how parental characteristics influence (log) wages, the following regression approach was used: wages were regressed on secondary school degrees conditional on parental characteristics. The probability to hold a special secondary school degree conditional on the background characteristics is obtained from the results of the ordered probit model (see above).

Major results referring to Germany

At the aggregate level, Devroye and Freeman (2001) consider the fact that both earnings and educational inequalities differ among developed countries, and ask the question whether differences in the distribution of earnings can partly be explained by differences in the distribution of skills. They decompose the difference in the standard deviation of earnings between countries and conclude that skill inequality determines not more than 7 per cent of the cross-national differences in earnings inequality. Overall, they conclude that cross-country differences in the dispersion of skills, as measured by test scores or, alternatively, by years of schooling, hardly explain differences in the dispersion of pay. Below, some of the results referring to Germany are summarised.

In a descriptive cross-country consideration, Devroye and Freeman (2001) illustrate that the coefficient of variation in skills (measured by IALS test scores) is positively correlated with the 90-10 earnings ratio. Both the measure for skills and for earnings differentials are relatively low in Germany. The coefficient of variation in skills is lowest in Germany and only two countries (Belgium and Sweden) have lower 90-10 earnings differentials than Germany. Interestingly, in Germany, the test scores in the lowest quintile of the earnings distribution are hardly lower compared to the scores at the highest quintile (294 and 308, respectively). Furthermore, the scores in the lowest quintile are *higher* than the scores in the middle quintiles. When looking at the standard deviations of log earnings separately by skill bands in the middle part of the test score distribution, one finds that the dispersion in the EU countries (including Germany) is lower than in the USA. Additionally, the dispersion of earnings is lower in the EU countries at each quintile of the pay distribution (except from the highest quintile for Germany) than in the USA. Finally, regressing log earnings on categorical variables indicating an individual's position in the distribution of test scores, Devroye and Freeman (2001) find that in Germany, as well as in the other examined EU countries, the dispersion of earnings hardly decreases as narrower score intervals are used. This is astounding since one would expect that the mean standard error of log earnings decreases and approaches some fixed value as narrower score intervals are chosen (as is the case for the USA). Additionally, at any level of test score dispersion or number of score groups, the dispersion of log earnings is much lower in Germany compared to the USA.

As a major result, Bedard and Ferrall (2003) find that the wage dispersion is generally lower than the test score dispersion across countries as well as over time. There is only suggestive evidence on the relationship between wage and skill dispersions. Wage inequality measures may underestimate the increase in inequality due to labour market institutions and technological change, because younger workers bring more and more equal skills to the labour market. Comparing Gini coefficients for the countries participating in the International Mathematics Examinations (IME), one finds that the test score dispersion, as well as the dispersion of wages later in life are comparably low in West Germany for the considered 1962 cohort (no information on the 1982 cohort seems to be available). Only Finland (Gini coefficient of 0.104) and Belgium (0.131) have less score dispersion than West Germany (0.133), while the Gini coefficient is highest in the UK (0.211). Concerning wage inequality, only wages in Japan seem to be more equal (0.061) than West German wages (0.093), while the highest Gini coefficient refers to the USA

(0.143). Looking at the Gini coefficients for the different countries, Bedard and Ferrall (2003) find a negative correlation between the Gini coefficients on test scores and the *median* scores. Furthermore, the Gini coefficient on wages is smaller than the coefficient on test scores for most countries (including West Germany). Similarly, looking at Lorenz curves, the score curve is below the wage curve for nearly all observations.

Dustmann (2001) finds that even if there is a small convergence in secondary education (i.e. lower-education inequality), there is little convergence in the earnings individuals attain later in life. A possible link between the distributions of wages and education works through parental background. The parents' social class influences especially children's secondary school choices, which are made at an early stage in the children's life (at the age of ten) in Germany. This influence yields wage differentials later in the children's life. Dustmann (2001) concludes that observed cross-country differences in education and wage outcomes might be caused by differences in educational institutions.

Finally, the study by Bender and Dietrich (2001), mentioned in Section 3, looks at the proportions of individuals being full-time employed or unemployed as measures of labour market success. The study concludes that the better educated 1971 cohort is more successful in the labour market than the 1964 cohort. However, Bender and Dietrich (2001) do not explicitly link education and labour market outcomes. The better placement in the labour market could also be caused by different economical and demographic conditions of the 1971 birth cohort.

5 Conclusions

Summarising the existing literature leads to the conclusion that there is a relative stability in wage inequality, both between and within educational levels, and in the returns to education. Most change has occurred in East Germany, with a widening of the wage distribution. The lower returns to education for the upper quantiles of the wage distribution compared to the lower part suggest that an increase in the general level of educational attainment benefits the low-wage earners relatively more.

The inequality in education has decreased, especially concerning educational participation of children from disadvantaged social backgrounds. At the same time, the average educational attainment has risen, with a fall in the percentage of low educated and a rising proportion of

high educated. The observations of stable wage inequality and a rising average educational level comply with the results on the link between education and wage inequality. Returns to education are found to be slightly decreasing along the conditional wage distribution, which allows for a contracting effect of educational expansion on wage inequality. As no drastic changes have occurred in the distributions of education and wages over the last decade, the importance of the separate factors is difficult to illustrate, however.

Scope for further research includes an analysis of the link between education and wage inequality for different cohorts, and for the most recent data. Moreover, the evidence on the direct link between the distribution of wages and the distribution of education is scarce in Germany. Especially studies relating the distribution and development of cognitive skills, instead of formal schooling, to wages hardly exist.

Literature

Abraham, K. and S. Houseman (1995), Earnings Inequality in Germany, in Freeman, R. and L. Katz (eds), *Differences and Changes in Wage Structures*. University of Chicago Press.

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

Bedard, K. and C. Ferrall (2003), Wage and Test Score Dispersion: Some International Evidence, *Economics of Education Review* 22(1), 31–43.

Below, S. von (1999), Bildungschancen von Jugendlichen in Ost- und Westdeutschland, in Luettinger, P. (ed.), *Sozialstrukturanalysen mit dem Mikrozensus*. Mannheim.

Bender, S. and H. Dietrich (2001), *Unterschiedliche Startbedingungen haben langfristige Folgen. Der Einmündungsverlauf der Geburtskohorten 1964 und 1971 in Ausbildung und Beschäftigung – Befunde aus einem IAB-Projekt*. Institut für Arbeitsmarkt- und Berufsforschung, IAB Werkstattbericht 11, Nürnberg.

Blau, F. and L. Kahn (1996), International Differences in Male Wage Inequality: Institutions versus Market Forces, *Journal of Political Economy* 104, 791–837.

Blau, P. and O. Duncan (1967), *The American Occupational Structure*. New York.

Blinder, A. (1973), Wage Discrimination: Reduced Form and Structural Estimates, *Journal of Human Resources* 8, 436–455.

Blossfeld, H. (1993), Höherqualifizierung und Verdrängung – Konsequenzen der Bildungsexpansion in den Siebziger Jahren, in Müller, W. and M. Haller (eds), *Beschäftigungssystem im gesellschaftlichen Wandel*. Campus, Frankfurt am Main.

Boudon, R. (1974), *Education, Opportunity, and Social Inequality. Changing Prospects in Western Society*. Wiley, New York.

Bushinsky, M. (1994), Changes in the US Wage Structure 1963-1987: Application of Quantile Regression, *Econometrica* 62(2), 405–458.

Devroye, D. and R. Freeman (2001), *Does Inequality in Skills Explain Inequality of Earnings Across Advanced Countries?* NBER Working Paper No. 8140.

Dustmann, C. (2001), *Parental Background. Primary to Secondary School Transitions and Wages*. IZA Discussion Paper No. 367.

Fitzenberger, B. (1999), *Wages and Employment Across Skill Groups – An Analysis for West Germany*. Physica-Verlag.

Fitzenberger, B. and G. Wunderlich (2002), Gender Wage Differences in West Germany: A Cohort Analysis, *German Economic Review* 3(4), 379–414.

Fitzenberger, B., R. Hujer, T. MaCurdy and R. Schnabel (2001), Testing for Uniform Wage Trends in West-Germany: A Cohort Analysis Using Quantile Regressions for Censored Data, *Empirical Economics* 26, 41–86.

Freeman, R. and L. Katz (1992), Rising Wage Inequality: The United States vs. Other Advanced Countries, in Freeman, R. (ed.), *Working Under Different Rules*. Russell Sage Foundation, New York.

Gang, I. and K. Zimmermann (2000), Is Child Like Parent? Educational Attainment and Ethnic Origin, *The Journal of Human Resources* 35(3), 550–569.

Gang, I. and M. Yun (2001), The Gender Wage Gap and Discrimination, East Germany 1990-1997, *Vierteljahrshefte zur Wirtschaftsforschung* 70(1), 123–127.

Gang, I. and M. Yun (2003), Decomposing Male Inequality Change in East Germany During Transition, *Schmollers Jahrbuch* 123(1), 43–53.

Gottschalk, P. and T. Smeeding (1997), Cross-national Comparisons of Earnings and Income Inequality, *Journal of Economic Literature* 35(2), 633–687.

Handl, J. (1984), Chancengleichheit und Segregation: Ein Vorschlag zur Messung ungleicher Chancenstrukturen und ihrer zeitlichen Entwicklung, *Zeitschrift für Soziologie* 13, 328–345.

Handl, J. (1985), Mehr Chancengleichheit im Bildungssystem. Erfolg der Bildungsreform oder statistisches Artefakt?, *KZfSS* 37(4), 698–722.

Henz, U. and U. Maas (1995), Chancengleichheit durch die Bildungsexpansion?, *KZfSS* 47(4), 605–633.

Hunt, J. (2001), Post-Unification Wage Growth in East Germany, *The Review of Economics and Statistics* 83(1), 190–195.

Hunt, J. (2002), The Transition in East Germany - When Is a Ten Percent Fall in the Gender Wage Gap Bad News?, *Journal of Labor Economics* 20(1), 148–169.

Köhler, H. (1992), *Bildungsbeteiligung und Sozialstruktur in der Bundesrepublik. Zu Stabilität und Wandel der Ungleichheit von Bildungschancen*. Berlin.

Lauer, C. (2000), *Gender Wage Gap in West Germany: How Far Do Gender Differences in Human Capital Matter?* ZEW Discussion Paper No. 00-07, Mannheim.

Lauer, C. (2002a), *A Model of Educational Attainment. Application to the German Case*. ZEW Discussion Paper No. 02-06, Mannheim.

Lauer, C. (2002b), Enrolments in Higher Education in West Germany: Do Economic Incentives Matter?, *Education and Training* 44(4/5), 179–185.

Lauer, C. (2003), Family Background, Cohort and Education. A French-German comparison based on a multivariate ordered probit model of educational attainment, *Labour Economics* 10, 231–251.

Lauer, C. (2004), *Education and Labour Market Outcomes: A French-German Comparison*. Doctoral thesis, ZEW, Mannheim.

Lauer, C. and V. Steiner (2001), Education and Earnings in Europe – Germany, in Harmon, C., I. Walker and N. Westergaard-Nielsen (eds), *Education and Earnings in Europe. A Cross Country Analysis of the Returns to Education*. Edward Elgar, Cheltenham.

Maier, G. and P. Weiss (1990), *Modelle diskreter Entscheidungen. Theorie und Anwendung in den Sozial- und Wirtschaftswissenschaften*. Springer-Verlag.

Mare, R. (1981), Change and Stability in Educational Stratification, *American Sociological Review* 46, 72–87.

Martins, P.S. and P.T. Pereira (2004), Does Education Reduce Wage Inequality? Quantile Regressions from 16 Countries, *Labour Economics* 11(3), 355–371.

Mincer, J. (1974), *Schooling, Experience and Earnings*. Columbia University Press, New York.

Möller, J. (2000), Technological Change, Unemployment and Recent Trends in Human Capital Formation – Impact on the German Wage Structure, in Landesmann, M. and K. Pichelmann (eds), *Unemployment in Europe*. Confederation of European Economic Associations, Conference Volumes, and Macmillan Press, Houndsmill, Basingstoke.

Möller, J. and L. Bellmann (1996), Qualifikations- und industriespezifische Lohnunterschiede in der Bundesrepublik Deutschland, *ifo Studien* 421, 235–272.

Müller, W. (1994), Bildungsungleichheit im sozialen Wandel, *KZfSS* 46(1), 1–42.

Müller, W. and D. Haun (1994), Bildungsexpansion und Bildungsungleichheit, in Glatzer, W. (ed.), *Einstellungen und Lebensbedingungen in Europa*. Campus, Frankfurt am Main.

Oaxaca, R. (1973), Male-Female Wage Differentials in Urban Labor Markets, *International Economic Review* 14(3), 693–709.

Odink, J. and J. Smits (2001), The Inequality of the Wage Distribution in 15 European Countries, in Asplund, R. (ed.), *Public and Private Returns to Educa-*

tion - PURE Final Report. Downloadable at http://www.etla.fi/PURE/publications

Peisert, H. (1967), *Soziale Lage und Bildungschancen in Deutschland*. Piper, München.

Prasad, E. (2000), *The Unbearable Stability of the German Wage Structure: Evidence and Interpretation*. IMF Working Paper No. 00/22, Washington D.C.

Ram, R. (1990), Educational Expansion and Schooling Inequality: International Evidence and Some Implications, *Review of Economics and Statistics* 72(2), 266–274.

Riphahn, R. (2003), Die Bruttoeinkommensverteilung in Deutschland 1984-1999 und die wachsende Ungleichheit unter ausländischen Erwerbstätigen, in Schmähl, W. (ed.), *Wechselwirkungen zwischen Arbeitsmarkt und Sozialer Sicherung II*. Schriften des Vereins für Socialpolitik, Band 294, Duncker & Humblot, Berlin.

Schimpl-Neimanns, B. (2000), *Hat die Bildungsexpansion zum Abbau der sozialen Ungleichheit in der Bildungsbeteiligung geführt? Methodische Überlegungen zum Analyseverfahren und Ergebnisse multinomialer Logit-Modelle für den Zeitraum 1950-1989*. ZUMA Arbeitsbericht 02, Mannheim.

Schnabel, I. and R. Schnabel (2002), *Family and Gender Still Matter: The Heterogeneity of Returns to Education in Germany*. ZEW Discussion Paper No. 02-67, Mannheim.

Steiner, V. and K. Wagner (1998), Has Earnings Inequality in Germany Changed in the 1980s?, *Zeitschrift für Wirtschafts- und Sozialwissenschaften* 118, 29–59.

Steiner, V. and T. Hölzle (2000), The Development of Wages in Germany in the 1990s – Descriptions and Explanations, in Hauser, R. and I. Becker (eds), *The Personal Distribution of Income in an International Perspective,* Springer-Verlag.

CHAPTER 6

Education and Inequality in Greece:
A Literature Review

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In the Greek public discourse, education is usually considered as the main vehicle for the promotion of social equality and social mobility. The paper surveys the existing literature and concludes that the relationship between education and inequality in Greece is strong. Inequities are evident at all levels of the education system; especially as regards access to the most rewarding level, that is, university education. Many facets of the inequities observed in the labour market are associated with education, while education appears to be the single most important factor that shapes the overall distribution of income and influences the probability of poverty. Nevertheless, so far, several links between education and inequality have not been examined in detail.

1 Introduction[1]

Contemporary macroeconomic theory stresses the importance of human capital for the achievement of high rates of economic growth (Lucas, 1988; Romer, 1990; Barro and Sala-i-Martin, 1995), while human capital theory suggests that the distribution of human capital across individuals is an important determinant of aggregate inequality through its effects on the distribution of earnings (Becker, 1964; Mincer, 1974). Indeed, the existing evidence in both developing and developed countries shows that better-educated workers enjoy higher wages, lower rates of unemployment and better career prospects (Psacharopoulos and Patrinos, 2004).

In the Greek public discourse, education is usually considered as the main vehicle for the promotion of social equality and social mobility. Taking into account the positive relationship between education and wages, many policy makers consider education as an efficient instrument for promoting growth and reducing inequality, especially through the improvement of the qualifications of the least educated segments of the population. Nevertheless, relatively limited empirical research has been carried out so far in Greece in comparison with most other European countries, by either economists or sociologists on the precise channels through which education influences inequality.

The present article examines in detail the existing empirical evidence on various aspects of the effects of education on economic inequality in Greece. The remaining of the article is structured as follows. The next section is devoted to the examination of inequities in the Greek education system. It consists of three sub-sections. The first provides an overview of the Greek education system, the second is devoted to the examination of inequalities in access to tertiary education – a topic that features prominently in the Greek public discourse – and the third to the examination of the distributional impact of public education transfers in-kind, a very important topic that was rather neglected until recently. Section 3 is devoted to the effects of education on labour market outcomes

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and also consists of three sub-sections. The first provides a brief overview of the Greek labour market, the second focuses on the relationship between education and unemployment, whereas the third surveys the existing evidence on the relationship between education and wage inequality. Section 4 examines the impact of education on aggregate income distribution, and consists of two sub-sections. The first analyses the links between education and aggregate inequality while the second is devoted to the examination of the association between education, poverty and social exclusion. Finally, Section 5 concludes the article.

2 Inequalities in the Greek education system

2.1 An overview of the Greek education system

For a number of historical reasons, traditionally Greece had a relatively well-educated population in comparison with countries at her level of economic development. This can be attributed primarily to the fact that ever since the creation of the modern Greek state, in 1830, Greece had an overbloated bureaucracy. According to Tsoukalas (1977), the share of the civil servants in the population of the predominantly rural Greece in the late 19th century was substantially higher than the corresponding share in the leading industrial country of that period, the United Kingdom. A job in the civil service was highly considered and sought after, especially after a constitutional reform in the early 20th century that gave tenure to civil servants. An essential requirement for admission in the civil service was high educational qualifications in comparison with the rest of the population. This, in turn, created a strong demand for education; a perennial feature of the Greek education system.

Until an important reform of the education system that took place in 1964 the years of compulsory education were six; i.e., only primary education was compulsory. After that reform they rose to nine, only to be reduced again to six during the period of the military dictatorship (1967–1974) (Gouvias, 1998a). Reforms that were implemented after the restoration of democracy in 1976 increased the years of compulsory education to nine – a limit that still applies today – thus, making primary as well as lower secondary education compulsory. At the same time, following the recommendations of international bodies such as the World Bank and the OECD for the support of vocational education and the need to

reduce the substantial inequalities in educational opportunities that were prevailing in the 1970s (OECD, 1980), the first non-university tertiary education institutions were established (Technological Education Institutions). The changes in the education system that took place after the 1970s were not radical. Their main characteristics were, firstly, the gradual abolition of selection at the lower levels of the system and, secondly, the introduction and strengthening of new selective procedures at the end of the upper secondary education.

Table 1. The structure of the Greek education system in the mid-1990s

• **Primary education**		
1. Pre-school education: Nursery school	Ages 4–5	Non-compulsory
2. Basic education: Primary school Duration of studies: 6 years	Ages 6–11	Compulsory
• **Secondary education**		
1. Lower secondary education: Gymnasium Duration of studies: 3 years	Ages 12–14	Compulsory
2. Upper secondary education: Lyceum Duration of studies: 2 to 3 years a. General Lyceum (65% of students) b. Technical-Vocational Lyceum (22% of students) c. Technical-Vocational School (8% of students) d. Integrated Lyceum (5% of students)	Ages 15–17	Non-compulsory
• **Tertiary education**		
1. Higher Education Institutions: Universities (AEI) Duration of studies: 4 to 6 years		
2. Technological Education Institutions (TEI) Duration of studies: 3 years		

Source: Gouvias (1998a) and Tsakloglou and Antoninis (1999).

According to the Greek constitution, education is provided free of charge at all levels. Pre-primary education is not compulsory and the public supply of nursery schools is not able to fulfil the existing demand, which is covered by private sector providers. A number of private schools

operate at the primary and the secondary level. Enrolments in private schools account for 5 to 10 per cent of all enrolments and the overwhelming majority of private school students belong to households located at the top two quintiles of the income distribution (Antoninis and Tsakloglou, 2001). At the tertiary level, degrees offered by private institutions, which are treated by the law as commercial enterprises rather than educational institutions, are not officially recognised as equivalent to those of public institutions. The structure of the Greek education system in the mid-1990s is summarised in Table 1. In 1998, the various types of upper secondary education institutions were replaced by Lyceums and Technical Vocational Schools, lasting for three years. Lyceum graduates are eligible to take part in the general examinations to enter the Higher Education Institutions, which operate under a *numerus clausus* status. Graduates of Technical Vocational Schools may only enter Technological Education Institutions by participating in the general examinations. In 2004, the Ministry of Education announced that in the near future upper secondary education will be re-organised in such a way that all secondary education students will be able to participate in the general examinations to enter the Higher Education Institutions (Universities or Technological Education Institutions). Moreover, it was announced that qualifying examinations would be re-introduced in both primary and secondary education.

The Greek education system – and, in particular, its secondary level – is supposed to provide general skills with particular emphasis on humanities. In this way it is not contributing intensively to the acquisition of practical or vocational skills. Several studies have pointed to the fact that, when compared to countries at her level of economic development, education has played a minimal role in spurring economic growth in Greece (Caramanis and Ioannides, 1980; Vaitsos and Giannitsis, 1993). Upper secondary education is primarily viewed as a means to enter the tertiary level and bears little relation to the needs of the economy. On the other hand, the technical-vocational lyceums and schools offer reputedly lower quality of education. Links with firms are scarce and there is no formal way to absorb and channel graduates in the labour market.

Even though the education system expanded rapidly and enrolment rates have risen substantially in recent years, public expenditure on education did not rise accordingly and has, during the last decade, hovered between 3.5 and 4 per cent of GDP (OECD, 2002). This proportion is one of the lowest in OECD. Despite the limited number of students attending private schools, private expenditures on education are very high (for things such as foreign languages teaching and, especially, crammer

schools for preparation for tertiary education examinations) and rising inter-temporally. Kanellopoulos *et al.* (2003) estimate that the share of education expenditures in household budgets rose from 2.15 per cent in 1974 to 4.41 per cent in 1999; a share substantially higher than that of almost every other European country. Taken together, public and private education spending accounts for approximately 6.5 per cent of GDP (Kanellopoulos and Psacharopoulos, 1997).

With substantial contributions from EU Structural Funds, the infrastructure of primary and secondary education improved considerably in recent years. Moreover, due to the rapid decline in fertility rates and despite the fact that, during the last fifteen years, there was a large influx of children of immigrants working in the Greek labour market in the first two levels of the Greek education system, the number of students attending primary schools declined rapidly. A similar but less pronounced decline in the number of students is observed in secondary education, in spite of the increased share of students attending the non-compulsory part of secondary education. Partly as a consequence of this decline, the pupil-teacher ratio declined rapidly and is nowadays lower than the OECD average (see the evidence reported by Brunello *et al.* in this volume).

In the 1950s and 1960s, large numbers of students dropped out before completing the compulsory levels (primary and lower secondary) of the education system. In the early 1980s, drop-out rates from compulsory education had declined to around 20 per cent, and in the 1990s they were close to 10 per cent (Paleokrassas *et al.*, 1997). This proportion was not substantially different from the EU average at that time. It is not unlikely that with the influx into the Greek education system of foreign students experiencing language and assimilation problems, these rates may have risen a little in recent years. Drop-out rates from compulsory education are higher among males than females and, further, they are higher in the poorer rural areas of the country than in the cities (Paleokrassas *et al.*, 1997). About half of these drop-out rates concern persons who do not register into lower secondary education after the completion of primary education. Despite the decline in drop-out rates, according to Kanellopoulos *et al.* (2003), in the late 1990s 12.2 per cent of all persons aged 15–19 had not completed the compulsory levels of the Greek education system, while the corresponding proportion for those aged 20–24 was 10.4 per cent.

Until recently, the appointment of primary and secondary education teachers in public schools was based upon a waiting list for education departments' graduates. The time between graduation and employment

lasted for several years; a fact that most probably was affecting negatively the quality of teaching. Moreover, the salaries of public education teachers in Greece are primarily determined by seniority rather than performance. They are lower than those in most other OECD countries (see Brunello *et al.* in this volume), but the ratio of these salaries to the average earnings appears to be higher in Greece than in most OECD countries. No study can be found in the literature examining the effect of teacher salaries on educational outcomes (it should be noted, though, that in the existing framework such a study would not present enormous interest from either a research or a policy point of view).

Regarding the outcome of the first two levels of the Greek education system, the evidence of international comparative projects like the OECD–PISA (Programme for International Student Assessment) does not seem very encouraging. The assessment of students aged 15 in OECD countries shows that the Greek scores were lower than the OECD average in all subjects tested: reading literacy (474), scientific literacy (461) and mathematical literacy (457), against the OECD average of 500 (see Brunello *et al.* in this volume). In addition, it should be noted that the education system is highly centralised with respect to what is being taught throughout the country. For example, the textbooks in use are the same for all schools (even for the private ones) designed by a special body, the Pedagogical Institute. Naturally, this has an effect on the pace of adaptation of the content of studies to the changing social conditions.

An overview of inequality in access to higher education is provided in the next sub-section. Regarding primary and secondary education, in theory, the fact that these levels of education are characterised by a centralised structure should guarantee schooling of equal quality across regions and schools. However, the existing direct and indirect evidence suggests that this is far from true. Public schools in poorer areas are considerably less well equipped in terms of infrastructure than public schools located in more prosperous areas while, when exams were still in place in secondary education, there was clear evidence of a strong correlation between educational level of parents and success in the examinations (Katsikas and Kavadias, 1994).

2.2 Inequalities in access to tertiary education

As noted earlier, demand for tertiary education in Greece is very strong and is rationed using a centralised *numerus clausus* system. More specifically, every year the Ministry of Education decides about the number of places that will be allocated to each department of each higher education

institution. On the basis of this quantity rationing, upper secondary education graduates fill the places, after participating in nationwide competitive entry examinations ('general examinations'). These examinations, normally held in June, receive high attention from the press and, as Psacharopoulos and Tassoulas (2004, p. 241) point out "it is not an exaggeration to say that the whole nation is mobilized around this event". It is generally agreed that this particular system of examinations has distorted the whole educational process, has gradually reduced the educational role of the Lyceum, encouraged memorisation instead of innovative thinking, and is quite inefficient in sorting out students according to their abilities.

Until the early 1990s, less than 20 per cent of the candidates entered Universities, while slightly less than 20 per cent entered Technological Education Institutes, mostly not of their choice. In recent years, the number of places offered has risen considerably, mostly in newly established Universities and, especially, Technological Education Institutes. As a result, the ratio of candidates to places offered has declined, although the demand for places in University faculties such as medicine and engineering exceeds supply by a very wide margin. Even though it is generally recognised that some Technological Education Institutes offer skills that are highly valued in the labour market, the perception of the general public is that the courses offered by Technological Education Institutes are of inferior quality in comparison with the courses offered by the Universities and, hence, their educational status is usually considered as substantially lower (Benincasa, 1998).

The issue of unequal access to tertiary education has been studied by numerous researchers (see, among others, Meimaris and Nikolakopoulos (1978), Psacharopoulos and Papas (1987), Psacharopoulos (1988), Papas and Psacharopoulos (1991), Patrinos (1992, 1995) Katsikas and Kavadias (1994), Polydoridis (1995), Kyridis (1996), Kassotakis and Papagelli-Voulioui (1996), Gouvias (1998a, 1998b), Chryssakis and Soulis (2001), Psacharopoulos and Tassoulas (2004), Psacharopoulos and Papakonstantinou (2005)). Even though most of these studies are descriptive in nature (for example, no study uses probability analysis in order to investigate in detail the factors that affect the success or failure of candidates in the general examinations), their conclusions are very similar: children of parents with better educational qualifications and occupational background are far more likely to succeed in tertiary education examinations than students from lower socio-economic strata. This phenomenon is far stronger in Universities than in Technological Education Institutes.

Table 2. Indices of unequal access to university according to father's occupational status: all first-year university students, 1984/85 to 1987/88

Academic year	Father's occupational status				
	White-collar worker	Farmer	Blue-collar worker	Unemployed	Other (mainly pensioner)
1984-85	2.01	0.54	0.90	0.07	0.19
1985-86	2.08	0.49	0.93	0.11	0.15
1986-87	2.19	0.49	0.88	0.11	0.14
1987-88	2.13	0.54	0.94	0.12	0.16
1988-89	2.20	0.53	0.96	0.09	0.10
1989-90	2.14	0.46	0.97	0.17	0.25
1990-91	2.10	0.50	0.94	0.14	0.25
1991-92	2.19	0.45	0.88	0.20	0.24
1992-93	2.10	0.43	0.95	0.16	0.26
1993-94	1.95	0.43	1.04	0.13	0.20
1994-95	1.97	0.36	0.95	0.17	0.20
1995-96	2.06	0.35	0.84	0.11	0.18
1996-97	1.97	0.33	0.89	0.15	0.16
1997-98	2.01	0.31	0.85	0.14	0.15

Source: Chryssakis and Soulis (2001).

A vivid picture for the period 1984 to 1998 is provided by Chryssakis and Soulis (2001) and is reproduced in Table 2. This table reports the ratio of the proportion of first-year University students whose fathers belong to one of five particular occupational groups to the proportion of males aged 45–64 belonging to the corresponding occupational group (national average: 1.00). According to this index of unequal access to Universities (not tertiary education in general), children of blue-collar workers are slightly under-represented in the Greek Universities, while those of white-collar workers are around twice as likely as the national average to succeed in University entry examinations. The three remaining groups – children of farmers, unemployed persons and the residual category 'other' (mostly children of pensioners) – are substantially under-represented in Greek Universities. Similar evidence for more recent years is reported in Psacharopoulos and Papakonstantinou (2005). The differences are even more striking when the investigation is performed at the faculty level, with the children of better-educated white-collar workers even more heavily over-represented in fields like medicine, engineering and, to a lesser extent, business studies (Chryssakis and Soulis, 2001). Gouvias (1998a) also reports considerable disparities with respect to the

educational qualifications of the parents of higher education students, although he also notes that they are not as large as the disparities observed with respect to their parents' occupational status. Furthermore, according to Psacharopoulos and Tassoulas (2004), poor districts, evening schools, and state schools are associated with lower achievement in higher education entry examinations, whereas private schools are associated with higher achievement, even controlling for parental schooling and wealth (it should be noted, though, that the latter is questionable, since the data used by the authors are aggregate data rather than micro-data).

What lies behind these differences? As noted above, private demand for higher education is strong. As a result of the parents' keen interest in the success of their children in University entry examinations, a very large number of costly private crammer schools assisting the candidates have sprouted, operating in parallel with the official education system but, in fact, substituting it in many respects. Psacharopoulos and Tassoulas (2004) estimate that private spending per secondary education student is equal to 1.44 times the amount spent by the state per secondary education student, and speculate that this figure is substantially higher if the sample is restricted to upper secondary education students. Indeed, most upper secondary education students attend such crammer schools; even those from poor households. However, private spending per student and, hence, the quality of private tuition obtained varies considerably according to the ability of the household to pay for such services.

The latter is evident in the figures of Antoninis and Tsakloglou (2001), which are reproduced in Table 3. In this table, individuals aged 15–17 are grouped into quintiles according to the equivalent income of their households. In theory, everybody has the same chances to succeed in tertiary education entry examinations. However, the reality is very different. For a start, participation in post-compulsory secondary education is positively related with the economic status of the student's household; the proportion of persons aged 15–17 who do not participate in the post-compulsory stages of secondary education is more than twelve times as high in the bottom than in the top quintile. Moreover, as the evidence of the next row of the table points out, although the evidence is not clear-cut, among the population members aged 15–17 who participate in secondary education, the proportion of those who attend technical rather than general education is higher among the poorer students. As a result, not only fewer students from poor households reach the starting line for tertiary education entry examinations, but even those who reach it are more likely to be blocked from participating in exami-

nations for a place in a University. On top of this, the next row of the table suggests that

Table 3. Participation in education and private spending per upper secondary education student per quintile, Greece 1994

	Quintile				
	Bottom	Lower middle	Middle	Upper middle	Top
Proportion of persons aged 15–17 not in education, %	31.51	11.16	10.05	9.18	2.50
Proportion of upper secondary education students in technical education, %	23.62	21.67	18.97	24.85	12.53
Proportion of households with upper-secondary education students with expenditures on fees for cram schools and private tuition (%)	22.00	42.33	52.51	57.87	62.82
Monthly mean private spending per upper-secondary education student attending a cram school or taking private tuition (in drachmas)	9,226	15,096	19,218	26,318	33,875
Ratio of tertiary education to upper secondary education students	0.3068	0.3644	0.5264	0.6179	0.4989
Ratio of university to general upper secondary education students	0.2769	0.2760	0.3850	0.5501	0.3632

Source: Antoninis and Tsakloglou (2001).

the probability that an upper secondary education student attends a crammer school or receives private tuition is closely associated with the socio-economic status of his or her family. This probability is almost three times higher for such a student belonging to the top than to the bottom quintile. Further, it is not only the probability of attending a crammer school or receiving private tuition that is closely associated with the socio-economic status of the student's family, but also the actual amount of spending for services of this kind (see also Psacharopoulos and Papakonstantinou, 2005). The evidence of the fourth row of Table 3 shows that, on average, spending per upper secondary education student attending a crammer school or receiving private tuition is 3.7 times high-

er for students belonging to the top than to the bottom quintile. As a consequence, the ratio of tertiary education (University) students to upper secondary (general upper secondary) education students, reported in the last row of Table 3, is positively related to the quintile of the student's household (a reversal is observed in the top quintile; this should be attributed to the fact that a considerable proportion of the children of the households of the top quintile is likely to be found studying in foreign rather than Greek Universities). Under these circumstances, it is easy to understand why students from richer households are overrepresented in tertiary education.

The insufficient number of places in Greek higher education institutions and, until recently, the underdevelopment of post-graduate studies in Greece led a substantial number of Greek students to foreign Universities, thus perpetuating and strengthening a long tradition of high numbers of Greek students abroad. There is no official record in Greece of the number of Greek students studying abroad. However, according to UNESCO (1997), in the early 1990s over 40,000 Greeks were studying abroad, while Eurostat (2001) estimates the number of Greek students in other EU countries alone in the late 1990s to around 50,000. Psacharopoulos and Tassoulas (2004) argue that the total number of Greek students abroad in the early 2000s should be approximately 70,000. If this estimate is correct, it means that almost 65 Greek students per 10,000 persons in the general population study abroad; a staggering figure for student emigration and definitely one of the highest in the world. In short, the idea of free education guaranteeing equal opportunities in access to tertiary education to everybody appears contestable in practice while, at the same time and taking into account the cost of studying abroad, all the available evidence suggests a relatively high willingness-to-pay for education services.

2.3 The distributional impact of public education

Despite the fact that one of the main mechanisms used by the state in order to redistribute resources among its citizens is the education system, until recently no detailed study could be found in the literature examining in detail the distributional impact of public education transfers in-kind in Greece. In recent years, two papers (Tsakloglou and Antoninis, 1999; Antoninis and Tsakloglou, 2001) used static incidence analysis in order to examine this impact in 1988 and 1994. Even though they tried several alternative reference populations – the entire population, households with heads aged 25–60, households with members aged 6–24,

children in particular age brackets, etc. – the results were always similar in qualitative terms (although, naturally, in quantitative terms they were not). In a static framework, the overall distributional effect of the provision of free education services by the state was found to be progressive, but the extent of progressivity varied substantially across educational levels. More specifically, transfers to primary and secondary education students were found to reduce inequality substantially, while transfers to tertiary education students – and, especially, University students – were found to increase inequality. For example, Antoninis and Tsakloglou (2001), using the data of the 1993/94 Household Budget Survey, derive the estimates reported in Table 4.

Table 4. Distributional impact of education in-kind transfers, Greece 1994 (Index of inequality: mean log deviation)

Distribution	**Sample**		
	All households	Households with heads aged 25–60	Households with members aged 6–24
Initial distribution (pre-transfer)	0.1574	0.1360	0.1246
	Change in inequality after the addition of the education transfers, %		
Final distribution (post-transfer)	-2.16	-9.63	-11.88
Initial distribution plus primary transfers	-1.90	-5.10	-6.91
Initial distribution plus secondary transfers	-1.64	-4.75	-6.17
Initial distribution plus tertiary transfers	+1.52	+0.15	+2.89
Initial distribution plus TEI* transfers	+0.13	-0.22	+0.24
Initial distribution plus AEI** transfers	+1.33	+0.37	+2.73

Note: * TEI: Technological Institutes; ** AEI: Universities.
Source: Antoninis and Tsakloglou (2001).

The index of inequality used in this table is the mean log deviation. Depending on the distribution used, public education transfers reduce inequality between 2.2 and 11.9 per cent. Almost all this progressivity is due to primary (1.9 to 6.9 per cent) and secondary (1.6 to 6.2 per cent) education transfers. Nevertheless, this may be an over-estimation since, due to lack of relevant information, the authors were not able to take into account the effects of drop-out rates of children below the age of 14 which, as noted earlier, are likely to be higher among poorer students.

Unlike transfers to students at the first two levels of the education system, transfers to tertiary education students increase inequality between 0.2 and 2.9 per cent, depending on the distribution used. In the latter case, almost the entire effect is due to transfers to University students, while the impact of transfers to Technological Education Institute students is negligible. In fact, the authors argue that in reality the distributional impact of tertiary education transfers is likely to be far more regressive. This is because due to lack of detailed information they used a uniform subsidy per University or Technological Education Institute student. However, there is evidence that students from wealthier households are over-represented in faculties such as medicine and engineering where transfer/cost per student is substantially higher than the average whereas those from poorer households are concentrated mostly in low transfer/cost per student humanities and social sciences faculties (Meimaris and Nikolakopoulos, 1978; Frangoudaki, 1985; Chryssakis, 1991; Petychaki-Henze, 1992). Moreover, Antoninis and Tsakloglou (2001) report that the progressivity of public education transfers declined between 1988 and 1994 and almost the entire change is accounted for by changes in the progressivity of tertiary education transfers.

3 Education and labour market inequalities

3.1 An overview of the Greek labour market

The Greek labour market is characterised by a number of features, uncommon in the labour markets of most other European countries. Agricultural employment in Greece is approximately 15 per cent and is by far the highest in the 'old' EU-15 countries. The great majority of those engaged in agricultural activities are self-employed farmers. Self-employment is also widespread outside agriculture (almost a quarter of those working in industry and services are self-employed); especially in the low-skill segment of the labour force (domestic services, shopkeepers, small traders, etc.) and the high-skill segment (lawyers, engineers and other professionals). In addition, the great majority of those engaged in paid employment in the private sector of the economy works in small firms (firms with less than 50 employees), while about a third of the paid employees are employed in the broadly defined public sector (Kanellopoulos *et al.*, 2003). This results in a dualistic labour market. On the one hand, there are those who are either low-skilled self-employed or employed in small firms, receive low wages, work in unstable and precarious conditions,

often for very long hours, and face a highly competitive environment. On the other hand, there are those who are working either in the highly unionised public sector or in large private sector firms, and who receive relatively high wages and enjoy far better working conditions.

Three other features of the Greek labour market are also worth mentioning. First, employment rates are lower than the EU average. For example, in 1998 the employment rate was 55.5 per cent against the EU average of 62.2 per cent. Nevertheless since, due to institutional and legal constraints, part-time employment in Greece is the lowest in the EU, Greece's full-time equivalent employment rate of 54.1 per cent was only slightly lower than the EU average of 56.8 per cent. The difference in employment rates between Greece and the EU average is exclusively due to differences in female employment rates (40.2 against 52.9 per cent), whereas male employment rates are almost identical (70.6 against 69.7 per cent). Second, in recent years a very large number of legal and, particularly, illegal immigrants, mostly from former centrally planned Eastern European economies, has entered the Greek labour market. According to some estimates, the share of immigrant workers in the Greek labour force may be as high as 10 per cent. Scant evidence suggests that the overwhelming majority of these workers work in very precarious conditions and receive substantially lower wages than the indigenous workers (Lianos *et al.*, 1996). Third, even though, as noted below, the problem of unemployment is quite serious and the majority of the unemployed are long-term unemployed, less than one per cent of GDP is devoted to labour market policies, roughly equally divided between active and passive policies. Unemployment benefits are quite low, virtually flat, and provided for a limited period of time. Additionally, Greece is one of the few EU countries without a minimum income guarantee scheme, and active labour market policies are rather underdeveloped.

As noted earlier, the Greek education system expanded rapidly in the post-war period. This expansion is reflected in the evolution of the educational composition of the labour force. The evidence of Tables 5a and 5b is revealing. Using the data of three Household Budget Surveys covering the last quarter of the 20th century (1974, 1988 and 1999), the labour force is cross-classified according to sex and education (Table 5a) and age and education (Table 5b). The evidence of Table 5a shows that the share of those in the labour force with tertiary education rose from 7.3 per cent in 1974 to 15.3 per cent in 1988 and 22.2 per cent in 1999, while the share of those with less than lower secondary education declined from 71.1 per cent in 1974 to 54.7 per cent in 1988 and 31.4 per

cent in 1999. The educational qualifications of both males and females improved, but the improvement is more marked in the case of females. In fact, Kanellopoulos *et al.* (2003) report that it is not only the average educational qualifications of women that improved rapidly in the period under examination, but that women increased their representation in occupations that require particular educational qualifications and that, until some decades ago, were considered as male bastions. Moreover, the evidence of Table 5b suggests that this improvement in educational qualifications gradually affected all age groups. For example, in 1974 only 7.3 per cent of the labour market participants aged below 35 were tertiary education graduates while 62.2 per cent had completed less than lower secondary education. By 1999, the corresponding percentages were 23.6 and 13.2. Likewise, in 1974 only 5.3 per cent of the labour market participants aged over 50 were tertiary education graduates while 83.2 per cent had not completed lower secondary education. Twenty-five years later, the corresponding percentages were 14.1 and – the still high – 63.8, respectively.

Table 5a. Educational qualifications of the labour force (by sex)

Educational level	1974			1988			1999		
	M	F	All	M	F	All	M	F	All
Tertiary	7.5	6.7	7.3	13.4	15.3	14.1	20.2	25.3	22.2
Upper secondary	14.8	15.8	15.1	24.1	24.1	24.1	34.3	34.5	34.4
Lower secondary	7.9	3.5	6.5	11.4	5.9	9.5	13.5	9.8	12.1
Primary	52.3	41.8	49.1	42.2	39.3	41.2	29.0	24.0	27.1
Primary not completed	17.5	32.2	22.0	8.9	15.4	11.1	3.0	6.3	4.3

Notes: M refers to males, F to females.

Table 5b. Educational qualifications of the labour force (by age group)

Educational level	1974			1988			1999		
	Below 35	36–49	Over 50	Below 35	36–49	Over 50	Below 35	36–49	Over 50
Tertiary	7.3	8.3	5.3	16.5	15.3	8.0	23.6	25.6	14.1
Upper secondary	21.3	13.0	7.5	37.4	18.4	9.5	48.2	33.1	14.4

Lower secondary	9.1	5.3	4.1	14.1	7.5	4.4	15.0	11.9	7.6
Primary	55.5	43.8	47.6	30.8	50.6	45.4	12.2	27.7	49.9
Primary not completed	6.7	29.5	35.6	1.3	8.2	32.6	1.0	1.7	13.9

Source: Authors' own estimates from Household Budget Survey micro-data.

3.2 Education and unemployment

The link between education and unemployment in Greece has not been studied in great detail. Reliable unemployment statistics exist in Greece only since the early 1980s. At that time, the rate of unemployment was quite low by European standards but, since then, it has risen almost steadily and, in the 1990s, exceeded the EU average. The evidence presented in Table 6 is taken from the 1998 Labour Force Survey (Eurostat, 1999). At that time, the aggregate unemployment rate stood at 11.5 per cent. It then declined to around 9 per cent before starting to rise again. Although the evidence is slightly dated, the overall picture regarding the structure of unemployment corresponds sufficiently well to the picture of the early 2000s.

Table 6. Unemployment rates by educational attainment level, age group and sex, Greece 1998

		All	Less than upper secondary	Upper secondary	Tertiary
15–24 years	All	29.7	24.6	32.2	34.0
	Males	21.4	18.7	23.5	..
	Females	39.3	37.8	40.1	36.5
25–49 years	All	9.5	9.6	11.0	6.9
	Males	5.9	6.0	6.6	4.6
	Females	14.6	15.8	17.1	9.7
50–59 years	All	4.8	4.8	6.7	..
	Males	3.9	3.9	5.3	..
	Females	6.7	6.6	10.4	..
15–59 years	All	11.5	9.9	15.3	7.4
	Males	7.4	6.9	9.6	4.5
	Females	17.5	15.4	23.0	11.1

Note: .. indicates non-zero but extremely unreliable estimate.

Source: Eurostat (1999).

A number of striking features emerge from the estimates displayed in the table. First, unemployment is substantially higher among females than among males, irrespective of age group or educational qualifications; in 1998 the female unemployment rate stood at 17.5 per cent against a male unemployment rate of 7.4 per cent. Second, unemployment is extremely high in the youngest cohort (15–24 years old) irrespective of sex or educational qualifications; in 1998 it was a stunning 29.7 per cent. The rate of unemployment is relatively low, 4.8 per cent, in the oldest cohort (50–59 years old), but this may be attributed to early exit from the labour market, especially of the less skilled workers. Third, and most importantly form this survey's point of view, the relationship between unemployment and educational qualifications appears to be non-linear, irrespective of age or sex. More specifically, the lowest unemployment rates are observed among tertiary education graduates (7.4 per cent on average) and the highest among upper secondary education graduates (15.3 per cent on average), while the unemployment rates of those with less than upper secondary education lie somewhere between those of the other two groups (9.9 per cent on average).

The fact that unemployment rates are so high among secondary education graduates should be attributed to the fact that the skills offered in the general strand of upper secondary education, at least, are not suitable for the needs of the Greek labour market, while the system of apprenticeship, which is common in several European countries, is almost non-existent in Greece. Regarding tertiary education, it should be stressed that among University graduates, unemployment is anything but uniform. Kanellopoulos *et al.* (2003) show that a few years after graduation unemployment is very low among graduates of medicine, engineering, law, economics and business, while the opposite is observed among graduates of humanities. From a more general point of view it should be noted that on *a priori* theoretical grounds and in a dynamic context, the relationship between unemployment and enrolment in higher education is not as straightforward as sometimes assumed in the Greek public discourse. Higher unemployment rates may reduce the incentive to invest in education either because of the higher risk that they lead to or because they lower the expected wages of higher education graduates. Nevertheless, when unemployment is very high – and especially for those with intermediate educational qualifications, as in the case of Greece – the opportunity cost of studying declines and the incentive to invest in higher education rises.

3.3 Education and wage inequality

Human capital theory considers education as an investment in human capital, which yields a return in the form of enhanced future wages (Becker, 1964). Therefore, since education is an essential determinant of wages, the distribution of education is likely to affect the distribution of wages. Nevertheless, several empirical studies also show that wages differ not only between workers with different levels of education but also within narrowly defined educational groups. In fact, usually differences within educational groups account for a substantially larger part of total wage variation than differences between educational groups. Within educational levels wage inequality may be due to unobserved skills or various observable characteristics of the workers.

Table 7a. OLS estimates of log hourly earnings

	1974	1988	1994	1999
Men				
Schooling	0.073	0.056	0.074	0.083
Pot. Exper.	0.064	0.054	0.076	0.075
Pot. Exper. Sq.	-0.097	-0.078	-0.103	-0.098
Adj. R Squared	0.397	0.327	0.321	0.311
Women				
Schooling	0.115	0.080	0.102	0.117
Pot. Exper.	0.050	0.041	0.060	0.078
Pot. Exper. Sq.	-0.073	-0.059	-0.082	-0.112
Adj. R Squared	0.517	0.375	0.256	0.307
Private sector				
Schooling	-	0.054	0.067	0.071
Pot. Exper.	-	0.050	0.062	0.062
Pot. Exper. Sq.	-	-0.074	-0.082	-0.084
Women=1	-	-0.207	-0.252	-0.248
Adj. R Squared	-	0.273	0.199	0.213
Public sector				
Schooling	-	0.062	0.078	0.089
Pot. Exper.	-	0.029	0.052	0.064
Pot. Exper. Sq.	-	-0.034	-0.068	-0.092
Women=1	-	-0.046	-0.081	-0.109
Adj. R Squared	-	0.332	0.292	0.302

Source: Authors' own estimates from Household Budget Survey micro-data.

Several studies examining a number of aspects of human capital theory in Greece, using a variety of data sets, can be found in the literature. Cholezas and Tsakloglou (1999) provide a comprehensive survey. A number of studies have appeared since then, though (Tsakloglou and Cholezas, 2001; Kanellopoulos and Mavromaras, 2002; Kanellopoulos *et al.*, 2003; Papapetrou, 2004). Nevertheless, several channels of the link between education and earnings remain unexplored. Instead of reproducing the findings of the survey, we estimate Mincerian earnings functions on the data most widely used in the existing studies; i.e., those of the Household Budget Surveys for five years (1974, 1982 (only for monthly earnings), 1988, 1994 and 1999) and provide a summary of the main results. The corresponding estimates are reported in Tables 7a (for hourly earnings) and 7b (for monthly earnings). The data used refer to net earnings after taxes and national insurance contributions ('take home pay'). Most of the results reported in Tables 7a and 7b are in line with the results of the existing studies.

Table 7b. OLS estimates of log monthly earnings

	1974	1982	1988	1994	1999
Men					
Schooling	0.059	0.043	0.049	0.066	0.071
Pot. Exper.	0.063	0.054	0.055	0.073	0.074
Pot. Exper. Sq.	-0.097	-0.088	-0.081	-0.101	-0.101
Adj. R Squared	0.356	0.227	0.319	0.288	0.289
Women					
Schooling	0.095	0.060	0.057	0.073	0.084
Pot. Exper.	0.041	0.033	0.037	0.056	0.071
Pot. Exper. Sq.	-0.062	-0.048	-0.057	-0.084	-0.111
Adj. R Squared	0.464	0.261	0.300	0.190	0.228
Private sector					
Schooling	-	-	0.051	0.065	0.068
Pot. Exper.	-	-	0.050	0.064	0.064
Pot. Exper. Sq.	-	-	-0.076	-0.089	-0.089
Women=1	-	-	-0.243	-0.269	-0.294
Adj. R Squared	-	-	0.317	0.217	0.231
Public sector					
Schooling	-	-	0.046	0.058	0.059
Pot. Exper.	-	-	0.031	0.049	0.068
Pot. Exper. Sq.	-	-	-0.041	-0.068	-0.104
Women=1	-	-	-0.157	-0.206	-0.234
Adj. R Squared	-	-	0.330	0.286	0.293

Source: Authors' own estimates from Household Budget Survey micro-data.

In all years under examination, the returns to an additional year of education are higher for females than for males. For example, in the case of hourly earnings, the return to education for females varies between 8.0 and 11.7 per cent per year depending on the surveyed year, whereas in the case of males it ranges between 5.6 and 8.3 per cent. Although these estimates look relatively high, especially if we consider the fact that they refer to net rather than gross earnings, Harmon *et al.* (2001) using meta-analysis for fifteen European countries, and after controlling for several factors, conclude that the returns to schooling in Greece are relatively low in comparison with the rest of the countries included in their analysis. The evidence of Tables 7a and 7b further suggests that the returns to education are higher when hourly earnings are used instead of monthly earnings. The results are mixed regarding the returns to education in the public and the private sector of the economy. When hourly earnings are used, returns to education appear to be higher in the public sector, whereas the opposite holds when distributions of monthly earnings are utilised.

Irrespective of the distribution used, the returns to education appear to have declined substantially between the mid-1970s and the 1980s, but to have recovered in the 1990s. In the international literature, three possible explanations have gained prominence for the analysis of changes in wage inequality and returns to education in recent decades: skill-biased technological change (that is, an increase in the demand for particular types of skills that is not matched by an equivalent rise in supply), international trade and the institutional framework. The reasons behind the changes in the returns to education in Greece have not been investigated in detail. A number of studies (Kioulafas *et al.*, 1991; Lambropoulos, 1992; Lambropoulos and Psacharopoulos, 1992) attribute the decline in private returns to education in the late 1970s and 1980s to the rapid expansion of the education system, which resulted in an increased supply of better-educated workers. At the same time, slow economic growth contributed to a negligible rise in the demand for such workers, thus producing a decline in returns to education. Contrary to this, Tsakloglou and Cholezas (2001) argue that although all three aforementioned factors are likely to have contributed to the observed changes in private returns to education, the main contribution should probably be attributed to the institutional framework (especially taking into account that incomes policies were widely used until the early 1990s); a view that is also shared by Kanellopoulos *et al.* (2003). More specifically, until the late 1970s minimum wages were set at a different level for males and females, and a

considerable proportion of females was remunerated with the minimum wage. When the institutional framework changed and the minimum wage was set at a uniform rate for both sexes, thus raising the minimum wage for women, the wage differentials between low- and high-skilled women declined substantially, as did also the returns to education. Even more importantly, after the election of a socialist government in 1981, real hourly earning rose by 10.4 per cent between 1981 and 1982 while productivity and GDP per capita were declining. This rise was driven by a 17.3 per cent increase in the minimum wage in real terms. At the same time, wage indexation policies were introduced. However, indexation was fully realised only up to a particular wage level, and was less than complete above it. These developments, coupled with high inflation rates, led to a compressed wage structure. In the mid-1980s severe austerity measures were introduced, which reversed the earlier gains of wage and salary earners, but left the wage structure largely unchanged. As a consequence of this compressed wage structure, returns to education appear to have declined substantially in the 1980s. Wage indexation was abolished in the 1990s, incomes policies were abandoned, the labour market was gradually liberalised and, furthermore, there was an influx of low-skilled immigrant workers that mitigated the growth rate of the nominal wages of indigenous low-skilled workers. As a result, wage differentials across skill levels rose and private returns to education increased accordingly (even in the early 1990s, when the education system was expanding rapidly and the growth rates were quite low).

Table 8. Evolution of earnings inequality in Greece, 1974 to 1999

	1974	1982	1988	1994	1999
Monthly earnings:					
Males – Gini	0.292	0.215	0.225	0.272	0.301
Males – Mean log deviation	0.150	0.075	0.095	0.158	0.182
Females – Gini	0.287	0.196	0.212	0.257	0.304
Females – Mean log deviation	0.150	0.060	0.085	0.162	0.209
Hourly earnings:					
All – Gini	0.312	-	0.249	0.289	0.322
All – Mean log deviation	0.161	-	0.106	0.150	0.183

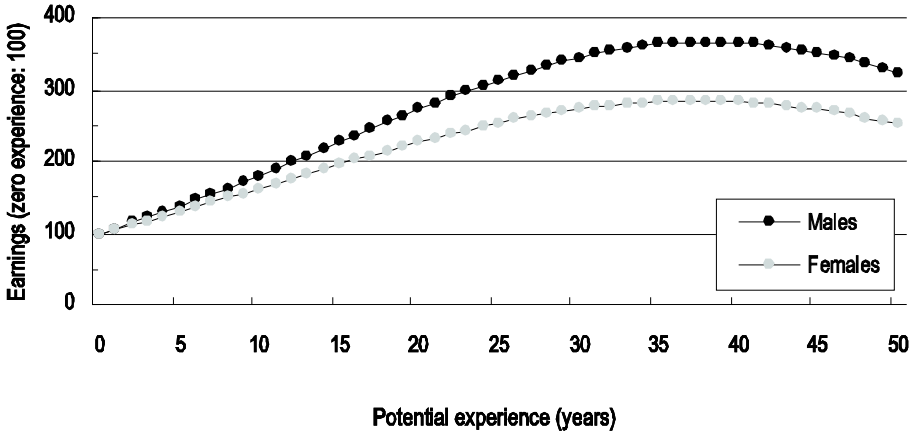
Source: Kanellopoulos *et al.* (2003) and Cholezas and Tsakloglou (2004).

The evolution of aggregate wage inequality followed a pattern similar to that of private returns to education. It declined between the 1970s and

the 1980s and rose in the 1990s. In fact, in 1999 wage inequality was higher than in 1974. As the evidence of Table 8 shows, this pattern is observed irrespective of whether distributions of monthly or hourly earnings are utilised, irrespective of the index of inequality used and irrespective of whether the reference sample consists of all employees, male employees or female employees only. Most probably the aforementioned institutional changes, which are likely to explain the evolution of private returns to education, also explain the evolution of wage inequality. Odink and Smits (2001) also report similar trends, albeit for a shorter period. They also note that Greece's inequality in the distribution of hourly earnings is one of the highest in Europe. It is worth mentioning at this point that Kanellopoulos *et al.* (2003), using evidence from Household Budget Surveys, show that in real terms, monthly earnings rose very substantially between 1974 and 1982, declined between both 1982 to 1988 (considerably) and 1988 to 1994 (mildly), only to rise again between 1994 and 1999. Nevertheless, even in 1999 they were lower than in 1982. This trend is observed for both males and females, but varies within narrowly defined sub-groups of workers. Similar but less pronounced results, and for a shorter period, are also reported by Tsakloglou and Cholezas (2001) who use hourly instead of monthly earnings.

Although returns to education are higher for females than for males, potential experience seems to play a more important role in the earnings determination process of male than of female employees. In all years under examination, the age–earnings profiles of female workers are substantially flatter than those of male workers. An example taken from Tsakloglou and Cholezas (2001) for 1994 is provided in Figure 1. Of course, it should be noted that the use of potential rather than actual experience (due to lack of data) may be misleading, since the working careers of female employees are more likely to be interrupted for voluntary (such as child birth) or involuntary (such as unemployment) reasons. Moreover, it should be mentioned that, in reality, very few workers – males or females – are located in the descending part of the age–earnings profile curve.

Figure 1. Age–earnings profiles – Greece, 1994



Several studies show that the returns to education are non-linear with respect to levels of education (Kanellopoulos, 1982, 1985, 1986, 1997; Psacharopoulos, 1982; Kioulafas *et al.*, 1991; Lambropoulos and Psacharopoulos, 1992; Magoula and Psacharopoulos, 1999; Tsakloglou and Cholezas, 2001). Table 9 reproduces the evidence of Tsakloglou and Cholezas (2001) and shows that marginal rates of return to education are rising with respect to the level of education in the case of both males and, to a lesser extent, females. For example, in 1994 each additional year of primary, lower secondary, upper secondary (non-technical) and university education increased the private returns to education of male workers by 2.1, 6.1, 6.9 and 8.7 per cent, respectively. Moreover, if these estimates are adjusted for the probability of unemployment per educational level and age group, the differences are even more striking (2.0, 5.4, 6.3 and 9.1 per cent, respectively).

Table 9. Marginal annual rates of return per educational level, Greece 1994 (%, unadjusted and adjusted for unemployment)

Educational level	Unadjusted		Adjusted	
	Males	Females	Males	Females
Primary	2.1	- *	2.0	- *
Lower secondary	6.1	- *	5.4	- *
Upper secondary	6.9	9.2	6.3	7.5
Upper secondary technical	6.3	11.9	5.9	9.3
Tertiary technical (TEI)	7.0	6.6	6.6	7.8
University (AEI)	8.7	10.4	9.1	10.6

Note: * indicates that the coefficient is statistically non-significant.

Source: Tsakloglou and Cholezas (2001).

Martins and Pereira (2004) and Cholezas (2004a) examine whether the returns to education are uniform across the wage distribution using quantile regression techniques, the former within a cross-country framework, the latter using Greek data for the period 1974 to 1999. The basic idea behind quantile regressions is that, if returns are higher at the top end of the earnings distribution than at the bottom end, then education boosts earnings inequality, since education is a better investment for the 'rich'. If the opposite holds true, then education reduces earnings inequality. Martins and Pereira (2004) report that in the 15 European countries and USA that they examine, Greece is the only country – apart from Germany – in which the estimated returns to education are higher at the bottom deciles of the conditional earnings distribution; i.e., the slope of the returns–quintiles relationship is negative. Therefore, education appears to reduce wage inequality. For most years, Cholezas (2004a) reports a U-shaped pattern between returns to education and the quintiles of the conditional earnings distribution for both males and females (Figures 2a and 2b). However, when he tests the significance of the differences across quintiles, he reports that, in most cases, the differences of the estimated parameters are not statistically significant.

Figure 2a. Returns to education for different points of the earnings distribution – Males

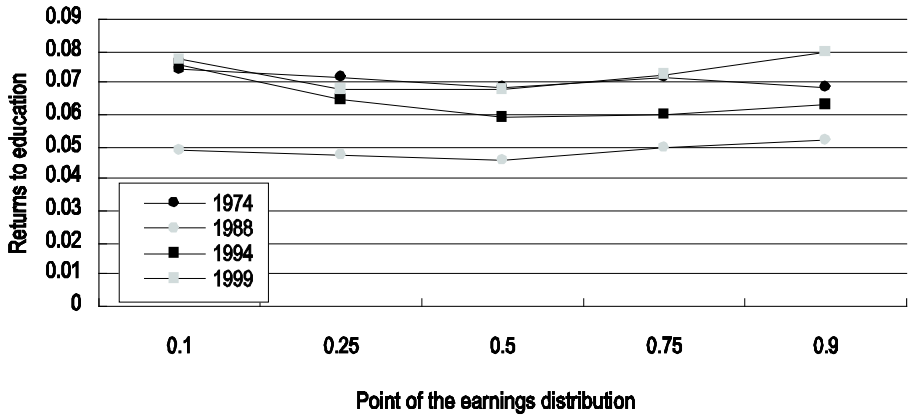
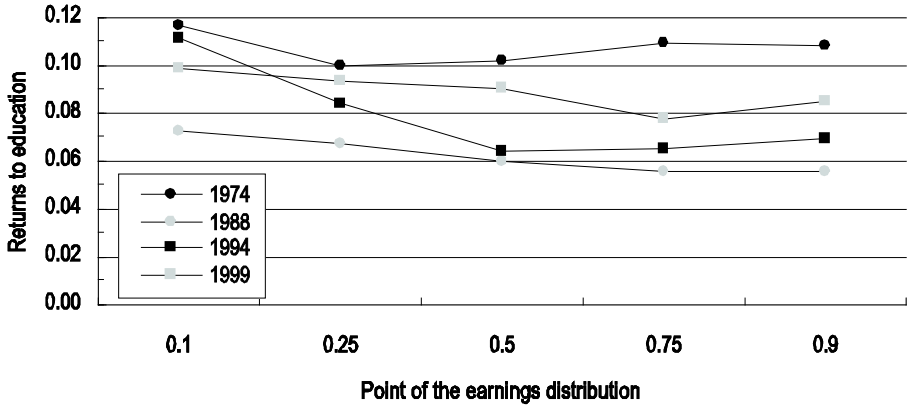


Figure 2b. Returns to education for different points of the earnings distribution – Females



Source: Cholezas (2004a).

Three other factors that may influence the rate of return to education and, hence, the dispersion of earnings have been examined in the literature: socio-economic background, discrimination, and screening. Regarding the worker's socio-economic background, the only studies available are those of Patrinos (1992, 1995), who uses data from the late 1970s. He investigates the extent to which access to tertiary education, which is the most costly and rewarding level of education, is influenced by the father's education and demonstrates that individuals with better-educated fathers are likely to be better-educated themselves. In addition, after defining four groups of individuals according to the father's education, he concludes that private returns to education are higher for those with higher socio-economic background – a phenomenon usually observed in developing rather than developed countries. Of course, taking into account the evidence of Table 3, it can be argued that those from more privileged socio-economic background are likely to receive education of higher quality, which may be reflected in higher quality of human capital, higher productivity and, therefore, higher returns to education, keeping the years of schooling constant. However, Patrinos offers two equally plausible explanations that seem to be valid in the case of Greece. He argues that it is very likely that in the Greek labour market where contacts and connections matter a lot, the observed pattern is the outcome of exploitation of the superior contacts and connections that better-educated fathers preserve and 'transmit' to their children. Moreover, the more privileged are able to afford a lengthy job search period since they are being supported by their families, while those with a less privileged socio-economic background are more likely to end their search period quickly, and wind up in inappropriate jobs.

The effect of discrimination on the observed earnings gap between male and female workers has been analysed in a number of papers. Kanellopoulos (1982) uses data from the 1960s and concludes that in a simple Mincerian framework, discrimination (i.e., the unexplained part of the earnings differential) accounts for almost 60 per cent of the observed male–female earnings gap. This percentage declines to 30, when additional explanatory variables are added. Psacharopoulos (1982) investigates the gender earnings differential in the late 1970s, and finds the female to male earnings ratio to be 65 per cent. He reports that almost 90 per cent of the gender earnings gap is accounted for by discrimination, while more educated female employees, within a given occupational group, are less discriminated against. Likewise, Patrinos and Lambropoulos (1993), using data from the early 1980s, conclude that almost the entire earnings differential between sexes can be attributed to discrimination. Kanellopoulos and Mavromaras (2002) utilise information from the Household Budget Surveys of 1988 and 1994, and show that selectivity bias is important and that females pay a large premium in terms of lower wages in order to be employed. According to their estimates, in 1988 the proportion of the wage gap due to discrimination was 71.5 per cent. By 1994 it had declined to 54 per cent. Unlike the rest of the studies, which have examined male–female earnings differences using distributions of hourly earnings, Kanellopoulos *et al.* (2003) use monthly earnings and examine both the level and the evolution of the structure of the earnings gap based on data from all Household Budget Surveys with national coverage. Their results are reported in Table 10. The earnings gap declined substantially between 1974 and 1982, from 38.1 to 26.1 per cent, and remained more or less stable thereafter. The proportion of the gap attributed to discrimination declined from 67.8 per cent in 1974 to 27.5 per cent in 1982, only to increase steadily thereafter and reach the level of 87.9 per cent in 1999. The authors attribute the dramatic increase in the share of discrimination between 1982 and 1999, when there was no perceptible change in the earnings gap, to the fact that during this period the educational qualifications of female employees improved substantially vis-à-vis those of male employees but this improvement was not reflected in their monthly earnings.

Table 10. Male–female monthly earnings gaps and the contribution of discrimination, Greece 1974 to 1999

Year	Earnings gap	Proportion due to discrimination

1974	38.1%	67.8%
1982	26.1%	27.5%
1988	22.9%	46.3%
1994	25.9%	70.7%
1999	23.7%	87.9%

Source: Kanellopoulos *et al.* (2003).

Papapetrou (2004) studies the earnings differential between sexes at different points of the earnings distribution using data from the 1999 wave of the ECHP. Her results indicate that the gap differs along the earnings distribution and that it tends to be larger at the top and at the bottom of the distribution. The main source of the differential is the unexplained part (discrimination), which takes its highest values at the bottom (60.7 per cent) and, especially, at the top decile point of the distribution (65.6 per cent). Cholezas (2004b) attempts to decompose the gender earnings differential in the private sector of the economy, after correcting for selectivity bias, into three distinct components, namely the characteristics component, the discrimination component and the selectivity component for the period 1988 to 1999. The selection equation shows that better-educated workers, especially women, are more likely to be employed in the public sector. Then, the author decomposes the earnings gap into all components (one for each explanatory variable). In line with most previous studies, he shows that the largest part of the earnings differential is to be attributed to discrimination.

Apart from earnings differentials between sexes, two studies also examine the earnings differentials between public and private sector employees. As noted earlier, about one-third of all workers engaged in paid employment work in the broadly defined public sector (civil service, local administration, public utilities, state-controlled enterprises). Moreover, their educational qualifications are, on average, higher than those of private sector employees. For example, Kanellopoulos *et al.* (2003) report that of all tertiary education graduates that were working, 41.1 per cent were employed in the public sector in 1998 (this share was even higher in earlier periods). Kioulafas *et al.* (1991) use data covering the period 1975 to 1985 and conclude that earnings, as well as returns to education and potential experience are higher in the public sector of the economy. Kanellopoulos (1997) investigates the public–private sector earnings differential separately for each sex using data for the late 1980s. He shows that both sexes are better rewarded in the public sector and reports evi-

dence of both selectivity bias (for public sector employment) and discrimination (across sectors of employment).

Finally, a number of studies have examined the role of education as a screening device, using different methodologies and reaching different conclusions. Kanellopoulos (1985) examines the effect of schooling on earnings in the 1960s within three different experience groups, using payroll data. His results indicate that schooling is extremely important in the first three years of working life, which reinforces the weak screening hypothesis. Returns decrease in the following years, since factors such as ability and skills influence earnings and reduce the importance of schooling. Lambropoulos (1992) investigates the issue using mid-to-early career earnings ratios calculated from payroll data for 1977, 1981 and 1985, and fails to identify patterns of screening in the Greek labour market. Likewise, Magoula and Psacharopoulos (1999) use data from the 1994 Household Budget Survey to test the screening hypothesis by use of experience–earnings profiles and examination of the impact on earnings of an interaction term between tertiary education and potential experience, and fail to identify any evidence of screening. Tsakloglou and Cholezas (2001), who also use Household Budget Survey data, compare the returns to education for self-employed persons, who do not face signalling effects, with those of employees, who may do so. It turns out that the self-employed have lower returns to education, which can be considered as an indication that education operates as a screening device in the Greek labour market. Even when the sample is restricted to private sector employees, the screening hypothesis cannot be rejected, at least for male workers.

4 Education and the income distribution

4.1 Education and aggregate inequality

Naturally, since education is one of the main determinants of earnings and earnings constitute the most important component of total income, education is likely to affect aggregate inequality. The contribution of education to aggregate inequality in Greece has been examined in a number of papers attempting one-way or multi-variate decomposition of inequality by population sub-groups (Lazaridis *et al.*, 1989; Tsakloglou, 1992, 1993, 1997; Mitrakos and Tsakloglou, 1997a, 1997b, 1998; Papatheodorou, 2000; Mitrakos *et al.*, 2000; Tsakloglou and Mitrakos, 2004). The con-

clusions of these studies are very similar: education is the single most important determinant of aggregate inequality. For example, the evidence of Tsakloglou and Mitrakos (2004), using the data of five Household Budget Surveys covering the period 1974 to 1999, reproduced in Table 11 is very clear.

Table 11. Structure of inequality, Greece 1974 to 1999

Grouping criterion	Number of groups	% of aggregate inequality attributable to differences 'between groups'				
		1974	1982	1988	1994	1999
Region	11	14.0	8.2	7.4	6.9	7.2
Type of locality	4	13.3	9.8	10.2	6.5	10.0
Demographic group	9	3.7	5.6	6.8	6.4	7.2
Socio-economic category of household head	9	17.0	12.5	13.5	11.5	13.8
Educational level of household head	5	25.2	17.7*	20.8	21.0	19.9

Note: * 4 groups only.

Source: Tsakloglou and Mitrakos (2004).

In this table, the entire population is grouped into mutually exclusive and exhaustive groups using five alternative criteria – region of residence, type of locality, demographic group, socio-economic category of the household head, and educational level of the household head – and the structure of inequality in the distribution of equivalent consumption expenditure is analysed (consumption expenditure is considered as a better proxy for the unobserved welfare level of the individuals than current disposable income, but similar results are also derived when income distributions are used instead). The contribution of differences 'between groups' to aggregate inequality is the proportion of total inequality emanating from disparities across groups when differences 'within groups' remain intact, using as index of inequality the mean logarithmic deviation, which is a 'strictly additive decomposable' index of inequality. In general, the more homogeneous the population groups and the larger the number of population groups, the larger the proportion of aggregate inequality attributable to disparities 'between groups'.

In all years under examination, the contribution of educational factors to the determination of aggregate inequality is higher than the contribu-

tion of any other partition of the population, even though in most cases the number of groups in the other partitions is substantially larger than the partitioning of the population into educational groups (five groups in all years, apart from 1982). In 1974, disparities between educational groups accounted for around a quarter of aggregate inequality. In the rest of the years under examination, the corresponding share hovers around 20 per cent. These results are reinforced by the results of multivariate decomposition of inequality (Tsakloglou, 1992; Mitrakos and Tsakloglou, 1997b, 1998; Tsakloglou and Mitrakos, 2004), which show that even when a fine partition of the population is attempted, using all the grouping factors of Table 11 simultaneously, education is the only factor that accounts independently for a high proportion of aggregate inequality. Moreover, Mitrakos and Tsakloglou (2000) using inequality trend decomposition analysis report that, *ceteris paribus*, the upgrading of the educational qualifications of the population during the last quarter of the 20th century (captured by the changes in the population shares of the educational groups) had an adverse effect on aggregate inequality and that the observed decline in aggregate inequality during that period should be attributed to changes in disparities both within and across educational groups.

4.2 Education, poverty and social exclusion

Besides inequality, a number of studies examining the structure of poverty in Greece show that the risk of falling below the poverty line is anything but uniform across educational groups (Tsakloglou, 1990; ISSAS, 1990; Karayiorgas *et al.*, 1990; Hagenaars *et al.*, 1994; Tsakloglou and Panopoulou, 1998; Mitrakos *et al.*, 2000). At least throughout the last quarter of the 20th century, for which empirical evidence is available, poverty is negatively related to education. Table 12 reproduces estimates of Tsakloglou and Panopoulou (1998) for the mid-1990s regarding the poverty rates and the contributions to aggregate poverty of particular population groups when the population is grouped by the educational level of the household head.

Table 12. Structure of poverty according to the educational level of the household head, using alternative welfare indicators, Greece 1994

Educational level of the household head	Population share	Poverty rate according to:			
		CE	CI	PI	NM
Tertiary education	11.2	1.4 (0.9)	1.4 (0.9)	2.4 (3.6)	2.2 (1.4)
Upper secondary education	18.3	4.6 (4.8)	6.6 (7.3)	4.9 (1.2)	5.0 (5.1)
Lower secondary education	8.8	13.7 (6.9)	10.8 (5.7)	3.5 (4.1)	9.2 (4.5)
Primary education	45.2	20.0 (52.2)	19.2 (52.4)	8.0 (48.3)	20.0 (50.0)
Primary education not completed	16.5	36.8 (35.0)	33.6 (33.5)	20.7 (45.9)	42.9 (39.1)
	100.0	17.4	16.6	7.4	18.2

Notes: CE refers to Consumption Expenditure; CI to Current Income; PI to Permanent income; and NM to Composite Non-Monetary Welfare Indicator. The figures in parentheses are contributions to the aggregate poverty rate.

Source: Tsakloglou and Panopoulou (1998).

Irrespective of the distribution used (consumption expenditure, disposable income, a proxy for the 'permanent income' of the household, or a composite non-monetary welfare indicator) a strong negative relationship is always evident between the poverty rate and the educational level of the household head. Poverty is negligible in households headed by tertiary education graduates (1.4 to 2.4 per cent depending on the distribution used) but quite common in households headed by persons who did not complete primary education or completed only primary education. In fact, depending on the distribution used, between 85 and 95 per cent of all poor individuals could be found in the latter two groups in the mid-1990s. The results are even stronger when distribution-sensitive poverty indices are used instead of the poverty rate as indicators of poverty.

Moreover, using probabilistic techniques, Loizides and Giahalis (1992) and Mitrakos *et al.* (2000) show that, even when several other factors are included in the analysis, education always turns out to be a very significant factor affecting the probability of falling below the poverty line. Likewise, Papatheodorou and Piatchaud (1998) examine the role of educational factors in the inter-generational transmission of poverty and conclude that both father's and mother's education are significant factors

in explaining whether in his or her adult life the individual will be located above or below the poverty line. With respect to the effect of the educational expansion on poverty in recent decades, Mitrakos and Tsakloglou (2000) using poverty trend decomposition techniques conclude that, *ceteris paribus*, the effect of changes in population shares regarding the educational composition of the population accounted for about two-fifths of the observed decline in relative poverty.

In recent years, in the public discourse of several European countries there has been a shift in emphasis from poverty to social exclusion. Although the operationalisation of the concept is far from uncontroversial, Papadopoulos and Tsakloglou (2004) select a particular approach and, using decomposition analysis, show that the risk of social exclusion is strongly inversely related with the educational level. In addition, Tsakloglou and Papadopoulos (2002) using logit analysis demonstrate that in Greece as in most EU countries, even after controlling for several factors, low educational qualifications increase substantially the risk of social exclusion.

5 Conclusions

The present article has surveyed the existing evidence on the relationship between education and inequality in Greece. This relationship appears to be strong. Greece experienced a rapid educational expansion in recent decades. Nevertheless, inequities are evident at all levels of the education system; especially as regards access to the most rewarding level, that is, university education. Furthermore, many facets of the inequities observed in the labour market are associated with education, while education appears to be the single most important factor that shapes the overall distribution of income and influences the probability of poverty. Even though the number of papers surveyed is not small, several aspects of the detailed channels through which education influences the level and the structure of inequality in Greece are still missing. This is especially evident as far as issues of the impact of the quality of education on earnings, on the effects of socio-economic background on earnings in recent years, as well as labour market inequities and, particularly, inequalities in the distribution of wages are concerned. Most probably, empirical research in the near future will shed lights to these areas, too.

Literature

Antoninis, M. and P. Tsakloglou (2001), Who benefits from public education in Greece? Evidence and policy implications, *Education Economics* 9, 197–222.

Barro, R. and X. Sala-i-Martin (1995), *Economic growth*. McGraw-Hill, New York.

Becker, G. (1964), *Human Capital: A theoretical and empirical analysis with special reference to education*. Columbia University Press, New York.

Benincasa, L. (1998), University and the entrance examinations in a Greek provincial town: a bottom-up perspective, *Educational Studies* 24, 33–44.

Brunello, G., S. Comi, C. Lucifora and E. Scarpa, *Inequality in education and wages in Italy: A review of the empirical literature*. (Chapter 7 of this volume)

Caramanis, M. and Y. Ioannides (1980), Sources of growth and the contribution of education, sex and age structure to the growth rate of the Greek economy, *Greek Economic Review* 2, 143–162.

Cholezas, I. (2004a), *Private returns to education in Greece: A quantile regression analysis*. Department of International and European Economic Studies, Athens University of Economics and Business. Mimeo.

Cholezas, I. (2004b), *Male–female earnings differentials in Greece*. Department of International and European Economic Studies, Athens University of Economics and Business. Mimeo.

Cholezas, I. and P. Tsakloglou (1999), Private returns to education in Greece: A review of the empirical literature, in Asplund, R. and P.T. Pereira (eds), *Returns to human capital in Europe: A literature review*. ETLA The Research Institute of the Finnish Economy, Series B156, Helsinki.

Cholezas, I. and P. Tsakloglou (2004), *Earnings inequality in Greece*. Department of International and European Economic Studies, Athens University of Economics and Business. Mimeo.

Chryssakis, M. (1991), Uneven access to tertiary education: the impact of educational changes, in Petralias, N. (ed.), *The University in Greece today*. Sakis Karayiorgas Foundation, Athens. (in Greek)

Chryssakis, M. and S. Soulis (2001), Inequalities in access to University education: An approach to the official data, *Panepistimio* 3. (in Greek)

Eurostat (1999), *Labour Force Survey 1998*. Theme 3, Series E, Eurostat, Luxembourg.

Eurostat (2001), *Yearbook 2001*. Brussels.

Frangoudaki, A. (1985), *Sociology of education*. Papazisis, Athens. (in Greek)

Gouvias, D. (1998a), The relation between unequal access to higher education and labour market structure: the case of Greece, *British Journal of Sociology of Education* 19, 305–334.

Gouvias, D. (1998b), Comparative issues of selection in Europe: The case of Greece, *Education Policy Analysis Archives* 6.

Hagenaars, A.J.M., K. de Vos and M.A. Zaidi (1994), *Poverty statistics in the late 1980s: Research based on micro-data*. Theme 3, Series C, Eurostat, Luxembourg.

Harmon, C., I. Walker and N. Westergaard-Nielsen (2001), Introduction, in Harmon C., I. Walker and N. Westergaard-Nielsen (eds), *Education and earnings in Europe*. Edward Elgar Publishing, Cheltenham.

ISSAS (1990), *Poverty in figures: Europe in the early 1980s*. Theme 3, Series C, Eurostat, Luxembourg.

Kanellopoulos, C.N. (1982), Male–female pay differentials in Greece, *Greek Economic Review* 4, 222–241.

Kanellopoulos, C.N. (1985), Individual pay differentials in Greece, *Spoudai* 35, 109–125.

Kanellopoulos, C.N. (1986), *Incomes and poverty in Greece: Determining factors*. Center of Planning and Economic Research, Scientific Studies No 22, Athens. (in Greek)

Kanellopoulos, C.N. (1997), Public–private wage differentials in Greece, *Applied Economics* 29, 1023–1032.

Kanellopoulos, C.N. and G. Psacharopoulos (1997), Private education expenditure in a 'free education' country: the case of Greece, *International Journal of Educational Development* 17, 73–81.

Kanellopoulos, C.N. and K.G. Mavromaras (2002), Male–female labour market participation and wage differentials in Greece, *Labour* 16, 771–801.

Kanellopoulos, C.N., T. Mitrakos and K.G. Mavromaras (2003), *Education and labour market*. Center of Planning and Economic Research, Scientific Studies No 50, Athens. (in Greek)

Karayiorgas, D, T. Georgakopoulos, D. Carantinos, I. Loizides, N. Bouzas, J. Yfantopoulos and M. Chrysakis (1990), *Aspects of poverty in Greece*. National Center for Social Research, Athens. (in Greek)

Kassotakis, M. and D. Papagelli-Vouliouri (1996), *Access to Greek tertiary education: Historical developments, problems and prospects*. Grigoris, Athens. (in Greek)

Katsikas, C. and G. Kavvadias (1994), *Inequities in Greek education*. Gutenberg, Athens. (in Greek)

Kioulafas, K., G. Donatos and G. Michailidis (1991), Public and private sector wage differentials in Greece, *International Journal of Manpower* 12, 9–14.

Kyridis, A. (1996), *Inequalities in Greek education and access to the University*. Gutenberg, Athens.

Lambropoulos, H. (1992), Further evidence on the weak and strong versions of the screening hypothesis in Greece, *Economics of Education Review* 11, 61–65.

Lambropoulos, H. and G. Psacharopoulos (1992), Educational expansion and earnings differentials in Greece, *Comparative Education Review* 36, 52–70.

Lazaridis, P., T. Papailias and M. Sakelis (1989), *The distribution of income in Greece*. Agricultural Economy Studies No 35, Agricultural Bank of Greece, Athens. (in Greek)

Lianos, T, A.H. Sarris and L.T. Katseli (1996), Illegal immigration and local labour markets: The case of Northern Greece, *International Migration* 34, 449–484.

Loizides, I. and V. Giahalis (1992), Poverty profiles in Greece: A probabilistic approach, *Greek Economic Review* 14, 71–88.

Lucas, R. (1988), On the mechanics of economic development, *Journal of Monetary Economics* 22, 3–42.

Magoula, T. and G. Psacharopoulos (1999), Schooling and monetary rewards in Greece: an over-education false alarm?, *Applied Economics* 31, 1589–1597.

Martins, P. and T.P. Pereira (2004), Does education reduce wage inequality? Quantile regression evidence from 16 countries, *Labour Economics* 11, 355–371.

Meimaris, M. and E. Nikolakopoulos (1978), Factor analysis of data concerning the relation between socio-economic background and the course of study of University students, *Epitheorisi Koinonokon Erevnon* 33–34. (in Greek)

Mincer, J. (1974), *Schooling, experience and earnings*. Columbia University Press, New York.

Mitrakos, T. and P. Tsakloglou (1997a), An anatomy of inequality: Greece 1988, *Bulletin of the International Statistical Institute* LVII, Book 3, 595–599.

Mitrakos, T. and P. Tsakloglou (1997b), The structure of economic inequalities in Greece, in Kintis, A. (ed.), *The present and the future of the Greek economy*, Vol. II. Gutenberg, Athens. (in Greek)

Mitrakos, T. and P. Tsakloglou (1998), Decomposing inequality under alternative concepts of resources: Greece 1988, *Journal of Income Distribution* 8, 242–253.

Mitrakos, T. and P. Tsakloglou (2000), Changes in aggregate inequality and poverty in Greece after the restoration of democracy, *Meletes Oekonomikis Politikis* 5, 1–52. (in Greek)

Mitrakos, T., G. Panopoulou and P. Tsakloglou (2000), Economic inequalities and poverty in Greece: Quantitative dimensions of the problem, in Pakos, T. (ed.), *The 2/3 society*. Panteion University Press, Athens. (in Greek)

Odink, J. and J. Smits (2001), The inequality of the wage distribution in 15 European countries, in Asplund, R. (ed.), *Public and Private Returns to Education - PURE Final Report*. Downloadable from http://www.etla.fi/edwin

OECD (1980), *Educational Policy Planning: Educational reform policies in Greece*. Paris.

OECD (2002), *Education at a Glance*. Paris.

Paleokrassas, S., P. Rousseas and V. Vretakou (1997), Greek lower secondary school dropouts: Results from a national survey, *European Educational Research Association Bulletin* 3, pp. 12-18.

Papadopoulos, F. and P. Tsakloglou (2004), Social exclusion in the EU: Quantitative estimates and determining factors, in Comim, F., S. Alkire and M. Qizilbash (eds), *Operationalising Sen's capability approach*. Cambridge University Press, Cambridge. (forthcoming)

Papapetrou, E.M. (2004), Male–female earnings differentials in Greece, *Economic Bulletin of the Bank of Greece* 23, 57–78. (in Greek)

Papas, G. and G. Psacharopoulos (1991), The determinants of educational achievement in Greece, *Studies in Educational Evaluation* 17, 405–418.

Papatheodorou, C. (2000), *Decomposing inequality by population subgroups in Greece: Results and policy implications*. LSE-STICERD, Distributional Analysis Research Programme Discussion Paper No 49.

Papatheodorou, C. and D. Piachaud (1998), Family background, education and poverty in Greece, in Korayem, K. and M. Petmesidou (eds), *Poverty and Social Exclusion in the Mediterranean Area*. CROP, Bergen.

Patrinos, H.A. (1992), Higher education finance and economic inequality in Greece, *Comparative Education Review* 36, 298–308.

Patrinos, H.A. (1995), Socioeconomic background, schooling, experience, ability and monetary rewards in Greece, *Economics of Education Review* 14, 85–91.

Patrinos, H.A. and H. Lambropoulos (1993), Gender discrimination in the Greek labour market, *Education Economics* 1, 153–164.

Petychaki-Henze, M. (1992), *Trends in social mobility in Greece*. Athens University of Economics and Business, Department of Economics Discussion Paper No 26. (in Greek)

Polydoridis, G. (1995), *Sociological analysis of Greek education: the University-entry examinations*. Gutenberg, Athens. (in Greek)

Psacharopoulos, G. (1982), Earnings and education in Greece, 1960–1977, *European Economic Review* 17, 333–347.

Psacharopoulos, G. (1988), Efficiency and equity in Greek higher education, *Minerva* 26, 119–137.

Psacharopoulos, G. and G. Papakonstantinou (2005), The real university cost in a "free" higher education country, *Economics of Education Review* 24, 103-108.

Psacharopoulos, G. and G. Papas (1987), The transition from school to the university under restricted entry: a Greek tracer study, *Higher Education* 16, 481–501.

Psacharopoulos, G. and H.A. Patrinos (2004), Returns to investment in education: A further update, *Education Economics* 12, 111-134.

Psacharopoulos, G. and S. Tassoulas (2004), Achievement at the higher education entry examinations in Greece: A Procrustean approach, *Higher Education* 47, 241–252.

Romer, P.M. (1990), Endogenous technological change, *Journal of Political Economy* 98, S71–S102.

Tsakloglou, P. (1990), Aspects of poverty in Greece, *Review of Income and Wealth* 36, 381–402.

Tsakloglou, P. (1992), Multivariate decomposition of inequality: Greece 1974, 1982, *Greek Economic Review* 14, 89–102.

Tsakloglou, P. (1993), Aspects of inequality in Greece: Measurement, decomposition and inter-temporal change: 1974, 1982, *Journal of Development Economics* 40, 53–74.

Tsakloglou, P. (1997), Changes in inequality in Greece in the 1970s and the 1980s, in Gottschalk, P., B. Gustafsson and E. Palmer (eds), *Changing Patterns in the Distribution of Economic Welfare. An International Perspective*. Cambridge University Press, Cambridge - New York - Melbourne.

Tsakloglou, P. and M. Antoninis (1999), On the distributional impact of public education: evidence from Greece, *Economics of Education Review* 18, 439-452.

Tsakloglou, P. and I. Cholezas (2001), Greece, in Harmon, C., I. Walker and N. Westergaard-Nielsen (eds), *Education and earnings in Europe*. Edward Elgar Publishing, Cheltenham.

Tsakloglou, P. and T. Mitrakos (2004), Inequality and poverty in Greece in the last quarter of the twentieth century, in Mossialos E. and M. Petmesidou (eds), *Social Policy in Greece*. Ashgate, Aldershot. (forthcoming)

Tsakloglou, P. and G. Panopoulou (1998), Who are the poor in Greece? Analysing poverty under alternative concepts of resources and equivalence scales, *Journal of European Social Policy* 8, 229–252.

Tsakloglou, P. and F. Papadopoulos (2002), Aggregate level and determining factors of social exclusion in twelve European countries, *Journal of European Social Policy* 12, 209–223.

Tsoukalas, K. (1977), *Dependence and reproduction: The social role of education mechanisms in Greece, 1830–1922*. Themelio, Athens. (in Greek)

UNESCO (1997), *1997 UNESCO Statistical Yearbook*. New York.

Vaitsos, C. and T. Giannitsis (1993), Greece, in Patel S. (ed.), *Technological transformation in the Third World*. Avebury, Aldershot.

CHAPTER 7

Inequality in Education and Wages in Italy: A Review of the Empirical Literature

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The level and the distribution of human capital in a country can have significant effects both on economic performance and on various forms of inequalities across individuals. This article presents some of the main stylised facts characterising the Italian education system, and reviews the empirical evidence on the relationship between education and wage inequality in Italy.

1 Introduction[1]

The level and the distribution of human capital in a country can have significant effects on economic performance, as well as on various forms of inequalities across individuals. As documented in the economic literature, educational achievement is a key factor in economic growth and innovative capacity (Bardone *et al.,* 1998) and, at the same time, educational patterns can influence the labour market performance of individuals in terms of wage and employment opportunities. Available evidence suggests that more educated individuals experience lower unemployment rates, higher wages and better career opportunities. Of course, the provision of human capital and the efficiency in the labour market also depend on the institutional setting and on the way the education system is organised within a country.

This chapter presents some of the main stylised facts characterising the Italian education system, and reviews the empirical evidence on the relationship between education and wage inequality in Italy. The rest of the chapter is organised in the following way. Section 2 describes the main features characterising the Italian education system (structure, organisation, financing, etc.). Section 3 presents some evidence on the educational attainment of the Italian population and the efficiency of the system itself, and discusses the controversial issue of quality of education. In Section 4, the relationship between education and wage inequality is presented and the relevant literature reviewed. Section 5 summarises the main findings and concludes.

2 The Italian education system

The Italian schooling system has been shaped over the last century by a number of important reforms. Following the 1923 educational reform[2], primary school (*scuola elementare*) became compulsory for children aged 6 to 11. Secondary school was divided into two distinct tracks, academic

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1 This text is prepared for the project 'Education and Wage Inequality in Europe–EDWIN' (HPSE-CT-2002-00108). Financial support from the European Commission under the V framework programme is gratefully acknowledged. We would like to thank project partners for helpful comments.

2 The so-called Gentile Law.

and vocational, and only students belonging to the academic track were allowed to enter tertiary education.[3]

The Italian school system remained largely unchanged until the 1962 reform of the compulsory lower secondary school (*scuola media*) established the leaving school age at 14, adding to primary school three further years of compulsory and comprehensive education. The 1969 reform eliminated restrictions of access to university, and allowed graduates of vocational secondary schools to enrol.

Primary school was reformed again in 1990, when the new curricula – approved in 1985 – were fully implemented.[4] One of the main effects of this reform was to increase the teacher/pupil ratio, which faced to the ageing of the Italian population also managed to provide jobs for an increasingly large (excess) supply of primary school teachers. Since then, in primary and lower secondary school classes no more than 25 pupils are allowed (down to 20 when the class hosts disabled children). In the 1990s, as an alternative to traditional tertiary education, two – and three – years' diplomas were also introduced. One of the more recent changes was intended to raise compulsory leaving age, from 14 to 15 in 1999. This change was to be effective from the year 2000, but was further cancelled by the Italian Parliament in early 2003.

Figure 1 draws a picture of the current educational system. The school year starts in September and covers a minimum of 200 school days per year. Exams are normally taken at 14 (*esame di scuola media inferiore*) and further education is a matter of choice. Those continuing in education can choose between courses of 3 or 5 years[5] leading to another leaving exam, usually after five years of upper secondary school (*scuola superiore*). This exam (known as *esame di maturità*) is mostly taken at age 19. Many students, however, drop out of school before reaching the final exam. The university system was reformed in 1999. Now it has adopted a scheme consisting of three cycles – undergraduate (*laurea,* usually 3 years) and post-graduate studies (2 years of specialist degree and then a three-

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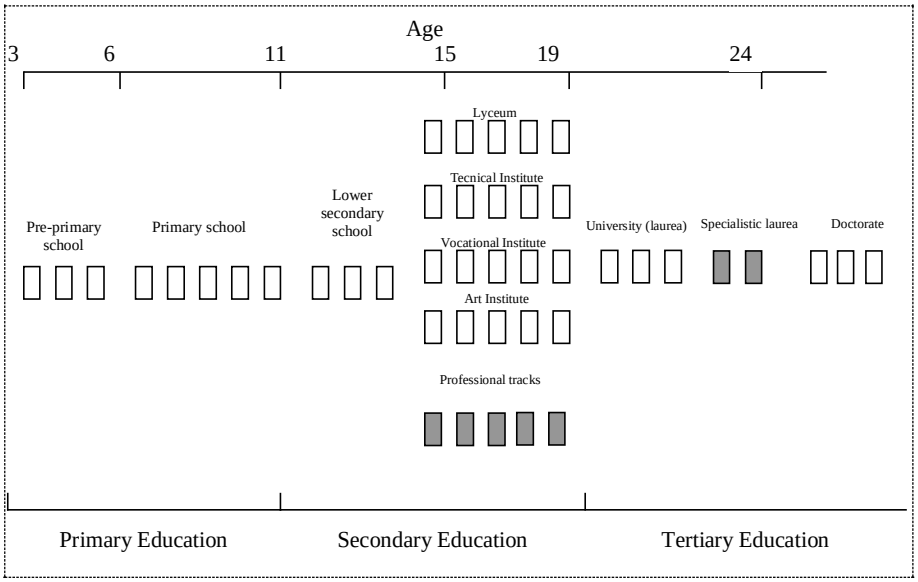
[3] The Italian vocational system is school based. See Shavit and Müller (1998) for a discussion.

[4] Primary school education is now aimed at promoting initial cultural literacy and the full development of individual pupils, with an emphasis on interaction with families and the social community.

[5] Courses that last 5 years are: classical and scientific type (*liceo classico and liceo scientifico*), artistic type (*liceo artistico, istituto d'arte*) and technical type (*istituto tecnico*) while vocational type (*istituto professionale*) lasts 3 years.

year doctorate). In the same year, a credit system was introduced, based on the ECTS (European credit transfer system) model. Other reforms of the whole system, from primary to upper secondary, are currently being discussed in the Italian Parliament (see Box 1 about the so called Moratti reform).

Figure 1. The structure of the Italian educational system



= last changes introduced by the Moratti reform (details are in Box 1)

Any level of education may also be carried out in a private school. Article 33 of the Italian Constitution establishes two fundamental principles regarding the educational policy of the country: (i) the State's obligation to offer a public school system, which is accessible to all young people and which conforms to their attitudes and aspirations, independently of their economic and social conditions, and (ii) the right of private persons and organisations to establish schools and educational institutes, without public financial involvement. Nowadays, there are different types of private schools for each level of study: at the primary level they can be authorised directly by the MPI (*scuole parificate*) or by the local Education Director (*scuole private autorizzate*); at the secondary level they can be legally approved (*scuole legalmente riconosciute),* and they are almost similar to public schools, or just authorised (*scuole pareggiate).* In the latter case, they are typically confessional schools.

Box 1 – The new reform of the Italian educational system (Moratti reform)

Italy recently approved a reform of the educational system, after one year of experimentation. The Italian system will be articulated as follows:

- **Pre-primary school**: for children from 2 and half years to 5 and half years (*not compulsory).*
- **First cycle**: for children from 5 and half years old and lasting 8 years; it introduces foreign languages and basic PC knowledge from the very beginning.
- **Second cycle**: the law introduces two different systems, the '*liceo*' lasting 5 years, and vocational training lasting 4 years (to be integrated with a further year to access University).

Upon reaching the 15th year of age, the second cycle (both '*liceo*' and vocational training) can be completed by an apprenticeship, by alternating vocational education and training. In this way the law maintains a clear differentiation of tracks. Differentiation, however, is less pronounced than in the German 'dual system'.

The following table shows how the EU education/training system is characterised with respect to the degree of differentiation and standardisation of curricula in upper secondary schools.

Typology of education/training systems

		Degree of differentiation of education /training system		
		High	***Medium***	***Low***
Degree of national standardisation	***High***	Germany, Netherlands	England, France, Italy	Japan, Ireland, Scotland
	Medium		Spain	
	Low			USA, Canada

Source: Hannan *et al.* (1997).

The Italian educational system is centralised but with some elements of devolution to regions introduced in the last decades, following the idea that a greater decentralisation of power usually leads to greater efficiency. A law enacted in 1997 has given greater autonomy to single schools concerning tracking, resources, staff and management. Table 1 contrasts the Italian settings with the different models of school organisation in other EU countries.

Table 1. Models of school system organisation in Europe

Models	Countries
Centralised (with some devolution to region)	Luxembourg, Portugal, Greece, France, Italy, Austria
Regional devolution	Germany, Belgium, Spain
Local control	Denmark, Finland, Sweden
Local control (religious)	Ireland
Institutional autonomy in a quasi-market	Netherlands, UK

Source: Green *et al.* (1999).

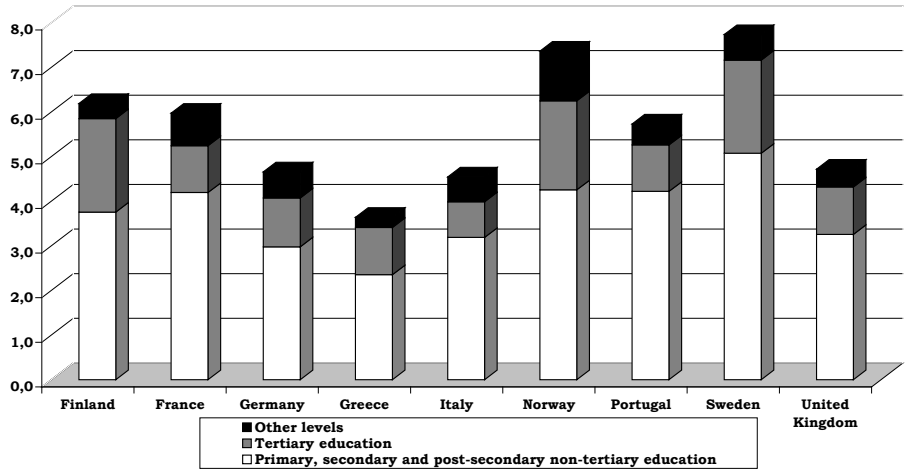
With regard to the financing of public education, the State funds the central and local offices of the MPI, the salaries of teaching and non-teaching staff in compulsory education and most upper secondary schools, and the management of school's teaching materials. In this way, the central government in 2000 controlled and distributed about 78 per cent of total public expenditure on primary and secondary education while 22 per cent of these funds were transferred to the provincial offices of the MPI, or to individual schools.

Local School Councils decide on the purchase, renewal and maintenance of school equipment and teaching materials, library endowments and consumer materials for classes. The preliminary budget and final accounts for school expenditure are drawn up by an Executive Board, elected by the School Council and chaired by the head teacher. Technical and vocational schools use funds allocated directly by the MPI for necessary expenditure and investment. Regions have particular powers concerning school buildings, vocational education, training and guidance, school transport, school meals and the supply of textbooks free of

charge, but these powers are usually delegated to the provinces and towns so that Regions control only 3 per cent of total public expenditure on primary and secondary education. The provincial authorities cover the cost of building schools of primary and lower secondary education, as well as technical and scientific upper secondary schools. The local authorities cover the building costs of classical upper secondary schools.

The Ministry of University and Scientific and Technological Research (MIUR) distributes available funds among state universities and the private universities which have obtained authorisation to issue legally recognised qualifications. Private universities also receive financial resources from local organisations, associations or foundations. In the context of university autonomy, state universities are allowed to accept financing and contributions for research and activities for different users. Additional income comes from student fees for services such as laboratories and libraries. Only 8 per cent of public spending at the tertiary level are transferred to households or others recipients that are not educational institutions. Public expenditure on education as a proportion of GDP in Italy was close to 5 per cent in 2000, and about 10 per cent of total public expenditure.

Figure 2. Public expenditure on education as a percentage of GDP, 1999



Source: OECD (2002).

Box 2 – School vouchers

In 2000, some regions introduced a school voucher system to help families support expenditures for primary and secondary school. Since this reform is very recent and due to lack of data, there is no empirical evidence or evaluation available of the impact of these measures. There has been much discussion about the opportunity to finance students attending private institutions and the way the school voucher is organised. In fact, due to the features of the school voucher, these funds help primarily students in private schools. Furthermore, the voucher is not only for low-income families (the income must be less than 30,000.00 Euros in *Lombardia* and 41,000.00 in *Veneto*). In addition the law introduces a threshold of about 200 euros, which tends to exclude students attending public schools.

The table below reports some evidence concerning the experimentation introduced in 2000–2001 in *Lombardia*. In total 47,000 school vouchers were distributed (over a total population of 1,000,000 students), 99 per cent of which to students enrolled in private schools.

School vouchers in *Lombardia* in the school year 2000-2001

	Public	Private	Total
Students	901,620	79,240	980,860
Applications	6,000	49,040	55,040
Accepted applications	600	46,335	46,935

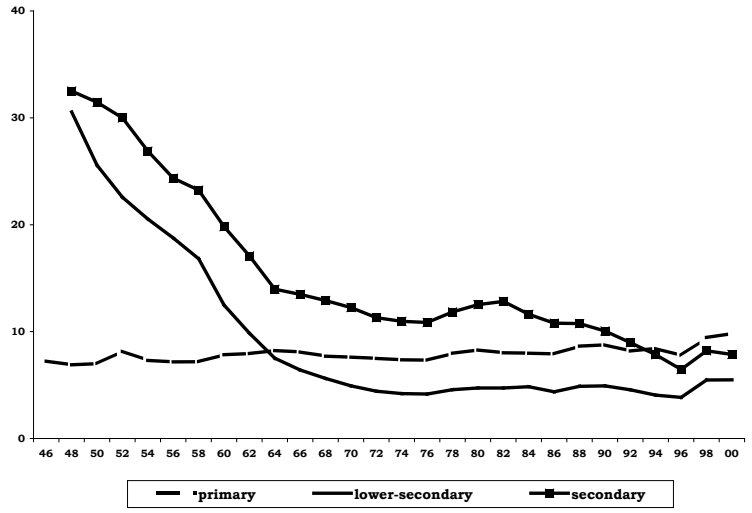
3 Schooling patterns: attainment and quality of education

As discussed in the previous section, the Italian educational system is characterised by a centralised structure, which should grant equality at all levels: equality in the opportunity of attending school, the same quality of schooling across regions and schools, similar outcomes of the educational process whatever socio-economic background individuals have.

3.1 Private provision of education

In 2000, about 28 per cent of children attended a private pre-primary school. This proportion falls to, respectively, 8 and 5 per cent in primary and lower secondary schools, and rises to 10 per cent in secondary schools. Pre-primary schools are not compulsory, and the public supply is not able to fulfil the existing demand. This creates room for private provision. As can be seen in Figure 3, the share of students in private schools decreased during the beginning of the latter half of last century, but has been quite stable ever since.

Figure 3. Share of students in private schools, 1945 to 2000



Source: adapted from Bertola and Checchi (2001).

3.2 Quality of education

There is a substantial literature having investigated the effects of indicators of school quality, such as class size and the pupil–teacher ratio, on test scores, educational attainment and returns to education (see Hanushek (1986, 1999) and Card and Krueger (1996) for surveys of this literature). Most of this literature focuses on the USA, but an increasing number of studies look at other countries as well, and consider also a comparative perspective.

In spite of the large number of contributions in the area, there is no broad consensus on the economic effects of school quality. While there is agreement that better school quality can improve educational attainment, consensus is still lacking on whether variations in class size can have significant effects on performance tests and returns to education (see Hanushek (1986) and Card and Krueger (1992, 1996) for a review).

Compared to other European countries, Italy has a relatively low pupil–teacher ratio, especially in primary schools (Table 2). Despite the centralisation of school design, school quality in Italy has exhibited important variations both over time and across different areas of the country.

Table 2. Pupil–teacher ratios in selected European countries, 2000

Countries	Pre-primary	Primary	Lower secondary	Secondary
Finland	12.2	16.9	10.7	17.0
France	19.1	19.8	14.7	10.4
Germany	23.6	19.8	15.7	13.9
Greece	15.8	13.4	10.8	10.5
Italy	**13.0**	**11.0**	**10.4**	**10.2**
Norway	N/A	12.4	9.9	9.7
Portugal	16.4	12.1	10.4	7.9
Sweden	N/A	12.8	12.8	15.2
United Kingdom	21.0	21.2	17.6	12.5

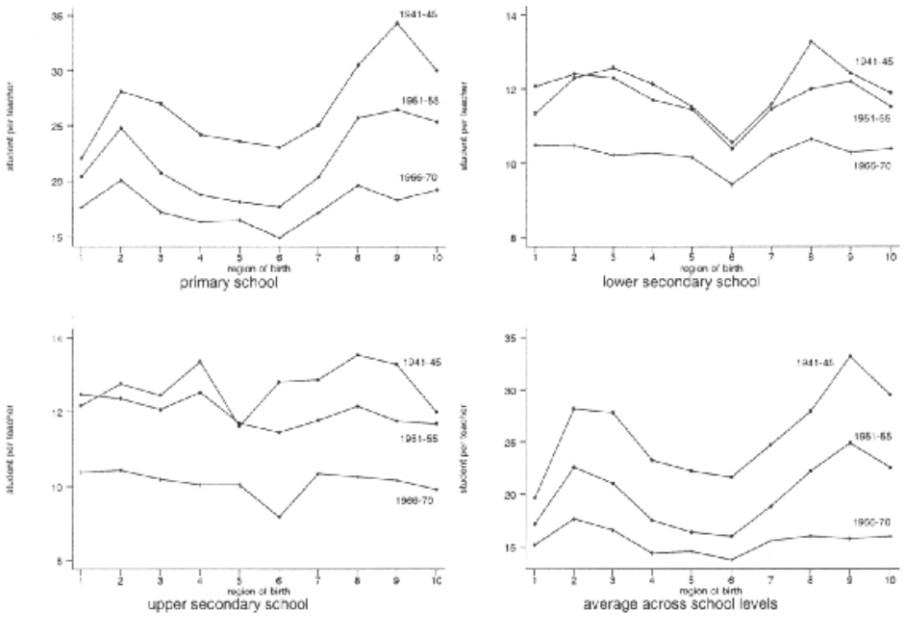
Source: OECD (2002).

Figure 4 shows the average pupil–teacher ratio in primary, lower secondary and upper secondary schools for 10 regions and three different age cohorts: compared to the cohort born between 1941 and 1945, the average pupil–teacher ratio experienced by the cohort born between 1966 and 1970 was only about half as high (Brunello and Checchi, 2003).

As previously discussed, one of the main outcomes of education and training is to endow individuals with skills that, in addition to improving human capital, also favour their job opportunities and earnings capacity. In this respect, and when compared to the USA, the Italian society shows relatively little mobility, both in terms of educational attainment and occupational outcomes. In Italy, less than 2 per cent of the offspring of households where the father has not completed compulsory education have ac-

quired a college degree. In the USA, this share is close to 12 per cent.

Figure 4. Pupil–teacher ratio by age cohort and region of birth
(different school levels and average across school levels)



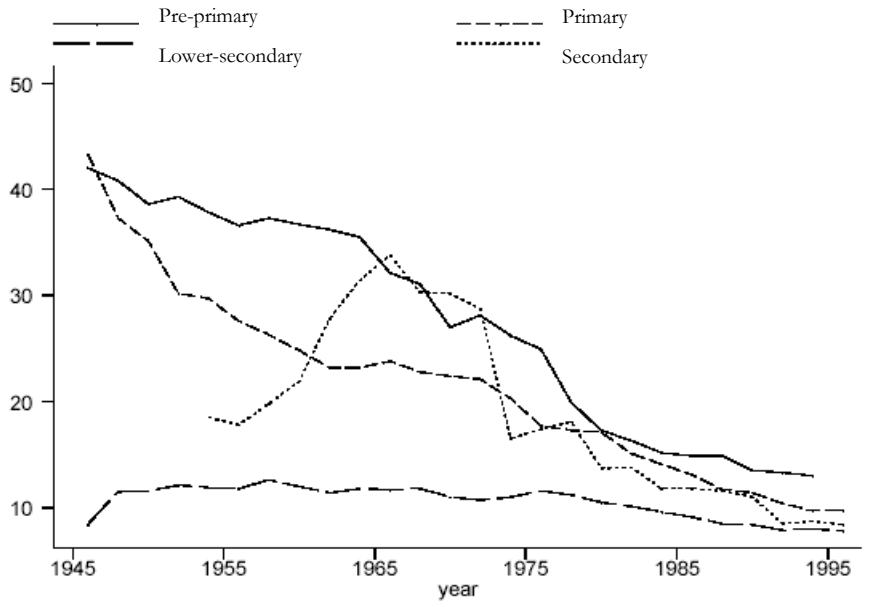
1	Piemonte+Valle d'Aosta+Liguria (North)	6	Umbria+Marche (Center)
2	Lombardia (North)	7	Lazio+Abruzzi+Molise (Center)
3	Trentino+Veneto+Friuli (North)	8	Campania (South)
4	Emilia Romagna (North)	9	Puglia+Basilicata+Calabria (South)
5	Toscana (Center)	10	Sicilia+Sardegna (Islands)

Source: Brunello and Checchi (2003).

Similarly, only 4 per cent of Italians born in households where the father's income belongs to the lowest quartile of the income distribution receive college education, compared to 17 per cent in the USA (Checchi *et al.*, 1999). When family background plays an important role in the educational process and for labour market outcomes, it can also generate persistence in social and economic stratification. In this environment, (public) school quality, when set and administered by the central government, can have important countervailing effects, and increase social and economic opportunities of children belonging to less fortunate households. Figure 5 reports the evolution of the pupil–teacher ratio over time for different types of schools.

The effects of school quality and school provision have been recently investigated in a number of studies. Table 3 presents an overview of the existing literature.

Figure 5. Pupil–teacher ratio in Italy, 1945 to 1995



Source: Brunello *et al.* (2002).

Brunello *et al.* (2002) investigate the relation between several indicators of school quality and returns to education, educational attainment, and employment probability in Italy. They find that a further year of education in a class with a marginally higher pupil–teacher ratio yields lower returns. Brunello and Checchi (2003) study how changes in school quality, measured by the pupil–teacher ratio, affect educational attainment. They find that educational attainment is higher when the pupil–teacher ratio is lower, and that the impact of quality on individual attainment is stronger when parental education is lower.

Checchi and Jappelli (2003) use data from the 1993 wave of the Survey of Household Income and Wealth of the Bank of Italy (SHIW) to study the effects of school quality on school choice. The survey contains a special section where respondents rate the quality of public schools, on a scale from 1 to 10. Checchi and Jappelli find that the indicator of quality is lower in the South and reaches the highest levels in two Northern regions, Trentino and Emilia. In the empirical analysis, the probability of attending a private school is regressed on potential determinants of school choice,

including the pupil–teacher ratio. Results confirm that the perceived quality of public schools is a determinant for enrolling into a private school, and that higher public expenditure in public schools has a significant (negative) impact on enrolment into private institutions.

Table 3. Economic effects of school quality and provision

Authors (years)	Data set, period analysed	Topics, issues	Main evidence
Brunello *et al.* (2002)	SHIW 1989/1991/1993/ 1995/1999	Quality of education, returns to education.	Quality of education affects private returns, but less than elsewhere.
Checchi (1997)	Istat, 1861 - 1991	Efficiency of the educational system.	High drop-out rates in college.
Brunello and Checchi (2003)	SHIW 1993/1995/ 1998/2000	Impact of family background and school quality on returns to education.	Lower student-teacher ratio is positively correlated with higher educational attainment.
Checchi and Jappelli (2003)	SHIW 1993	School choice and quality.	Quality as a driving factor of the choice between public and private schools.

Table 4. Annual statutory teachers' salaries in public institutions, in 2000, in equivalent US dollars converted using PPP

Countries	Primary			Lower secondary		
	Starting salary	After 15 years of experience	Top of scale	Starting salary	After 15 years of experience	Top of scale
Finland	18,489	25,183	26,140	20,720	28,690	30,124
France	20,199	27,172	40,091	22,358	29,331	42,357
Germany	31,213	37,905	41,021	34,891	40,561	46,180
Greece	20,065	24,336	29,358	20,387	24,658	29,680
Italy	**20,927**	**25,115**	**30,306**	**22,657**	**27,507**	**33,510**
Norway	23,752	26,831	29,051	23,752	26,831	29,051
Portugal	17,914	26,607	49,492	17,914	26,607	49,492
Sweden	19,893	25,553	N/A	19,893	25,553	N/A

Source: OECD (2002).

One aspect that has not yet received attention in the Italian literature is the impact of teachers' earnings. Earnings are a key factor in determining the supply of qualified teachers and, consequently, the quality of education. Italian teachers' salaries are lower, if compared to other EU countries (Table 4). According to the OECD *(Education at a Glance)*, the salary of a teacher working in a primary school in 2000 (measured at the end of the career) is 18 per cent lower than the average salary in EU countries. This difference is lower for salaries at the beginning of the career, but increases over time. Italian teachers at the top of the career receive a salary (both in primary and secondary schools) that is about 20 per cent lower than the EU average.

Differences to other countries still remain when considering hourly earnings, in spite of the fact that the number of annual teaching hours is generally lower in Italy than in other European countries.

3.3 Attainment, access and completion

Although school attainment has increased over time, the percentage of people aged 25 to 34 with a secondary degree is still lower in Italy than the OECD average. Table 5 reports the percentage of individuals having

Table 5. Percentage of population with at least an upper secondary degree, 2001, by country and age group

Countries	Gender	Age group				
		25-64	25-34	35-44	45-54	55-64

Finland	Males	72	84	81	68	51
	Females	76	90	87	72	51
France	Males	67	78	69	62	52
	Females	61	78	66	55	40
Germany	Males	87	87	88	88	85
	Females	78	84	83	78	67
Greece	Males	54	69	62	47	33
	Females	49	76	58	40	23
Italy	**Males**	**44**	**55**	**48**	**42**	**26**
	Females	**43**	**60**	**51**	**35**	**18**
Norway	Males	86	93	90	83	73
	Females	84	94	91	80	66
Portugal	Males	19	28	19	14	10
	Females	21	37	21	13	7
Sweden	Males	79	90	84	76	63
	Females	82	91	88	81	67
UK	Males	69	70	70	71	63
	Females	57	65	59	52	42
OECD AVERAGE	Males	66	73	70	64	54
	Females	62	74	67	57	43

Source: OECD (2002).

attained at least an upper secondary education, by age group and country. The share of Italian females with a secondary degree has increased over time to the extent that there are no significant gender differences in attainment in the age group 25–64. In the older age group (55–64), on the other hand, only 18 per cent of females have a secondary degree, to be compared with 26 per cent for males. In the younger age group (25–34), females with a secondary school degree make up 60 per cent, compared to 55 per cent for males.

One of the key negative features of the Italian education system is the high drop-out rate, which affects different levels of education. Table 6

Table 6. Theoretical career in education of a cohort of 1,000 Italian youngsters, academic year 1996-1997

	1,000 children enter compulsory (primary + lower + secondary) education
36 drop out without any certificate	⇩
	964 obtain the lower secondary degree (*licenza media*)
93 do not enrol into upper secondary	⇩

education	
	871 enrol into upper secondary schools
71 drop out of upper secondary school	⇩
128 achieve a short (3 year) secondary diploma	⇩
	666 obtain a long (5 year) secondary diploma (*diploma di maturità*)
214 do not enrol into tertiary education	⇩
	452 enrol into universities
104 drop out during their first year of university attendance	⇩
41 drop out during their second year of university attendance	⇩
136 drop out during subsequent years of university attendance	⇩
	22 obtain a three year degree (*diploma triennale*)
	149 obtain an ordinary 4-5 year degree (*laurea*)

Source: Garonna *et al.* (2000).

shows the hypothetical situation of 1,000 students enrolling into compulsory school, and tracks their future choices: a small percentage of individuals (3.6 per cent) does not finish compulsory education, 16 per cent of those who finish does not enrol into secondary education, and more than 20 per cent among those who complete a degree do not enrol into tertiary education.

Figure 6 presents some time-series evidence on the attainment of upper secondary education. In the left panel we show the share of high-school graduates in the population at the theoretical age of graduation; in the right panel we plot the ratio of drop-outs to students enrolled in the first year of upper secondary school. Starting from the end of the 1950s, the percentage of graduates in the population at the theoretical age of graduation has steadily increased. At the same time, the percentage of individuals dropping out peaked in the 1960s and declined to about 16 per cent in 1992.

Figure 6. Graduation and drop-out rates: upper secondary school, 1955 to 1992

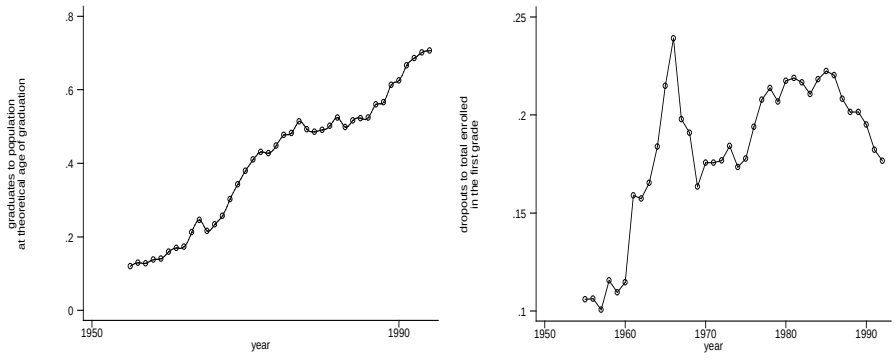


Figure 7. Graduation rates and graduates to students enrolled in the first year: college, 1955 to 1992

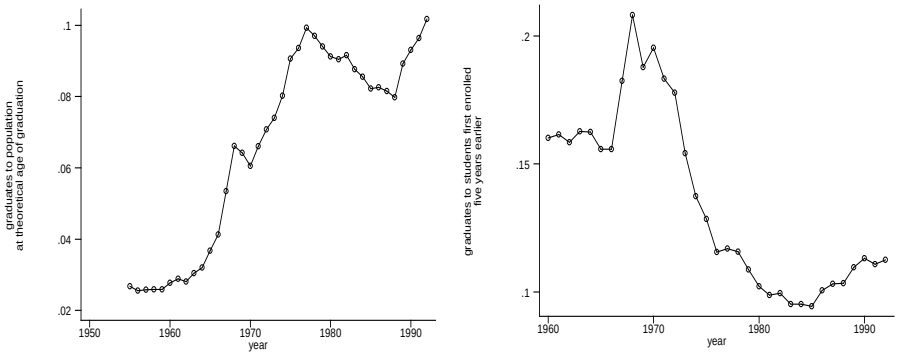


Figure 7 presents similar evidence for tertiary education. While the proportion of college graduates in the population at the theoretical age of graduation has increased more or less steadily, the ratio of graduates to students enrolled in the first year has declined sharply, pointing to the increased average time to completion of a college degree.

Time to completion and the drop-out problem have been investigated in the literature (see Table 7). Checchi (1997) studies the efficiency of the Italian education system and considers data on enrolments and completions for each level of education covering the period 1861 to 1991. Concerning secondary school, he finds that the generalist track ('*liceo*') has been affected by a lower percentage of drop-outs compared to the vocational track. Drop-out rates are highest in college, independently of the field of study. It is expected that the recent reform, which has introduced courses of shorter duration, might help reducing the drop-out rate.

Table 7. Attainment, access and completion in education

Authors (years)	Data set, period analysed	Topics, issues	Main evidence
Checchi (2000)	SHIW, 1995 student administrative files from Università degli studi di Milano, 1995-1996	University education	Parental income influences the choice of secondary school and of university, age and performance the probability of obtaining a university degree.
Becker (2001)	Istat, 1998	University drop-outs	Graduates of vocational tracks are more likely to drop out.
Flabbi (2001)	SHIW, 1998	Determinants of the choice of secondary school	Better family background increases the probability of enrolling into a generalist school.
Trivellato and Bernardi (1994)	Istat, 1981	Education in the South of Italy	Higher drop-out in compulsory school in the south.
Iannelli (1997)	Social Mobility Study, 1985	Educational choice	Better family background raises the probability of continuing in school.

Checchi (2000) investigates which variables might affect the decision to invest in education. He studies:

- the completion of secondary school;
- the decision to enrol into university;
- the choice of university faculty;
- the performance of students enrolled in university.

He starts by stressing that family income is an important determinant of educational choice: the evidence suggests that families with children at university have, on average, higher income and wealth. The existence of a dual track (vocational and generalist) induces students to self-select into each track according to ability and family resources. Since the type of secondary school is the most important determinant of the decision to enrol into university, family background has a pervasive effect. Concerning the probability to complete university, he finds that age and academic performance have important impact.

Brunello and Checchi (2003) use a two-step model to estimate the impact of family background and school quality on returns to education in a sample of Italians born between 1941 and 1970. They find that educational attainment is higher when family background is better, and that Italy has a strong intergenerational persistence in educational attainment: one additional year of parental education increases the educational attainment of their children by half a year.

Becker (2001) investigates why Italian students stay so long in universities or, alternatively, drop out and develops a model in which he compares Italy and Germany (where the drop-out rate is low). He exploits data from Istat (1998) and SHIW to find that students who graduate in vocational secondary tracks are more likely to drop out of university. His analysis also confirms that 'ability', measured as the average grade at the end of lower and upper secondary school, and parents' education highly influence the probability of staying in university.

Flabbi (2001), using SHIW data for 1998, develops a multinomial logit model to examine the determinants of the choice of secondary school. He shows that the choice of secondary school is influenced by family background (meaning parents' education and family income): an additional year of parents' education increases by 10 per cent the probability of enrolling into a generalist track. Moreover, enrolment into university is more likely if one has attended '*liceo*'. His conclusions are in line with the idea that the Italian school system is not able to guarantee equal opportunities to everybody.

Iannelli (1997) uses data from the Social Mobility Survey and studies two cohorts (the first one born between 1930 and 1939, the second between 1960 and 1965) to see how gender, social origin and place of residence can influence pupils' track choices. She finds that in both cohorts, family background plays a very important role, increasing the odds ratio of continuing in school.

Turning to differences between geographical areas, Trivellato and Bernardi (1994), using an extended Markovian model of the educational process, study in detail the situation in the South of Italy, which presents

a rather critical picture especially in compulsory schools. Their analysis shows that, in 1981, in a cohort of 1,000 southern students starting the first year of compulsory school, only 669 finish compulsory school within the prescribed time. Among the Centre students, this number was 833.

4 Inequality in educational outcomes

The efficiency and quality of a school system can also be evaluated by looking at output measures. In such a context, educational outcomes can be measured at various levels and, broadly defined, using two types of variables: outcomes of the educational system in the production of human capital, which can be evaluated using completion rates within levels, marks and literacy-numeracy scores; alternatively, labour market indicators such as wages, labour force attainment, and employment probability. As already discussed, a well-educated and well-trained population is a key factor for the wealth of nations and there is a large body of literature stressing the importance of investment in education as a determinant of economic growth.

An important motivation for individuals to demand education is that by improving their knowledge and skills, both the productivity and the earnings potential increases. In the following sections, we look at labour market outcomes and at the relationship between education, wage inequality and inter-generational mobility.

4.1 The stock of human capital and test score outcomes

The average education attained by employees in the Italian labour force is higher than the educational attainment of the population (not reported), but is still low with respect to other countries, probably due to the low schooling attainment registered in the past. Differences across cohorts (even between employed and active workers) emerge from Table 8, particularly with respect to higher educational levels.

A further dimension along which the skill achievements of students can be evaluated is their results in (standardised) literacy and numeracy test scores. Recently the outcome of the OECD-PISA (Programme for International Student Assessment) project targeted at an assessment of students in compulsory schools (aged 15) attracted much attention in some European countries.[6] In particular, the 2001 evaluation of Italian

[6] The PISA project covers 15-year-old students in the OECD countries who have to pass the same tests.

students reported a rather poor performance in reading literacy[7] (499), as well as scientific and mathematical literacy[8] (478 and 457, respectively), which compares with an OECD average of 500 (see Table 9). Seen from this perspective, the Italian compulsory school system does not seem to be very efficient, and raises some doubts on the efficacy of pupil–teacher ratios, which, as discussed above, are lower in Italy than elsewhere.

Table 8. Educational attainment of the labour force in 2002, %-share with a given degree

Levels	Labour force		Employees	
	Aged 24-34	Aged 35-54	Aged 24-34	Aged 35-54
University-doctorate	14	13	13	14
Secondary	47	38	48	38
Lower secondary	36	37	36	37
Primary	3	12	3	11

Source: Istat (2003).

Table 9. Performance of 15-year-olds on the PISA reading literacy, scientific and mathematical scale

	Mean			10th percentile			90th percentile		
	Read-lit.	Scien.	Math.	Read-lit.	Scien.	Math.	Read-lit.	Scien.	Math.
Finland	546	538	536	429	425	536	654	645	637
UK	523	532	529	391	401	529	651	656	646
Sweden	516	512	510	392	390	510	630	630	626
France	505	500	517	381	363	517	619	631	629
Norway	505	500	499	364	377	499	631	619	613
Germany	484	487	490	335	350	490	619	618	619
Italy	**487**	**478**	**457**	**368**	**349**	**457**	**601**	**602**	**570**
Greece	474	461	447	342	334	447	595	585	586
Portugal	470	459	454	337	343	454	592	575	570

Source: OECD (2002).

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7 The test concerns the ability to understand written texts.

8 The test concerns students' ability to recognise, interpret and solve mathematical problems.

4.2 Labour market outcomes

Employment and unemployment

Important labour market indicators are unemployment rates and earnings by educational level. How is the probability of being employed related to educational achievement? The unemployment rate in 2001 was 9.8 per cent for younger men aged 25 to 34 and 16.2 per cent for the same cohort of women, with an average value of 12.5 per cent for both genders. This indicator exhibits relevant geographical differences: the South of Italy is affected by a very high unemployment rate (Table 10). Higher education is usually associated with a lower unemployment risk. In Italy, however, the unemployment rate of young individuals is relatively high both for the less educated and for the better educated. If we consider individuals aged 35 to

Table 10. Unemployment rates by educational level and geographical area, 2001

Educational level	North-West	North-East	Centre	South
People aged 25-34				
University degree and doctorate	5.6	7.9	14.1	28.0
Secondary degree	3.8	3.6	9.8	27.3
Degree from vocational track	4.1	3.2	8.3	26.6
Lower secondary degree	5.9	4.0	10.5	24.7
Primary school or no degree	11.1	5.8	14.5	35.6
All	5.0	4.3	10.6	26.8
People aged 35-64				
University degree and doctorate	1.1	1.3	2.0	2.3
Secondary degree	1.8	2.0	3.0	6.3
Degree from vocational track	2.5	2.4	3.6	9.9
Lower secondary degree	3.6	2.7	4.7	12.3
Primary school or no degree	3.9	2.9	5.8	16.3
All	2.7	2.4	3.9	10.0
Total				
University degree and doctorate	2.7	3.7	5.6	9.7
Secondary degree	2.6	2.7	5.6	14.4
Degree from vocational track	3.1	2.7	5.2	15.1
Lower secondary degree	4.4	3.1	6.6	16.6
Primary school or no degree	4.4	3.1	6.4	18.6
All	3.5	3.0	6.0	15.3

Source: Istat (2002).

64, the pattern of unemployment is much more in line with expectations, and unemployment rates monotonically decrease among the better educated.

The relationship between unemployment and enrolment into higher education can be ambiguous. On the one hand, higher unemployment rates can reduce the incentive to invest in education either because of the higher risk or via (lower) expected wages. On the other hand, when unemployment is very high – and higher for the poorly educated – the opportunity cost of studying falls and the incentive to invest in further education increases.

A survey conducted by Istat shows that holding a university degree increases the probability of employment. It reports that 63.5 per cent of university graduates found a stable job after concluding their studies. This percentage falls both for students with a university diploma (56.9 per cent) and for those with a high-school degree (41.5 per cent). Differences exist also by type of university degree: only 48 people out of 100 with a degree in law could find a stable job after graduation, compared to 75 to 93 out of 100 with a scientific or an economics degree. There is also evidence suggesting the presence of *over-education*, since only 67.3 per cent of all graduates are employed in activities requiring a university degree.

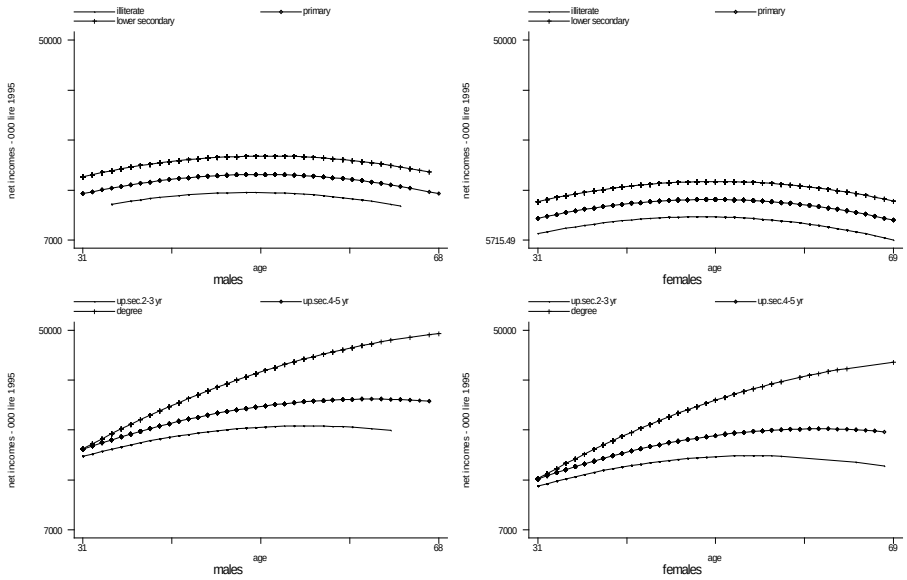
Another survey, conducted in 22 Italian universities (Almalaurea, 2002), shows that while 61.1 per cent (59 per cent of women, 65 per cent of males) find a job within one year after the degree, 22.2 per cent do not search for a job. This survey also shows that younger graduates are more likely to find a job if they had previous work experience or work training periods. Males take, on average, 10 months to enter the labour market while females take 11 months. If we look at graduates three years after obtaining a degree, we find that 79 per cent of them are employed, while only 7 per cent are still seeking for a job.

Returns to education and age–earnings profiles

Another labour market effect of investments in education is related to the increase in earnings. Figure 8 shows the age–earnings profiles in 1995 (in Italian lire) by gender and educational levels. As can be seen, age-earnings profiles show a different slope depending on the level of education attained, with higher education having the steepest slope.

When we compare relative earnings of full-time workers by level of education across countries, we find that the college–high school wage premium is not particularly high, at least when compared with the United States, France and the United Kingdom (Figure 9).

Figure 8. Age–earnings profiles by educational attainment, 1995 (italian liras)



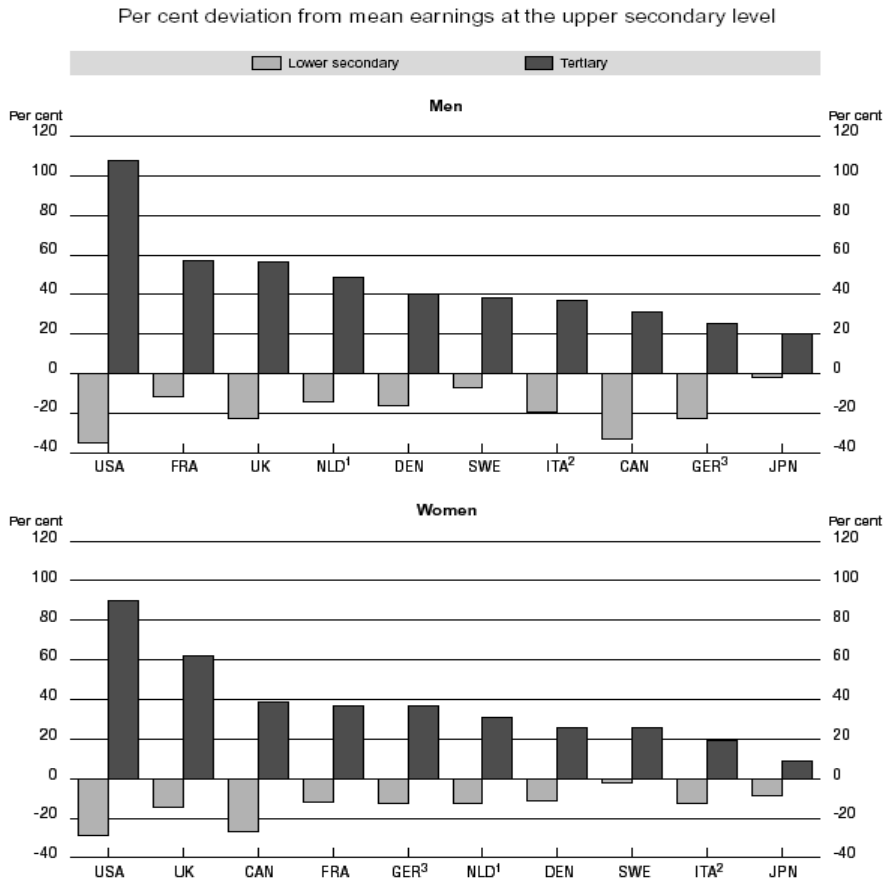
Source: Checchi (2001).

The monetary private returns to investments in human capital have been measured by estimating Mincerian earnings functions. Italian studies in this area conclude that the estimated returns to an additional year of education is some 4 to 5 per cent, a value lower than in most other European countries. An overview of the literature on this matter is in

Table 11. Returns to education

Authors (years)	Data set, period analysed	Topics, issues	Main evidence
Rossetti and Tanda (2001)	SHIW 1995	Returns to education	Higher levels of education increase monetary and non-monetary returns.
Breen *et al.* (1998)	Social Mobility Survey 1985	Returns to education	Higher education increases occupational status.
Cobalti and Schizzerotto (1997)	Social Mobility Survey 1985	Returns to education	Higher education increases occupational status.
Giannelli and Monfardini (2000)	SHIW 1995	Determinants of investments in education	Expected earnings and labour market conditions as determinants of investments in education.
Boero *et al.* (2001)	Istat survey 1998	Outcomes of higher education in Italy and the UK	No significant effect of degree score on earnings.

Figure 9. Relative earnings of full-time workers by gender and level of educational attainment, 1999/2000



Note: Countries are ranked in descending order in terms of the tertiary earnings progression. Wage premia are not standardised for different age and seniority compositions of educational groups across countries.
1. 1997.
2. Annual post-tax earnings.
3. 1998.

Source: Blöndal *et al.* (2002).

Brunello *et al.* (1999) and we refer to their paper for Italian studies until 1999. In this review we focus only on more recent studies (see Table 11).

Rossetti and Tanda (2001) use SHIW for 1995 and analyse returns to education. They find that individuals with a secondary high-school degree earn on average 37 per cent more compared to people with no qualifications or with just a primary school degree (35 per cent in the North and Centre of Italy, and 44 per cent in the South). For college graduates, the returns are 57 to 89 per cent higher than for the reference group.

Wage differences by education also concern gender: women earn on average 17 per cent less than men, and this differential increases in the South of Italy to 28 per cent. When transitions from unemployment to employment are analysed, the probability of finding a job is, respectively, 4 to 7 per cent higher (with respect to the reference group) for people with a lower secondary or an upper secondary degree.

Boero *et al.* (2001) review recent evidence on the outcomes of higher education in Italy and the United Kingdom. They use the 1998 Istat survey of college graduates in 1995 and study the determinants of their earnings. They show that, for both countries, there are large pay differences according to the subject studied. Conversely and in contrast with the evidence for the UK, the final score has only a small effect on earnings in Italy.

Giannelli and Monfardini (2000) study the effects of expected earnings and local unemployment on the behaviour of young adults with a secondary school degree, using SHIW data for 1995. They estimate a multinomial probit model and find that the most important factor influencing the decision to study is expected earnings from a university degree. Concerning labour market conditions they state that unemployment plays an important role in the demand of education; when labour market opportunities are poor, people often decide to continue investing in education.

The sociological literature has also focused on the returns to education and on the transition from school to work. Cobalti and Schizzerotto (1997) study the link between educational qualifications and employment status from the mid-fifties to the mid-eighties, using data from the Italian Social Mobility Survey conducted in 1985 on men and women aged 18 to 65 and analysing those born in 1941 to 1960. They find that school attainment, as well as family background, are the most important factors affecting the social position of the first job.

Breen *et al.* (1998) test the hypothesis that the low level of tertiary education in Italy is correlated with low educational returns. Using data from the 1985 Social Mobility Survey, they analyse the impact of educational attainment on the occupational status of the first job. They conclude that attending university increases the prestige of the first job.

4.3 Education and earnings: inter-generational mobility

Only in very recent years have Italian economists studied the inter-generational perspective of investments in education (see Table 12). The interest in the transmission of economic status (educational attainment, occupation or income) from one generation to another is generally motivated by the wish to determine the degree of equality of opportunity in a

country. There is a general agreement that investment in education is the main channel for transmitting the socio-economic position from one generation to the next (Becker and Thomes, 1986).

Table 12. Inter-generational mobility

Authors (years)	Data set, period analysed	Topics, issues	Main evidence
Checchi *et al.* (1999)	Indagine nazionale sulla mobilità sociale (1985) for Italy, Panel Study of Income Dynamics for the USA	Inter-generational mobility and the educational system	Higher inter-generational mobility in the USA than in Italy although in Italy the schooling system in more equal.
Checchi and Dardanoni (2002)	SHIW 1993/1995/1998 and Treiman and Ganzeboom (1990) cross-country dataset (data about 16 countries)	Inter-generational mobility indexes	Comparing mobility by a single summary mobility index gives results that are very dependent on the characteristics of the chosen index.
Comi (2003)	European Community Household Panel	Inter-generational mobility	Mediterranean countries, together with Portugal and Ireland, are more immobile in earnings and education.

Checchi and Dardanoni (2002) review alternative measures of inter-generational mobility, and then compare the performance of various mobility indexes using data on occupational mobility collected by Treiman and Ganzeboom (1990) for 16 countries. The mobility rank obtained is different depending on the index used. They conclude that the choice of mobility index has a substantial effect on the results. They also use the SHIW to study how mobility in income[9] has changed over time in five Italian macro-regions. They find that inequality was higher in the parent generation and that it has decreased over time due to some equaliser device, such as industrial development and/or educational push. With almost all the indexes, the northern regions show higher occupational mobility than the southern ones. There is no concordance in the 10 indexes about the evolution of income mobility over time, however. They conclude that structural mobility has been declining in the post-war period (i.e. fathers' and sons' marginal distributions have become closer) while exchange mobility has increased over time (fathers' and sons' incomes have become less positively associated).

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[9] They combine educational credential, work status and sector of employment, and get 160 potential cells for which they compute the median income in the sons' generation and impute the same value to the same cell in the fathers' generation.

Checchi *et al.* (1999) compare Italy and the USA in terms of the schooling system and the degree of mobility, measured in various ways (using PSID for the USA and a Social Survey for Italy). In particular, they note that Italy has a more equal and a definitely cheaper schooling system than the USA and that, whilst theoretical models would predict higher upward mobility where the access to education is almost free like in Italy, a lower degree of intergenerational social mobility is found instead. The authors try to understand why the Italian educational system does not generate at least the same level of intergenerational mobility as that produced in the USA. The issue of educational mobility, measured by comparing the possibility of reaching the highest educational degree (university), shows that Italy experienced the largest percentage shift from one generation to the next, but the probability that a son of a non-graduate obtains a university degree is lower in Italy than in the USA. The opportunities of obtaining a university degree are more unequally distributed in Italy than in the USA (and this evidence emerges also when educational mobility is measured by comparing the possibility of reaching a secondary degree). In their theoretical model, they highlight the crucial role played by individual effort for successful accumulation of human capital, and show that the Italian school system probably does not attract the expected educational investment of poor families.

Finally, Comi (2003) analyses intergenerational mobility using the European Community Household Panel. She focuses on two possible intergenerational correlations: earnings and education correlations, and find that Italy is among the most immobile countries in both respects.

4.4 Wage inequality and earnings mobility

In recent decades, a number of industrialised countries have experienced significant changes in the distribution of earnings. Various factors of economic as well as institutional nature have contributed to re-shaping the structure of wage differentials across different groups of workers. Earnings inequality has risen in most OECD countries over the 1980s, increasing and underlining the existing gap between rich and poor. Three possible explanations of the overall increase in inequality have found large consensus in the literature: skill-biased technological change (a rise in the demand for skills non-matched by an equal rise in supply), the institutional framework, and international trade.

A couple of studies investigate earnings inequality and its possible causes using a cross-country comparison setting, which also includes Italy. In particular, wage-setting institutions have been found to strongly af-

fect earnings inequality. Blau and Khan (1996) compare earnings inequality for a given year in 12 OECD countries and find that the centralisation of the wage setting plays a crucial role in explaining the observed differences in earnings inequality. Lucifora (1999) investigates the role of institutional features (trade unions, structure of collective bargaining, existence of regulations on wages) on low-wage employment and earnings inequality across a number of OECD countries. His results suggest that institutions are a relevant factor in shaping the distribution of earnings and the incidence of low pay. He also shows that countries with wider wage differentials are often characterised by a larger proportion of low-paid individuals. To better describe this evidence, we report some indicators in Table 13 for selected OECD countries. As can be seen, wage-setting practices affect the distribution of earnings in that countries with high rates of unionisation tend to have less earnings inequality. In the same way, high minimum wages relative to average wages seem to be associated with lower levels of earnings dispersion.

Table 13. Earnings inequality and labour market institutions, mid-90s

Country	Earnings dispersion for full-time workers			Trade union density	Collective bargaining coverage	Ranking of centralisation/co-ordination	Minimum wage index*	Benefit generosity
	D9/D1	D9/D5	D5/D1					
Finland	2.34	1.66	1.41	81	95	16		43
France	3.08	1.93	1.59	9	95	7	58	37
West Germany	2.80	1.76	1.59	30	92	17		27
Italy	2.41	1.73	1.39	39	82	15		19
Norway	1.99	1.49	1.34	58	74	18		39
Portugal	4.05	2.47	1.64	27	71	7	47	35
Sweden	2.20	1.59	1.39	89	89	7		27
UK	3.39	1.87	1.81	33	47	4		18
USA	4.59	2.17	2.11	14	18	1	35	12

* Minimum wage as a percentage of the median wage of full-time workers.
Source: Bardone *et al.* (1998).

In Italy, the evolution of earnings inequality has some distinctive features. As can be seen in Figure 10, earnings differentials fell between the late 1970s and mid-1980s and rose thereafter so that the earnings dispersion presents an overall U-shaped development, which contrasts with the steady increase of inequality in the UK and the USA. Brandolini *et al.* (2001) study the trend of earnings dispersion by sex and region and show that inequality, measured by the Gini index, diminished for both men and

women since 1979 but, just as for global inequality, between 1991 and 1993 this reduction was completely cancelled out. With regard to geographical differences, they find that the monthly earnings were about 15 per cent lower in the South than in the North at the end of the 1970s. The gap virtually closed in the period of decreasing global inequality up to 1989. It widened again in the following decade and, in 1998, it was about 16.3 per cent. Similar evidence is found using a non-parametric approach (D'ambrosio, 2000). More specifically, the changes in the earnings distribution from 1987 to 1995 are reported to be mainly due to changes within groups classified by geographical area, age and educational attainment. D'Ambrosio also finds that from 1987 to 1995, there was a convergence in the distributions of earnings by educational level (with the exception of workers with the highest level of education) in the Centre and in the North of Italy, while in the South the opposite occurred.

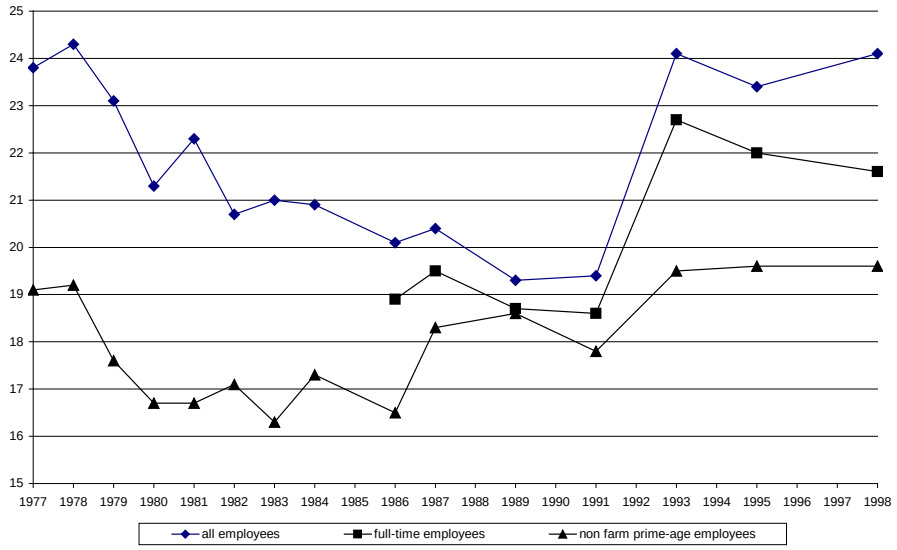
Erickson and Ichino (1995) point out that "the compression of wage differentials came to a stop in 1982-1983, coincident with a major institutional change (in the form of the escalator clause in Italian union contracts), a major economic change (the slowdown of inflation), a major technological change (industrial restructuring and the computer revolution), and a political change (the loss of support for unions and their egalitarian pay policies)" (p. 265).

As regards labour market institutions, the Italian wage-setting institutions have witnessed significant changes over the last three decades. By the end of the 1970s, the system of wage indexation against inflation was based on allowances that were equal in absolute terms for all wage earners (*Scala mobile*), and granted the same absolute wage increase to all employees as prices rose, thus providing higher real wage protection to workers at the bottom relative to those at the top of the pay scale and compressing wage. In 1983, the government reduced the value of *Scala mobile* by approximately 15 per cent, and then the system was progressively reformed towards proportionality through the 1980s and eventually abolished in 1993. Along these years of reforms, its potential equalising effect has declined with the decline of the inflation experienced in Italy, starting from the early 1980s (Manacorda, 2003).

The bargaining structure also evolved during the 1980s, and the importance of the pay component determined at the firm level rose relative to the component set by industrial bargaining at the national level. Furthermore, Regalia and Regini (1996) report that, in the manufacturing sector, during the 1980s bargaining agreements at the company level showed a big increase, with the introduction of performance-related premia as well as of individual bonuses. The same pattern is documented by Dell'Aringa and Lucifora (1994), who argue that individual wage

premia were paid especially in favour of skilled non-manual employees, leading to an increase in the wage differential. In addition to institutional changes, market forces can also help explaining the recent widening of Italian earnings differentials. Evidence suggests that the demand for skills rose during the 1980s, most likely because of industrial restructuring, technological innovations and changes in workplace organisation. Casavola *et al.* (1996) find the growth of Italian earnings differentials to be positively associated with the intensity of workplace innovation activity during the late 1980s.

Figure 10. Distribution of real monthly net earnings, 1977 to 1998 (Gini index)



Source: Brandolini *et al.* (2001).

There is a broad consensus that the peculiar Italian trend in earnings inequality is due to a combination of institutional factors and market forces, and the Italian economics literature has analysed the effect of each possible factor and its relative importance in shaping this trend.

Erickson and Ichino (1995) study the evolution of wage differentials across skill and occupation levels within sectors and across individual characteristics from 1974 to 1985, comparing Italy and the USA. They show that there has not been great variation in wage differentials by educational level from the end of the 1970s to the mid-80s, but that college wage premia have been rising in Italy over the same period, although their levels were lower than the US ones. They consider several possible explanatory variables for the rising inequality in the USA and the fall in

Italy, such as the influence of taxes, the distribution of skills in the two countries and the differences in the labour market institutions. They provide evidence that, in Italy, unions succeeded in promoting reforms (the most important one was the introduction of *Scala mobile*) which were able to compress wages in the 1970s, and that both inflation and egalitarian wage-setting institutions influenced Italian wages. However, they did not draw any clear conclusion about the relative importance of these explanations compared to a possible explanation relying on changes in market forces. In fact, using time-series variation in the structure of earnings to identify the effects of labour market institutions raises the doubt that one is confusing it with the effect of other aggregate factors.

Cappellari (2003) uses panel data spanning from the late 1970s to the mid-90s to model the intertemporal earnings covariance structure, and to separate the life-time earnings component from transitory shocks. He studies to what extent recent trends in earnings inequality reflect changes in the distribution of long-term earnings and transitory earnings fluctuations. His results show that rising earnings differentials were driven by long-term earnings components and that two forces were at work, namely the life-cycle divergence of earnings careers and a generalised increase of persistence since the late 1980s. These results suggest that both the abolition of *Scala mobile* and the increasing flexibility in pay determination (or increasing demand for skills) led to a rise in the remuneration for long-term workers' characteristics, such as skills. It is worth noticing that the results of this study contrast with those for the USA, the UK and Canada, where both earnings components played a role in shaping recent trends of earnings distribution while in Italy long-term earnings differentials account entirely for aggregate trends. According to the author, "this reinforces the impression that the change in labour markets … might be the main explanation for the trends observed, since other countries did not experience the strong wage compression and the subsequent decompression brought out by the set of reforms that Italy had" (p. 26). The documented higher life-time inequality and persistence at the bottom of the distribution raise the necessity of policies aimed at increasing the long-term earnings potential of low-paid workers.

Another possible way to isolate and measure the effect of a particular institution is to consider its variation over time as a sort of natural experiment. Manacorda (2002) uses this approach and studies the impact of the abolition of *Scala mobile* on earnings inequality. To identify a comparable group of workers not affected by *Scala mobile*, he assumes that, in the absence of *Scala mobile*, inequality would have evolved similarly for men and women. He concludes that the *Scala mobile* has compressed earnings between the 1970s and the mid-80s.

Table 14. Wage inequality and earnings mobility

Authors (years)	Data set, period analysed	Topics, issues	Main evidence
Brandolini, *et al.* (2001)	SHIW 1977-1998	Earnings dispersion	The distribution of net earnings narrowed from late 70s till 80s and widened in the early 90s.
Lucifora (1999)	OECD data	Role of institutions for earnings inequality	Institutions are a relevant factor in shaping the distribution of earnings and the incidence of low pay.
Manacorda (2002, 2003)	SHIW 1977-1993	Inequality and institutions	The '*Scala mobile*' is responsible for the fall of earnings inequality in Italy.
Lucifora and Origo (1997)	SHIW 1977-1993	Wage differentials by educational levels	Only after 1993 could some of the earnings dispersion be explained by wage differentials by educational levels.
Erickson and Ichino (1995)	Assolombarda, SHIW, Federmeccanica, Ministry of labor, National Accounts	Wage differentials and institutions	Unions promoted reforms which compressed wages in the 70s.
D'ambrosio (2000)	SHIW 1987-1995	Inequality	From 1987 to 1995 there has been a convergence in the distribution of earnings by educational level.
Cappellari (2002)	SHIW	Low pay	The probability of becoming and remaining a low-paid worker is not independent of past low-pay experience.
Cappellari (2003)	INPS 1979-1995	Dynamics of inequality	Rising earnings differentials were driven by long-term earnings components.
Biagi (2003)	SHIW 1984-1995	Inequality	Changes in inequality do not seem to be very significant.
Bigard *et al.* (1998)	National Social Security, 1974-1998	Earnings mobility	Low earnings mobility (compared to a 'perfect mobility' world); Higher mobility in France than in Italy.
Brandolini and Sestito (1994)	SHIW 1977-1991	Income inequality	Income inequality diminished up to 1993.
Checchi (2003)	Data from Barro-Lee, Deininger and Dhareshwar, World Bank and Unesco	Inequality in income and access to education	Female participation in education is more strongly conditioned by family income.

Two papers have investigated whether the rise in earnings inequality starting in the late 1980s was due to an increase in returns to education. Lucifora and Origo (1997), using data from 1977 to 1993, find that the variation in wage differentials by educational levels is not significant for the trend of earnings dispersion, and only after 1993 could some of the earnings dispersion be explained by wage differentials by educational levels. Based on the same span of years, Manacorda (2002), in contrast, finds that earnings differentials started to become more unequal when the institutional setting was reformed in the mid-80s. Furthermore, these reforms were found also to affect the returns to education, the effects of which, according to the author, were previously offset by the *Scala mobile*.

Finally, Biagi (2003) looks at the evolution over time of cohorts' age-earnings profiles. Using SHIW data for the period 1984 to 1995, he estimates age profiles by level of education (College Graduates, Junior High School and High-School Graduates) to study how inequality has changed across time and cohorts. He makes intra- and inter-generational comparison for Italy, and compares his results with those obtained for the USA and Canada, where workers with a low level of education have experienced a drop in their real wages and a decline in their relative position due to the almost constant real wages for better educated workers. For Italy he finds that all three education groups share a similar pattern in that younger cohorts enter with higher entry wages. At the same time, he finds that the age-earnings profiles of younger generations are becoming flatter. He concludes that Italian low-educated workers have experienced better performance than US and Canadian workers. Concerning high-school graduates and junior high-school graduates, the results are quite similar to those for college graduates.

4.5 Low pay and earnings mobility

While the cross-sectional evolution of Italian earnings inequality is well documented, its longitudinal features are less explored. With longitudinal data it is possible to precisely measure the probability of reaching a higher position in the earnings distribution. Bigard *et al.* (1998) analyse earnings mobility in France and Italy using data from 1974 to 1988. The authors show that the evolution of earnings inequality in these two countries has exhibited a similar structure with moderate changes over the period analysed. They find that in both countries, earnings mobility is low (compared to a 'perfect mobility' world) and that, in France, mobility is higher than in Italy. The empirical evidence shows that, in both countries, the initial ranking in the earnings hierarchy influences earnings mobility: lower earnings at the beginning imply little upward mobility. The

authors also investigate gender differences and the role of the life-cycle. The evidence suggests that there exists a pole of immobility for Italian men located at the bottom end of the hierarchy. The analysis of mobility by cohort suggests that, in both countries, younger individuals are characterised by higher earnings mobility.

Evidence on low pay – both persistence and measurement - is still scarce but steadily growing. Brandolini *et al.* (2001) focus on the bottom of the distribution by measuring the share of low-paid work, its trend over time and its socio-demographic composition. They find that the share of low-paid jobs evolved together with earnings inequality. The proportion of low paid presents the same U-shaped trend: it declined from 17 per cent in 1977 to a minimum of 8 per cent in 1989, and rose to 18 per cent in 1998.

Longitudinal data can help to add evidence about the persistence of low pay and about the probability of exit from low-paid jobs. Contini *et al.* (1998) estimate models for low-pay transitions in a context with exogenous initial conditions, and show that job mobility and employment in large firms positively influence transitions out of low pay, while employment in the service sector and past unemployment episodes generate transitions into low pay.

Cappellari (2002) studies in detail low-pay transitions in Italy. He shows that the probability of becoming and remaining a low-paid worker is not independent of past low-pay experience (i.e. he finds evidence for the presence of so-called genuine state dependence) but depends on initial conditions. He finds that gender, education, occupation, employer size, sector and region of residence have some effect on low-pay incidence, suggesting that there might be some scope for policies targeted at these attributes, even if the impact of such policies could be only minor, since persistence in low pay to some extent affects individuals irrespective of their characteristics.

4.6 Income inequality

As expected, the time trend of income inequality in Italy is almost similar to the trend in earnings inequality: it dropped between 1977 and 1983 and increased from 1983 to 1987. The evolution after 1987 is controversial. According to d'Ambrosio (2001), inequality continued to rise, but according to Brandolini and Sestito (1994), it diminished up to 1993. The dynamics of income inequality was not the same in all Italian areas. In particular, the distributions of the three main Italian areas (North, Centre and South) were very similar in 1987, but in 1995 they were quite apart

due to a dramatic change in the distribution in the South. D'Ambrosio applies a non-parametric decomposition method to the Italian data and shows that changes in household characteristics did not have a large influence on the evolution of inequality; most of the observed variation was due to the dramatic change in within-group income schedules.

Brandolini and Sestito (1994) also decompose the aggregate measure of inequality by socio-economic groups, and find that it was especially the group of families whose head is self-employed that determined the positive correlation between macro-economic conditions and income inequality. Within-group inequality turns out to be the most important component no matter which family characteristic is used to decompose inequality.

4.7 Income inequality and education

The only relevant study to have examined directly the relationship between inequality and education is Checchi (2003), who investigates the income distribution and its link to education patterns. He studies the effect of income distribution on enrolment rates at different stages of education for a panel of 108 countries. Concerning enrolments into primary school, he finds no evidence of a negative effect of income distribution, measured by the Gini index. When considering secondary education, he finds a strong correlation between income distribution and school enrolments. The results show that a one-point decline in the Gini index, and so a more equalitarian distribution, implies a 0.25 percentage point rise in enrolments (while a significant increase in inequality reduces female enrolments more than males one). Looking at higher education, he finds weak evidence of an impact of income inequality on enrolments.

5 Conclusions

In this chapter, we have reviewed the key features of education in Italy, with particular attention to school quality and quantity, labour market returns, and inequality. While there is by now substantial evidence on private returns to education for Italy, we still know relatively little both about the social returns and about the relationship between education and wage and income inequality. Inequality in educational attainment is likely to be correlated with income inequality. From a policy perspective, it is clear that the distribution of income, as well as the allocation of

human capital in the population are vital issues, at least as important as the measurement of the private and social returns to education. After all, these returns can vary significantly in the population.

In the future, academic research in Italy should focus less on the area of private returns to education and more on the area of education and income inequality.

Literature

Almalaurea (2002), *Condizione occupazionale dei laureati*. www.almalaurea.cineca.it

Bardone, L., M. Gittleman and M. Keese (1998), Causes and consequence of earnings inequality in OECD countries, *Lavoro e industriali* 2/1998, 13–59.

Becker, S. (2001), *Why don't Italians finish University*? European University Institute. Mimeo.

Becker, G.S. and N. Tomes (1986), Human Capital and the Rise and Fall of Families, *Journal of Labor Economics* 4(3), S1–S39.

Bertola, G. and D. Checchi (2001), Sorting and private education in Italy, *Lavoro e relazioni industriali* 2/2001, 88–124.

Biagi, F. (2003), *Characterizing cohort patterns for Italian wages*. Università di Torino. Mimeo.

Bigard, A., Y. Guillotin and C. Lucifora (1998), Earnings Mobility: An International Comparison of Italy and France, *The Review of Income and Wealth* 44, 535–544.

Blau, F.D. and L.M. Khan (1996), International differences in male wage inequality: institutions versus market forces, *Journal of Political Economy* 104(4), 791–837.

Blöndal, S., S. Field and N. Girouard (2002), Investment in human capital through upper-secondary and tertiary education, *OECD Economic Studies* No. 34, 2002/1, 41–91.

Boero, G., A. Mcknight, R.A. Naylor and J. Smith (2001), Graduates and graduate labour markets in the UK and Italy, *CRENOS*, Contributi di ricerca 01/11.

Brandolini, A., P. Cipollone and P. Sestito (2001), *Earnings dispersion, low pay and household poverty in Italy, 1977-1998*. Bank of Italy, Discussion paper n° 427.

Brandolini, A. and P. Sestito (1994), *Cyclical and trend changes in inequality in Italy, 1977-1991*. Bank of Italy. Mimeo.

Breen, R., C. Iannelli and Y. Shavit (1998), *Occupational returns to education in Italy: a consideration of rational action theory of university attendance*. European University Institute. Mimeo.

Brunello, G. and D. Checchi (2003), *School quality and family background*. IZA. Discussion Paper No. 705.

Brunello, G., D. Checchi and S. Comi (2002), *Qualità della formazione scolastica, scelte formative ed esiti sul mercato del lavoro*. Università di Milano. Mimeo.

Brunello, G., S. Comi and C. Lucifora (1999), Returns to education in Italy: a review of the applied literature, in Asplund, R. and P.T. Pereira (eds), *Returns to Human Capital in Europe – A Literature Review*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Cappellari, L. (2002), Do the 'Working Poor' Stay Poor? An Analysis of Low Pay Transitions in Italy, *Oxford Bulletin of Economics and Statistics* 64(2), 87–110.

Cappellari, L. (2003), The Dynamics and Inequality of Italian Men's Earnings: Long-term Changes or Transitory Fluctuations?, *The Journal of Human Resources*. (forthcoming)

Card, D. and A.B. Krueger (1992), Does school quality matter? Returns to education and the characteristic of public schools in the United States, *Journal of Political Economy* 100, 1–40.

Card, D. and A.B. Krueger (1996), *Labour market effects of school quality: theory and evidence*. NBER Working Paper No. 5450.

Casavola P., A. Gavosto and P. Sestito (1996), *Wage Inequality and Expenditures in R&D*. Bank of Italy. Mimeo.

Checchi, D. (1997), L'efficacia del sistema italiano in prospettiva storica, in Rossi, N. (ed.), *L'istruzione in Italia: solo un pezzo di carta?* Il Mulino.

Checchi, D. (2000), *University education in Italy*. Università di Milano. Mimeo.

Checchi, D. (2001), Scuola, formazione, mercato del lavoro, in Brucchi, L. (ed.), *Manuale di economia del lavoro*. Il Mulino.

Checchi, D. (2003), Inequality in incomes and access to education: a cross-country analysis (1960-95), *Labour* 17, 153–201.

Checchi, D. and V. Dardanoni (2002), *Mobility comparisons: does using different measures matter?* University of Milan, Department of Economics, Working Papers 2002-15.

Checchi, D., A. Ichino and A. Rustichini (1999), More equal but less mobile? Education financing and intergenerational mobility in Italy and in the US, *Journal of Public Economics* 74, 351–393.

Checchi, D. and T. Jappelli (2003), *School choice and quality*. IZA Discussion Papers No. 828.

Cobalti, A. and A. Schizzerotto (1997), Occupational returns to education in contemporary Italy, in Shavit, Y. and W. Müller (eds), *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*. Oxford University Press.

Comi, S. (2003), *Intergenerational mobility in Europe: evidence from ECHP*. wTw Working Paper No. 3/2003.

Contini, B., M. Filippi and C. Villosio, C. (1998), Earnings Mobility in the Italian Economy, in Asplund, R., P.J. Sloane, and I. Theodossiou (eds.), *Low Pay and Earnings Mobility in Europe*. Edward Elgar, Chelthenham.

D'Ambrosio, C. (2000), La distribuzione dei salari in Italia: un'applicazione empirica, in CNEL-IRS (eds), *Rapporto sulle retribuzioni e il costo del lavoro*. Giuffre' editore.

D'Ambrosio, C. (2001), Household Characteristics and the Distribution of Income in Italy: An Application of Social Distance Measures, *Review of Income and Wealth* 47(1), 43–64.

Dell'Aringa, C. and C. Lucifora (1994), Egualitarismo e sindacato: vent'anni dopo, *Lavoro e relazioni industriali* 1/94, 3–41.

Erickson, C.L. and A. Ichino (1995), Wage differentials in Italy: market forces, institutions, and inflation, in Freeman, R, and L. Katz (eds.), *Differences and changes in wage structure*. NBER/University of Chicago Press.

Flabbi, L. (2001), La scelta della scuola secondaria in Italia, *Rivista di Politica Economica* 7/8.

Garonna, P., F. Nusperli and A. Silvestrini (2000), *Istruzione e capitale umano: statistiche e questioni di misura*. Paper presented at the SIE conference (Ancona 2000).

Giannelli**,** G.C. and C. Monfardini (2000), *Joint decision on household membership and human capital accumulation of youths. The role of expected earnings and local markets*. IZA Discussion Paper No. 191.

Green, A., A. Wolf and T. Leney (1999), *Convergence and divergence in European Education and Training System*. Institute of Education, London.

Hannan, D., D. Raffe and E. Smyth (1997), Cross-National Research on School to Work Transitions: An Analytical Framework, in Werquin, P., R. Breen and J. Planas (eds), *Youth Transitions in Europe: Theories and Evidence*. Céreq, Documents séminaires n° 120, Marseille.

Hanushek, E.A. (1986), The economics of schooling: production and efficiency in public schools, *Journal of Economic Literature* 24(3), 1141–1177.

Hanushek, E.A. (1999), The Evidence on Class Size, in Mayer, S.E. and P. Peterson (eds), *Earning and Learning: How Schools Matter*. Brookings Institution.

Iannelli, C. (1997), *Educational choices in Italy. The role of track placement in the allocation process of education*. Mimeo.

Istat, *Università e lavoro*. www.istat.it

Lucifora, C. (1999), Wage inequalities and low pay: the role of labour market institutions, in Bazen, S., M. Gregory and W. Salverda (eds), *Labour market inequalities*. Oxford University Press.

Lucifora, C. and F. Origo (1997), I differenziali retributivi 1990-1994: un'analisi sui micro-dati tratti dagli archivi INPS, in CNEL-IRS (eds), *Rapporto sulle retribuzioni e sul costo del lavoro*. Guiffre' editore.

Manacorda, M. (2002), Wage indexation and the evolution of returns to education in Italy, 1978-92, in Freeman, R. (ed.), *Inequality around the world*. IEA Conference Volume No. 134.

Manacorda, M. (2003), Can the Scala Mobile Explain the Fall and Rise of Earnings Inequality in Italy? A Semiparametric Analysis, 1977-1993, *Journal of Labor Economics*. (forthcoming).

OECD (2002) *Education at a Glance*. Paris.

Regalia, I. and M. Regini (1996), *Italia anni '90: rinasce la concertazione*. IRES Discussion Papers No. 23.

Rossetti, S. and P. Tanda (2001), Rendimenti dell'investimento in capitale umano e mercato del lavoro, *Rivista di Politica Economica* 7/8, 159–202.

Shavit, Y. and W. Müller (eds) (1998), *From School to Work: A Comparative Study of Educational Qualifications and Occupational Destinations*. Oxford University Press.

Treiman, D. and H. Ganzeboom (1990), Cross-National Comparative Status Attainment Research, in *Research in Social Stratification and Mobility, Volume 9*. JAI Press.

Trivellato, U. and L. Bernardi (1994), Scolarità e formazione professionale nel Mezzogiorno: nuove evidenze da un'analisi dei flussi, *Economia e lavoro* (28), 3–34.

CHAPTER 8

Education and Inequality in Norway:
A Review of the Literature

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Education has boomed in Norway over the last 30 to 40 years. This article summarises the empirical literature on the relationship between education and wage/earnings inequality. National supply of educated labour affects wage differentials by changing the distribution of skills and productivity in the economy, and by changing relative wages by moving the economy along the relative labour demand curve. Also in Norway, there are strong effects of social and family background on educational outcomes. One question raised by several authors is whether the influence of family background has increased or decreased over time in recent decades.

1 Introduction[1]

Norway, together with the other Scandinavian countries, has low income inequality, in particular with respect to wages, and high levels of education compared to most other countries. The remarkable growth in the average level of education over the last century occurred concurrently with high economic growth, pulling Norway from being a relatively poor country in Europe to become a rich one, coupled with persistent equalisation of wages and income. This article addresses two different issues that are both related to the relationship between inequality and education. The first concerns the direct effect of education on income or wage inequality, measured at any given point in time in the economy. The other is a question of inequality in access to education: What is the extent of inter-generational mobility in levels of education?

The effect of education on inequality takes three routes: The first is the *direct link between the variation in the levels of education and the variation in income*. Since education improves ones income potential, a more equal distribution of education should, given prices, produce a more equal distribution of income. The second route is through *potential spill-over effects of education*. If the level of education affects the productivity of also less educated, an offsetting process is at work, reducing the impact of higher levels of education on relative income or wages, for given skill prices. The third route is through *the effect on relative prices*. A larger supply of highly educated workers may depress the wage premium attached to higher education, and thus reduce overall inequality.

The inter-generational aspect of inequality of education adds another important dimension to the relationship between inequality and education. A high level of inter-generational mobility in education may be viewed as an indication of equality of opportunity. On the other hand, if parental income, education and other resources are strong determinants of the level of education for the young, education tends to reproduce old class lines. A strong link between family resources and education may be caused by financial constraints, inherited abilities, differences in parental investments in the child or transmission of learning ability and motivation through different types of upbringing.

The main purpose of this article is to survey the empirical literature on the relationship between education and inequality in Norway. We start

[1] The authors wish to thank the European Commission for financial support through the EDWIN project (HPSE-CT-2002-00108).

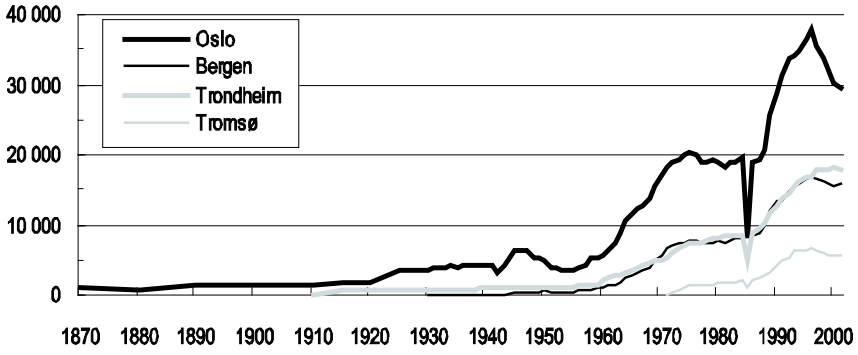
with a brief description of the development of the level of education in Norway, as well as of the present system of education with respect to financing and the selection of entry into different educational levels. The next two sections survey the literature on education and inequality and inter-generational transmission. We conclude the article with a brief summary.

2 Description of the education system and the current debate

2.1 A boom in education

Education has boomed in Norway over the last 30 to 40 years. Figure 1 shows the number of students at the different universities in Norway from 1870 to 2003. Adding up the numbers gives an increase in the total number of students from 1,479 in 1900 to 7,481 in 1950 to more than 80,000 in 2003. From 1950 to 2003, the number of students increased by a factor larger than 10.

Figure 1. Number of students at the different universities in Norway, 1870 to 2003



Source: Statistics Norway. www.ssb.no/emner/historisk_statistikk

This boom, together with exits from the labour market of old workers with lower than average education, has lead to a considerable change in the skill composition in the Norwegian population. Table 1 gives the

share of individuals above 16 years of age with different levels of highest completed education.

Table 1. Share of population aged 16+ with different levels of highest completed level of education

	1970	1980	1990	2000
Primary school	53.6	44.5	33.6	22.0
Secondary school	39.2	44.4	51.3	56.3
Tertiary A (1-4 years after secondary)	5.5	8.8	12.1	17.2
Tertiary A (5 + years after secondary)	1.7	2.4	3.1	4.7

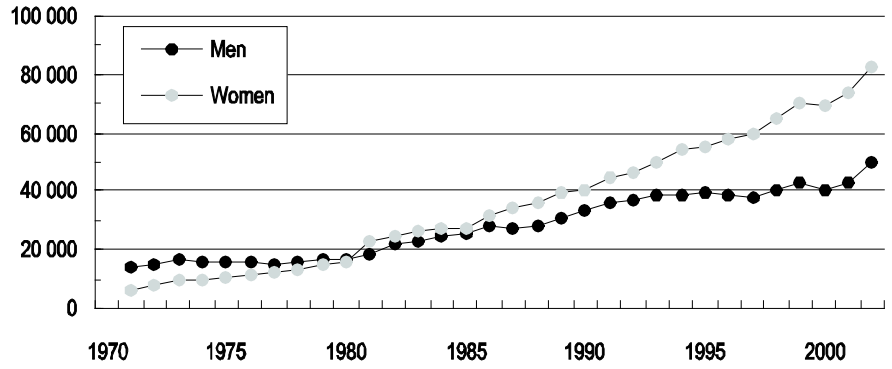
Source: Statistics Norway.

In Figure 2, we find that the growth in the number of students attending colleges outside of the universities has been even more dramatic over the last 30 years. The total number of students in college has grown from less than 20,000 in 1971 to more than 130,000 in 2002.

According to Aamodt and Stølen (2003), based on information on the present school choices and levels of education in the labour force, the share of higher education will continue to increase well beyond 2030.

The boom in education has been particularly strong for women. The growth for women has come about particularly in college-level schooling. This is evident from Figure 2, where the number of women attend-

Figure 2. Number of students in colleges 1971–2002, men and women



Source: Statistics Norway; www.ssb.no/emner/04

ing college is shown to have grown at a high rate. Women's college attendance surpassed that of men in the early 1980s. The growth in education for women has a strong influence on inequality also because women's labour market status is more sensitive to levels of education. The education system is highly gender segregated (Støren and Arnesen, 2003). Educational choices follow traditional gender lines. However, Støren and Arnesen (2003) find that gender segregation is decreasing. For instance, between 1980 and 2001 the Duncan and Duncan index of segregation for higher education decreased from 0.47 to 0.35 while the same index for Phd's decreased from 0.49 to 0.26. This decline was found also within fields of study. Gender segregation is higher in the earlier stages of educational choices, and smallest at the top (PhD level).

2.2 Recent reforms and the present system

In 1997, the *compulsory school* was extended to ten years by lowering the age at which children start school to 6. Primary education was then divided into two levels: The lower level covers the four first years and the intermediate levels include the fifth, sixth and seventh years. The three last years of compulsory school constitute the lower secondary level.

In 1994, youth between the ages of 16 and 19 were given the *statutory right* to a minimum of three years of *upper secondary education*. At the same time, vocational training changed from a three-year training programme in school to a dual model involving a basic model based on two years of school and two years of on-the-job training. Also, vocational pupils may achieve the qualifications necessary to apply for admission to colleges and universities by completing a specific course the last year.

With regard to higher education, important changes took place during the 1970s. In the first place, a series of new regional colleges were established throughout the country. These were set up to provide shorter (2–3 three years) vocationally oriented programme, as well as courses that could be incorporated in traditional under-graduate university studies. Secondly, a number of post-secondary educations that had not so far been regarded as higher education (e.g., schools for engineers, nurses, elementary school teachers) were upgraded and often extended from two to three years. (Teacher training was further extended in 1992, from three to four years of college.) Partly as a consequence of this, the number of students in higher education increased from about 30,000 in 1970 to about 80,000 in 1980 (Ministry of Finance, 1998).

At present there is a change in the university system, labelled (somewhat euphemistically) the 'Quality Reform'. An important motivation for the reform has been the fact that students typically do not finish in time and often spend several years more than stipulated before achieving their degrees. An important element is a stronger emphasis on the supervision and follow-up of individual students and on group-based education. Also there is a shift from traditional final exams to more continuous types of evaluation (so-called portfolio evaluation).

In addition to these changes in methods of teaching and evaluation, there is an attempt to increase the importance of the bachelor degree. Traditionally, this has to a considerable extent been a stepping stone on the way to higher degrees. The reform aims to make this degree more oriented toward the labour market.

As yet, it is unclear to what extent the reform will have important implications for the level of education. On the one hand, more students may be attracted to higher education, and drop-off may be reduced. On the other hand, a more attractive bachelor's degree may reduce the number who go on to take higher degrees.

The education sector is financed by the state. However, since 1986, local governments are given a budget within which they may allocate their own means. This basically means that primary and secondary schools are subject to local priorities. But the sector is highly regulated, and the degrees of freedom at the local levels are rather small.

The State Educational Loan Fund was established in 1947 to provide students with loans and grants. The level of student support is among the highest in Europe, providing students with financial resources during their time as students. The grant's share of the sum of loans and grants given to students every semester is now above 35 per cent.

2.3 The current debate

The educational system has several aims. One is to supply the economy with a qualified labour force. A second is to contribute to the moral development of children and young people. A third aim – at least in some countries, including Norway – is to reduce social and economic inequality. The public debate on education in Norway during the last few decades has to a large extent been related to tensions between these different aims, particularly between productivity related aims, on the one hand, and the egalitarian and moral development aims, on the other. One issue is ability tracking, which was originally introduced in the 1970s but was

soon abolished. Another is the use of grades: Grades are now used from the 8th year, but not during the first 7 years of primary school. A third is the use of national tests, which are not used at present but which have been suggested by the current government.

International skills tests, like the PISA study, indicate that Norway performs only average among the OECD countries on several of the scores (Høiskar, 2003). For example, Norwegian 15-year-olds' performance was average in reading, math and science in 2001. At the same time, Norway is one of the countries with most resources put into education, both measured per student and per capita. In terms of public expenditure on education, we rank as number three in the world, after Sweden and Denmark (Høiskar, 2003). These facts indicate that we do not get enough out of our resources, and have, as in many other countries, spurred and intensified the debate about school aims, content and quality.

A related issue is the question of public subsidies for private schools (public schools are generally free). There is no law against private schools, but they have to meet strict requirements to obtain public subsidies. At the primary and lower secondary levels only 1.6 per cent attended private schools in 2000–2001 (Hansen and Mastekaasa, 2003) (nearly all of these schools were subsidised). The main argument put forward for subsidising private schools is individual freedom, the main argument against is potential in-egalitarian effects of private schools.

Following a recent government commission about the organisation of higher education, the issue of ownership and modes of control over the educational sector is a matter of heated debate. The commission suggested that universities and colleges should be made into self-owning organisations rather than being under direct state ownership as today. Large controversies concern both issues of academic freedom and independence from state and market influences, as well as budgets and effects on student flows.

3 Education and inequality

3.1 Direct effects through changes in the variance of social status

The considerable growth in the average level of education in the population affects the dispersion of education in the population. A more dis-

persed skill distribution leads to more inequality, while a compressed skill distribution contributes towards equality of pay.

Hærnes (1993) uses census data from 1970, 1980 and 1990 to investigate the relationship between income and education in Norway over this 20-year period. He finds that the level of education increased sharply over these years. For example, the number of full-time employees with a masters-level degree, increased by 121 per cent from 1970 to 1990. The skill upgrading of the labour market took place both between, but also to a large extent within industries. At the same time, he finds that relative earnings between educational groups remained fairly constant between 1970 and 1980, but that the relative wages of highly educated workers dropped for both men and women from 1980 to 1990.

An Official Committee Report (NOU 1993:17) on the level of living in Norway, reported that education contributed to income equalisation between 1980 to 1990 in two ways. First of all, they observed an increase in the level of education in the population; summarised by the observation of "200,000 fewer individuals in the labour force with primary school only and 200,000 more individuals with tertiary education" (p. 160). Furthermore, they report on reduced earnings differentials across educational levels from 1980 to 1990. We will return to the issue of earnings differentials below.

3.2 Productivity effects

There is only one paper exploring the direct link between productivity and education in Norway. Hægeland and Klette (1999) estimate simultaneously the productivity and wage premium associated with different levels of education at the plant level. They obtain somewhat higher estimated wage differences than those found in other studies for Norway. They report a significant effect of education on productivity, but the numbers are smaller than for the USA (Hellerstein *et al.*, 1996). They find that the wage returns to education correspond well to productivity differences, with the exception of workers with low education who appear to be over-paid relative to their productivity.

There is very little evidence on the issue of potential externalities of education. As pointed out by Hægeland (2003), this is the case in the international literature as well. Barth (2002) uses a linked employer-employee data set and finds that there is an extra return of 1–2 per cent per year to individual wages from the average level of education at a plant, in addition to the effect on individual wages of own education.

This is an indication of a spill-over effect at the plant level, implying that increasing the level of education increases the productivity also of those who do not experience an increase in education.

3.3 Impact on wage compression

Increasing the average level of education in the society should lead to wage compression through changes in skill prices. Increased relative supply of highly educated workers should, *cet par*, reduce wage differentials between groups, since the supply of low-educated workers decreases, while the supply of high-educated workers increases. Barth and Røed (2002) estimate the elasticity of substitution between workers with tertiary education and workers without tertiary education to about unity. Concurrently, however, they estimate a positive shift in the demand for higher education. This result is basically driven by the observed stability in relative wages even in the face of the educational boom. We next summarise the recent literature on the return to education for Norway.

The return to education is most often measured by the use of standard Mincer regressions. This gives a measure of the wage differential associated with higher education. Barth and Røed (1999) summarise the literature on returns to education for Norway up to the end of the 1990s. They find that the return to education is low in Norway, compared to other countries. Most of the studies indicate returns to education in the neighbourhood of 5 per cent. IV estimates are higher (own estimates and Hægeland *et al.*, 1999), while the twin-study of Raaum and Aaabø (2000) gives lower estimates.

Barth and Røed (1999) report a rather stable relationship between wages and levels of education over the period from 1980 to 1995. They highlight the importance of public-sector wage setting for the overall wage structure by finding an increasing gap between the public and the private sector. Barth and Børing (2002) report a wage differential associated with one more year of education of above 7 per cent in both 1995 and 2000 in the private sector, while the wage differential in the public sector was estimated to 4 per cent in 1995 and 5 per cent in 2000. The overall return to education in the labour market in 2000 was estimated to 5.5 per cent.

An interesting historical study, which was not included in Barth and Røed (1999), is given by Minde (1998). His study investigates the return to educational investments in Norway from 1885 to 1955, using data from banks and the central public administration. He concludes that ed-

ucational investment has proved to be a profitable investment for the individual over the whole period. However, there has been a decline in the return to education, in particular for the investment in upper secondary education compared to primary education, over the period. He argues that this may be due to an excess supply of college and academy candidates. He does, however, also ask the question whether the government wage policy has been an effective tool for equalisation, indicating that the public-sector wage policy may have had a significant influence on the observed decline in returns to education. Based on more recent studies, Barth and Røed (1999) also conclude that the public-sector wage policy is an important explanation of overall returns to education in Norway.

In a large-scale study of returns to education in Norway, Hægeland (2001) finds a reduction in the return to education across cohorts over time. However, when using family background variables and an ordered probit in the first stage, he finds that the reduction in the return is due to changes in the selection into education (from positive to negative), and reports a very stable level of returns to education in Norway after control for selection into education.

Aakvik *et al.* (2003) use educational reforms as instruments in the wage equations, to solve for the problem of endogeneity of schooling. Their OLS estimate is about 7.5 per cent, which is high in a Norwegian context. The IV estimator is even higher, about 10 per cent, while the average of a random coeffcient model gives an estimated return to education of 6.3 per cent. With more flexible models, they find that the return to education in Norway is strongly non-linear, and that the returns to upper secondary school and shorter programme at regional colleges together with master's programme at universities, have high returns to education.

The assumption of a positive effect of the supply of educated labour on wage compression is valid to the extent that wage differences between individuals with different levels of education reflect the human capital accumulated in the education system. To the extent that education works as a signalling/screening device, however, wage compression does not necessarily follow. In that case one would expect (future) job seekers to find additional ways to signal their quality and employers to attach more weight to additional screening criteria. In other countries, a trend toward more stress on differences between educational institutions (elite schools and universities) has been noted, and possibly also a greater importance of grades (e.g. Brown, 1995). To the extent that such processes occur, smaller wage differences between levels of education might be offset by greater differences within levels.

As noted above, so far there has been little differentiation in terms of prestige (or assumed quality) among educational institutions in Norway. Some wage effects of graduating from particular institutions may nevertheless be present, but no empirical study of such effects has been carried out. With regard to wage differentiation based on individuals' grades, a couple of studies have been carried out using data on people with higher education. Mastekaasa (2000) examines the relationship between university grades and annual earnings in several groups of university graduates. In most groups the relationship was very weak. A very strong relationship was found for law graduates, however, and it was also of some magnitude for graduates in business administration, dental medicine and even in social sciences. To the extent that a relationship between grades and earnings was found, it tended to increase over the individual's career. Analyses by Arnesen and Try (2001) and Try and Grøgaard (forthcoming) corroborate the finding of generally weak effects with law as a notable exception. None of the studies of grade effects examined trends over time, however.

4 Inter-generational mobility

Has the education system provided new opportunities for economic success for the recent generations, or is it just a way of reproducing and perhaps reinforcing old class lines? This question is illuminated in studies of inter-generational mobility in education and income. Both as a background for normative judgements as well as for policy recommendations, it is important to know whether background effects are due to financial constraints or to other factors related to the old question of 'nature versus nurture'.

Hansen (1986) gives a summary and assessment of the literature in Norway on social differences in education. Social inequality in educational attainment is a well documented fact in Norway at this point in time. She examines the explanations of social patterns in education by distinguishing between (a) theories of differences among social strata in values or preferences, (b) theories stressing cultural differences or cultural deprivation, and (c) theories of variation in the relative costs and benefits of higher education. As a proponent of the first type of theory, differences in preferences, she refers back to the study of Schneider and Lysgaard (1953), arguing that there are differences between social strata in the ability or willingness to achieve 'deferred gratification', as well as to Lindbekk (1962). The second type of theory, resource or cultural dep-

rivation, is represented by the work of Hoëm (1972), Hernes (1974) and Hernes and Knudsen (1976). This strand of theory stresses the differences in resources that children from different strata possess as a result of different socialisation patterns. Hansen (1986) goes through the existing evidence on the effect of social background, and argues that the evidence is rather in favour of theories of social position. According to this strand of theory, the costs and benefits of education is different depending on the social position of the child, particularly because different levels of education are required in order not to experience social degradation.

An early study of the relationship between parental status and their children's educational achievements is Skrede (1976). She finds an increasing correlation with the father's level of education, as measured by the standardised regression coefficient, from the 1921 cohort (0.224) to the 1941 cohort (0.266). In the same model, she finds an increasing coefficient for the educational level of the mother (0.157 for the 1921 cohort compared to 0.173 for the 1941 cohort). However, in the same model she finds a considerable drop in the coefficient for the socio-economic status of the father: from 0.289 for the 1921 cohort to 0.194 for the 1941 cohort. All in all, the evidence with respect to the overall reproduction of social status is ambiguous.

In the same study, Skrede (1976) also reports on the correlation between parents' status and the health status of the adult children. She fails to find significant relationships. However, she finds significant effects of the father's education on the adult child's income in 1970.

Edvardsen (1991) summarises the literature on educational choice up to the beginning of the 1990s, and presents own analyses on data from several data sources. Comparing future educational outcomes of high-school students from different cohorts, he concludes that there is a strong positive correlation between the social status of the father and the educational level of the child. In particular, he compares the outcomes of cohorts from each decade after the Second World War, and shows that there was a reduction in the differences between the educational levels of individuals from different levels of social status from the 1950s to the end of the 1970s. However, due to difficulties in comparing the data from the different periods, he is not able to conclude with respect to the development in the 1980s. One conclusion is firm, though, and that is the one of equalisation across genders in this period.

Hansen (1997) uses Norwegian census data linked to educational registers to study the relationship between parental social class and income and educational outcomes. She finds an impact on the probability of attaining secondary school and tertiary education of both parental income

and social class (father if present, else mother). She finds a stronger impact of these variables in the first stages of the schooling ladder (compulsory to secondary schooling) but still significant effects also in the later transitions. The impact of social origin/income on transition is stronger for transitions into 'prestigious tracks of tertiary-level education'.

In Hansen (1999), she uses large register-based data sets from Statistics Norway to investigate the relationship between social status and parental income and educational outcomes between the 1980s and the 1990s. She finds a strong relationship between both social class and family income and the probability of obtaining tertiary education. She distinguishes between open and closed (admission regulated) tertiary schools as well as college level schools. She finds that income has a stronger effect on admission regulated schools, but can display no trend in the relationship between social origin and tertiary university-level education from the 1980s to the 1990s. She does, however, document a reduction in inequality in the recruitment into college level schools. The way she does this is by interacting cohort with the measures of social background, pointing to less impact of social origin on college level education over time.

Raaum and Aabø (2002) use a large register-based data set to study the relationship between the number of years of schooling and the parents' level of education, income and wealth. They find a significant influence of all these variables on years of schooling. The influence of the father's income is strong, 0.92 years per 100,000 NOK, when entered alone into the equation. This effect drops to about one-third after inclusion of the parent's levels of education. The influence of the mother's income is smaller than the influence of the father's income, about one-fourth of the effect, but the influence of years of schooling from each parent is quite similar. They go on to study the relationship between family size and the level of education. In particular, they use information on the time of birth of siblings to estimate a 'time-squeeze' effect, and find a significant negative 'time-squeeze' effect, independent of the level of income of the family.

Raaum and Aabø (2002) also analyse sibling correlations in educational attainment. Sibling correlations are strong, and only slightly more than half of them are explained by the economic status and income of the parents. When splitting the sample into twins and non-twins, they find twice as strong a correlation among twins. This is the case also when comparing to non-twins born less than 18 months apart. They interpret this as evidence that also inherited traits influence the educational career of the individual.

Raaum *et al.* (2001) study neighbourhood effects in more detail. They find a significant neighbourhood effect, also after correcting for the individual's parent's level of education. They find that neighbourhood effects, measured in terms of correlations, dropped from around 0.12 (0.06 adjusted for family background) for the 1947 cohort to less than 0.02 (0.01 adjusted) for the 1970 cohort. The correlation between parent's education and own education dropped from 0.43 (father) and 0.33 (mother) for the 1947 cohort to 0.25 and 0.19, respectively, for the 1970 cohort.

Black *et al.* (2003) use a unique data set from Norway in an attempt to distinguish between the effect of parents' education and other family characteristics. They use a reform of the education system that was implemented in different municipalities at different times in the 1960s as an instrument for parental education, and fail to find evidence of a causal effect of parental education on children's education, despite a significant OLS relationship. On the basis of this result, they conclude that the high correlations between parent's and children's education are due primarily to family characteristics and inherited ability rather than to educational spill-overs across generations.

5 Conclusion

Education has boomed over the last 30 to 40 years. The growth in the average educational level has been particularly strong for women. Scarce historical evidence suggests that the return to education dropped during the first half of the 1900s, probably as a result of growth in supply. However, the recent boom has not led to a drop in the returns to education, at least not after the late 1970s. The growth in educational attainment of the labour force has occurred concurrently to a similar growth in the relative demand for higher education in the labour market.

Norway has a compressed wage structure, to a large extent due to the centralised wage bargaining institutions. The state offers free education and large-scale financial support for students. This support ensures individual incentives for education, even with wage compression. The huge expansion in the education system has alleviated the pressure for higher wage differentials which would otherwise have been the result of the increase in the relative demand for education. In this sense, education policies have supported wage compression in Norway over these last decades.

There is strong evidence that family background, both related to parents' income, wealth and other family factors including neighbourhood, affects educational outcomes in Norway. To the extent that these factors are evaluated over time, the evidence is not entirely consistent. All in all, there seems to have been some reduction in the importance of social background over the second half of the last century.

Literature

Aakvik, A., K.G. Salvanes and K. Vaage (2003), *Measuring Heterogeneity in the Returns to Education in Norway*. CEPR Discussion Paper No. 4088.

Aamodt, P.O. and N.M. Stølen (2003), Vekst i utdanningssystemet (Growth in the educational system), in *Utdanning 2003: ressurser, rekruttering og resultater (Education 2003: Resources, recruitment and results)*. Statistics Norway, Statistiske Analyser No. 60, Oslo.

Arnesen, C.Å. and S. Try (2001), *Karakterers betydning for overgangen fra høyere utdanning til arbeidsmarkedet (The Importance of Grades for School-to-Work Transitions)*. Norwegian Institute for Studies of Education and Research, Report 6/2001, Oslo.

Barth, E. (2002), *Spillover Effects of Education. Evidence from the Wage Structure*. Institute for social research, Oslo. Mimeo.

Barth, E. and P. Børing (2002), Utviklingen i lønnsstrukturen 1995–2000 (The Development of the Wage Structure 1995–2000), *Søkelys på arbeidsmarkedet* 19, 45–54.

Barth, E. and M. Røed (1999), Education and Earnings in Norway, in Asplund, R. and P.T. Pereira (eds), *Education and Earnings in Europe – A Literature Review*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Barth, E. and M. Røed (2002), Do We Need all that Higher Education?, in Asplund, R. (ed.), *Education and Earnings: Further Evidence from Europe*. The Research Institute of the Finnish Economy ETLA, Series B183, Helsinki.

Black, S.E., P.J. Devereux and K.G. Salvanes (2003), *Why the Apple Doesn't Fall Far: Understanding the Intergenerational Transmission of Human Capital*. NBER Working paper 10066, Cambridge, MA.

Brown, P. (1995), Cultural Capital and Social Exclusion: Some Observations on Recent Trends in Education, Employment and the Labour Market, *Work, Employment & Society* 9, 29–51.

Edvardsen, R. (1991), *Valg av utdanning og yrke. Betydning av kjønn, sosial og geografisk bakgrunn ved utdannings- og yrkesvalg* (*Choosing Education and Occupation: the Influence of Gender, Social and Geographical Background)*. Utredningsinstituttet for forskning og høyere utdanning, Rapport 12/91.

Hansen, M.N. (1986), Sosiale utdanningsforskjeller. Hvordan er det blitt forklart? Hvordan bør de forklares? (Social Differences in Education. How Have They Been Explained? How Should They Be Explained?), *Tidsskrift for samfunnsforskning* 27, 3–28.

Hansen, M.N. (1997), Social and Economic Inequality in the Educational Career: Do the Effects of Social Background Decline?, *European Sociological Review* 13, 305–322.

Hansen, M.N. (1999), Utdanningspolitikk og ulikhet. Rekruttering til høyere utdanning 1985–1996 (Educational Policies and Inequality. Recruitment into Higher Education 1985–1996), *Tidsskrift for samfunnsforskning* 40, 172–203.

Hansen, M.N. and A. Mastekaasa (2003), Utdanning, ulikhet og forandring (Education, Inequality and Change), in Frønes, I. and L. Kjølsrød (eds), *Det norske samfunn (The Norwegian Society)*. Gyldendal akademisk, Oslo. (4. ed)

Hernes, G. (1974), Om ulikhetens reproduksjon (On the Reproduction of Inequality), in Mortensen M.S. (ed.), *I forskningens lys* (*From the perspective of research*). NAVF, Oslo.

Hernes, G. and K. Knudsen (1976), *Utdanning og ulikhet* (*Education and Inequality*). NOU:1976:46, Oslo.

Hellerstein, J., D. Neumark and K. Troske (1996), Wages, Productivity and Worker Characteristics: Evidence from Plant-Level Production Functions, *Journal of Labor Economics* 17, 409–446.

Hoëm, A. (1972), Kunnskapsoverføring som sosialt fenomen (Transfer of Knowledge as a Social Phenomenon), *Tidsskrift for samfunnsforskning* 13, 251–264.

Hægeland, T. (2001), *Changing Returns to Education across Cohorts: Selection, School System or Skills Obsolescence?* Statistics Norway, Discussion Papers No. 302, Oslo.

Hægeland, T. (2003), Økonomisk avkastning av utdanning (Economic Returns to Education), in *Utdanning 2003: ressurser, rekruttering og resultater (Education 2003: Resources, recruitment and results)*. Statistiske Analyser No. 60, Statistics Norway, Oslo.

Hægeland, T. and T.J. Klette (1999), Do Higher Wages Reflect Higher Productivity? Education, Gender and Experience Premiums in a Matched Plant-Worker Data Set, in Haltiwanger, J., J. Lane, J. Spletzer, J. Theeuwes and K. Troske (eds), *The Creation and Analysis of Employer-Employee Matched Data*. Elsevier Science B.V., Amsterdam.

Hægeland, T., T.J. Klette and K.G. Salvanes (1999), Declining Returns to Education in Norway? Comparing Estimates across Cohorts, Sectors and over Time, *Scandinavian Journal of Economics* 101(4), 555–576.

Hærnes, E. (1993), Utdanning og inntekt – Struktur og utvikling 1970, 1980 og 1990 (Education and Income – Structure and Development 1970, 1980 and 1990), *Sosialøkonomen* 10/93, 10–14.

Høiskar, A.H. (2003), Norge i verden (Norway in the World), in *Utdanning 2003: ressurser, rekruttering og resultater (Education 2003: Resources, Recruitment and Results)*. Statistics Norway, Statistiske Analyser No. 60, Oslo.

Lindbekk, T. (1962), Den sosiale rekruttering til de akademiske profesjoner i vår tid (The Social Recruitment to Academic Professions in Our Time), *Tidsskrift for samfunnsforskning* 3(4), 231–254.

Mastekaasa, A. (2000), Universitetsutdanning, karakterer og økonomisk suksess (University Education, Grades and Economic Success), *Tidsskrift for samfunnsforskning* 41, 523–560.

Minde, K.B. (1998), Was there a Fall in the Return to Educational Investment in Norway, 1885–1955?, *Scandinavian Economic History Review* XLVI(3), 6–22.

Ministry of Finance (1998), *Økonomien i den statlige høgskolesektoren* (*The Finances of the State Owned Colleges)*. Minstry of Finance, NOU 1998:6, Oslo.

NOU 1993:17, *Levekår i Norge* (*Level of living in Norway*). Norwegian Official Committee Report #17:1993.

Raaum, O. and T.E. Aabø (2000), The Effect of Schooling on Earnings: Evidence on the Role of Family Background from a Large Sample of Norwegian Twins, *Nordic Journal of Political Economy* 26, 95–113.

Raaum, O. and T.E. Aabø (2002), *Do Family Resources and Structure Affect Educational Attainment?*. The Frisch Center for Economic Research, Oslo. Mimeo.

Raaum, O., K.G. Salvanes and E.Ø. Sørensen (2001), *The Neighbourhood Is Not What it Used to Be: Has there been Equalisation across Families and Communities in Norway?* University of Oslo, Department of Economics, Memorandum 38/2001.

Schneider, L. and S. Lysgaard (1953), The Deferred Gratification Pattern. A Preliminary Study, *American Sociological Review* 18, 142–159.

Skrede, K. (1976), *Inequality of Education, Income and Health Status in three Norwegian Male Cohorts*. Institute of Applied Social Research (INAS), Memorandum No 13, Oslo.

Støren, L.A. and C.Å. Arnesen, (2003), Et kjønnsdelt utdanningssystem (A Gender Segregated Educational System), in *Utdanning 2003: ressurser, rekruttering og resultater (Education 2003: resources, recruitment and results)*. Statistics Norway, Statistiske Analyser No. 60, Oslo.

Try, S. and J.B. Grøgaard (forthcoming), *Measuring the Relationship Between Resources and Outcomes in Higher Education in Norway*. Norwegian Institute for Studies of Education and Research, Oslo.

CHAPTER 9

Education and Wage Inequality in Portugal

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This article summarises the recent literature on the relationship between inequality in wages and education for Portugal. The main conclusions are the following. First, Portugal is one of the OECD countries with lowest educational level. At the same time, returns to education are large, and suggest that skills are particularly valuable in the Portuguese labour market. Second, over the last two decades returns to education increased steadily, which suggests that skill-biased technological change is partly responsible for the observed pattern. Analysis of the returns across educational levels and the dispersion of returns over the wage distribution reveals that education may have helped to increase both between-group and within-group inequality. Third, the recent evolution of average years of education has lead to a considerable increase in the standard measures of over-education, particularly among younger cohorts. Since schooling mis-matches are associated with lower wages, recent changes in the educational composition of the workforce may have consequences for the wage distribution. Fourth, some conclusions can also be established on the interaction between formal education and acquired skills. Most forms of training are associated with higher wages and appear to act as remedial education. Less educated individuals are less likely to get trained. However, once trained, they obtain larger returns. Finally, analysis of employment opportunities and school-to-work transitions suggests that more educated individuals benefit from better job opportunities and receive more job offers.

1 Introduction[1]

This article explores the connection between education and economic inequality in Portugal. First, it describes the data sets that are frequently used in the literature. Then, it briefly describes the Portuguese education system with particular attention being paid to its recent evolution. Measures of enrolment and drop-out rates as well as average schooling are reported and compared to those for other countries. Moreover, it draws on the existing literature to analyse the efficiency of the education system in terms of the schooling performance of Portuguese students. Third, it examines recent changes in the wage distribution, and presents candidate explanations for the observed pattern. The evidence suggests that education is partially responsible for the increased wage inequality experienced by the Portuguese economy over the last years. Therefore, the reminder of the article is devoted to explicitly exploring the links between education and wage inequality. Hence, in a fourth step, it attempts to shed some light on the link between educational attainment and social background. Unfortunately, this analysis is strongly limited by the lack of studies on this topic. Fifth, the focus is turned to the impact of education on wages, and a discussion of the connection between education and between-group as well as within-group inequality. The consequences of signalling effects, education mis-matches, and training participation are also discussed. Sixth, one non-pecuniary benefit of education is security of employment. Some recent studies allow us to explore the connection between educational attainment and school-to-work transitions and job stability.

2 Data sets

In this section we provide a short description of the data sets that have been used most frequently in the literature. The *Personnel Records* (QP, Quadros de Pessoal) is an employer-based data set collected by the Portuguese Ministry of Employment since 1982 on an annual basis from all business firms with more than one employee. Public administration, domestic work, and agricultural occupations are not included. A law makes it compulsory for firms to report on worker characteristics such as gen-

[1] Financial support from the European Commission within the framework of the EDWIN project (HPSE-CT-2002-00108) is gratefully acknowledged, as are also helpful comments by Prof. Pedro Telhado Pereira.

der, age, education, qualification level, occupation, years in the firm, firm size, hours worked, and earnings. The forms are prepared by the Ministry of Employment and are filled in by the employers. This procedure, together with a large number of observations (more than 60,000 workers each year), guarantees a higher degree of quality, as well as comparability of the data across years.

The *Employment Enquiry* (IE, Inquérito ao Emprego) is a quarterly survey of a representative sample of households in Portugal, carried out by the National Institute of Statistics. It has a sample size of about 45,000 individuals, and a rotating structure in which 1/6 of the sample is dropped randomly each quarter. The IE asks individuals about their monthly net wage, age, educational level, training activities, time when the first job contract was obtained, sector of employment, type of contract, professional activity, hours worked, tenure, and region, among other variables.

The *Enquiry of Actions of Professional Formation* (IAFP, Inquérito às Accões de Formação Professional) has been carried out by the Portuguese Ministry of Employment since 1992 on a yearly basis, with the exception of 1993, 1995 and 1999. Firms with more than 10 employees are asked to report on their training schemes, including the number, duration, content and costs of their training activities and the individuals participating in such activities (number, age, gender and type of contract). The sample size in 2000 was 5,500 firms.

Finally, the *European Community Household Panel* (ECHP) was conducted for the first time in 1994 and presents a panel structure that extends over all subsequent years. It has a sample size of about 4,500 households and 11,000 individuals that report information regarding family and personal characteristics such as educational background, occupational status, monthly wages, worked hours, and sector of employment, among other variables.

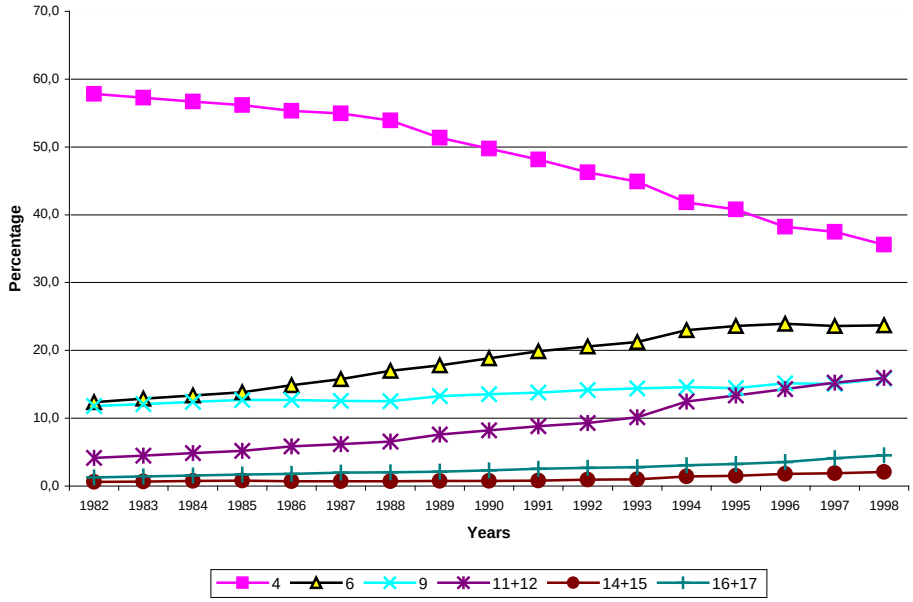
3 The Portuguese education system

Today's Portuguese education system is regulated by the 1986 reform. It ranks a basic level of 9 years, a new compulsory minimum from then on, a secondary level of 3 years (including the technical branch), and a superior level which comprises both universities (which award 4-, 5-, and 6-year degrees) and polytechnic institutes (which confer 3-year, usually more technically-minded degrees). This law allowed private universities

to operate and expand in an attempt to decrease the state's involvement in the higher education system. This reform, together with the 1983 reform, helped to consolidate the Portuguese education system after a period of instability.[2]

As displayed in Figure 1, the Portuguese labour force has experienced a significant educational upgrade over the last years. In 1982, almost 60 per cent of the workforce belonged to the lowest educational attainment level (4 years of schooling or less), while in 1998 this share had fallen to 35 per cent. Eurostat (2004) provides internationally comparable information about the educational attainment of the Portuguese labour force.

Figure 1. Schooling attainment of the Portuguese labour force, 1982 to 1998



Source: Pereira and Martins (2002a).

[2] A period of consolidation was launched with the 1983 reform. As stated in Pereira and Martins (1999), "its most relevant achievement was to reorganise the technical branch at the upper secondary level. Students who wished to focus on a more job-related type of learning would take a three-year course, after having completed 9 years of academic-oriented education. As a novelty, students graduating from these technical courses could move on to university. However, this branch turned out not to be too successful since the academic path was overhelming preferred by retrospective pupils" (p. 11).

The number of students enrolled in tertiary education more than duplicated over the last decade, going from 186,000 in 1991 to 396,600 in 2002. From 1990 to 1996, the growth rate of tertiary education enrolment was the highest among EU countries, or about 144 per cent. From 1993 to 2002, the percentage of all 18-year-olds who were still in any kind of school (all ISCED levels) went from 52.7 to 60.5, while the percentage of the adult population (25 to 64 year-olds) that had completed at least upper secondary education increased from 19.9 to 20.6. These numbers are, however, far from the EU averages (74.7 and 64.6 per cent, respectively, in 2002). Male and female enrolment rates in tertiary education are, respectively, 22 and 30 per cent in the 18 to 21 age bracket, 17 and 23 per cent in the 22 to 24 age bracket, and 8 and 10 per cent in the 25 to 28 age bracket. As compared to other European countries, these numbers indicate that enrolment rates are relatively low in Portugal, as well as less evenly distributed across age groups. In line with other European countries, women tend to participate more than men in higher education.

Illiteracy in Portugal still raises serious concerns. In 2002, some 7 per cent of the total population were illiterate. Moreover, as illiteracy is concentrated to older individuals, higher enrolment rates among younger individuals have helped only partially to reduce this problem. The sharp decrease of the illiteracy rate observed during very recent years, falling from 11.1 per cent in 1995 to 7.1 per cent in 2002, is nevertheless remarkable.

The number of drop-outs is still substantial, with a 45 per cent rate for the 18–24 age group (52 per cent for men) in 2001, which is far away from the 19 per cent EU average. This places Portugal as the country with the highest drop-out rate in the EU, more than 10 percentage points above the country with the second highest rate (Spain). Moreover, drop-outs are rather uniformly distributed across educational levels.

Total public expenditure on education – direct expenditure for educational institutions, scholarships, public loans, and public subsidies for educational activities to private firms or non-profit organisations (transfers to private households and firms) – is relatively high in Portugal. In 2001, public expenditure on primary, secondary and tertiary education accounted for, respectively, 1.8, 2.5 and 1.1 per cent of GDP, while the corresponding EU averages were 1.1, 2.4 and 1.1 per cent. Public funds for education account for about 13.5 per cent of total public expenditure. From 1990 to 1999, public funds devoted to education experienced an average growth rate of 12.4 per cent, representing 5.4 per cent of GDP in 1995, 5.7 per cent in 1998 and reaching 6.9 per cent in 1999, which ranked Portugal as the country with the third largest GDP share

in the EU. The growth of expenditure on education has been accompanied by growth in public employment in education. According to Branco (2000), private financing of the Portuguese education system is of a residual nature; it is almost exclusively financed by taxation.

A variety of studies has analysed the efficiency of the Portuguese education system along several dimensions. Neves and Rebelo (2001) investigate the academic performance of Portuguese students. Their results warn that average scores are rather low by international standards, and that more funds are required, as the expenditure per student is low relative to other OECD countries. Martins (2000) warns that schooling attainment levels are worrying low even for the youngest cohorts. Público (2001) uses students' examination results from secondary schools to analyse the academic performance of Portuguese students. The study presents several findings. First, average scores are low, particularly in mathematics. Second, regional disparities are large, with regions in the interior part of the country yielding poorer results. Third, private schools are over-represented both in the top and in the bottom of the distribution of results. Clements (1999) investigates the efficiency of expenditures on education. The presented evidence suggests that, despite substantial recent investments in education, the academic performance of Portuguese students is still low. Since public expenditures appear to be rather inefficient, Clements (1999) proposes a set of reforms, such as the establishment of a minimum student-teacher ratio, setting targets for performance by school, and easing employment and work rules governing public school teachers.

4 Wage inequality

Cantó *et al.* (2000) consider changes in the Portuguese wage structure between 1985 and 1995. By running standard wage regressions for both years, they explore how the remuneration of observable individual and job characteristics has evolved. The authors conclude that wage inequality increased steadily in Portugal from 1985 to 1995, mostly due to an increase in the dispersion at the upper tail of the distribution. The Gini coefficient increased from 0.31 in 1985 to 0.36 in 1995. To asses the robustness of this pattern, additional measures are reported as well. The Theil index increased from 0.20 to 0.26, the wage ratio P90/P10 increased from 3.37 to 4.09, the P50/P10 ratio from 1.50 to 1.58, and the P90/P50 ratio from 2.26 to 2.59.

The increased wage inequality in Portugal seems to have arisen mainly from changes taking place within industrial sectors rather than changes across industrial sectors. Indeed, the inter-industrial wage structure changed only slightly between 1985 and 1995, with the fall in the wage premium of the finance sector being the most conspicuous change. Instead, the main causes can be traced to increasing returns to schooling and a huge decrease in the relative wage of production workers. This is also in line with the results reported in Hartog *et al.* (2001), who provide evidence in support of education being a major source of wage inequality. Returns to education have increased over time, thus increasing between-group inequality. Moreover, based on quintile regression, they find that education tends to increase within-group inequality as well.

In the next section, we investigate the link between education and wage inequality more explicitly. There are, however, additional factors that help explain the observed pattern. Apart from education and skills, labour market institutions (like the impact of collective bargaining at the intermediate level) and regional factors (increasing wage premiums in Lisbon and the Algarve region) have also shaped the wage distribution. Lima and Pereira (1999) find that different rewards for individual attributes are more important for explaining higher male wages than are individual differences in the endowments of the attributes. They conclude that specific pay policies of the employers are one of the explanations for the rise in wage inequality. Cardoso (1991) studied Portuguese wage inequality from a regional perspective. The study is conclusive about the regional imbalances. She finds that regional components of wage inequality are weak when compared to other contributions, but strong when compared with other European, as well as Latin American countries and the USA. According to Cantó *et al.* (2000), the Portuguese labour market is characterised by sharp regional contrasts. The differences have fallen slightly over time, however. Regions accounted for 13.6 per cent of overall earnings inequality in 1985 and for 11.0 per cent in 1995. There is evidence that between-region inequality is higher in terms of wages than in terms of income. The structure of within-region inequality, in turn, appears to be determined by the employment dimension of the region. The larger the manufacturing labour force relative to other regions, the more sensitive are the market and wage determination processes to human capital variables. Regions with a small share of total manufacturing employment reveal a stronger contribution of industrial variables to wage inequality.

5 Determinants of educational attainment

Before turning to the labour market prospects of individuals with different educational background, it is convenient to explore the factors that more primarily govern the educational attainment of individuals. To our knowledge, there are no studies that explicitly analyse socio-economic determinants of the demand for further education in Portugal. This is unfortunate, and contrasts with the situation in most other European countries, where the relationship between the youngsters' demand for education and parental education, occupation, professional category, and region has been extensively explored.

Some conclusions can nevertheless be established. Simple cross-tabulations reveal that individuals living in interior regions and in the region of Madeira tend to demand less education. This might respond to a labour market signal insofar as the return to education is significantly lower in those regions (Saraiva, 1999). Modesto (2000) has analysed the choice between to study more or to go to the labour market at the end of two different stages of the education system: the 9th grade and the 12th grade. Choices are modelled from the point-of-view of the student as well as the employer. The student's choice consists in whether or not to participate in more schooling; the employer's in whether or not to make a job offer. The estimations are based on data from two surveys of the Portuguese Ministry of Education, one conducted among individuals with only the 9th grade completed and another among those that finished the 12th grade, both in 1993.[3]

Basically, the model considers the two kinds of choices (students and employers) as being dependent of the wages, which in turn depend on personal and job characteristics. The earnings functions were estimated using maximum likelihood techniques instead of conventional linear regression (it may be inconsistent) and the 'Heckit' two-step method (which may become heavy and awkward in this case, where more than one selection rule exists). As the decision to study and the earnings function were assumed to be independent, two likelihood functions were considered: one for the decision to study and another for the remaining aspects. The main results tell us that (i) gender has a significant influence only in the 9th grade, with girls tending to continue more often than

[3] The questions of the surveys were asked in December 1994, more or less one and a half years after graduation.

boys; (ii) the older the student, the more likely he or she is to drop out, both at the 9th and the 12th level; (iii) higher parental education tends to lower the probability of exiting from school; and (iv) unemployment of the parents may promote earlier drop-outs.

6 Returns to education

6.1 Basic results

Compared to other topics, the amount of research on returns to schooling has been considerable. These analyses have been conducted on the basis of alternative data sets, population groups, and econometric specifications, and, therefore, provide complementary information on the private value of schooling.

A common conclusion is that the returns to formal schooling are considerable. The most comprehensive work is due to Pereira and Martins (2002a). They use the QP and the ECHP to estimate the impact of formal education on wages. They differentiate between the private sector and the public sector, and between men and women. They find that, on average, an additional year of education increases wages by 11 per cent. As compared to other OECD countries, Portugal exhibits the largest returns to education. Given the low levels of human capital, this evidence suggests that skills are particularly valuable in the Portuguese labour market.

Their findings also show that the returns to education differ substantially across educational levels. Thus, for example, the average increase associated with an extra year of schooling for the transition between secondary and university education ranges from 12 to 18 per cent, while an extra year of schooling for the transition between the second cycle (7th to 9th grade) and the third cycle (10th to 12th grade) of compulsory education raises wages by only 7 per cent. There are also differences across fields of study at the tertiary level. Engineering degrees are particularly highly rewarded, while human and social sciences attract the lowest returns. Furthermore, returns to education are nearly 2 percentage points higher in the private sector as compared to the public sector. No substantial differences in returns can be found across genders. Gross returns are higher than net returns, which can be attributed to the progressive nature of the tax system. As an extension, the authors explore the returns to education under a variety of specifications. They find that for a large number of covariates, the estimated return can drop to half of its original size.

An important issue in the literature is that education might be endogenously determined and depend positively on the individual's ability. If this is the case, simple OLS estimation may yield biased estimates. To address this problem, Vieira (1999) and Pereira and Martins (2002a) use law changes in compulsory school attainment as an instrument for education, and find that the returns under IV can be nearly 3 percentage points lower than those obtained under OLS. In an alternative model, Pereira and Martins (2002a) use parental education as an instrument, and find that the IV estimates are 2 percentage points higher than the OLS estimates. This leads them to conclude that the results under IV are inconclusive, and that further investigation on the quality of the instruments is needed.

Concerning the evolution of returns to education, an era of stability can be found for the 1982 to 1986 period. However, from 1986 to 1992 returns to education increased sharply, and contributed to increased between-group inequality. This expansion occurred among both men and women, although it was more pronounced in the latter group. In this catching-up process, the changes that occurred in the return to tertiary education for women deserve to be highlighted. A candidate explanation for this phenomenon can be found in Hartog *et al.* (2001). In their words, "skill-biased technological change seems to be the chief explanation for a shift in the demand towards educated labour. This is primary based on the fact that the shift in the use of more-educated labour is due to changes taking place within industries (consistent with technological change) rather than to a reallocation of employment between industries towards sectors requiring high-educated labour (e.g., due to changes in international trade or de-industrialisation). Indeed, after 1986 the employment composition shifted towards sectors that traditionally require low educated rather than high-educated labour such as retail, restaurants and hotels (tourism), construction, textiles, and social services, so this cannot explain the facts. The relevance of forces operating within industries naturally reflects a process of modernisation and may not be independent of joining EU in 1986. First, structural funds from the EU in combination with specific financial aids to industrial investment for modernisation of the productive structure have contributed to the introduction of new technologies. Second, the liberalisation of trade with more developed countries producing capital goods likely encouraged the importation of technology requiring skilled labour" (p. 23–24).

6.2 Signalling

Some authors have suggested that there is an interaction between human capital and signalling effects in the determination of wages. Pereira and Martins (2000, 2002a) have explored the existence of signalling effects in Portuguese education. For that purpose, they compare the returns to education of wage-earners and self-employed. The hypothesis is that the self-employed need not signal their ability, so their educational pay-off must capture returns to human capital. The authors find that the returns to education for the self-employed are at least as high as those for employees. According to this test, no clear evidence of signalling effects can be established. These results, together with the lack of studies in this field, suggest that further investigation is needed in order to uncover the presence and size of signalling effects.

6.3 Over-education

In the literature, there are several methods to classify workers according to whether they are over-educated, adequately educated, or under-educated for their jobs. For a description of these measures and a meta-analysis of existing evidence, see Groot and Van den Brink (2000).

The first relevant work covering educational inequality in Portugal was Kiker *et al.* (1997). This paper brought up some empirical evidence about how earnings and returns to education are influenced by over- and under-education. Operationally, over- and under-education was measured by comparing the educational attainment of workers and the skill requirements of their jobs. The authors use three alternative measures of educational mis-match, including Verdugo and Verdugo's (1989) definition, and find the results to be surprisingly heterogeneous. The proportion of over-educated workers ranges from 9.4 to 33.1 per cent (from 6.9 to 40.0 per cent in the case of women, and from 10.9 to 28.8 per cent in the case of men), while the proportion of under-educated workers ranges from 5.0 to 37.5 per cent (between 4.7 and 25.9 per cent for females, and 5.3 and 44.2 per cent for males). Despite this heterogeneity, it is reasonable to conclude from these results that there occur substantial schooling mis-matches in the Portuguese labour market.

The effects of over- and under-education on earnings were estimated from two different models, presented by Verdugo and Verdugo (1989) and by Duncan and Hoffman (1981). Both models brought up some evidence suggesting that over-educated workers receive more (and under-

educated less) than their colleagues with adequate educational attainment. The results also suggest that over-educated workers earn less (and under-educated more) compared to workers having the same education but holding jobs for which they are adequately educated.[4]

Oliveira and Santos (2002) and Martins (2001) use the QP to investigate the extent and consequences of over-education. They classify as adequately educated those workers whose completed schooling is equal to the modal value of employees holding identical jobs, and as over-educated (under-educated) those workers whose completed schooling is above (below) the modal value in each occupation. They use an ORU specification to estimate returns to over-education, adequate education, and under-education. Oliveira and Santos (2002) explore, using a 3-digit level, the evolution of over- and under-education measures from 1980 to 1997. They find evidence of a persistent and growing misadjustment between school-provided skills and those required in the labour market. The proportion of workers with a very low level of educational attainment decreased markedly between 1985 and 1997. Symmetrically, the proportion of workers with 6 and more years of schooling increased substantially. Notwithstanding this, the average level of educational attainment among the Portuguese workers was only 7 years in 1997. On average, nearly 35 per cent of the workers are over-educated, and about 16 per cent are under-educated. Nearly 70 per cent of job entrants take jobs for which they are over-educated. Over-education is negatively correlated with potential experience, and cohorts of younger and more educated people joining the labour force tend to be over-educated. Nevertheless, the authors warn that these classifications may generate misleading results, insofar as the low educational level in Portugal may lead the researcher to identity situations of over-education that, in reality, reflect under-education.

According to the reported estimates, required education increases wages by some 8 per cent, while the returns to over-education remain at 4 per cent. In contrast, under-education carries a pay penalty that ranges from 3 to 7 per cent. These results suggest that over-educated workers would obtain wage gains from changing to a job where their qualifications are commensurate with those needed for the job, while under-educated workers would benefit from catching up with the educational level of their co-workers.

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[4] The comparison is undertaken not only with colleagues having completed the same number of schooling years, but who have also identical remaining characteristics.

Martins (2001) uses data from the chemical sector, and reports that approximately 33 per cent of the workers are over-educated and 17 per cent are under-educated. Overeducated workers tend to be younger, more educated, less experienced, and have less tenure. Using the ORU specification, Martins (2001) estimates both a random effects and a fixed effects model. His estimates are somewhat larger than those obtained by Oliveira and Santos (2002). He finds that over-education raises wages by some 9 per cent while under-education decreases wages by about 7 per cent. Required schooling pays an 11 per cent premium. Drawing on the panel structure of his data, Martins (2001) also presents results showing a significant positive correlation between the level of a worker's over-(under-)education and the probability of the worker experiencing a decrease over time in his or her over-(under-)education level. As far as over-education is concerned, this provides some support for the stepping-stone perspective of schooling mis-matches.

To sum up, educational attainment levels exceeding the job requirement yield a positive return, though lower than the return to years of required education, while an education below that intended for the job is penalised. This pattern is in line with international evidence on the subject.

In an interesting experiment, Hartog *et al.* (2001) use quintile regression techniques to explore how the returns to these three types of education change over the conditional wage distribution. They find that the gap between the returns to over-education and the returns to under-education increases as one moves up the conditional distribution. This feature is overlooked when using standard OLS estimation.

6.4 Quantile regression

Recently, a large number of studies have used quantile regression techniques to explore the impact of education on wages along the conditional wage distribution. For the Portuguese case, some examples are Hartog *et al.* (2001), Machado and Mata (2001), Martins and Pereira (2004) and Pereira and Martins (2002a, 2002b), all of which also provide evidence on OLS returns to education along the lines indicated above. These studies find significant differences in average returns across workers with similar (observable) characteristics. In particular, returns to education among workers who have high wages are much higher than those earned by workers with similar characteristics but who have low wages. This phenomenon, which is particularly evident in the case of male workers, suggests that the dispersion of earnings increases with the workers' average level of education.

Moreover, the return differential between conditional quantiles has increased over the last 20 years. Following the lines of Buchinsky (1994), this can be interpreted as evidence that education has helped to increase within-group wage dispersion over the last two decades. To put it differently, education may be partially responsible of the increase in wage inequality documented in Cardoso (1998) and Pereira and Martins (2000).

The dispersion of returns to education across the wage distribution can be seen as a measure of education risk. Using the spread between returns at the upper and lower conditional quantiles, the reviewed studies find that Portugal exhibits the highest wage risk among European countries.

6.5 Training

According to the available literature, there are important interactions between formal education and acquired skills. OECD (1999) shows that Portugal is one of the countries with the lowest incidence and the most unequal distribution of training, as it is mostly concentrated on younger and more educated workers. At the same time, the returns to formal education in Portugal are the highest in Europe, and the wage gap between high- and low-skilled workers is substantial. In this scenario, low training participation raises equity concerns. If training increases wages, and is concentrated to individuals with more favourable labour market characteristics, lower training participation among specific groups of workers may deteriorate the labour market position of already disadvantaged individuals.

Moreover, different forms of training may be associated with different returns. This drives an additional wedge between groups of workers that typically participate in different training schemes. Furthermore, individuals that differ in gender, education, and professional background may obtain different benefits from training activities, thus warning policymakers that equality of provision does not assure equality of outcome.

Low training coverage raises also efficiency concerns, since it may lead to substantial costs in terms of labour productivity, skill deterioration and unemployment. This might be of particular importance in an economy that over the last two years, and after a decade of convergence to OECD levels, has seen a deterioration of its relative labour productivity.[5]

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[5] See EUROSTAT (2004).

Up to date, the evidence for Portugal is scarce. At the employer level, the main source of information is the Enquiry for Professional Formation. In 2000, 13.5 per cent of all firms offered some training schemes to their employees. Finance (46.3 per cent) and Electricity, gas and water distribution (36.6 per cent) were the activity sectors with the highest coverage. In terms of average hours of formation by participant, the intensity of training was highest in Education (396,2 hours) and lowest in Financial activities (17,5 hours). Concerning training content, Personal development, Finance, banking and insurance, and Business and administration were the most common fields. The dispersion across regions is not large, ranging from 15.3 per cent in Lisbon and Vale do Tejo to 7.1 per cent in Algarve. Finally, the average cost of the formation actions per participant was 424 Euro.[6]

Studies that analyse both the determinants and the effects of training participation at an international level typically report little evidence on the Portuguese case. At the national level, Saraiva (1999) finds that more educated individuals are more prone to undertake training activities. His estimates suggest that training activities that take place in the firm have a positive impact on wages, while those provided by other institutions, such as training centres, do not increase wages significantly. Hartog *et al.* (2000) use the European Community Household Panel to explore the impact on wages of different types of training. They find that only some types of vocational training seem to increase wages. A weakness of earlier analyses is that the estimated returns are averages across all training participants.

Budria and Pereira (2004) use the Employment Enquiry 1998–2000 to provide new evidence on the link between education, training and wages. First, they use logit regressions to show that there are major differences in training participation across groups, with older low-educated workers participating substantially less. Second, they find evidence that returns to training are large and significant. The estimated coefficients point to about 24 per cent in the case of men and 35 per cent in the case of women. Discriminating between gender, educational level, experience, the public and the private sector, and industrial activity reveals important differences across categories of workers. Workers with low qualifications and long professional experience earn larger returns. On average, women receive higher returns than men, though they are subject to greater variation across education and experience levels. The average effect of training is similar in the private sector and in the public sector. However, less

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[6] For further evidence, see MTS (2000).

qualified workers and workers with short professional experience obtain larger wage gains in the public sector than in the private sector.

Hence, an important conclusion from Budria and Pereira (2004) is that training appears to be remedial. Workers with low education levels are less likely to get trained. However, once trained, they earn larger returns than trained individuals with more education. Consequently, policies promoting and investing in the training participation of workers who seldom get trained may be desirable.

7 Employment opportunities and school-to-work transition

There is a module called "School-to-active life transition" in INE (2000) which belongs to a broader plan of modules at the EU level. It provides information about the school-to-work transition in the period from 1990 to 2000. The sample constitutes of 28.6 per cent of the individuals who were asked to answer the Employment Enquiry of the second quarter of 2000 and who had dropped out or interrupted their studies for more than one year at some point during the previous 10 years. Of this population, 44.1 per cent are aged 20 to 24, while an additional 24.5 per cent are aged 25. The individuals were asked to report on the number of paid employment relationships that they had obtained after leaving school. Nearly 10 per cent of the individuals had not found a job by the time of the survey, and some 54 per cent reported one job only. Interestingly, the average educational background of this group was found to be lower than that of the remaining individuals (those reporting two or more jobs). The delay between leaving the educational path and the first employment was less then 2 months for almost one-third of the individuals, but more than one year for more than one-fourth of them. No evidence could be established on the link between education and the duration of the job search.

One non-pecuniary benefit of education is security of employment. Cardoso and Ferreira (2002) use the QP data set to analyse job creation and destruction at the firm level for university graduates, as compared to other groups of workers. Unemployment rates for university graduates rose sharply over the last two decades, from 1 per cent in 1981 to nearly 4 per cent two decades later. This evidence may suggest that tertiary educated individuals have faced increasing difficulties in finding a job and in retaining it. However, the authors conclude that job creation took place

at a much faster pace for university graduates than for the rest of the labour force. Moreover, more educated individuals benefit from better job opportunities, since they have the capacity to adapt more smoothly to a changing work environment in response to new employment opportunities.

Varejão (2002) analyses the use of fixed-term contracts in the Portuguese labour market, the impact it has on employers' strategies, and the effects on workers recruited on temporary contracts. It is assumed that the consequences of fixed-term contracts on growth depend crucially on the use that employers make of them. Three possibilities are considered: fixed-term contracts may be used to deal with fluctuations in the workload; to screen workers for permanent positions; or to churn workers at continuing positions. Using firm-level data on the proportion of fixed-term contracts and the number of fixed-term contracts converted into permanent ones, it was found that the major reason for firms to use these contracts is to screen. What firms actually do is to hire new workers on temporary contracts, and offer them training thereby eliciting the information they need about the quality of the match. When this information arrives, employers decide either to destroy the match or to convert it into a permanent one.

Consistent with fixed-term contracts being used as screening devices, the rates of transitions of individuals from temporary to permanent contracts also indicate that fixed-term contracts are stepping-stones into a permanent job rather than representing dead-end jobs. This result is particularly strong for young workers, who use fixed-term contracts as ports-of-entry into the labour market. In this context, the observed magnitude of the rates of transitions from fixed-term to open-ended contracts becomes an indicator of the success of this joint process of search and screening. When comparing the age–earnings profiles of workers with temporary and permanent contracts, temporary workers tend to receive lower returns to experience. This occurs either because they receive less training due to the very nature of their employment contracts, or because frequent spells of unemployment or inactivity imply serious depreciation of whatever human capital they may have accumulated. These results should not, however, obscure the fact that employer and employee data alike indicate that fixed-term contracts are predominantly used as screening/searching devices that eventually lead to the formation of better, therefore more stable, matches.

Traça (2002) addresses the evolution of the Portuguese labour market over the last thirty years. It is concluded that, compared to the development in Europe and the USA, the Portuguese labour market has shown a

very distinct pattern. On the one hand, flexible wage negotiation institutions and relatively low price disincentives to job search have ensured a relatively low rate of unemployment. On the other hand, rigid employment protection legislation and ineffective labour market policies have produced a very sclerotic and lifeless labour market, with very low turnover and a high proportion of long-term unemployed.

It is further argued that, for the next thirty years, an expansion in the volatility of labour demand is likely to be the key transformation in the labour markets of industrialised countries, such as Portugal, due to the development in international trade and capital flows, the technological and institutional change in product and capital markets, and the implementation of the Euro. Thus, the ability to respond to the increased volatility of labour demand will be determined by the flexibility and adaptability of labour market institutions and of the labour force. The study identifies three main determinants of adaptability. Apart from the ease of hiring and firing restrictions, it highlights the role that the level of educational attainment of the labour force and the effectiveness of active labour market policies aimed at increasing training provision functions must play in the process of adaptability.

This is in line with the recommendations indicated by the OECD (2003). According to this report, reforms in the Portuguese labour market "should be accompanied by a stronger emphasis on vocational training, to ease the school-to-work transition. New rules permitting employment of unqualified youths on condition that training is provided by the employer may help, but it would be better if the schools themselves were better able to provide school-leavers with qualifications useful to employers […]. These reforms should be accompanied by the training and re-training of existing workers. The government's aim to provide employment-related training to all youths that are registered in employment centres and a renewed emphasis on life-long training are welcome. If successful, these incentives would increase the productivity and earnings capacity of those who might otherwise exit the labour force".

8 Conclusions

This review summarises the recent Portuguese literature on the relationship between inequality in wages and education. The main conclusions are as follows. Despite spectacular increases in enrolment rates, Portugal is still one of the OECD countries with the lowest educational level. At

the same time, returns to education are highest in Portugal, thus suggesting that skills are particularly valuable in the Portuguese labour market. Over the last two decades, returns to education increased steadily, which indicates that skill-biased technological change is partially responsible for the observed pattern. Analysis of the returns across educational levels and the dispersion of returns over the wage distribution revealed that education may have helped to increase both between-group and within-group inequality.

The increase in average years of education has lead to a considerable increase in the standard measures of over-education, particularly among younger cohorts. Since schooling mis-matches are associated with lower returns, recent changes in the educational composition of the workforce may have consequences for the wage distribution in Portugal.

Some conclusions can also be established concerning the interaction between formal education and acquired skills. Some forms of training are associated with higher wage increases and appear to act as remedial education. Less educated individuals are less likely to get trained. However, once trained, they obtain higher returns than their more educated counterparts.

Furthermore, analysis of employment opportunities and school-to-work transitions indicates that the job opportunities are better for graduated workers than for workers with low qualifications. In particular, more educated individuals receive more job offers, and are also able to adapt more smoothly to a changing work environment in response to new employment opportunities.

A notable shortcoming is that our conclusions are limited by a relatively small number of studies on each topic. We have found that, in Portugal, there are striking gaps in the literature on education and inequality and that further research must be carried out. A blatant example is the scarce evidence on the connection between educational attainment and socio-economic background. Understanding this relationship may help shed more light on the factors that most primarily govern inequality of opportunities. Addressing this topic is a task for further research.

Literature

Branco, F. (2000), Estudo Prospectivo sobre o financiamento da Educação em Portugal (Prospective Study on the Financing of Education in Portugal). *O Futuro da Educaçao em Portugal. Tendências e Oportunidades*, in Carneiro, Caraça and Pedro, vol. 3.

Buchinsky, M. (1994), Changes in the US Wage Structure 1963-1987: Application of Quantile Regression, *Econometrica* 62, 405–458.

Budria, S. and P.T. Pereira (2004), *On the Returns to Training in Portugal*. Mimeo.

Cantó, O., A.R. Cardoso, M. Izquierdo, C. Farinha and J.F. Jimeno (2000), *Integration and Inequality: Lesson from the Accessions of Portugal and Spain to the EU*. FEDEA Working Paper 2000-10.

Cardoso, A.R. (1991), *Desigualdades Salariais em Portugal – Uma perspectiva regional: 1982-1990 (Wage Inequalities in Portugal – A Regional Perspective: 1982-1990*. M.Sc. thesis, Lisbon Technical University, Lisbon.

Cardoso, A.R. (1998), Earnings Inequality in Portugal: High and Rising?, *Review of Income and Wealth* 44, 325–343.

Cardoso, A.R. and P. Ferreira (2002), *The Dynamics of Job Creation and Destruction for University Graduates: Why a Rising Unemployment Rate can be misleading*. IZA Working Paper 623.

Clements, B. (1999), *The Efficiency of the Education Expenditure in Portugal*. International Monetary Fund WP/99/179.

Duncan, G.J. and S. Hoffman (1981), The incidence and wage effects of overeducation, *Economics of Education Review* 1, 75–86.

EUROSTAT (2004), *EUROSTAT structural indicators*. Luxembourg. Available at: http://europa.eu.int/comm/eurostat/

Groot, W. and H. Van den Brink (2000), Over-education in the Labour Market: A Meta-Analysis, *Economics of Education Review* 19, 131–147.

Hartog, J., P.T. Pereira and J.C. Vieira (2000), Vocational Training and Earnings in Portugal, *Economia* XXIV, January–October 2000.

Hartog, J., P.T. Pereira and J.C. Vieira (2001), Changing Returns to Education in Portugal during the 1980s and early 1990s: OLS and Quantile Regression Estimators, *Applied Economics* 33, 1021–2037.

INE (2000), *Transição da Escola para a Vida Activa (Transition from School to Working Life)*. Módulo AD-HOC 2000.

Kiker, B., F. de Oliveira, M. Mendes and M.C. Santos (1997), Over-education and Undereducation: Evidence for Portugal, *Economics of Education Review* 16, 111–125.

Lima, F. and P.T Pereira (1999), Wages and Human Capital: Evidence from the Portuguese Data, in Asplund, R. and P.T. Pereira (eds), *Returns to Human Capital in Europe*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Machado, J. and J. Mata (2001), Earning functions in Portugal 1982-1994: evidence from quantile regressions, *Empirical Economics* 26, 115–134

Martins, P.S. (2000), *Avaliação e Reforma do Sistema Educativo Portugûes (Evaluation and Reform of the Portuguese Education System)*. Diário Económico 28 November.

Martins, P.S. (2001), *Wage Impacts of Schooling Mismatches: Evidence from A Matched Employer-Employee Panel*. Mimeo.

Martins, P.S. and P.T. Pereira (2004), Does Education Reduce Wage Inequality? Quantile Regressions Evidence from 16 Countries, *Labour Economics* 11(3), 355–371.

MTS (2000), *Inquérito à Execução de Acções de Formação Profissional – 2000 (Enquiry of Actions of Professional Formation – 2000)*. Departamento de Estatística do Trabalho, Emprego e Formação Profissional.

Modesto, L. (2000), *Should I Stay or Should I Go? Educational Choices and Earnings: An Empirical Study for Portugal*. IZA Discussion Paper 230.

Neves, J. and S. Rebelo (2001), *O Desenvolvimento Economico em Portugal (The Economic Development in Portugal)*. Fórum de Administradores de Empresas and Bertrand Editora.

OECD (1999), *Training of Adult Workers in OECD Countries: Measurement and Analysis*. OECD Economic Outlook 1999, Paris.

OECD (2003), *Portugal – Assessment and Recommendations*. OECD Economic Surveys, available at http://www.bportugal.pt/publish/other/ocde_03_e.htm

Oliveira, M.M. and M.C. Santos (2002), *Qualification Requirements and Educational Attainment in Portugal, 1985-1997*. Bank of Portugal Conference Proceedings 2002.

Pereira, P.T. and P.S. Martins (1999), *Returns to Education in Portugal: preliminary report*. PURE project internal report.

Pereira, P.T. and P.S. Martins (2000), Educação, salários e desigualdade: a situação europeia e o caso português (Education, wages, and inequality: the European situation and the Portuguese case), *Economia Pura 2000*.

Pereira, P.T. and P.S. Martins (2002a), *Education and Earnings in Portugal*. Bank of Portugal Conference Proceedings 2002.

Pereira, P.T. and P.S. Martins (2002b), Is there a Return-Risk Link in Education, *Economics Letters* 75, 31–37.

Publico (2001), *A Lista (The List).*

Saraiva, A. (1999), Incidência e Impacto Salarial da Formação Profissional em Portugal (Extent and Wage Impact of Training Activities in Portugal), *Economia* XXII, January–May 1999.

Traça, D. (2002), *Recent Performance and Challenges for Development in the European Context.* Bank of Portugal Conference Proceedings 2002.

Varejão, J.M. (2002), *Fixed-Term Contracts, Employment Flows, and Productivity*. Bank of Portugal Conference Proceedings 2002.

Verdugo, R. and N.T. Verdugo (1989), The impact of surplus schooling on earnings: Some additional findings, *Journal of Human Resources* 24, 629–695.

Vieira, J. (1999), Returns to Education in Portugal, *Labour Economics* 6, 535–541.

CHAPTER 10

Education and Inequality in Sweden:
A Literature Review

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This article reviews the current state-of-knowledge on three dimensions of social inequality in Sweden: (1) the association between social background and educational attainment, (2) the link between educational attainment and position in the labour market, and (3) the pattern of economic returns to education. The review begins with a description of the Swedish school system and its changes in recent decades (Section 1). We then summarise results from empirical research on inequality of educational opportunity and its development over time (Section 2). Apart from reviewing earlier studies, we present a new analysis of the impact of students' social origin on their school results at age sixteen. The transition process between school and working life is the topic of Section 3, and in Section 4 we turn to educational wage premia in the labour market and their development over time. We conclude with a summary and a discussion of policy implications and topics for future research.

1 The Swedish school system[1,2]

The nine-year compulsory school and the following upper secondary school are both comprehensive and co-educational. The curricula for compulsory and upper secondary education are uniform nationwide. Education for adults equivalent to the education conferred by the compulsory and upper secondary school is part of the public school system. Swedish education is thus a structurally uniform system from the elementary level to upper secondary schooling and adult education. All public education is wholly or partially financed by the public budget and tuition is free of charge in all public institutions. Various financial assistance schemes are provided for students in upper secondary, adult and higher education.

A series of transformations of the school system has occurred since the 1950s. A nine-year comprehensive compulsory school and an upper secondary school which integrates theoretical and vocational study programmes have gone into operation, and adult education has been expanded. Close to all post-secondary education, i.e., all university-type education as well as non-academic colleges for vocational education and training, was incorporated into a single system in 1977. Swedish post-secondary education contained a strong element of national planning and regulation; the aims and length as well as the location and financing of most study programmes were laid down by Parliament. Until 1989 the central government also established the curricula for all the general study programmes. A new Higher Education Act came into effect in 1991, aiming at a deregulation of the higher education system, greater autonomy for each institution of higher education and a wider scope of individual choice for students. The organisation of study and range of courses on offer are determined locally. Students have been given increased freedom of choice regarding study courses within the framework of a new internationally valid Degree Ordinance.

As part of a general trend in Swedish society towards decentralisation of responsibility and decision-making powers, the education system has undergone fundamental changes in recent years. In 1991, full manda-

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2 This section is mainly a summary of information available at the Swedish Institute; see http://www.sweden.se/templates/FactSheet____3953.asp plus 4024.asp and 4153.asp.

torship for teaching staff was transferred from the central authorities to the municipalities and their local school authorities, which were also given undivided responsibility for organising and implementing school activities. Parliament also laid down the principles of school management by objectives and results with fewer regulations and clearer goals.

Another guiding principle of education policy has been to create scope for diversity within the education system, and freedom for individual students to choose between different types of schools as well as between study routes. The municipalities are obliged to compensate independent schools that are approved by the National Agency for Education for providing compulsory education for students who choose this type of school. This also applies to independent schools at upper secondary level, although the level of compensation is not as high.

The main principle of the division of responsibilities and functions within the Swedish education system today is that the parliament and the government should control educational activities by defining national goals and guidelines for education. Within this framework, the central and local education authorities together with the different organisers enjoy considerable freedom to determine how activities are to be implemented and resources distributed and used.

The shift to goal- and result-oriented steering of the education system requires the central and local authorities, as well as individual schools, to systematically follow up and evaluate educational activities in relation to goals and conditions applying to them. Each municipality and school is required to prepare an annual quality audit, describing and analysing goal achievement.

1.1 Compulsory schooling

Compulsory elementary school in Sweden was introduced in 1842. Today's nine-year compulsory comprehensive school came into being in 1962, together with the first modern curriculum. All children between the ages of 7 and 16 attend school, free of charge. There is no tracking: everyone follows the same route from grade 1 to grade 9. No marks are allowed until grade 8.

Educational policy in recent years has been dominated by an active reforming process. The structure of responsibility and management has been altered, the school system has acquired new curricula, syllabi and assessment systems, and parents and pupils now have greater freedom to opt for the compulsory school of their choice.

The new curriculum lays down the goals which must have been achieved by the end of the fifth and ninth years of school. This provides an opportunity for national evaluation of school achievement. New syllabi came into force in 2000. While their predecessors indicated the subject items to be covered in teaching, suitable teaching efforts and recommended selection of subject matter, these things are now left for the individual teacher to decide.

In addition to municipal compulsory schools, there is a small but growing number of independent schools. These can be approved for compulsory schooling if they meet certain requirements laid down by the parliament and government. Their share of all compulsory school pupils was about 3 per cent in 2001.

Parents and pupils have a free choice of municipal school, and they can also opt for an independent school. The pupil's municipality of residence has to pay for the pupil's schooling, even if the pupil opts to attend a municipal school elsewhere or an approved independent school.

1.2 Upper secondary schooling and adult education

About 98 per cent of compulsory school leavers go on to upper secondary school, which offers both vocational and academic programmes. Municipalities must provide upper secondary schooling for all residents who start studying before age 20. Persons beginning their studies after age 20 can pursue upper secondary studies within the public school system for adults.

Upper secondary schooling in Sweden has passed through a period of reform and development in the last 25 years. In 1970, the then existing different types of schools for academic and vocational education at upper secondary level were amalgamated into one school, the upper secondary school (*gymnasieskola*), designed to accommodate all young people. During the 1970s and 1980s a number of measures were taken to improve upper secondary schooling so as to match the needs of the labour market and those of higher education with the wishes and requirements of young people. At the end of the 1980s, a reform of the structure of the upper secondary school was initiated, which in 1991 led to major alterations to the School Act. The new system was fully implemented by 1995.

All education is now organised in study programmes of three years' duration. The new vocational programmes are designed to confer wider and deeper knowledge compared with the former system. The students are also given increased choice with respect to the content of their own education, as well as better opportunities to influence the learning situation.

There are 17 national programmes, 14 of which are primarily vocationally oriented while three prepare primarily for university studies. Most national programmes are divided into profiles in the second and third year. In addition to the national profiles that are drawn up centrally, municipalities may choose to set up local profiles adapted to local needs and conditions. Class size does usually not exceed 30 in academic study programmes and 16 in vocational ones.

Students who have requirements other than those provided for within the national programmes can opt to follow a specially designed programme, for which the student, in co-operation with the school, designs an individual plan for the whole period of study. For students unsure of what to study there are also individual programmes of varying length and content. After studies in an individual programme to bring up to standard any deficiencies in subjects from compulsory school, most students in individual programmes transfer to one of the national programmes or to a specially designed programme. As from 1997, a new form of apprenticeship is being tried out in some municipalities, the standard of which is to be equivalent to a national programme.

In the vocationally oriented programmes, at least 15 per cent of the students' total time is to be spent at workplaces. School mandators are responsible for the procurement of training opportunities and for supervision of the students during their workplace training. The students remain in *statu pupillari* for this part of the programme.

Municipal adult education has existed since 1968. Since 1992 it has included basic adult education, upper secondary adult education and post-secondary adult education. Upper secondary adult education confers knowledge and skills equivalent to that conferred by youth education at upper secondary level. Although persons above age 20 are not entitled to upper secondary education, the municipalities are obliged to make an effort to provide educational opportunities corresponding to demand and individual needs. The purpose of post-secondary adult education is to provide vocational courses which are not available in youth education. These courses lead to higher professional qualifications or to a qualification in a new profession.

Adult education outside the public school system is also available at some 150 folk high schools, mainly residential and owned either by county councils or by trade unions, churches, temperance societies or other non-profit organisations. Educational programmes are also offered through study circles organised by eleven nationwide voluntary educational associations. The latter are usually affiliated with a political party or special-interest organisation. Folk high schools and voluntary educational associations are subsidised

by the State, but the organisers are free to develop the content of their own courses. The National Council for Adult Education is responsible for the distribution of State grants to study circles and folk high schools, and for following-up and evaluating the activities of these establishments.

In upper secondary school and adult education, there are no examinations. Within a new grading system for the upper secondary schools, the award of grades is to be looked upon as a continuous process. Grades on a four-point scale are awarded on the completion of every course and not for individual subjects or for each term.

All students between age 16 and 20 who are pursuing upper secondary studies receive study assistance. This assistance comprises a general study grant representing a continuation of child allowance and payable to all students from the age of 16 and a needs-tested grant towards the cost of studies and daily travel. In addition, there are adult study assistance schemes for both long-term and short-term studies.

1.3 Higher education

The number of students in higher education has increased substantially in Sweden during the last decade – since 1991 by around 50 per cent. Almost one-third of young people now enter higher education within five years after completing upper secondary school. The majority (57 per cent in 2000) of students in undergraduate studies are female, while men (63 per cent in 2000) outnumber women in post-graduate studies.

The basic required qualifications to enter higher education are established by the government and are identical throughout Sweden. Students have the basic qualifications once they (a) complete a national programme of study at upper secondary school (or a foreign equivalent), or (b) have reached age 25 and have been employed for at least four years. A good command of Swedish and English, equivalent to having passed the upper secondary school level, is a requirement for all applicants.

If the number of applicants for a course is greater than the number of places available, a selection is made on the basis of upper secondary grades or the results of the national university aptitude test. Sometimes working experience is also taken into account. The national university aptitude test, taken by some 100,000 people every year, is voluntary and common for all higher education. In addition to grades and the national university aptitude test, special tests are sometimes carried out (for instance in medical, teaching and art studies). Permission for using such tests must be obtained from the National Agency for Higher Education.

There are two kinds of first degrees – general and professional. The professional degrees are awarded upon completion of studies of varying length leading to specific professions, in education, law, medicine, technology, etc. The general degrees are Diploma or Certificate (*högskoleexamen*) after studies amounting to not less than 2 years of full-time study, Bachelor's degree (*kandidatexamen*) after completion of at least 3 years of full-time study, including at least 1,5 years in the major subject, and Master's degree (*magisterexamen*) after studies amounting to not less than 4 years of full-time study, including at least 2 years in the major subject.

Examination procedures are decided by each university or university college. Marks are generally given on a three-level scale: fail, pass and pass with distinction. Institutions may, however, decide to use other types of scales.

In Sweden, almost all higher education institutions fall under the responsibility of the Ministry of Education and Science. Most universities and university colleges are thus run by the central government, and their employees are national civil servants. Eleven of the state-run higher education institutions are universities and two are specialised institutions of higher education and research in medicine and technology. In addition, the state runs about 20 small and medium-sized regional university colleges, and about ten small colleges in special subjects.

There was previously only one major private institution within the system of higher education, the Stockholm School of Economics, run by a private foundation with central government support. However, in 1994 Chalmers University of Technology and the University College of Jönköping were transferred to non-state ownership in the form of foundations.

All students who need help to finance their studies are entitled to assistance from the central government in the form of student grants and loans. This assistance may be reduced if the student's own income is substantial, but no account is taken of the economic situation of the student's family (parents or spouse). Study assistance is payable for a maximum of 240 weeks (6 years of full-time study). From age 41 this period is gradually reduced, reaching zero at age 51. To continue receiving study assistance, a person must show acceptable scholastic achievement. Foreign students may also receive study assistance if they have been Swedish residents for two years or more and have been granted a permanent residence permit or an EU/EEA permit.

Study assistance consists of a non-repayable grant plus a loan to be repaid with interest. The total amount in 2001 was SEK 64,760 (about

7,000 Euro) for one year (40 weeks) of full-time study. The grant portion is 34.5 per cent of the total amount and is counted as pensionable income. Repayment of the loan occurs in an annuity-like system over a period of 25 years or by the time the borrower has reached age 60.

Swedish students enrolled at universities and colleges abroad may bring their study assistance privileges with them. A growing number of students (currently in the order of 5 to 10 per cent of all undergraduate students) is taking advantage of this opportunity.

2 Inequality of educational opportunity

As seen in the previous section, Sweden, like many other industrialised countries, has experienced a rather rapid expansion of the educational system during the last century. Data covering the period from 1930 to 2000 show a gradual increase of educational attainment in Sweden. In 1930, 93 per cent of women and 90 per cent of men had only finished compulsory school. The corresponding figures for secondary school were 7 and 8 per cent, respectively. Tertiary education was more or less an unknown phenomenon for women while about two per cent of all men had attained a university degree. By 1970, the share of people who only attained the compulsory level of education had fallen to 66 per cent among women and 60 per cent among men. The figures for secondary education had increased to 27 and 33 per cent, respectively. The share of the population with tertiary education had also increased, to 6 per cent of women and 7 per cent of men. Finally, the period 1970 to 2000 was characterised by a very rapid increase of educational attainment. The share of the population that only reached compulsory education fell to 22 per cent among women and 26 per cent among men, while 48 per cent of both women and men had finished secondary education. As much as 30 per cent of all women and 26 per cent of all men had reached the tertiary educational level (see Statistics Sweden 2003).

2.1 Social origin and educational attainment

The political goal of reducing inequality of educational attainment is generally accepted in Sweden. Among many reasons behind this acceptance, one can mention equality of opportunity and societal efficiency. It is a rather self-evident statement in the Swedish political debate

that life-chances of individuals should not be determined by the conditions to which they were born (and thus could not influence). In addition, the 'societal efficiency' argument claims that an educational system that hinders individuals from lower strata to attend higher educational levels under-utilises the aggregate human talent available in a society (see for instance Erikson and Jonsson, 2000).

Sweden has a long tradition of studies analysing the association between individuals' social origin and their educational attainment (Erikson and Jonsson, 1993, 1996, 2000; Broady *et al.*, 2000; Gustafsson *et al.* 2000). The most comprehensive results regarding the inequality of educational opportunity (IEO) are given in a series of studies performed by Erikson and Jonsson, who analyzed trends in IEO over time. In these studies, the inequality of educational attainment was operationalised in terms of odds ratios that represent the relative chances of children originating in different occupational classes to continue to higher educational levels.[3] Erikson and Jonsson (2000) show results from an analysis of trends in educational inequality over a very long time period. The oldest cohorts in their analysis were born at the end of the 19th century and the youngest in 1978. Social origin is defined according to the EGP class schema (see footnote 2), and the degree of inequality (and its variation over time) is measured as the contrast between children from higher white-collar origins (class I) and children from semi- and unskilled worker origins (class VII). Three educational branching points are identified: (1) compulsory school *versus* any higher level, (2) upper secondary or higher education *versus* lower education, and (3) university degree *versus* shorter education.

Briefly, the results of their analysis show that the association between the occupational class of parents and the educational achievements of children weakened during the period studied. The equalisation trend over time is strongest for the earliest branching point (i.e., compulsory school versus higher educational levels). The explanation of this result, given by the authors, is that higher social strata have reached a saturation level in this transition. Almost all children from class I continue their education above the compulsory school. The analysis of the remaining

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[3] Normally, some version of the EGP class model is used (for presentation of this class schema, see Erikson and Goldthorpe, 1992, Chap. 2). This model distinguishes between seven main occupational classes: higher white-collar and professional occupations, middle-range white-collar occupations, routine non-manual occupations, self-employed and employers in non-agricultural business, farmers and smallholders, skilled manual workers, and semi- and unskilled workers.

transitions is concentrated to the cohorts born after 1930.[4] For the transition to upper secondary school and the attainment of a university degree the equalisation trend is most clear across cohorts born between 1930 and 1950. For the cohorts born later the trend ceases.

The general picture of the association between social origin and educational achievement given by Erikson and Jonsson (1993, 1996, 2000) is one of both stability and change. The pattern of inequality among children from different occupational classes is much the same for all cohorts studied. "It is with one exception the same social classes that lag behind, and it is the same classes that have the greatest opportunities" (Erikson and Jonsson 1996, p. 90). The only social group that breaks the pattern is the children of farmers. This category had a very poor educational attainment in the beginning of the 19th century but fares rather well in the later period. Another sign of stability of the system is that inequality in transitions to higher levels of education remains quite stable in the period between 1970 and 1990, i.e., the latest period covered by the data (cohorts born after 1950).

The youngest cohorts in Erikson and Jonsson's data were too young at the time of data collection to experience transitions to higher educational levels. The transitions to tertiary education for these cohorts were analysed by Gustafsson *et al.* (2000). Using odds ratios to analyse the association between occupational class and the propensity for transition to university for cohorts born between 1972 and 1977, the authors observed a considerable degree of inequality and a weak trend towards equalisation, over cohorts analysed. When tertiary education is split into short, medium and long programmes, it is shown that the impact of social origin for the transition to short and middle-range programmes is diminishing over the cohorts studied, i.e., among young people who began their university education during the 1990s. For the long and most prestigious educations, the results indicate that social inequality is more enduring. Thus, for the 1990s, the period not covered by the most comprehensive analyses of inequality of educational opportunity in Sweden, there are some indications that the trend of contraction of inequality in transitions to higher educational levels emerged again. This observation is, however, valid only for relatively short educational programmes at the university level.

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[4] For earlier cohorts and later branching points there are relatively few observations, making estimates of inequality less reliable.

The majority of Swedish studies of educational inequality focus on the occupational class of parents as the most important predictor of children's educational attainment. There are, however, some studies that extend these analyses to other measures of social background. The two most important indicators of social origin (besides occupational class) singled out in these studies are parental education and income. Summarising the research results, Erikson and Jonsson (1993) claim that education, class and income have independent effects on children's propensity to continue their studies at the higher secondary educational level. Parental education seems to be the most important factor. Parental economic resources seem to play a rather subordinate role in this context.

2.2 Explanations of inequality of educational attainment

Why is there inequality of educational attainment between children with different social backgrounds? According to Erikson and Jonsson (2000), the persistence of systematic educational inequality is produced mainly by two mechanisms: (1) differences in academic ability (and performance) between children from different social backgrounds, and (2) differences in children's propensity to continue to higher levels of education, controlled for individual ability. Each of these factors explains approximately half of the association between social origin and educational attainment. In order to explain these empirical results, the authors propose a theoretical model drawing on traditions of socialisation theory and rational choice theory. This model aims to account for both permanent features of educational inequality and the reduction of the degree of inequality over time.

As discussed by Erikson and Jonsson, the decision to continue to higher educational levels, or to quit school, is a result of the individual's assessment of: (1) the probability of success (at higher level), (2) the costs of transition, and (3) the expected benefits to continue in education.

According to Erikson and Jonsson (2000), parents act in two ways to enhance their children's *probability of success*. (1) Parents may teach their children by helping them with their homework; they may widen children's horizons by trying to engage them in out-of-school activities with intellectually stimulating contents, i.e., parents do their best to transfer cultural capital between generations. (2) Parents may help their children to navigate through the educational system. Knowledge about how the system works and about which educational tracks that may be most beneficial for the future career, are important resources in this context.

Thus, the cultural resources of the family of origin are important for children's probability of success in the educational system.

It is, reasonably, quite obvious that the economic resources of the family must play an important role in creating and maintaining educational inequality in educational systems where the *costs* of transition to higher levels are high. The Swedish educational system, however, is cost-free and it grants students at the tertiary level quite generous loans for living. State reforms aiming to reduce the costs of education thus facilitate the transition to higher educational levels for children from less resourceful homes. However, some results discussed above indicate that economic resources continue to influence transition probabilities to tertiary education even in Sweden. There is a need for more research to explain why this kind of inequality persists in a country like Sweden.

Finally, the perceived *benefits* of education may vary with social background. Even if the real benefits like income, career opportunities *et cetera* are independent of the social background, children from different backgrounds may still attach different value to educational attainment. The mechanism explaining why children from more resourceful homes may attach greater value to education is that "the absolute value of social demotion is in an absolute sense greater than the positive value of social ascent" (Erikson and Jonsson, 2000, p. 363). The argument claiming the high relative price of downward mobility is in line with the results from experimental psychological research showing that the discomfort of losing a given sum of money is greater than the pleasure of winning the same amount of money (Tversky and Kahneman, 1986). Thus, one can expect that the perceived benefits of transitions to higher educational levels are higher for children from more resourceful families. Hence, to motivate talented children from lower social origins to continue their education is an important challenge for the educational system.

This explanatory model proposed by Erikson and Jonsson deals both with continuity and change in educational inequality. Families' strategies to support their offspring's chances for achievement often prove to contradict political ambitions to promote equality of opportunity. In Sweden, this official ambition has been promoted by policies aiming at lowering the costs of education and opening up educational opportunities for children from less resourceful families. As discussed by Erikson and Jonsson (1996, 2000; also see Vallet, 2003) these policies can explain the relatively low degree of educational inequality in Sweden.

2.3 Natural ability

Another important argument when trying to explain inequality of educational opportunity is that natural ability, or intelligence, is unequally distributed across the population. It is a rather uncontroversial statement that intellectual capacity influences educational achievement. However, it is more controversial to use differential ability as an explanation of the relatively strong and persistent differences in school achievement among members of various social strata.

To our knowledge, there is only one Swedish data set, covering relatively recent information, that has been used to estimate the impact of ability in explaining educational performance (Erikson and Jonsson 1993). These data contain information on an extensive, nationally representative sample of children (born in 1967) when they were 13 years old. The main result of the analysis based on these data is that "around one third of the association between social origin and educational attainment is transmitted via IQ, as measured by standardised tests at age 13, before any branching takes place in school" (Erikson and Jonsson, 2000, p. 355). However, as the authors emphasise, this estimate should not be taken as a reliable measure of the effect of natural ability, or genetic factors, on educational attainment. The IQ measured at age 13 confounds genetic factors with environmental factors related to social background, such as socialisation. The best guess, which can be made on the basis of this analysis, is that educational inequality is mediated by natural ability to an extent that is "much less than one third and (…) may be nil" (Erikson and Jonsson, 2000, p. 356). This conclusion is in line with results in similar fields of research. In an analysis of the association between economic success of parents and their children, Bowles and Gintis (2002) found that the contribution of genetic transmission of IQ for understanding the inheritance of economic position is very limited.

2.4 The impact of social background on school results at age sixteen

In this section we present results from an analysis of how social origin and individual characteristics affect pupils' school results. We have at our disposal a comprehensive data set, based on registers from Statistics Sweden, containing all children who left Swedish public compulsory school in 1998 and 1999. Given the fact that a majority of Swedish research on educational inequality focuses on the association between occupational class background and educational attainment, it is important

to establish how other dimensions of the social background influence the school progress of individuals. Furthermore, the value of our analysis is enhanced by the fact that differences in school success at the compulsory level will to some extent be translated into future differences in educational attainment. There are good reasons to believe that poor performance at the compulsory level is correlated with poor performance later on.

The outcome variable analysed is the sum of school grades in all subjects (more than twenty) for each individual student. The data also include information about the students' sex, country of birth, age of immigration to Sweden (when applicable), number of siblings, and type of family. Furthermore, we have data on the biological parents'[5] level of education, income, country of birth, unemployment experience, and experience of social assistance during the relevant year.[6]

The students' immigrant status is measured by two binary variables. First, a dummy coded as one if the student and both his/her parents were born abroad, and zero otherwise. This measure is, hence, an indicator of whether the student belongs to the first generation of immigrants or not. The second variable is coded as one if the student was born in Sweden but both his/her parents were born abroad. This indicator distinguishes students belonging to the second generation of immigrants.

The parents' level of education is based on the highest out of seven levels of education achieved, namely: short compulsory (less than nine years), compulsory (nine years), short secondary (two years of study in addition to compulsory school), upper secondary (three years), lower tertiary (less than three years in addition to secondary schooling, mostly higher vocational education), university degree, and post-graduate level. The lowest educational level is used as reference category in the analysis. The parents' experience of being on social welfare is a dummy variable coded as one if at least one of the parents obtained social support during the relevant year. The parents' experience of unemployment is a dummy variable coded as one if at least one of the parents obtained unemployment benefits during the relevant year.

In the first column of Table 1, we present some basic statistics about the differences in school performance, in the last grade of compulsory school, between individuals with different characteristics and different

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5 Adoptive parents are classified together with biological parents.

6 This is the year when the student left the compulsory school, i.e., 1998 or 1999.

Table 1. Differences in average grades from compulsory school between students with different social origin and individual characteristics. OLS regression. All children in Sweden who left public compulsory school in 1998 and 1999.

	Average grades from compulsory school (deviations from reference category)	Estimated coefficients**
Short compulsory education	162	Ref.
Compulsory education	+5	-1.1
Short secondary education	+26	10.9
Secondary education	+37	26.7
Lower tertiary education	+51	37.7
University degree	+67	52.9
Post-graduate	+84	68.5
Experience unemployment (yes)	-19	-7.14
Experience unemployment (no)	204	Ref.
Experience social assistance (yes)	-50	-34.5
Experience social assistance (no)	206	Ref.
Family income*	0.09	0.04
Female	+22	22.2
Male	189	Ref.
First generation immigrant	-32	-5.8
Second generation immigrant	-16	-2.3
Swedish	203	Ref.
Total average/Constant	199	167.0
Adjusted R^2		0.207
Number of individuals		187,714
Number of schools		1,043

* Family income is measured in hundreds of thousands SEK.

**All coefficients, except that of 'compulsory education', are significant at least at the 0.001 level.

Source: Authors' own calculations.

backgrounds. It should be mentioned that the influence of social background on school results of students is strongest at lower levels of education (Breen and Jonsson, 2000). As can be seen in the table, there are very large differences in school results depending on the parental level of education. The difference in grades between students from families with the lowest educational attainment (short compulsory school) and the highest (post-graduate) is 84 points (on a scale running from zero to 320 points). Thus, educational background seems to play an important role for the student's performance at the lowest level of the educational system. Two other aspects of social background, the experience of unemployment and of social assistance, also seem to be of great importance in the context studied. Children from homes experiencing economic hardships seem to perform worse than children without such an experience. However, another measure of economic resources in the family, family income, is only weakly associated with children's school results.

Finally, gender and ethnic background play some role for the average grades obtained. Female students perform better than male students; and immigrant students worse than native students. The difference between native and immigrant students is especially marked for the first generation of immigrants.

OLS regression of our data (with the student's average grades as the dependent variable) confirms most of the results obtained with simple cross-tabulation. The most striking deviation from the pattern shown in the first column is that ethnic differences to a large extent can be accounted for by differences in social background. In particular, it seems as if the differences in performance between second-generation immigrants and native students to a great extent are due to the social background of these students. For first generation immigrants, the performance gap to native students is also reduced when background factors are accounted for. The general impression from this analysis is that the educational background of the student's family is the single most important factor for their school success.

To conclude the analysis in Table 1, the students' performance in Swedish compulsory schools at the end of the 1990s was strongly affected by the student's social origin. Besides the obvious effect of the parents' educational background, other aspects of the social background also seem to influence the students' performance. The association between the economic standing of the family and the school results of the students is, however, not straightforward. It seems that economic resources of the family *per se* do not play any major role for the performance. Students from relatively poor economic conditions perform almost as well as students from wealthy

families. However, a background in a socially marginalised family seems to contribute to poor school performance.

3 The transition from school to work

The association between education and labour market position is in large measure a youth issue. The transition from school to work is a crucial phase of young people's entry into adulthood. Two individual-level goals in this phase are particularly important: to find a job that matches one's skills, and to avoid unemployment (or involuntary non-employment) while searching. In recent decades, the period between school and work has tended to become longer and more problematic in many countries (Blanchflower and Freeman, 2000; OECD, 1999). Finding a good job has become more difficult, and spells of unemployment have increased in frequency (see e.g. Blossfeld and Klijzing, 2003). Relative youth wages have also tended to decline, at least in the USA and the UK (see e.g. Ryan, 2001).

When the problems first emerged, in the late 1960s to early 1970s, they were mainly attributed to demographics; as the post-war baby boom generation reached school leaving ages, the competition for attractive jobs among labour market entrants was fierce. The typical forecast was that these problems were temporary, since the coming youth generations were smaller, and so their prospects at labour market entry would in all likelihood improve (Freeman and Wise, 1982).

This expected improvement has so far failed to materialise, however. Despite a more advantageous demographic situation in terms of sheer numbers, young workers have continued to face comparatively bleak opportunities with respect to both employment and wages. Cross-nationally these problems are to some extent traded off against each other, with low youth wages in several English-speaking countries and high youth unemployment in much of continental Europe. This lack of improvement is all the more remarkable given that structural change in most countries has also tended to favour youth: industries that employ many young workers (consumer services, for instance) have grown in both relative and absolute size over recent decades, which should have been a positive development factor in the youth labour market (Blanchflower and Freeman, 1996). In addition, the young are better (or at least more) educated than older generations, and certainly have more skills in some crucial areas, such as foreign languages and computer technology.

All this implies that the relative position of youth in the labour market should have improved since the 1970s, but in fact it has not. To a large extent, this remains a puzzle in the research literature (see the overview in Blanchflower and Freeman, 2000).

There is a substantial variation across nations, however, in how young individuals fare as they switch from full-time education to the search for stable employment (OECD, 1999; Schröder, 2000; Ryan, 2001). One important source of this variation is international differences in educational institutions (Shavit and Müller, 1998; Stern and Wagner, 1999). An influential way of capturing these differences is Allmendinger's (1989) typology based on two fundamental characteristics: (a) the standardisation of educational provisions, and (b) the stratification of educational opportunity. The first dimension concerns the extent to which there is a nationwide uniformity in schooling quality standards, such that educational degrees at various levels provide reliable signals to employers of the degree holders' productive capacity. The second dimension refers to the form of tracking at secondary schooling levels. A high degree of tracking implies that students are separated into vocational and academic tracks upon entering secondary school, and that there is little mobility between tracks. The association between educational qualifications and occupational attainment is expected to be strong in nations with highly standardised and stratified educational systems. In addition to these two dimensions, it is also important to take the degree of vocational specificity into account (Marsden, 1986; Maurice *et al.*, 1986); the higher the specificity, the stronger the expected association between education and occupation.

In this three-dimensional space, Müller and Shavit (1998) have attempted to locate 13 OECD nations in a comparative study of school-to-work transitions. At one extreme, with highly standardised, stratified and vocationally specific educational systems, we find Germany, the Netherlands and Switzerland. Indeed, Germany and Switzerland are countries with long established apprenticeship systems, in which there are also strong connections between vocational schools and specific employers who provide in-house training and subsequent employment opportunities. (Austria and Denmark would also belong to this category, had they been included in the study.) At the other extreme, with low values on all three dimensions, we find several English-speaking countries: Australia, Britain, Ireland and, in particular, the United States. Japan is also included here. In the middle ground between these two poles is a heterogeneous group of countries including France, Israel, Italy, Sweden and Taiwan.

The main hypothesis in the Müller-Shavit study is that the character of the school-to-work transition process is systematically related to this country grouping. This expectation is largely borne out empirically. For instance, the impact of the highest educational level attained on the occupational status of the first job (after leaving full-time education) is strongest in Switzerland, Germany and the Netherlands, and weakest in Britain, Japan and the United States. Moreover, later empirical studies within the CATEWE project (Comparative analysis of transitions from education to work in Europe) show that workers in national labour markets with apprenticeship systems have significantly smoother phases of switching from schooling to employment than workers in other countries, in the sense of facing much lower unemployment risks (see e.g. Gangl, 2001; Raffe and Müller, 2002; Müller and Gangl, 2003).

3.1 Sweden's education system in a comparative perspective

Against this background, let us consider the Swedish case (see also Section 1). As stated above, the educational system in Sweden is of an intermediate character along the dimensions of standardisation, stratification and occupational specificity. In line with this, the empirical association between individual workers' education and occupation is of medium strength in an international context (Müller and Shavit, 1998). There are four features of the Swedish school system that are especially important for the link between education and labour market position (Erikson and Jonsson, 1998a). First, the occupational skills taught in vocational education are of a general rather than a specific character. Apprenticeships are rare. Second, comprehensive and secondary schooling is highly standardised, with a nationally centralised curriculum. Third, the degree of stratification (tracking) is low. Fourth, there is an absence of educational dead-ends, with good opportunities for further education beyond both vocational and academic secondary school, as well as a large system of adult education providing second chances for early school leavers.

Over time, the emphasis on general rather than specific educational content has grown stronger. In fact, five to six decades back Sweden's education system resembled the German apprenticeship model. Since then, the reforms of compulsory and secondary schooling have shifted education towards a system of the US kind (see Nilsson and Svärd, 1991; Schröder, 2000). The main tendency in secondary schooling is to make vocational and academic tracks increasingly similar in both kind and volume. The most recent reform with this intent was carried out in the

1990s, with an expansion of secondary vocational school from two to three years, bringing it to the level of academic tracks and paving the way for immediate transitions from vocational school to college. More change in the same direction, in the form of reducing the number of vocational tracks and bringing them an additional step closer to an academic curriculum, is currently being planned. This is in line with international trends, based on conceptions of the 'knowledge society' and an increasingly fluid and mobile working life with growing but less fixed and specific skill demands. The reforms are not without problems, however. Although a large majority (around 98 per cent) of young cohorts in Sweden now continue in school beyond the compulsory level, a significant fraction (about 15 per cent) of students in secondary school leave after one year or less, after having failed to meet the changing requirements. Calls for increasing rather than further reducing the degree of tracking between vocational and academic fields are becoming more frequent, often together with suggestions to introduce apprenticeship opportunities.

3.2 The link between education and occupation

Despite changes in the educational system, the empirical association between individuals' education and occupation has been quite stable over a long period of time (Jonsson, 2002). In the sociological literature, a long-standing hypothesis has been that meritocratic principles in job matching processes will increase in importance over time. The assumed mechanism is that work organisations, as well as social organisation in general, will make increasing use of rational decision-making in order to enhance efficiency. Empirical support for a growing impact of formal education in the allocation of individuals to jobs has been slight, however, in Sweden as well as in other countries (see e.g. Breen, 2004).

This negative finding might be explained by changes in the distributions of educational and occupational attainment. There are two important facts in this regard. First, a quarter century ago the labour market was dominated by low-educated workers and low-skill jobs, to a large extent matched with each other. Since then, the labour market has become much more heterogeneous, with a significantly larger scope for mismatch. Secondly, the distribution of education among individuals has shifted upwards at a higher rate than the parallel upgrading of the occupational structure, at least in Sweden. The proportion of the working-age population with only compulsory schooling fell from 52 to 16 per cent between 1974 and 2000, while the proportion of all jobs that do not require any education beyond compulsory school dropped clearly less,

from 50 to 27 per cent (le Grand *et al.*, 2003). These structural trends might well have counteracted any tendency of increasingly meritocratic allocation processes. Hence, one interpretation of the stable net association between education and occupation is that underlying driving forces have tended to cancel each other out.

3.3 Youth unemployment

For several decades until the 1990s, Sweden was something of an outlier in the international context of youth labour markets. Between the late 1960s and the mid-1980s the relative wages of young workers grew markedly, along with a general compression of the wage structure (Edin *et al.,* 2000). In 1968, the average hourly wage of workers in their late teens (16-19) was 55 per cent of the corresponding wage for mid-age (35-44) workers. This ratio had increased to as much as 80 per cent by 1986, and has since been rather stable. During the same period, the wages of 20-25 year-olds compared to mid-age workers did not change significantly. The strong rise in teenage relative wages did not lead to any clear increase in the variation of employment rates by age, however. Until 1990, rates of unemployment were generally very low. In 1970, the overall rate stood at 1.4 per cent. In 1990, another year with a tight labour market, the rate was 1.6 per cent. The corresponding figures for workers aged 18-24 were 2.5 and 3.5 per cent. Between these two time points, the overall unemployment rate never exceeded 4 per cent. Youth unemployment was kept low in Sweden by a consistently high level of general labour demand. Indeed, the strong connection between overall unemployment rates and youth unemployment is also the main explanation that Blanchflower and Freeman (2000) offer to account for the continuing problems of young workers in many countries despite many beneficial developmental factors.

The general labour market situation changed dramatically in Sweden in the early 1990s. The overall unemployment rate jumped from 1.6 per cent in 1990 to 8.2 per cent in 1993, and remained high until 1997. By 2000, the rate had fallen to 4 per cent, where it has since remained with only minor fluctuations (the figure was 4.8 per cent in June 2003 according to the Labour Force Survey, AKU; for a recent overview of the rise and fall in Swedish unemployment, see Holmlund, 2003). The youth (age 18-24) unemployment rate soared from 3.5 to 19.1 per cent between 1990 and 1993, remained high in the mid-1990s, and then fell to around 8 per cent in 2000. In relative terms, the deterioration of the labour market, as well as the subsequent improvement, was of the same magnitude

for young workers as for workers in other age groups, although the fluctuations in absolute numbers were clearly greater among the young. This cyclical pattern is similar to the situation in several other countries, and also resembles the variations in unemployment rates between different educational categories (Nickell and Bell, 1995; Edin *et al.*, 2000).

It is not obvious, however, how employment problems among young persons should be measured. The conventional unemployment measure – the proportion unemployed in the labour force – is based on the traditional behaviour of adult males who have permanently left the education system, i.e., a person who is either employed, unemployed or retired (Schröder, 2000). But young people are in a much more fluid state as they make their way from full-time schooling to a stable working life position, with many possible combinations of and transitions between education, employment, unemployment and various kinds of non-employment. Alternative ways of estimating unemployment rates yield partly different patterns of the international variation in youth unemployment. If full-time students who are looking for work are included among the unemployed, Sweden has one of the highest youth unemployment rates in the OECD, especially among men (Schröder, 2000). Young men in Sweden also have a relatively high rate of 'inactivity', i.e., the share of all individuals who neither study nor are employed.

As indicated above, Sweden occupies a middle ground between the German-speaking and English-speaking countries with respect to educational and labour market institutions. In the USA, the loose school-to-work linkages are coupled with an unregulated market with weak insider power and, hence, low employment barriers, while in Germany the strongly regulated labour market is coupled with an apprenticeship system that significantly eases school-to-work transitions.

Sweden combines loose school-to-work linkages of the Anglo-Saxon variety with labour market regulation in the form of high minimum wages (bargained but not legislated) and seniority-based employment protection. This is an unusual combination (possibly shared only with France) that might be negative for young people's prospects of finding a job (Schröder, 2000).

The traditional Swedish solution of this problem is to use active labour market policy measures to combat unemployment. The volume of such measures increased markedly in Sweden during the 1990s unemployment crisis, with a number of special programmes directed specifically at young workers. The available evidence suggests, however, that these programmes were not successful (Edin *et al.*, 2000; Larsson, 2000). Again, the situation of young workers seems to be tightly connected to

general labour market conditions rather than any age-specific factors, including age-specific policy interventions.

4 Economic returns to education

There has been a considerable amount of research on the returns to schooling in Sweden, including sensitivity analyses. Arai and Kjellström (1999) have written a comprehensive overview of Swedish research on the return to education in Sweden up to the beginning of the 1990s (see Arai and Kjellström (2001) for a shorter version of this review). Another review published in the Swedish language on this topic has been written by Björklund and Kjellström (1994). Since the development from the end of the 1960s to the beginning of the 1990s has been covered in previous reviews, we will here concentrate on changes that have taken place during the 1990s. In order to get the picture for a longer period of time, however, we will also present some results for earlier years. Also, we will review recent analyses concerning the problems with selectivity, endogeneity and heterogeneity in regard to the returns to education.

4.1 Data sources

Up to the end of the 1990s, analyses of returns to education were primarily performed on the basis of two data sets: The Level of Living Surveys (LNU) and the surveys on Household Market and Nonmarket Activities (HUS). Since the late 1990s, these survey data sets have been complemented by register data from Statistics Sweden (see e.g. Albrecht *et al.*, 2003). In this review we focus on results from two data materials, the LNU and the register data of Statistics Sweden. We begin by giving a short description of them.

The Level of Living Surveys have been carried out five times: 1968, 1974, 1981, 1991 and 2000. These data are suitable for our purposes since the design, as well as (most of) the questions, of the survey has been the same for all waves, which implies that the changes in the returns to education can be tracked for a long period of time, more than thirty years. Moreover, the LNU contains rich information about many determinants of individuals' wages, including actual work experience, indicators of working conditions, as well as demographic and family related characteristics. The drawback of the Level of Living Survey data is its small sample size (approximately 3,000 employees per wave). Hourly

wage is measured using information from several questions: pay per hour, week, month and so forth, conditional on the mode of pay of the worker. Information about normal working hours is used to compute hourly wages for those who are not paid by the hour.

The second type of data sets has been created from administrative registers of Statistics Sweden. Results for 1998 based on the so-called LINDA data set, created by Statistics Sweden for research purposes, will be reported below (see Edin and Fredriksson, 2000; Albrecht *et al.*, 2003). The LINDA data set is based on a random sample of about 300,000 people. The sample is followed over time, complemented each year with immigrants and newly born to make it nationally representative in each year. For the 1998 data, employers have reported monthly earnings information for all employees. The monthly earnings figures are expressed in full-time equivalents, that is, in terms of the amount the individual would have earned if he or she had worked full-time. Although only a few explanatory variables are available (actual work experience is missing, for example), there is good information about educational attainment in these data. Educational level and field are taken from the educational register of Statistics Sweden. Register data from Statistics Sweden of around 29,000 workers in 1992, used by Albrecht *et al.*, (2003), were collected in the same way as the LINDA data.

4.2 General results[7]

In Table 2, the results of a series of Mincer equations are shown based on the Level of Living Surveys. The dependent variable is log hourly wages before taxes. Experience is actual experience, measured according to the respondents' answers to survey questions. Schooling is the number of years of education. From panel A in the table can be seen, as others have shown, that the wage premium of education decreased from 1968 up to 1991, and strongly so during the 1970s. Between 1991 and 2000, by contrast, the schooling coefficient has increased somewhat. In 1968, wages increased by around 8.5 per cent for each additional year of schooling. In 1974, the corresponding difference was 5.1 per cent, in 1981 4.6 per cent, in 1991 4.4 per cent and in 2000 4.8 per cent.

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7 This section is based on le Grand *et al.* (2001a) written in Swedish.

Table 2. OLS regression of log hourly wages: wage premia of education and experience

(A) Men+Women	**1968**	**1974**	**1981**	**1991**	**2000**
Actual Exp.	0.035	0.029	0.023	0.021	0.018
Actual Exp.^{2}	-0.00058	-0.00048	-0.00034	-0.00028	-0.00023
Women=1	-0.274	-0.205	-0.142	-0.171	-0.180
Schooling, years	0.085	0.051	0.046	0.044	0.048
R^2	0.430	0.369	0.367	0.355	0.289
σ of the residual	0.323	0.259	0.218	0.231	0.262
N	2,764	2,897	3,158	3,280	2,954
(**B) Men**	**1968**	**1974**	**1981**	**1991**	**2000**
Actual Exp.	0.036	0.031	0.026	0.025	0.021
Actual Exp.^{2}	-0.00059	-0.00051	-0.00038	-0.00034	-0.00026
Schooling, years	0.086	0.052	0.051	0.049	0.054
R^2	0.371	0.284	0.301	0.293	0.248
σ of the residual	0.299	0.255	0.237	0.258	0.292
N	1,706	1,683	1,686	1,654	1,508
(**C) Women**	**1968**	**1974**	**1981**	**1991**	**2000**
Actual Exp.	0.036	0.027	0.020	0.017	0.015
Actual Exp.^{2}	-0.00066	-0.00047	-0.00031	-0.00026	-0.00020
Schooling, years	0.084	0.050	0.040	0.038	0.042
R^2	0.288	0.237	0.273	0.258	0.210
σ of the residual	0.357	0.262	0.193	0.196	0.224
N	1,058	1,214	1,472	1,626	1,446
(D) Private sector	**1968**	**1974**	**1981**	**1991**	**2000**
Actual Exp.	0.036	0.030	0.025	0.025	0.023
Actual Exp.^{2}	-0.00060	-0.00050	-0.00038	-0.00035	-0.00031
Schooling, years	0.081	0.049	0.052	0.054	0.061
Women=1	-0.317	-0.236	-0.160	-0.173	-0.151
R^2	0.389	0.361	0.359	0.356	0.311
σ of the residual	0.325	0.253	0.230	0.249	0.279
N	1,912	1,797	1,740	1,795	1,739
(**E) Public sector**	**1968**	**1974**	**1981**	**1991**	**2000**
Actual Exp.	0.033	0.027	0.020	0.017	0.013
Actual Exp.^{2}	-0.00054	-0.00044	-0.00027	-0.00021	-0.00012
Schooling, years	0.083	0.052	0.042	0.041	0.044
Women=1	-0.237	-0.172	-0.112	-0.123	-0.135
R^2	0.514	0.388	0.394	0.387	0.334
σ of the residual	0.311	0.266	0.200	0.199	0.214
N	852	1,100	1,418	1,476	1,191

Note: All coefficients are significant, $p<0.05$.

Source: Authors' calculations from Level of Living Survey data.

Moreover, the results in panels D and E show that the increase in the schooling premium was much larger in the private sector during the 1990s (from 5.4 per cent in 1991 to 6.1 per cent in 2000) than in the public sector (from 4.1 to 4.4 per cent). According to HUS (The Survey of Household Market and Nonmarket Activities) data, the schooling coefficient dropped from around 8 per cent in 1968 to around 4 per cent in 1996 (Arai and Kjellström, 2001).

When comparing the coefficients in panels B and C, we see that men and women, on average, received approximately the same wage premium in 1968 and 1974. However, since then women have received smaller returns to their schooling than men have (which is also true for experience). The gender differential in the return to schooling was approximately the same in 2000 as in 1991.

The smaller returns to schooling for women relative to men is one important explanation as to why the gender wage gap, which decreased dramatically between 1968 and 1981, has been relatively unchanged since then. During the 1990s, the average gender wage gap, standardised for schooling and experience, decreased somewhat in the private sector (women's average standardised wage was 84.4 per cent of that of men in 1991 and 86.0 per cent in 2000), while it increased somewhat in the public sector (88.8 per cent in 1991 and 87.4 per cent in 2000). The results of a decomposition analysis performed by le Grand *et al.* (2001a) indicate that the changes in the wage structure that have taken place in the last two decades have been unfavourable for women as a group. During this period of time there has been a marked equalisation between the sexes concerning years of schooling and experience that, all else equal, ought to have resulted in a considerable decrease of the gender wage gap. However, the gap has remained relatively stable. The authors argue, on the basis of their results, that the reason for that being the case should be looked for in the increased wage inequality within groups of the same schooling and experience that has occurred since the beginning of the 1980s. Since women tend to be paid less, given schooling and experience, their relative earnings will decrease if the wage dispersion within educational/experience groups increases, *ceteris paribus* (le Grand *et al.*, 2001a). More research within this area is obviously needed.

The difference between men and women in Sweden as to the schooling coefficient is closely related to the corresponding difference between private and public sector employees, since women are heavily overrepresented in the public sector and men in the private sector. Therefore, the difference in the schooling coefficient between the private and public sectors (panels D and E) shows the same pattern as that between men

and women. The wage premium has increased in the private sector since 1974, from 4.9 per cent to 6.1 per cent in 2000. By contrast, the premium has decreased in the public sector from 5.2 per cent in 1974 to 4.4 per cent in 2000. Thus, private sector employees received in 2000 much higher returns to their education than public sector employees did. Even if the sector can explain part of the sex differentials in the returns to schooling, more detailed analyses (not reported in the table) show that the return to schooling (as well as to experience) is smaller for women than for men in both the private and the public sector.

The lower returns to education in the public sector are connected to the overall deterioration of the relative earnings of public sector employees in the last thirty years. The average wage of public sector employees was in 1968 about 2 per cent less than that of private sector employees, controlling for schooling and experience. The corresponding difference in 2000 was as much as 16 per cent (le Grand *et al.*, 2001a). Furthermore, the proportion of workers with stressful work has increased much more among public sector than among private sector workers in the last two decades (le Grand *et al.*, 2001b). Thus, both relative wages and working conditions seem to have deteriorated among workers in the public sector.

Another result in Table 2 worth mentioning concerns changes in the R^2 and in the standard deviation of the residual log hourly wage. These measures can roughly be interpreted as the degree of wage inequality between workers with the same schooling and experience. From panel A it is evident that the proportion of the variance of log wages among Swedish workers explained by schooling and experience decreased markedly between 1968 and 1974, but was more or less stable from 1974 up to 1991. However, during the 1990s a dramatic decrease can be seen in the variance explained: R^2 decreased from around 36 per cent in 1991 to 29 per cent in 2000. Moreover, according to estimates reported by Arai and Kjellström (2001) based on HUS data, the explained variation in log hourly wages by year of schooling and experience shows a continued drop from 1993 to 1996. Furthermore, as also observed by Arai and Kjellström (2001), human capital variables explain more of the variation in log wages in the public sector than in the private sector, although the sector differences are much smaller in 1991 and 2000 compared to previous years.

The standard deviation of the residual shows the same pattern as the R^2 from 1968 to 1974, that is, a marked decrease (see Table 2). However, from 1974 to 1991, the log wage dispersion of the residual continued to decrease. In the 1990s, the wage inequality within education/experience

groups increased, according to this measure, from 0.23 to 0.26 log wage units between 1991 and 2000. The same pattern of increased within-group wage inequality during the 1990s can also be seen when men and women, and private and public sector employees are analysed separately (panels B to E).

4.3 Explanations for the increase in within-group wage inequality

We have seen that wage inequality within schooling/experience groups has increased in Sweden during the 1990s. This trend may be related to the fact that during the same period of time, the overall wage dispersion has also increased. Several measures of overall wage dispersion show that inequality increased between 1981 and 2000 after having decreased dramatically between 1968 and 1981. According to the P90/P10 ratio and the standard deviation of log wages, the overall wage inequality in 2000 stood at the same level as in 1974. However, the increase in wage dispersion that took place in the 1990s was almost entirely due to an increase in the upper half of the wage distribution. Inequality within the lower half of the distribution was more or less unchanged (le Grand *et al.*, 2001a).

When looking at more specific suggestions as to why within-group inequality has increased, one prevalent view is that the spread of more 'flexible' and 'market-oriented' wage-setting policies has increased the employers' scope for considering such individual productivity differentials that are not captured by, for researchers, observable factors (such as education and experience). These more subtle productivity differentials are hypothesised to have become more important over time, owing to changes in the work organisation and in the nature of work (see, for example, Lindbeck and Snower, 2000). There is, however, a conspicuous lack of systematic empirical evidence on the dramatic changes in work organisation claimed by these authors to have taken place and, therefore, their arguments remain an hypothesis to be tested.

4.4 Sensitivity studies and other extensions

Quite a large number of sensitivity studies and extensions have been performed on Swedish data in order to test the assumptions behind the standard Mincer equation. Some of these will be shortly summarised here.

Variations in results across earnings measures and data sets

Using the Level of Living Survey data from 1968, 1981 and 1991, Björklund and Kjellström (1994) find, first, that the rate of returns to education depends on what measure of earnings is used. If monthly income is used instead of hourly wages, the return for women becomes markedly higher. The reason is that there is a strong 'work hours effect' of education for women, i.e., women with a high educational attainment tend to work more hours than low-educated women do. Second, the rate of return tends to become somewhat larger when both employees and self-employed are included in the analysis.

Arai and Kjellström (2001) report that using net (after-tax) wages instead of gross wages results in about 10 per cent lower estimates of the schooling coefficient, which is not surprising given the progressive tax system in Sweden. Furthermore, also as expected, the explained variation in log net wages is smaller than that for log gross wages.

Albrecht *et al.* (2003) compared a register data set from Statistics Sweden for 1992 with the Level of Living Survey data of 1991. They found that the data from Statistics Sweden (based on information on earnings reported from employers) show less wage inequality, both in terms of the standard deviation of the log wage and the percentile ratios, than the Level of Living data (based on information on earnings reported from employees). When they estimated wage equations with identical regressors, the explanatory power was found to be somewhat higher in the Statistics Sweden data, especially for women (see Albrecht *et al.*, 2003; Table A1). Furthermore, the gender wage gap is considerably smaller in the Statistics Sweden data, around 15 per cent compared to 20 per cent according to the Level of Living Survey data. As for returns to education, the pattern is similar in the two data sets except for the highest educational category (post-graduate studies) for which the returns are higher, especially for men, in the Statistics Sweden data than in the Level of Living Survey data (.583 log wage units compared to .444 according to the model with both men and women). However, the explanations for these discrepancies are not obvious.

The internal rate of return

Björklund and Kjellström (1994), in the study referred to above, report that study allowances constitute important benefits for university students, and when these are considered in the calculations, the internal rate of return increases with one to two percentage units. Accounting for taxes and subsidised loans also has a substantial effect on the size of the

internal rate of return to university education (Edin and Holmlund (1995) reach the same conclusion).

In a second article, Björklund and Kjellström (2002) examine how well the schooling coefficient in standard Mincer equations approximates the marginal internal rate of return to education. Data are again the Level of Living Surveys from 1968 to 1991. Three main findings are reported. First, the semi-log functional form is misleading in one respect: The dramatic decline in the returns to schooling from 1968 to 1981 was mainly attributable to a fall in the return to college education, whereas the return to high-school education was stable. This finding has also been reported by Palme and Wright (1998). Second, according to the findings of Björklund and Kjellström, the rate of return is sensitive to assumptions made about the length of working life and/or the retirement decision for persons with different length of schooling (also see Kjellström, 1999). However, data for Sweden indicate that more highly educated persons tend to retire later, so in this respect the Mincer schooling coefficient is not markedly at variance with the data. Third, by comparing the present value of lifetime earnings between youth and adult education, there are large differences in favour of youth education (see Kjellström, 1999).

Quantile regressions

Using the LINDA data set for 1998, Albrecht *et al.* (2003) report results from a number of quantile regressions. Although their main purpose is to analyse the gender earnings gap, they also report estimated returns to different educational levels (see Table A2 in the appendix of their article). They show that earnings increase significantly with each higher level of education at almost every percentile in the wage distribution, and at each level of education the estimated returns to education increase almost uniformly by percentile (the percentiles estimated are the 5th, 10th, 25th, 50th, 75th, 90th and the 95th).

Furthermore, Albrecht *et al.* (2003) find that women realise essentially the same returns to education as men do at almost all levels of education at the very bottom of the wage distribution. However, once we reach the 25th percentile, men start to get a bigger payoff than women do at almost all levels of education. This is particularly true at the very top of the wage distribution. For some levels of education, this difference is quite important. For example, at the 95th percentile in the two distributions, the payoff to a man who has completed at least 3 years of post-secondary schooling is estimated to be about 20 per cent higher than the corresponding payoff to a woman. However, the payoff to post-graduate

studies does not seem to be much different between men and women (Albrecht *et al.*, 2003).

Horizontal heterogeneity in the returns to education: educational field and industry

In regard to horizontal heterogeneity of the return to education, not much research has been done with respect to differentials in the returns to schooling owing to type of education. Wadensjö (1991) compared annual earnings for workers with technical, medical and social sciences background. He found that the earnings varied across these groups, as well as across the universities where the education was attained. The main explanation given for earnings variation across universities is different labour market situations across the different regions of Sweden.

Although male and female educational attainment is nowadays essentially the same in terms of years of schooling, there are some potentially important differences in the types of education completed by men and women that may offer one explanation for the smaller returns to schooling for women (Erikson and Jonsson, 1998a). Using the LINDA data set of 1998 for a decomposition analysis of the gender wage gap, Albrecht *et al.* (2003), in the same article as referred to above, report that when the field of education is added to a wage model including age, age squared, an immigrant dummy and six dummies for educational level, the counterfactual gap decreases from -.174 to -.162 log wage units. Thus, field of study does not seem to be a dominant factor for explaining the gender earnings gap in Sweden. More research is, in our view, needed on this potentially important issue.

Arai and Skalli (1996) estimate a standard Mincer equation where the schooling variable is interacted with industry dummies. Their results imply that the rate of return to education is systematically correlated with industry affiliation. These industry differentials in returns to schooling are similar to those observed for France. An extension of these analyses would be to investigate to what degree these industry differentials are related to differences between private and public sector employees with regard to returns to schooling.

Selectivity and endogeneity issues

In his doctoral dissertation, Öckert (2001) presents three studies on the effects of higher education and the role of admission selection. The main problem addressed is that estimates of the return to university education in conventional studies do not take into consideration that individuals

with different levels of education may differ in their pre-university ability to achieve the outcome (e.g. earnings) or, in other words, that selection bias may exaggerate the 'true' return to university education. In Öckert's first study, the earnings premia for university admission and graduation are estimated using data from the admission selection process. Applicants and non-applicants for university education in Sweden in 1982 are studied in terms of their earnings in 1996. A number of groups are constructed as comparisons to those who completed a university programme, implying different degree of control for admission selection variables: non-applicants; three groups of non-admitted applicants (non-eligibles, withdrawals, screen-outs); two groups of admitted applicants who did not complete the programme (no-shows, dropouts). The choice of comparison group is shown to be crucial when estimating the admission earnings premium. Öckert concludes that about two-thirds of the university premium is attributable to unobserved differences, while only one-third can be seen as a causal effect of university education.

Öckert's second study is based on the fact that applicants for university education in Sweden, who possess equal qualifications, have been subject to selection by lottery, i.e., there has been a social experiment at the margin. The data used consists of over 1,600 individuals who, in the autumn of 1982, were subject to randomised admission into university. Annual earnings between 1982 and 1996 are used to compute lifetime earnings. The author concludes that the estimates suggest that the internal rate of return to a completed university education may be as much as about 20 per cent. However, Öckert also concludes that despite having access to data from a social experiment, the desired treatment effects cannot be identified without invoking strong assumptions. The main problem here is that some treatment group members choose to drop out from the treatment in order to pursue better alternatives. The estimated treatment effect then suffers from dropout bias.

In the third study, Öckert analyses the completion probability and the effects of university studies on labour market performance for groups with different pre-university background. The data include detailed information on the admission selection process for most applicants to university education in Sweden in 1982. The results reveal considerable heterogeneity in the probability of obtaining a degree, as well as in the effect of university studies on labour market performance. The best predictor of degree completion is grade point averages from high school, and field of educational interest. Applicants with long high school are more likely to graduate from university than other students are. Age is negatively related to student performance.

Arai and Kjellström (2001) present results from various sensitivity analyses in regard to the conventional Mincer model. To deal with the possible sample selection bias of the schooling estimates for women, Heckman's two-step model was used. The results indicate no major changes compared with the standard OLS estimates. To consider the problem of endogeneity of schooling, an IV procedure was used. The results show that the IV estimates of return to schooling are higher, not lower, than the OLS estimates. The authors also find no screening or sheepskin effects, as estimated by controlling for completed diplomas. When various measures of ability are included, the returns fall by between 10 and 20 per cent (also see Kjellström, 1999; Erikson and Jonsson, 1998a; Meghir and Palme, 1999; the results of these studies lead basically to the same conclusion). Overall, the conclusion by Arai and Kjellström is that the results do not imply that a major revision of the OLS results is required.

Isacsson (1999) presents results from analyses of a sample of twins. He shows that the measurement-error-adjusted estimate of the return to education is slightly biased upwards, due to omitted ability variables. However, he also demonstrates that the conclusion about the size of a potential ability bias in conventional Mincer estimates of returns to education depends crucially on the magnitude of the reliability ratio. Thus, like Öckert's (2001) analyses of data from a natural experiment, it seems that the conclusions when using data on twins is not straightforward, but have to be conditioned by quite strong assumptions.

5 Discussion

The relatively low degree of inequality in regard to educational opportunity in Sweden can mainly be explained by "relatively low costs and no early selection" (Erikson and Jonsson, 1996, p. 57). Moreover, Erikson and Jonsson suggest that the relatively small differences in living conditions experienced by people from different social strata are contributing to an equalisation of educational opportunities. The main reason for the persistence of inequality in this field, in spite of what has just been said, may be the 'long arm of family'. Parents do their best to help their children and to transfer cultural capital between generations. This kind of mechanism can undermine the efforts of state policies, which aim at equalisation of educational opportunities.

The impact of recent school reforms in Sweden on educational inequality would appear to be ambiguous. On the one hand, the diminishing differences between vocational and academic tracks in secondary school

should contribute to equalisation in educational careers between individuals from different social backgrounds. On the other hand, the decentralisation of educational policies, school organisation, and curriculum decisions probably leads to a variation in educational content across social strata that might run counter to equalisation.

In an international perspective, the wage premium of schooling, as well as earnings inequality in general, is low in Sweden. From the end of the 1960s up to the beginning of the 1980s, the returns to schooling dropped considerably, especially during the beginning of the 1970s. Björklund and Kjellström (1994) find that this is true for hourly wage, as well as for monthly income before and after taxes. Between 1981 and 1991, no large changes occurred, although possibly the return increased somewhat for incomes after taxes, and especially for highly educated employees and for men. (These results are in line with those reported by Edin and Holmlund (1995) and Palme and Wright (1998)). During the 1990s, the wage premium of schooling has increased. In 2000, the schooling coefficient was at approximately the same level as in 1974.

This pattern of change over time – with a sharp decrease from the end of the 1960s up to the beginning of the 1980s, and after that an increase from 1991 to 2000 – can be seen not only for between-education wage inequality but, more or less, for overall wage dispersion, as well as for within-education/experience wage inequality.

In order to understand the increase in earnings inequality in Sweden, both between and within groups, the institutional changes that have taken place in the last decades have to be considered. Several specific features of the 'traditional' Swedish labour market model can be seen as the main explanations of the relatively low degree of inequality of earnings in Sweden. Many observers emphasise the high degree of institutionalisation and regulation in the Swedish labour market (Edin and Holmlund, 1995; Edin and Topel, 1997). The most prominent feature mentioned in this context is that wages from the mid-1950s to the early 1980s were, to a large extent, determined through centralised collective bargaining at the national level. A 'solidaristic wage policy' aiming at equal pay for equal work, regardless of the profitability and productivity of the firm or industry, was widely pursued, with the explicit purpose of minimising variation in wages between similar jobs across firms and sectors.

However, since the beginning of the 1980s, the consensus around the solidarity wage policy has been undermined. The national federation of employers has adopted new policies aiming at wage determination at the firm level, while the attitudes among the trade unions have been mixed. This new situation has resulted in a decentralisation of wage negotia-

tions, giving more space for local agreements. Hence, the scope for variation in earnings, both between and within groups, has increased markedly in Sweden during the last decades.

The increase in within-group inequality is connected to two developments in the Swedish labour market that have important policy implications. First, the gender wage gap has been stable in the last two decades although the gender differences in years of experience have diminished markedly. This lack of improvements in the gender wage differentials is closely related to the fact that the returns to education have decreased for women in relation to those for men. Thus, the trend towards increased within-group wage inequality seems to be to the disadvantage of women in Sweden.

Given the strong political support for the idea of equal conditions for men and women in the labour market, the lack of success in decreasing the gender wage gap is conspicuous. Moreover, the gender wage gap has increased somewhat in the public sector during the 1990s while it decreased somewhat in the private sector. These changes may be difficult to understand since, reasonably, public sector employers should be expected to be more responsive to political pressures for wage equity than private sector employers. Further studies on these issues are needed.

Second, the relative wages for public sector employees have fallen drastically in the last decades. This development is closely related to a decrease in the returns to education for public sector employees in relation to those for private sector workers. This trend is, of course, related to the first trend, as women dominate strongly in the public sector. Reasonably, the main explanation for the rise of earnings inequality between public and private sector employees is the increasing financial problem of the public sector, as well as the decentralisation of the wage-setting processes that has taken place in Sweden since the first half of the 1980s.

The deterioration of the relative wages in the public sector should, in our view, be seen as a serious social problem since the prevalence of highly stressful jobs has increased strongly in the public sector, primarily within the female-dominated care and educational sectors, during the same period of time. Thus, the working conditions in the public sector change for the worse at the same time as the relative wages also deteriorate. There are reasons to be concerned that the Swedish welfare sector may develop into a 'secondary' labour market sector with worse jobs and worse pay compared to other sectors in the labour market. Even now, many public sector employers have problems recruiting personnel. Such problems may become acute within the near future, with potentially harmful effects on the whole Swedish welfare system.

Literature

Albrecht, J., A. Björklund and S. Vroman (2003), Is there a glass ceiling in Sweden?, *Journal of Labor Economics* 21, 145–177.

Allmendinger, J. (1989), Educational systems and labour market outcomes, *European Sociological Review* 5, 231–250.

Arai, M. and C. Kjellström (1999), Returns to human capital in Sweden, in Asplund, R. and P.T. Pereira (eds), *Returns to Human Capital in Europe*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Arai, M. and C. Kjellström (2001), Sweden, in Harmon, C., I. Walker and N. Westergaard-Nielsen (eds), *Education in Europe – A Cross Country Analysis of the Return to Education*. Edward Elgar, Cheltenham.

Arai, M. and A. Skalli (1996), The structure of wages: A French-Swedish comparison of cross-industry variation in the impacts of observable wage determinants, in *Comparaisons Internationales de Salaires*. DARES-INSEE, Actes du colloque.

Björklund, A. and C. Kjellström (1994), Avkastningen på utbildning i Sverige 1968 till 1991 (The return to education in Sweden from 1968 to 1991), in Erikson, R. and J. Jonsson (eds), *Sorteringen i skolan (The sorting in school)*. Carlsson, Stockholm.

Björklund, A. and C. Kjellström (2002), Estimating the return to investment in education: how useful is the standard Mincer equation?, *Economics of Eduaction Review* 21, 195–210.

Blanchflower, D. and R.B. Freeman (1996), *Growing into work*. CES Working Paper No. 108.

Blanchflower, D. and R.B. Freeman (eds) (2000), *Youth Unemployment and Joblessness in Advanced Countries*. University of Chicago Press / NBER, Chicago.

Blossfeld, H-P. and E. Klijzing (eds) (2003), *The Transition to Adulthood in a Globalizing World: A Comparison of Fourteen Countries*. (forthcoming)

Bowles, S. and H. Gintis (2002), The inheritance of inequality, *Journal of Economic Perspectives* 16, 3–30.

Breen R. and J.O. Jonsson (2000), Analyzing educational careers: A multinomial transition model, *American Sociological Review* 65, 754–772.

Breen, R. (ed.) (2004), *Social Mobility in Europe*. Oxford University Press.

Broady, D., M.B. Andersson, M. Börjesson, J. Gustafsson, E. Hultqvist and M. Palme (2000), Skolan under 1990-talet – sociala förutsättningar och

utbildningsstrategier (School during the 1990s – social premises and educational strategies), in *Välfärd och skola* (*Welfare and school*). SOU 2000: 39, Stockholm.

Edin, P-A, A. Forslund and B. Holmlund (2000), The Swedish youth labor market in boom and depression, in Blanchflower, D. and R.B. Freeman (eds), *Youth Unemployment and Joblessness in Advanced Countries*. University of Chicago Press / NBER, Chicago.

Edin, P-A and P. Fredriksson (2000), *LINDA – Longitudinal INdividual DAta for Sweden*. Working Paper No. 2000:19, Department of Economics, Uppsala University, Sweden.

Edin, P-A. and B. Holmlund (1995), The Wage Structure: The Rise and Fall of Solidarity Wage Policy?, in Freeman, R. and L. Katz (eds), *Differences and Changes in Wage Structures*. University of Chicago Press, Chicago.

Edin, P-A. and R. Topel (1997), Wage policy and restructuring: The Swedish labor market since 1960, in Freeman, R.B., R. Topel and B. Swedenborg (eds), *The Welfare State in Transition. Reforming the Swedish Model*. University of Chicago Press / NBER, Chicago.

Erikson, R. and J.H. Goldthorpe (1992), *The Constant Flux: A Study of Class Mobility in Industrial Societies*. Clarendon Press, Oxford.

Erikson, R. and J.O. Jonsson (1993), *Ursprung och utbildning (Origin and education)*. Fritzes, Stockholm.

Erikson, R. and J.O. Jonsson (1994b), *Can Education be Equalized? The Swedish Case in Comparative Perspective*. Westview Press, Boulder, Colorado.

Erikson, R. and J.O. Jonsson (1998a), Qualifications and the allocation process of young men and women in the Swedish labour market, in Shavit, Y. and W. Müller (eds), *From School to Work. A Comparative Study of Educational Qualifications and Occupational Destinations*. Clarendon Press, Oxford.

Erikson R. and J.O. Jonsson (1998b), Social Origin as an Interest-Bearing Asset: Family Background and Labour-Market Rewards Among Employees in Sweden, *Acta Sociologica* 41, 19–36.

Erikson, R. and J.O. Jonsson (2000), Understanding Educational Inequality: The Swedish Experience, *L´Année sociologique* 50, 345–382.

Freeman, R.B. and D.A. Wise (1982), *The Youth Labor Market Problem. Its Nature, Causes, and Consequences*. University of Chicago Press / NBER, Chicago.

Gangl, M. (2001), European patterns of labour market entry: A dichotomy of occupationalized versus non-occupationalized systems?, *European Societies* 3, 471–494.

Gustafsson, J-E., A. Andersson and M. Hansen (2000), Prestationer och prestationsskillnader i 1990-talets skola (Performance and performance differences in 1990th school), in *Välfärd och skola* (*Welfare and school*). SOU 2000:39, Stockholm.

Holmlund, B. (2003), *The Rise and Fall of Swedish Unemployment*. CESifo Working Paper No. 918.

Isacsson, G. (1999), Estimates of the Return to Schooling in Sweden from a Large Sample of Twins, *Labour Economics* 6, 471–489.

Jonsson, J.O. (2002), *Merit Rules O.K.? Educational qualifications and the allocation to social positions in Sweden 1968-2000*. Swedish Institute for Social Research (SOFI), Stockholm University. Mimeo.

Kjellström, C. (1999), *Essays on Investment in Human Capital*. Swedish Institute for Social Research, Stockholm University, Dissertation Series No. 36.

Larsson, L. (2000), *Evaluation of youth labour market programmes*. Working paper 2000:1, Institute for Labour Market Policy Evaluation (IFAU), Uppsala.

le Grand, C., R. Szulkin and M. Tåhlin (2001a), Lönestrukturen i Sverige (The Wage Structure in Sweden), in Fritzell, J., M. Gähler and O. Lundberg (eds), *Välfärd och arbete i arbetslöshetens årtionde* (*Welfare and Work in the Decade of Unemployment*). SOU 2001:53, Stockholm.

le Grand, C., R. Szulkin and M. Tåhlin (2001b), Har jobben blivit bättre? En analys av arbetsinnehållet under tre decennier (Have the jobs become better? An analysis of the content of work during three decades), in Fritzell, J., Gähler, M. and O. Lundberg (eds), *Välfärd och arbete i arbetslöshetens årtionde* (*Welfare and Work in the Decade of Unemployment*). SOU 2001:53, Stockholm.

le Grand, C., R. Szulkin and M. Tåhlin (2003), *Matchning på den svenska arbetsmarknaden 1974-2000: överutbildning eller kompetensbrist*? (Matching in the Swedish labor market 1974-2000: over-education or skill shortage? Swedish Institute for Social Research (SOFI), Stockholm University. Mimeo.

Lindbeck, A. and D.J. Snower (2000), Multitask Learning and the Reorganization of Work: From Tayloristic to Holistic Organization, *Journal of Labor Economics* 18, 353–376.

Marsden, D. (1986), *The End of Economic Man? Custom and Competition in Labour Markets*. Wheatsheaf, Brighton.

Maurice, M., F. Sellier and J.J. Silvestre (1986), *The Social Foundations of Industrial Power. A Comparison of France and Germany*. MIT Press, Cambridge, Mass.

Meghir, C. and M. Palme (1999), *Assessing the Effect of Schooling on Earnings Using a Social Experiment*. Working Paper No. W99/10, Institute for Fiscal Studies, Sweden.

Müller, W. and M. Gangl (2003) The transition from school to work: A European perspective, in Müller, W. and M. Gangl (eds), *Transitions from Education to Work in Europe. The Integration of Youth into EU Labour Markets*. Oxford University Press.

Müller, W. and Y. Shavit (1998), The institutional embeddedness of the stratification process. A comparative study of qualifications and occupations in thirteen countries, in Shavit, Y. and W. Müller (eds), *From School to Work. A Comparative Study of Educational Qualifications and Occupational Destinations*. Clarendon Press, Oxford.

Nickell, S.J. and B. Bell (1995), The collapse in demand for the unskilled and unemployment across the OECD, *Oxford Review of Economic Policy* 11(1), 40–62.

Nilsson, A. and B. Svärd (1991), *The quantitative development of vocational education in Sweden 1950-1990*. Lund Papers in Economic History No. 12/1991, Dept. of Economic History, Lund University.

OECD (1999), *Preparing Youth for the 21st Century. The Transition from Education to the Labour Market*. Paris.

Palme, M. and R. Wright (1998), Changes in the rate of return to education in Sweden: 1968-1991, *Applied Economics* 30, 1653–1663.

Raffe, D. and W. Müller (2002), *An overview of the Catewe project. Comparative Analysis of Transitions from Education to Work in Europe*. Paper to the European Research Network on Transitions in Youth, Florence.

Ryan, P. (2001), The school-to-work transition: A cross-national perspective, *Journal of Economic Literature* 39, 34–92.

Schröder, L. (2000), *Ungdomsarbetslösheten i ett internationellt perspektiv (Youth unemployment in international perspective)*. Institute for Labour Market Policy Evaluation (IFAU), Research Report 2000:4, Uppsala.

Shavit, Y. and W. Müller (eds) (1998), *From School to Work. A Comparative Study of Educational Qualifications and Occupational Destinations*. Clarendon Press, Oxford.

Statistics Sweden (2003) http://www.scb.se/statistik/uf0506/pyramid_agg.pdf.

Stern, D. and D.A. Wagner (eds) (1999), *International Perspectives on the School-to-Work Transition*. Hampton Press, Creskill, New Jersey.

Tversky, A. and D. Kahneman (1986), The framing of decisions and the psychology of choice, in Elster J. (ed.), *Rational Choice*. Blackwell, Oxford.

Vallet, L-A. (2003), *State of the art and current issues in comparative educational stratification research*. Paper presented at the Changequal workshop, University of Mannheim.

Wadensjö, E. (1991), *Högre utbildning och inkomster (Higher education and income)*, in Expertrapport till Produktivitetsdelegationen (Expert report to the Productivity Delegation), No. 4. SOU 1991:82, Stockholm.

Öckert, B. (2001), *Effects of higher education and the role of admission selection*. Dissertation Series No. 52, Swedish Institute for Social Research (SOFI), Stockholm University.

CHAPTER 11

Education and Income Inequality in the UK:
A Current Perspective

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This article provides a contemporary assessment of the education and income inequality which exists in the UK using the different data sets which are available. We provide a prospective on the most recent literature and review the empirical evidence from the trends in both education and income inequality. The article also examines the distribution of education and income inequality over the life-cycle by considering the changing fortunes of a cohort of people born in 1958. We provide an assessment of the literature and what we know and do not know and understand about the relationship between education and income inequality.

1 Introduction[1]

Over the last 25 years the rapid expansion of the education system in the UK resulted in large increases in the supply of highly educated workers. Over the post-war period in the UK, there has been an increase in every level of educational provision. More young people stay on in school after the age of 18 and the participation rate in higher education has been rising over the whole of the last 40 years. Over the same period, there has been a marked increase in the extent of income inequality. Many commentators have also suggested that there has been a systematic increase in the rate of return to education over this period.

The link between rising educational achievement and the rising levels of inequality is unclear, as one might expect that an increase in the supply of skills might lead to a fall in the rate of return to education. One possible explanation for the simultaneous occurrence of these trends is that the demand for skills has risen faster than the growth in the supply of these skills – largely fuelled by the revolution in technology. This revolution in the 'skill-biased technological change' has spawned a large literature on how rising inequality is related to the shortage of skills in different countries. This study is more fundamental in many respects since we first focus on the measurement of education and income inequality changes and describe them for the UK.

2 Education inequality

From the outset it should be emphasised that it is unclear what is meant by 'education inequality'. Variously we could mean: the inequality of educational provision by the state in terms of the funding which is spent on different pupils or students, or we could mean the difference in the educational achievements which are realised by different individuals. A further natural complication is that in any discussion of educational outcomes we must be aware of the inequality of natural ability in the population and, therefore, the inequality in the propensity of any individual to benefit from education. To some extent, what we may be interested in is

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the distribution of educational achievement conditional on natural ability. We will return to these more difficult issues in Section 4. In the first instance, it is appropriate to document the nature of educational achievement and how educational provision has expanded in the UK over the last 25 years.

2.1 Data sources on educational inequality in the UK

In many respects data on the educational system in the UK is very rich. We have detailed time series data relating education enrolment, staying on rates, the number achieving A level and degrees. In addition aggregate data exists on the amount of public money spent on education. It is also possible to calculate how this expenditure differs by socio-economic group and by Local Education Authorities. These same sources also allow us to determine how standards in educational achievement have changed and the degree of qualification inflation. These data are available on an aggregate basis via DfES publications, in some cases since the War but in others in detailed form from about 1960 onwards.

There is also limited amounts of annual cross-section data, which allow us to compare how educational achievements have changed over time. Notable in this regard is the General Household Survey (GHS). Although the GHS has a relatively small sample size, its main feature is that it does report the person's highest educational qualification on a relatively consistent basis over time. The GHS data is available from 1974 onwards and allows us to build up a picture of the changing nature of educational qualifications.

Limited data on education is also available in the Labour Force Survey. From 1992 information was collected on education as well as earnings for around 100,000 people per year. The problem is that before 1992 there was no information on earnings.[2] This limits the usefulness of the data for assessing trends in education and income inequality over time.

2.2 Review of literature on educational inequality

There are not many contributions to the literature on educational inequality in the UK. Nonetheless, two recent papers deserve our attention. The first one, carried out by Galindo and Vignoles (2002), investigates

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[2] This information is collected from winter 1992.

the determinants of cognitive ability, its role in the labour market, and how this has changed over time. A key result of this paper with regard to educational inequality is that the impact of cognitive ability on educational attainment has decreased in the UK over the last decades, while the role of parental social class and income has increased. Therefore, it is not the most able who have benefited from the expansion of the UK education system but rather the most privileged. In fact, they assert that "the expansion of the British education system appears to have disproportionately benefited children from wealthier backgrounds and higher social classes" (p. 13). Galindo and Vignoles (2002) find that for girls in the highest ability quartile, the probability of getting a degree, if they come from a family in the bottom income quintile, goes down from 38% to 29% between the cohorts. Additionally, for a girl, whose family is in the top income quintile, this probability increased from 60% to 70%. These conclusions are obtained from estimates based on the National Survey of Child Development (NCDS) and the British Cohort Study 1970 (BCS).

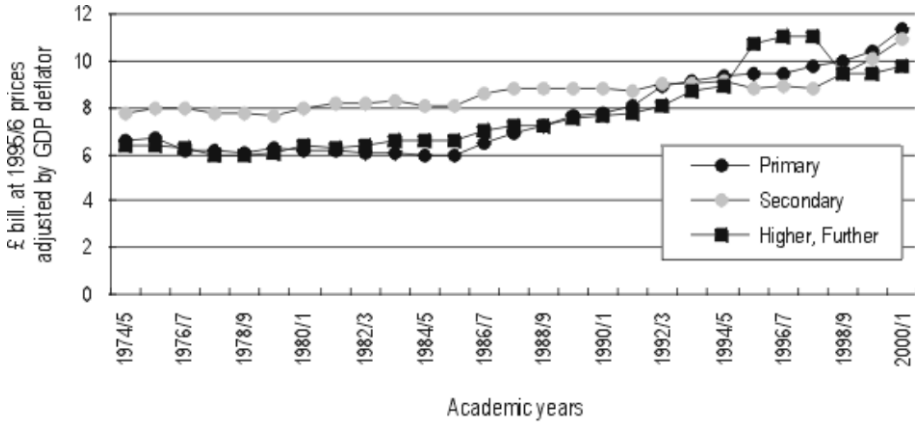
On the other hand, Blanden *et al.* (2003) deal with the question of changes in educational inequality from a similar perspective. The main conclusion of their study is very close to that reached by Galindo and Vignoles (2002); i.e., that the recent rapid expansion of higher education in the UK has disproportionately benefited children from richer backgrounds. Blanden *et al.* (2003) use data from the FES (Family Expenditure Survey), CPS (Current Population Survey; for the US), NCDS and BCS. They define educational inequality as educational participation and attainment by people from higher relative to lower income backgrounds. More specifically, they find a sharp rise in educational inequality over time in the UK, but with the stage of the education sequence mattering. In particular, they point out that although parental income became more important for the staying on at school decision in the 1980s, this pattern reversed in the 1990s once the age 16 examinations system was altered. The Blanden *et al.* (2003) paper suggests that education systems and the policies that shape them can matter for inequality.

2.3 Changes in educational provision over time 1970–2000

There have been slow but progressive changes in the nature of educational spending by the UK government over the last 30 years. The pattern of aggregate spending can be discerned in the graphs below. Figure 1 shows how spending on state education has been rising in real terms over the last 25-30 years expressed in 1995 prices. We can see that

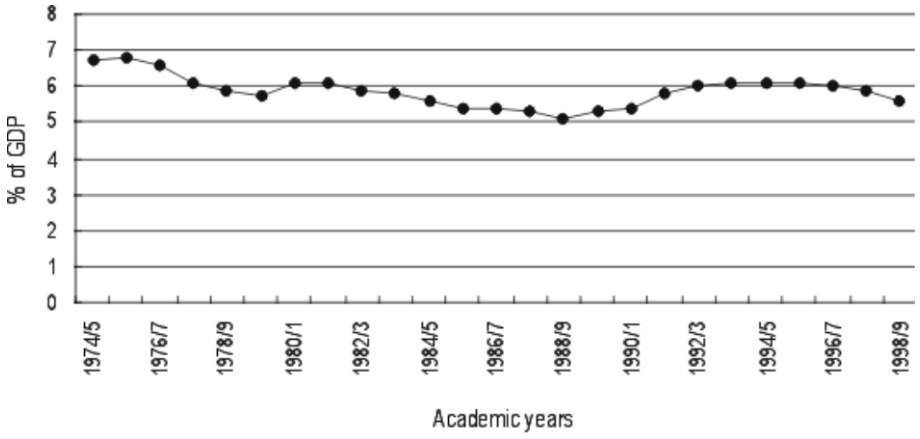
spending has risen from 6.6 billion in Primary and 6.4 billion on Further and Higher Education in 1975 to 11.4 billion in 2000/1 on Primary Education and 9.8 billion on Further and Higher Education in 2000/1. Expenditure on Secondary Education has been rising more slowly over the same period, from 7.8 billion in 1975 to 10.9 billion in 2000/1. Some of the explanation of these trends and their relative magnitudes may be due to demographic factors and some are due to the changing nature of government priorities on educational spending shifting from Higher Education towards education in the earliest years.

Figure 1. Current spending (net)



Source: Glennester (2002).

Figure 2. Total expenditure on education



Source: Glennester (2002).

Despite rises in educational spending in real terms (expressed as a fraction of GDP) in the different sectors, the overall trend in educational spending has been slowly down (Figure 2). In these terms, spending has fallen from 6.7 to 5.6 per cent of GDP. This represents a significant fall in state spending as measured in terms of overall economic activity. This pattern could be partly due to growth of the private sector of the economy.

These figures do not tell us how educational spending is distributed across different socio-economic groups within the UK. There has been relatively little work on this topic due to data difficulties. One notable exception is the work of LeGrand (1982), but this work is rather dated now. The authors know of no more recent work on this issue, which is deserving of research attention.

2.4 Changes in educational achievement over time 1962–2000

We use 'five or more grade A-C passes in GCSE or GCE/CSE at age 16' to measure academic success at school. This was traditionally the requirement for university entrance, but, in more recent years, has become one of the prime indicators of educational success for 16 year-olds. In particular, it features in the school performance tables and is a key statistic in government publications. Figure 3 reproduces the official data showing the proportion achieving this level of success in England since 1974.

The most noticeable feature of the figure is the clear break in the series after 1987. Before 1987, the series grows slowly. Indeed, it appears to be stationary or even falling immediately before 1987. There was then a staggering growth in the proportion with good examination performances, with 33 per cent reported in 1989 and 45 per cent by the end of the period. Moreover, boys and girls both improved, but girls did better than boys. Girls were on average about 1.3 percentage points better than boys in the six years before 1988. This difference had quickly increased to six points in 1989 and was about nine points or more in the mid-1990s.

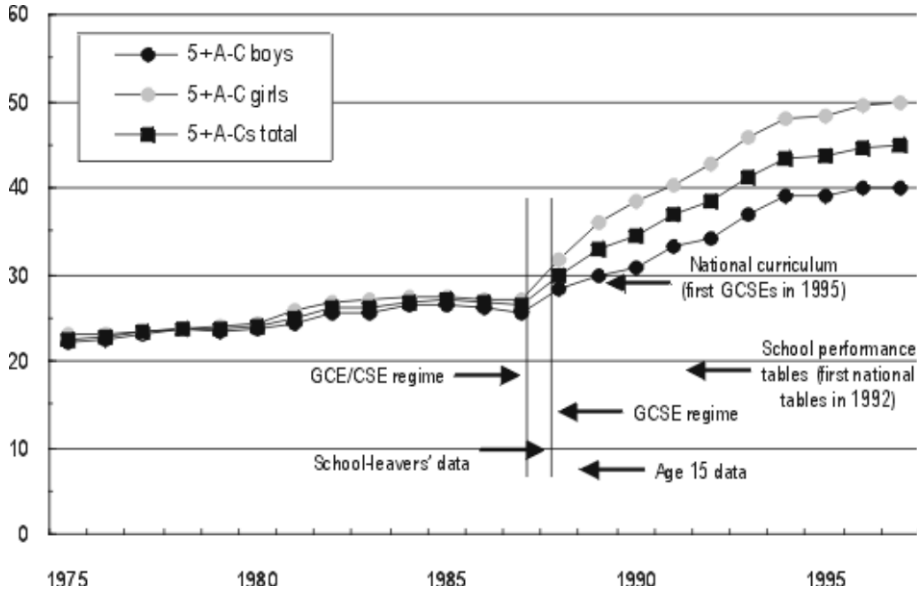
The dramatic change in performance would appear to be related to the replacement of O-levels by GCSEs. GCSEs differed from the earlier GCE/CSEs because they included an element of class-work and allocated marks on an absolute scale (thus abandoning the idea that a certain percentage of the population should get a particular grade). The change in the style of the examination may have produced a large improvement in results and this effect would have almost certainly continued over time as the teaching process adjusted to the new system. Further comparison

and evaluation over this period are complicated by other innovations with the phased introduction of the National Curriculum and the publication of School Performance Tables.

Although main changes appear clear from the official statistics, it is not possible to construct a fully consistent series from these data because there is a major discontinuity in the series between 1988 and 1989. The School Leavers Survey provides the earlier data. It covers all school-leavers and, therefore, includes individuals who were older than 15 at the start of the relevant academic year. The later series for 1989 to 1997 is based on two sources that each measures the performance of pupils aged 15 at the start of the academic year.

We have dealt with the problem of comparability by fitting separate trend models by gender to the data before and after 1988. We then predict the performance in 1988 using estimates from the O-level period and from the GCSE period. The difference shows the effect of the introduction of GCSEs. This exercise suggests that boys have improved by an extra 1.6 percentage points while girls have improved by an extra 6.4 percentage points. These results indicate that there was a substantial increase for boys in the proportion of successful candidates following the introduction of GCSEs but that the gain for girls has been four times as great as that for boys.

Figure 3. Percentage with 5 or more A-C grades in England



Source: Statistics of Education (1997, Table 1).

Figure 4. Total number of pupils with two or more A-level passes as a proportion of the average population aged 18

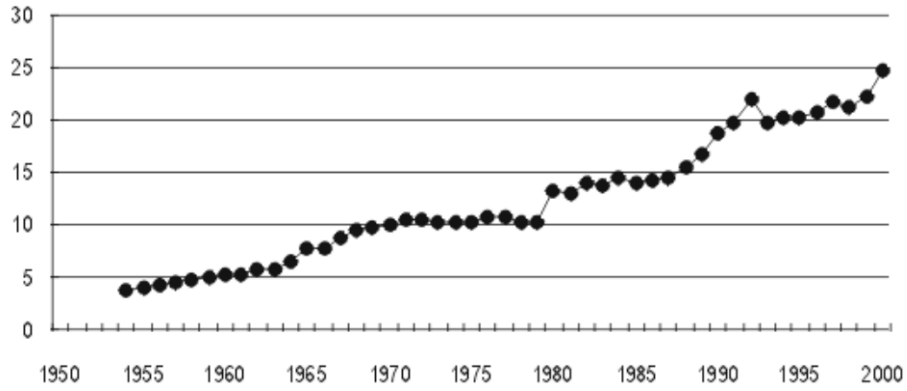
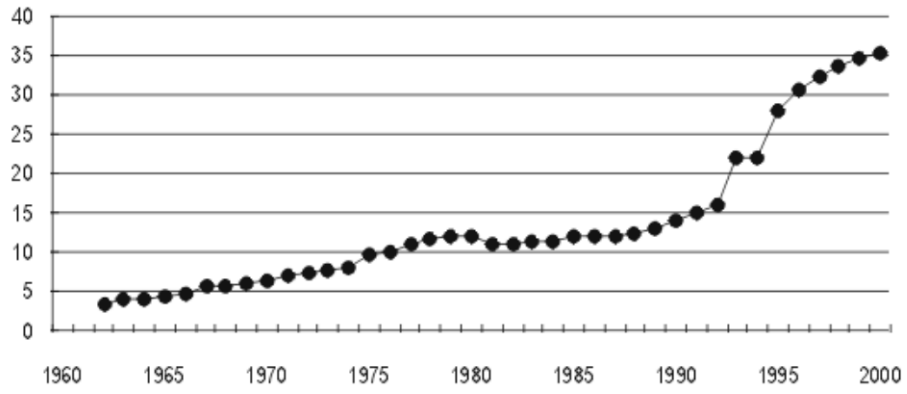


Figure 5. Higher education participation rate (%), 1962 to 2000



There has been a remarkable growth of educational participation and educational achievement in the UK over the last 40 years. Figure 4 shows us how the proportion of 18-year-old young people taking two or more A-levels has increased over time. In 1954, this proportion was only around 4 per cent. By 2001 it had risen to 25 per cent. This constitutes a dramatic rise in the post-compulsory education rate after age 16. This is further supported by the trend in the higher education participation rate, which has risen from around 4 per cent in 1962 to 35 per cent by 2001 (Figure 5).

2.5 Over-education, grade inflation and education quality

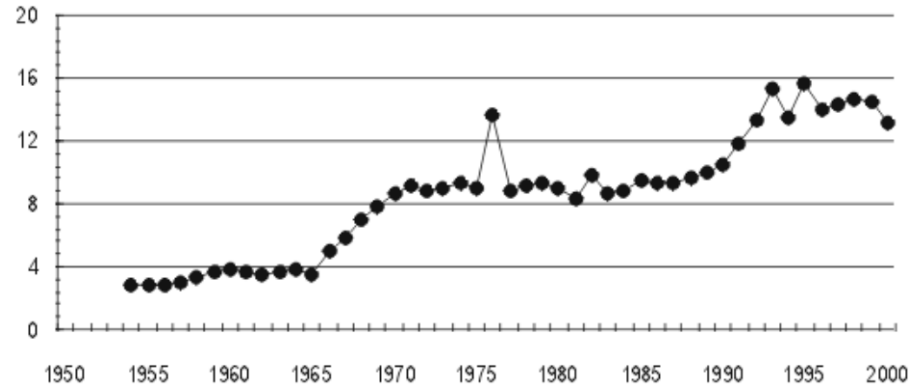
Various contributions to the literature have suggested that between 30 and 40 per cent of university graduates have jobs that do not require a university degree (Sloane *et al.,* 1999; Dolton and Vignoles, 2000). A growing literature on the economics of education has also demonstrated that there have been widespread skill shortages and deficiencies at the intermediate skill level, pointing to the neglected vocational element of education in the UK (McIntosh and Steedman, 2000; Prais, 2001).

The link between these two important findings has generated the literature on 'over-education' or downward occupational mobility (see Berg, 1970; Freeman, 1976).

One important factor in the over-supply of graduates is the mismatch between the types of graduates coming out of university and the kinds of shortage of vocational and technical skills that exist in the labour market. The extent to which learned skills can be transferred to the labour market varies markedly with the type of degree and the specialisation component of qualifications. In recent years, alongside the rapid expansion in higher education, there have been important changes in the types of qualifications being awarded by universities. There has been a substantial growth in the number of students studying degrees in media studies, sport and leisure and similar areas which, at face value, seem to be vocationally orientated. The rationale is that these new qualifications have emerged in response to changing demand for higher education from less mathematically and scientifically able students. Whilst these courses are very popular at the new universities in the UK and enjoy buoyant demand there is evidence that unemployment of graduates from these courses is high.

Standards in education are also a critical concern to employers. If the quality of qualifications is perceived to have been 'watered down', firms may upgrade their educational requirements to ensure the recruitment of the most able graduates. This may happen for all jobs in the hierarchy. Thus, overeducated workers could essentially be comprised of those who have non-professional qualifications, a low quality of education, or both. As a result of these changes, university graduates may be taking jobs today requiring less than a university degree. This phenomena, labelled 'bumping down' in the literature, is one that they would not have occurred (or occurred to a lesser degree) in the past.

Figure 6. Percentage of school leavers getting a degree three years later



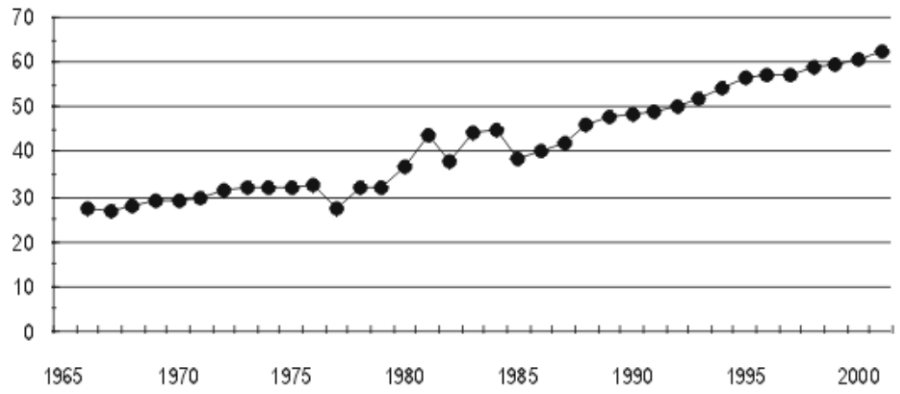
Source: DfES Statistics in Education.

Empirical evidence on these trends over time in the UK is scarce, but a brief consideration of the available Department for Education and Skills (DfES) data shows us the rate of increase of qualified school leavers, the growing pool of the qualified, and the extent of educational grade inflation. Figure 6 shows us the proportion of each school leaving cohort that qualifies as graduates three years later. This trend is steeply upward, showing that less than 3 per cent of school leavers in the UK got a degree three years later in 1955, whereas in the 1990s this figure had risen to around 15 per cent.[3] Figure 4 provides some limited evidence of qualification inflation. The graph shows that the proportion of school leavers achieving two or more A level passes has risen from 5 per cent in 1955 to around 20 per cent in the last few years. Figure 6 shows that the proportion of graduates attaining an upper second degree or above has risen from 27 per cent in 1966 to 63 per cent in 2001.

Although these graphs show how the supply of qualified manpower has been increasing, they do not provide evidence on the presence or scale of the over-education problem. An informed analysis of this would require clear evidence on the demand for qualified manpower. Sadly, comprehensive data on this does not exist. One consequence of over-

[3] Note that this proportion is much lower than the much publicised participation rates, since the numerator records only those getting degrees and does not include lower levels of post-school qualifications. In addition, the figure only includes those who actually pass degrees and hence also factors in the drop-out rate and the university exam failure rate.

Figure 7. The growing pool of qualified in the UK, measured as the percentage of graduates with first or upper second degrees



Source: DfES Statistics in Education.

supply of qualified manpower is that there may be a trade-off between schooling and other forms of human capital such as on-the-job training, years of experience and ability (Sicherman, 1991; Sloane *et al.*, 1999).

Several reasons may also be advanced to explain why over-education in future employment could be intrinsically linked with over-education on entering the labour market. In the literature to date, observing someone in the 'overeducated' state has usually been viewed as a 'static condition' which does not change as a person continues to work in the labour market.[4] Clearly this is naïve – some workers may start in a job for which they are over-qualified but quickly progress to something more appropriate to their qualifications. Likewise, other workers returning to the labour market after some time out of employment, or having moved locations, may seek to simply get back into the labour market by taking a job beneath their qualifications. Conversely, their first job may have been in their chosen graduate profession. These dynamic aspects of the over-education phenomena – which is the recognition that over the life-course people may shift in and out of over-education – should be explicitly recognised (see Dolton and Silles, 2001).

There are other explanations of the dynamic pattern of over-education. For instance, a lower level position in first employment may be difficult to recover from due to the obsolescence of skills that are not being used. Alternatively, once an individual has been in a lower grade job it may be hard to 'trade up' to a more demanding job as an employer could take

[4] Decker *et al.* (2000) is one exception.

their earlier experience as a negative signal of low ability and/or motivation. Such ability differences, the career-orientation of qualifications, and the quality of education could also permanently place graduates in lower-level occupations. These attributes of graduates create an unobservable factor that may have an effect on the probability of being overeducated in both first and later employment.

3 Income inequality

3.1 Sources of data in the UK

There are several sources of data in the UK available to study the changes in income distribution over time. The Family Expenditure Survey (FES), the General Household Survey (GHS) and the New Earnings Survey (NES). The FES covers only 10,000 people in work each year and does not contain information on individuals' educational qualification. The main drawback of the GHS is also that it is relatively small and does not report hourly earnings on a consistent basis over time. The big advantage of the GHS for our purpose is that it does report the person's highest educational qualification. The NES is a much larger survey of over 100,000 people per year. This kind of sample size is useful for looking at trends in pay by occupation or sector, or other forms of disaggregation. However, the NES does undersample low-wage and part-time employees, and so its usefulness for the study of inequality trends is limited.

As each of the available data sets has its own advantages and disadvantages, we will use them all to attempt to piece together the story of what is happening to income and educational inequality in the UK.

3.2 A review of recent UK literature on income inequality[5]

In continental Europe, institutional rigidities – including wage bargaining structures – have constrained potential increases in wage inequality; hence, labour market adjustment has occurred through significant diver-

[5] Selected contributions to the literature on UK inequality are summarized in Table A1 of the Appendix.

gences in relative unemployment and employment rates for skilled and unskilled labour (see e.g. Siebert, 1997). The UK represents an interesting intermediate case of a labour market that, especially after the Thatcher-era reforms, has moved in the direction of US-style flexibility. Examining the evolution of wage inequality in the UK is, therefore, of interest in terms of this broader debate.

A useful overview of the changes in the inequalities in the UK over the 1970s, 1980s and 1990s is provided by Machin (2001). The statistics and trends reported later in this chapter are a direct extension of his work.

Machin (2001) starts by presenting simple estimates of the changing wage returns to different educational qualifications, and then moves on to consider how the structure of employment has altered for workers with different education levels.

The 1980s will go down as the decade of the twentieth century where wage inequality rose by most. The late 1980s, reforms to the education system appear to have generated an acceleration in the supply of highly educated labour.

Demand has been shifting in favour of the more highly educated and skilled because, despite the fact that there are many more workers with higher educational qualifications, their wages relative to other groups have not fallen. Machin (2001) overviews the role of international competition, technological change and union decline on wage inequality.

A number of more detailed papers have explored changes in wage inequality in the UK in the 1980s and early 1990s. The general consensus in most of this work is that there was a significant increase in wage dispersion during the 1980s and a continued increase, although at a more moderate rate, during the early 1990s. The work of Prasad (2002) builds upon this earlier work and its first contribution is to update these results to include the latter half of the 1990s. Prasad (2002) uses individual micro data from the New Earnings Survey (NES) for the analysis. It has been variously suggested that tax and other policies in the Thatcher era (which began in 1979) were responsible in large part for the rising wage dispersion witnessed in the 1980s and early 1990s. Hence it is of interest to see what the longer-term effects of these reforms have been in the context of a period of strong employment growth and low unemployment, as has been witnessed in the UK in the latter half of the 1990s.

Prasad (2002) also includes an examination of changes in within- and between-group inequality and their contributions to changes in overall inequality. A number of recently developed theoretical models have proposed that increases in between- and within-group inequality are differ-

ent manifestations of the same phenomena, namely factors, which are mostly related to technological change. This literature has largely been based on existing stylised facts for the USA. Hence it is of interest to examine if other, relatively 'flexible', labour markets have seen similar patterns of changes in the different components of overall inequality.

Another important issue is whether changes in the structure of employment have influenced the evolution of wage inequality. Although wages and employment are jointly determined both at the aggregate and disaggregated levels, exogenous shifts in the structure of employment can, as an accounting matter, have a significant impact on wage inequality. An additional contribution of the Prasad (2002) study is a careful analysis of the effects of shifts in the structure of employment – in a variety of dimensions – on changes in wage inequality.

Prasad (2002) finds that increases in within-group inequality appears to have been the major determinant of changes in overall inequality during these earlier periods. However, both components of inequality have been essentially flat since the mid-1990s. Another interesting result is that there has been a convergence of the wage distributions for men and women over this period. This convergence in the gender wage distribution has resulted in more stability in the overall wage distribution than if we consider these groups separately.

It is useful to examine if changes in patterns of hours worked have influenced the evolution of labour earnings inequality. Systematic differences in weekly hours worked for workers at different points of the wage distribution could either exacerbate or dampen the dispersion of weekly earnings relative to hourly wages. For instance, it is possible that high-wage workers tend to work (and get paid for) more hours per week than low-wage workers. This would imply that wage inequality is a downward-biased measure of earnings inequality.

The main thing to note is that the basic time profile of changes in inequality is similar for both the wage and earnings measures – a moderate rise in inequality in the late 1970s, a sharp increase in inequality during the 1980s, more moderate but continued increases in inequality in the early 1990s and a levelling-off inequality in the latter half of the 1990s.

Wage inequality tends to rise over the life cycle due to the accumulated effects of individual-specific productivity shocks, as well as the rising dispersion of information about worker attributes available from employment histories and other sources.

While over the 1980s wage inequality and returns to education increased sharply in the USA and the UK, there was not an increase, or even no change, in continental European economies (Freeman and Katz, 1995; Katz *et al.*, 1995; Nickell and Bell, 1996).

Dickens (2000) further examines the evolution of male earnings in Britain over the 1975 to 1995 period. He fits a parsimonious model to the auto-covariance structure of earnings for all cohorts to analyse changes in the permanent and transitory components of earnings over the sample period. Examination of the auto-covariances of log hourly earnings of lags 1, 5, 10 and 15 years, suggests there are three main features in the data:

- The covariance elements are not the same at all lags.
- They are stationary over the life cycle.
- They are not stationary through the sample period.

Assuming an individual's education level is moderately stable, once they enter the labour market, then the impact of education will be estimated as part of the *permanent effect*. Dickens (2000) uses the worker' 'initial' occupation as a proxy for their level of education. One may believe that this initial occupation, before individuals start to change jobs, is a reasonable signal of their level of skills. Splitting the sample into four skill groups, he finds:

- The increase in the variance of earnings is greater in the non-manual than in the manual occupation groups.
- The rise in earnings variance is driven by changes in the transitory variance for both of the non-manual occupation groups (Managers, professional & technical, and Junior & intermediate non-manual).
- Conversely, in the manual occupation groups, the increase in the variance is largely explained by changes in the permanent variance.

Gosling *et al.* (2000) examine the changing distribution of male wages in the UK. The authors show that a large part of the changes in the UK wage inequality can be summarized quite simply as increases in education differentials and a decline of growth of entry-level wages, which persist subsequently. Furthermore, they suggest that an important aspect of rising wage inequality is increased within-group wage dispersion. They show that conditional on the presence of cohort effects, life-cycle profiles of wages have not changed. The sources of these cohort effects can be changes in education policy, changes in the role of labour market in-

stitutions, as well as changes in the conditions at labour market entry. If such pre- and early labour market factors serve to shift the life-cycle of wages permanently, then they can be summarized by an additive cohort effect, conditional on age, education and cyclical time effects.

Education differentials, together with cohort effects, can explain two-thirds of the overall increase in wage dispersion over the investigated time period. Nevertheless, there have also been important within-group shifts in the wage structure. As successive generations of workers have entered the labour market, they have done so with more and more dispersed wages, which have persisted over time to create a more unequal wage distribution. They model quantiles of the distribution of wages as functions of age, education, cyclical time effects and cohort effects. The latter reflect differences in productive characteristics across generations, as well as general productivity growth.

Their results can be summarized by their suggestion that the changes in wage inequality can be simply described by changes in the rate of growth and dispersion of entry-level wages across successive generations of workers, which then persist over the life-cycle. The rest of the story is explained by the changes in education differentials.

The cohort profiles for all education groups are concave, at least for cohorts born after 1952. Hence, the relative gap between the wages of older cohorts and younger ones is increasing. This effect is most dramatic for the lower education groups. There are a few sources of increasing heterogeneity within each education group:

- The set of qualifications received within each of the groups based on the years of education measure.
- Possible changes in the distribution of other skills across cohorts.
- Changes in the composition of ability in each group solely driven by the fact that the process determining educational choice may have changed.

In conclusion, Gosling *et al.* (2000) find that about a third of the increase in wage dispersion from the late 1970s to the mid-1990s is due to increases in educational differentials. Another third is due to a continuous decline in the growth rate of median wages of successive cohorts entering the labour market, an effect which persists over their time in the labour market. The remaining third is within group: successive cohorts entering the labour market with increased dispersion of wages.

The Gosling and Lemieux (2001) paper starts by observing that the changes in wage inequality experienced by the UK and the USA appear to be more dramatic than those found in other continental European countries. The paper tries to determine whether the reforms in the institutional structure of the labour market contributed to the increase in inequality in the UK. The main structural changes in the UK since 1979 have been:

- The decline of union membership and more restrictive legal obstacles to trade union action.
- A decline in public-sector employment.
- Wages councils were weakened and finally abolished in 1993.
- The introduction of further sex discrimination and equal pay legislation.
- The depth and coverage of employment protection legislation was reduced.
- Changes to the social security and welfare system.

On the other hand, it is possible that the United Kingdom would have diverged from the experience of the rest of Europe without any policy changes, given the existing differences in the structure of collective bargaining and the educational and training system.

The authors argue that the much steeper decline in unionisation in the UK explains why inequality increased faster than in the USA. For women, the fall and subsequent recovery in the real value of the US minimum wage explain why wage inequality increased faster in the USA than in the UK during the 1980s, while the opposite happened during the 1990s. The introduction of the National Minimum Wage in the UK in 1999 also contributed to the convergence in labour market institutions and wage inequality between the two countries.

Previous research has shown that the effect of factors such as unions and the minimum wage are best captured by modelling the whole distribution of wages rather than just focussing on the more standard wage differentials by age or education (DiNardo *et al.*, 1996).

As expected, the minimum wage has a much larger effect for women. For example, introducing a £3.6 minimum wage would have raised both the 5th and the 10th percentile to 3.6. As a result, both the 90–10 differential and the standard deviation would become lower for women than for men. On the other hand, the results of the variance decomposition confirm the finding of the previous literature that unions have little effect on the wage inequality for women.

Card *et al.* (2003) examine the differences between the USA and the UK in the timing of changes in unionisation and in wages and how these differences provide an opportunity for further assessing the contribution of institutional change to trends in income inequality. The authors show how the presence of unobserved productivity differences between union and non-union workers biases the calculation that ignores these differences.

The results for the UK show that between 9 and 29 per cent of the 0.087 growth in the variance of log wages between 1983 and 2001 can be accounted for by the decline in union compression effects. Furthermore, union wage compression effects remained relatively constant between 1993 and 2001. Unions systematically reduce the variance of wages for men, though the magnitudes of the effects are smaller when controlling for the skill composition of the workforce. Additionally, the union wage gap is larger for women than for men, resulting in a larger 'between sector' effect.

There is also a fairly widespread consensus that US wage inequality rose because the relative demand for skills increased faster than the relative supply, most likely due to rapid skill-biased technical change and perhaps also due to increased international trade. Acemoglu (2003) addresses the question of why the same technological developments have not increased skill premia in much of continental Europe. He suggests that there may be three explanations:

1. The relative supply of skills increased faster in Europe.
2. European wage-setting institutions prevented wage inequality from increasing.
3. Due to differences in technical change or openness to international trade, demand for skills has increased less in Europe than in the USA and the UK.

The traditional explanations (1 and 2) do not seem to provide an entirely satisfactory explanation for the differential inequality trends across countries. Instead, it appears that the US and European relative demand curves did not shift in the same way over the past 20 years. Nickel and Layard (1999) also reach an analogous conclusion using a similar approach but different data sources.

According to explanation 2, it is not the differential growth of skilled employment that is responsible for differences in inequality trends across countries. More specifically, firms respond to wage compression by reducing their demand for unskilled workers, and the employment of

skilled workers (relative to that of unskilled workers) increases in Europe compared to the USA. As a result, the market equilibrates with a lower employment of unskilled workers compensating for their relatively higher wages in Europe.

An alternative to the traditional explanations involves differential changes in the relative demand for skills across countries. Since most OECD economies likely have access, and even relatively rapid access, to the same set of technologies, the most plausible reason for such differential changes would be *differences in technology adoption from a given world technology frontier*. Institutional wage compression in Europe makes firms more willing to adopt technologies complementary to unskilled workers, inducing less skill-biased technical change there.

The view that minimum wages, unions and social insurance programmes create wage compression in Europe and increase the pay of low-skilled workers is widely shared by most economists, and supported by existing evidence (OECD, 1994; Blau and Kahn, 2000). Because of wage compression, firms are forced to pay higher wages to unskilled workers than they would otherwise do. This creates an additional incentive for these firms to increase the productivity of unskilled worker: they are already paying high wages, and additional investments will not necessarily translate into higher wages. Since European labour market institutions increase the pay of low-skilled workers, technology may be endogenously less skill biased in Europe than in the USA.

Haskel and Slaughter (1999) discuss how UK skilled wages relative to unskilled wages have fallen more or less continuously from the end of WWII to the late 1970s. Since then they have risen very sharply: the rise in the last twenty years has undone the fall over the previous thirty-five. They assert that the rise has been associated with a range of issues: social exclusion, poverty and unemployment. And emphasize that changes in price, not technology, were the major force behind the rise in inequality in the 1980s. The authors also find significant links between tariffs and price changes; tariff changes, working through price changes, raised inequality in the 1980s. They are the first to link tariff changes with wage changes in this context. Changes in prices were significantly concentrated in the skill-intensive sectors, whilst changes in technology were broadly similar across sectors of different skill intensity. If one assumes the UK is a small open economy and, hence, price changes are caused by changes in world trading conditions, then trade has caused the rise in skill premia; under the assumption that price and TFP growth are exogenous. Under the assumption that price and technical changes are endogenous, they get three main results:

- Changes in OECD prices and UK tariffs significantly raised 1980s skill premia through their effects on UK prices.
- The level of industry concentration significantly raised 1980s skill premia by lowering TFP in the unskilled-intensive sectors.
- Changes in NIC prices had no significant effect on TFP growth's sector bias and hence on relative wages.

3.3 Evidence on the changing nature of income inequality in the UK

A most basic measure of the nature of income inequality over time can be assessed by calculating the Gini coefficient for repeated cross-section data over time. Tables 1 and 2 report this Gini coefficient for male and female wages, respectively, from 1975 through to 2001. The graph of this information is produced in Figures 8a and 8b, respectively.

Looking at the trend in male wage inequality, we can see that it has been rising at a fairly constant rate over the whole of the last 26 years. This trend is clear no matter which data set is used for the calculations. The same is also true of female wage inequality, as graphed in Figure 8b. The Gini coefficient rises from about .24 in 1975 for men to around .35 in 2001, if we use the FES weekly data. Likewise, the coefficient rises from .35 to .39 for female wages over the same period. This constitutes a massive rise in realised wage inequality over the last 26 years.

One important point to note about these graphs is that the different sampling base of the NES is quite apparent. This is clear since the NES only samples those above the income tax threshold. Therefore, low-wage and part-time workers are under-represented in this data. Hence, it is obvious why the trend in the NES series always lies below the other series in the graph for males. Quite clearly in Figure 8b the NES series lies well below the other two series calculated from the GHS and FES, since there is a much higher proportion of part-time female workers. The fact that there is some convergence in this graph between the series is a result of the increasing proportion of women who are working full-time and paying taxes.

Table 1. Gini coefficients, male wages

	FES		NES		GHS*
	Weekly	Hourly	Weekly	Hourly	Weekly
1975	0.247	0.242	0.234	0.226	0.251
1976	0.242	0.235	0.235	0.232	0.245
1977	0.238	0.235	0.231	0.223	0.238
1978	0.243	0.242	0.236	0.229	0.236
1979	0.247	0.240	0.240	0.230	0.235
1980	0.262	0.255	0.241	0.235	0.245
1981	0.266	0.264	0.250	0.247	0.250
1982	0.263	0.257	0.251	0.250	0.279
1983	0.276	0.275	0.256	0.254	0.261
1984	0.270	0.269	0.264	0.262	0.282
1985	0.289	0.283	0.267	0.262	0.282
1986	0.300	0.288	0.273	0.267	0.290
1987	0.321	0.301	0.283	0.278	0.301
1988	0.312	0.297	0.290	0.285	0.300
1989	0.301	0.293	0.293	0.290	0.302
1990	0.319	0.316	0.293	0.291	0.304
1991	0.322	0.307	0.297	0.295	0.312
1992	0.335	0.310	0.300	0.297	0.321
1993	0.339	0.317	0.306	0.302	0.318
1994	0.337	0.325	0.311	0.310	0.323
1995	0.328	0.359	0.316	0.319	0.325
1996	0.331	0.336	0.320	0.319	0.339
1997	0.338	0.326	0.320	0.319	-
1998	0.350	0.337	0.328	0.325	0.347
1999	0.360	0.347	0.328	0.325	-
2000	0.346	0.338	0.331	0.326	0.413
2001	0.356	0.347	0.338	0.333	-

* GHS is biannual since 1996.

Source: Authors´calculations.

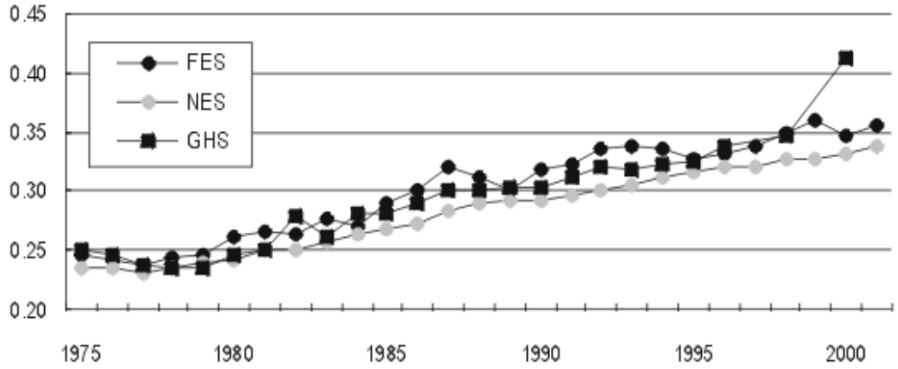
Table 2. Gini coefficients, female wages

	FES		NES		GHS*
	Weekly	Hourly	Weekly	Hourly	Weekly
1975	0.359	0.254	0.279	0.216	0.352
1976	0.363	0.258	0.292	0.226	0.351
1977	0.355	0.241	0.286	0.207	0.347
1978	0.354	0.253	0.286	0.205	0.347
1979	0.358	0.245	0.289	0.203	0.344
1980	0.361	0.252	0.294	0.210	0.349
1981	0.380	0.276	0.308	0.232	0.368
1982	0.383	0.266	0.310	0.227	0.375
1983	0.385	0.279	0.313	0.230	0.371
1984	0.382	0.277	0.319	0.237	0.378
1985	0.390	0.285	0.321	0.236	0.386
1986	0.388	0.295	0.325	0.237	0.388
1987	0.400	0.313	0.332	0.240	0.403
1988	0.398	0.313	0.342	0.250	0.396
1989	0.396	0.301	0.346	0.260	0.401
1990	0.403	0.323	0.349	0.260	0.400
1991	0.399	0.305	0.352	0.268	0.404
1992	0.407	0.308	0.360	0.271	0.406
1993	0.401	0.309	0.362	0.278	0.411
1994	0.402	0.307	0.367	0.278	0.407
1995	0.411	0.297	0.370	0.290	0.409
1996	0.404	0.311	0.373	0.289	0.408
1997	0.406	0.316	0.371	0.288	-
1998	0.408	0.306	0.373	0.288	0.417
1999	0.419	0.311	0.373	0.287	-
2000	0.406	0.320	0.375	0.288	0.439
2001	0.392	0.313	0.379	0.295	-

* GHS is biannual since 1996.

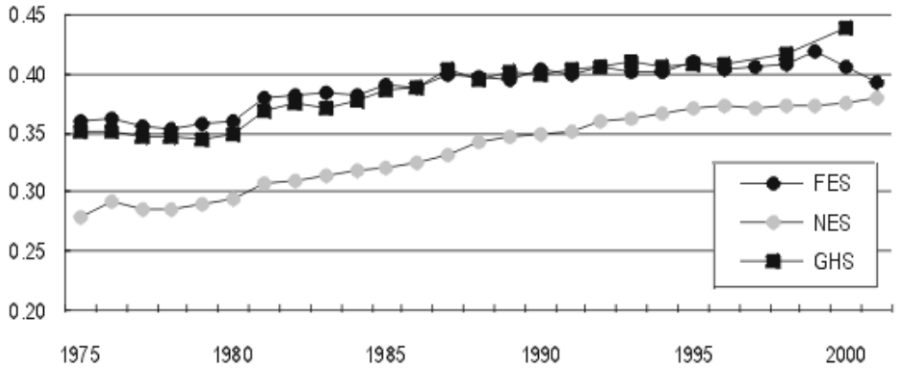
Source: Authors´calculations.

Figure 8a. Gini index, male wages



Source: Table 1 above.

Figure 8b. Gini index, female wages



Source: Table 2 above.

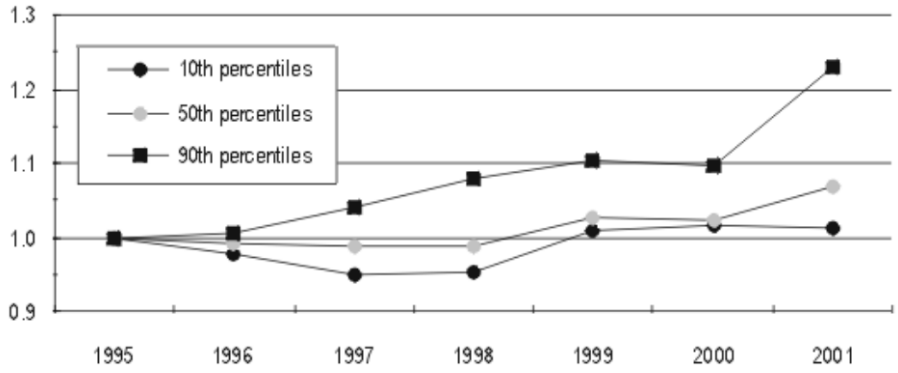
In order to identify the shifts that lie behind the overall inequality changes showed by the Gini coefficient, we present Table 3 and Figures 9a and 9b, which account for the evolution at the different percentiles of the real hourly earnings distribution along the period 1975 to 2001 using data from the FES. Those figures give further support to the pattern showed by the Gini coefficient.

Table 3. Percentiles of the earnings distribution

Male	Percentiles									Ratios		
	10th	20th	30th	40th	50th	60th	70th	80th	90th	90th-10th	50th-10th	90th-50th
1975	3.37	4.17	4.68	5.19	5.68	6.19	6.83	7.80	9.63	2.86	1.69	1.70
1980	3.44	4.32	4.96	5.54	6.13	6.83	7.64	8.65	10.65	3.10	1.79	1.74
1985	3.46	4.46	5.25	5.93	6.64	7.43	8.47	9.92	12.26	3.55	1.92	1.85
1990	3.64	4.87	5.75	6.55	7.41	8.44	9.73	11.56	14.43	3.97	2.04	1.95
1995	3.77	4.84	5.79	6.70	7.65	8.65	9.87	11.57	14.52	3.86	2.03	1.90
1996	3.69	4.74	5.67	6.61	7.57	8.65	10.07	11.76	14.62	3.96	2.05	1.93
1997	3.58	4.72	5.72	6.59	7.55	8.80	10.13	11.81	15.11	4.22	2.10	2.00
1998	3.59	4.68	5.66	6.57	7.55	8.77	10.39	12.20	15.68	4.36	2.10	2.08
1999	3.80	4.94	5.92	6.81	7.85	9.08	10.52	12.49	16.00	4.21	2.07	2.04
2000	3.83	4.89	5.78	6.77	7.83	9.09	10.62	12.51	15.91	4.16	2.05	2.03
2001	3.81	4.98	6.05	7.05	8.18	9.41	11.17	13.25	17.86	4.69	2.15	2.18
Female												
1975	2.21	2.60	2.96	3.30	3.61	3.99	4.42	5.08	6.42	2.91	1.64	1.78
1980	2.31	2.85	3.12	3.42	3.73	4.11	4.60	5.35	6.93	3.00	1.62	1.86
1985	2.49	2.91	3.21	3.58	4.01	4.54	5.19	6.14	7.96	3.20	1.61	1.99
1990	2.49	3.31	3.69	4.18	4.76	5.36	6.32	7.63	10.03	3.62	1.72	2.11
1995	2.77	3.41	3.91	4.49	5.16	5.81	6.79	8.13	10.48	3.57	1.76	2.03
1996	2.94	3.52	4.06	4.63	5.29	6.05	7.08	8.37	10.62	3.54	1.76	2.01
1997	2.93	3.48	3.94	4.55	5.19	5.97	7.00	8.52	10.95	3.74	1.77	2.11
1998	3.03	3.61	4.08	4.69	5.38	6.15	7.14	8.59	11.21	3.70	1.78	2.08
1999	3.08	3.69	4.22	4.80	5.52	6.26	7.45	8.90	11.67	3.79	1.79	2.11
2000	3.22	3.70	4.25	4.90	5.73	6.70	7.97	9.58	12.20	3.79	1.78	2.13
2001	3.28	3.96	4.59	5.28	6.01	6.93	8.09	9.87	12.48	3.80	1.83	2.08

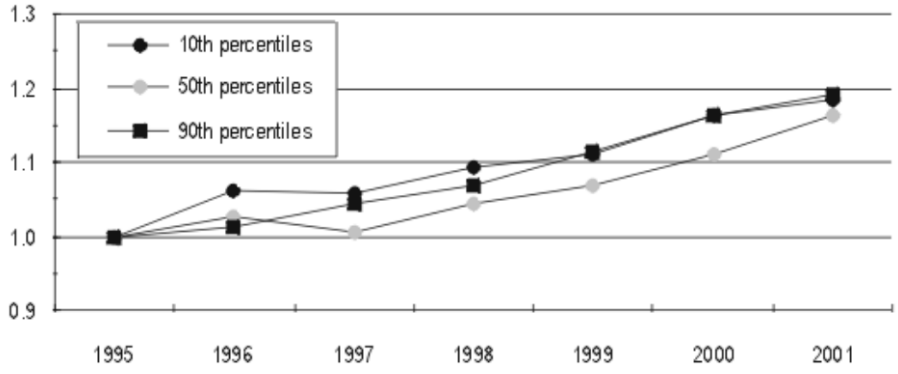
Source: Authors' calculations from FES.

Figure 9a. Men's hourly wages (indexed 1995)



Source: Table 3 above.

Figure 9b. Women's hourly wages (indexed 1995)



Source: Table 3 above.

3.4 The changing rate of return to education 1974–2000

A major part of the driving force behind earnings inequality is the changes in education that we have described in Section 2 above. We now examine some simple evidence relating to how the rate of return to education has changed over time. Table 4 and Figures 10a to 11b show the nature of this changing rate of return. We examine the rate of return to each level of qualifications relative to the 'no qualifications' reference group.

Table 4. Percentage increase in wages, by education qualification, relative to the non-qualification reference group, full-time workers

Educational qualification	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Men												
Degree	67.27	68.54	66.38	62.66	69.74	60.58	58.04	63.49	63.84	83.49	75.59	74.89
Higher vocational	45.67	46.65	42.46	51.48	48.66	33.51	36.04	38.79	41.27	55.58	52.50	43.48
Teaching	27.25	33.11	33.00	23.01	31.17	20.96	25.50	32.80	40.69	34.99	38.21	59.04
A-levels	24.12	23.99	29.80	34.14	30.13	19.76	23.86	30.29	26.60	19.84	18.74	26.49
O-levels	18.21	15.84	21.42	24.30	24.15	17.67	18.53	19.83	19.65	-0.70	-0.50	14.22
Cse	4.04	4.39	5.55	6.92	11.56	6.25	5.70	8.45	10.63	2.31	-4.87	-3.44
Other qualifications	10.71	16.77	15.55	18.28	20.84	13.43	9.20	14.08	13.31	20.20	20.20	42.33
Women												
Degree	106.27	115.98	86.79	81.88	81.07	102.49	99.61	87.54	88.72	90.98	86.45	61.77
Higher vocational	99.59	55.27	70.81	79.07	44.20	63.54	49.38	71.46	68.20	62.74	52.81	36.34
Teaching	63.79	68.71	89.09	59.98	56.36	59.52	69.59	71.62	67.63	40.92	51.59	56.52
A-levels	26.74	34.58	35.23	40.26	17.35	42.33	32.68	36.08	32.80	19.01	18.71	21.77
O-levels	20.97	20.20	24.86	17.66	23.68	16.53	17.34	20.72	22.14	-1.59	0.70	11.40
Cse	-1.25	-0.20	16.58	8.11	6.72	9.46	8.03	9.05	10.82	6.50	-7.50	-1.09
Other qualifications	14.09	14.80	4.86	23.69	5.44	15.82	14.96	16.18	2.27	29.95	39.79	21.29

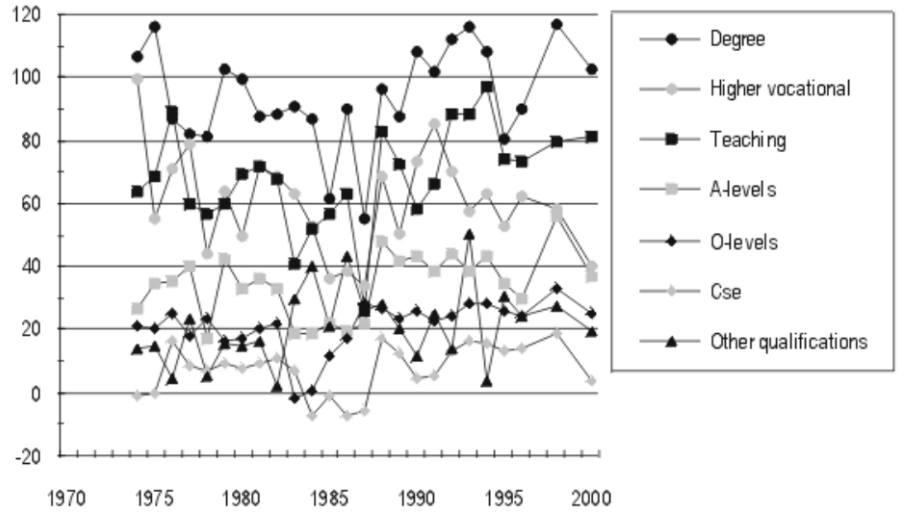
Source: Authors' calculations from GHS.

Table 4. (cont.)

Educational qualification	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Men															
Degree	91.08	85.52	76.07	65.86	75.24	80.15	87.24	68.20	80.94	86.08	64.38	-	98.18	-	87.67
Higher vocational	34.18	36.21	45.40	35.93	32.05	37.30	51.89	36.21	42.48	40.64	46.23	-	43.76	-	41.20
Teaching	67.20	39.93	35.38	72.98	43.76	14.57	61.45	65.04	31.69	47.55	32.18	-	37.99	-	35.93
A-levels	23.74	14.91	31.47	26.62	23.86	28.15	37.93	26.62	35.96	36.48	31.00	-	33.51	-	21.20
O-levels	16.42	13.66	19.09	15.60	22.38	12.30	25.07	18.06	23.65	22.38	19.01	-	22.14	-	27.89
Cse	6.82	-5.45	10.22	7.25	8.11	2.12	7.10	10.38	9.00	12.30	5.76	-	14.22	-	24.73
Other qualifications	51.29	16.18	13.85	7.04	19.72	19.24	12.75	32.71	27.80	39.93	22.68	-	24.23	-	38.13
Women															
Degree	89.88	55.27	96.38	87.39	108.13	101.78	112.31	115.98	108.34	80.76	90.22	-	117.06	-	102.99
Higher vocational	38.69	33.60	68.81	50.38	73.33	84.97	70.22	57.62	62.74	53.11	62.26	-	58.09	-	39.93
Teaching	62.91	26.36	82.65	72.29	57.93	66.20	88.14	88.14	96.99	74.19	73.67	-	79.50	-	81.12
A-levels	19.60	22.26	47.77	41.48	43.48	38.68	43.82	38.26	42.90	34.31	30.21	-	56.21	-	37.03
O-levels	17.35	27.89	26.50	23.49	26.24	22.63	24.11	28.40	28.15	25.99	24.36	-	33.11	-	25.48
Cse	-7.32	-5.45	16.96	12.19	4.81	5.13	12.98	16.53	15.49	12.86	14.22	-	19.12	-	3.67
Other qualifications	43.33	25.61	28.40	20.32	11.63	25.36	13.66	50.53	3.46	30.73	24.23	-	27.25	-	19.72

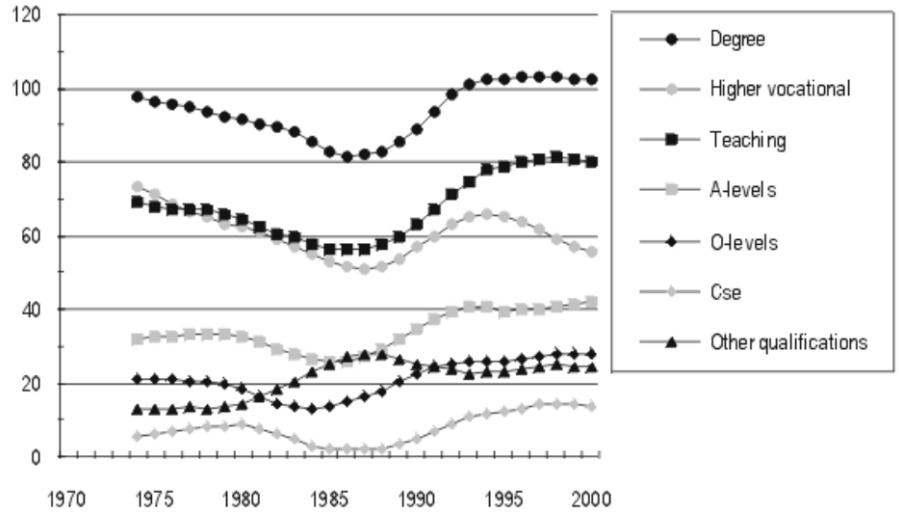
Source: Authors' calculations from GHS.

Figure 10a. Returns to educational levels in the GHS, full-time female workers



Source: Table 4 above.

Figure 10b. Non-parametric Kemel fit, women

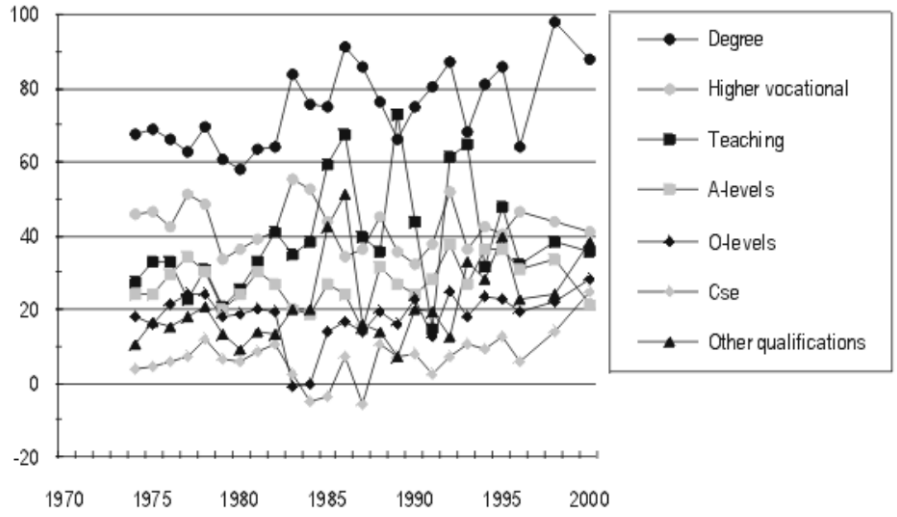


Source: Table 4 above.

Figures 10a and 11a graph the raw return as estimated for each equation relating to each year for men and women respectively. It can be seen that the pattern is fairly stochastic from one year to the next. This is mainly be-

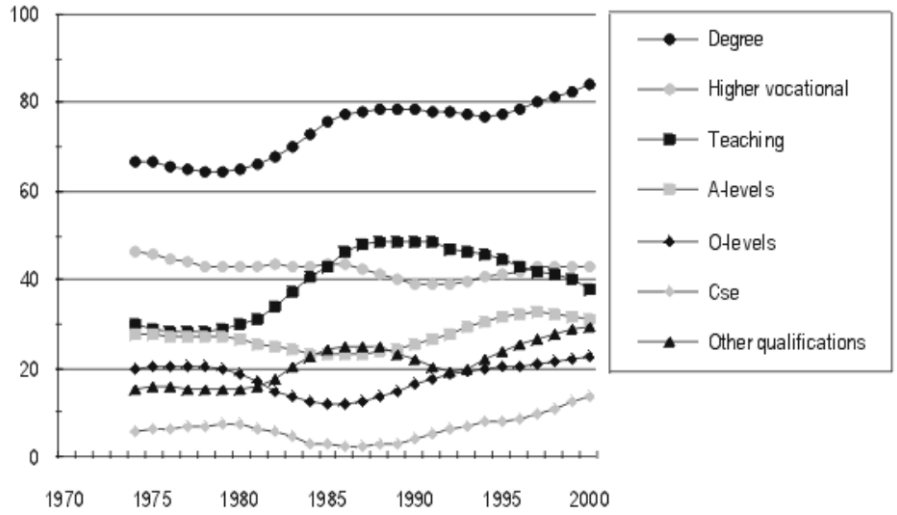
cause of the relatively small sample size and the stochastic influences associated with the demand-side factors. The pattern is more clearly discernable if a kernel is fitted to the data points to reveal a trend. This is done in

Figure 11a. Returns to educational levels in the GHS, full-time male workers



Source: Table 4 above.

Figure 11b. Non-parametric Kemel fit, men



Source: Table 4 above.

Figures 10b and 11b. These figures show how the rate of return to a degree (relative to no qualifications) for women has risen from 55 per cent in 1987 to 117 per cent by 1998. Most of this rise came from 1987 to 1996. There has also been a rise in the return to other lower qualifications (relative to no qualifications) over this period. The other main trend for women has been a fall in the rate of return to higher vocational qualifications. This has caused the gap between the rate of return to a degree and lower qualifications to rise. This rising gap in the return to a degree compared to other qualifications is seen more markedly for men, in Figure 10b. In this figure we also see a rapid increase in the rate of return to a degree over the last five years.[6]

Looking at Figures 10b and 11b together, we see a slow rate of growth in the return. This is in sharp contrast to the massive increase in the extent of earnings inequality and the rapid rise in the level of overall income inequality. A large part of these trends must be explained by changes in the demand conditions for qualified labour and the changing composition of the qualified workforce. Clearly, rapidly rising earnings inequality could be due to a fairly small minority of highly skilled technical and vocational graduates in subjects like law, accountancy, computing, medicine, etc., receiving large increases in pay as a result of shortages for these skilled workers. Likewise, the only slowly rising rate of return to a degree could be a result of this group being dragged down in average terms by a growing army of social science, humanities and arts graduates, who find it more difficult to get jobs and, indeed, go into non-graduate jobs in large numbers. The simultaneous occurrence of these two effects could explain both findings.

4 Inequality over the life-cycle

So far in this review we have examined the inequality of education and income in the UK and its pattern of change over time. Such a story is one of changing social and economic conditions and how the opportunities they provide have affected different generations of people over time. Although such a study is crucial to our understanding of how inequality has changed over time it does not tell us how, for a given set of people, the inequality they face has changed over time. To analyse such a question we need detailed cohort data with information on the same individuals over their life-cycle. Fortunately this data exists in the UK.

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[6] Table A2 of the Appendix exhibits the proportion of men and women who has achieved each formal qualification level during the period 1974 to 2000, using the GHS.

4.1 Data to assess life-cycle changes in education and earnings

High-quality panel data over a sufficient time span in the same individuals' lives is quite rare and very valuable. In the UK we have three main cohort data sets. These are the National Survey of Health and Development (NSHD), the National Survey of Child Development (NCDS) and the British Cohort Study 1970 (BCS). The NSHD began in 1946, the NCDS in 1958 and the BCS in 1970. Each is a birth cohort survey which samples a representative sample of the population and follows them at various intervals over time. These surveys are described in detail in Ferri *et al.* (2003). Here, we focus mainly on the NCDS to describe how the pattern of inequality has changed for the same group of people over their life-cycle.

4.2 The distribution differences in ability, achievement and earnings

Table 5 shows the most basic information relating to the net effect of changing educational structures by looking at the age at which members of the 1958 and 1970 cohorts left continuous[7] full-time education. The 1970 cohort tended to stay longer in full-time education than the 1958

Table 5. Age when leaving continuous education, and all qualifications obtained by the early thirties

	1970		1958	
	Men (%)	Women (%)	Men (%)	Women (%)
16 or under	54	45	66	60
17-18	21	30	17	24
19-22	17	18	14	14
23 or over	8	7	3	2
Total	100	100	100	100
N	4770	5139	5598	5799
N (both genders)*	9909		11397	

* Contains only those present at 30/33.

Source: Authors' calculations from NCDS and BCS.

[7] 'Continuous' may include a 'gap' year.

Table 6. All qualifications ever obtained in early thirties

	NCDS in 1991		BCS70 in 2000	
	Men (%)	Women (%)	Men (%)	Women (%)
Academic				
O-levels	62	68	56	61
1 or more A-levels or AS levels	24	23	23	25
Diploma of HE or other teaching certificate	3	4	9	11
Degree	13	11	18	17
Higher degree	2	1	3	2
Nursing or paramedic qualifications	0.4	7	0.6	4
Number - Academic	5563	5765	5450	5773
Vocational				
RSA Stage 1 or Other RSA	1	19	4	19
RSA Stage 2 or RSA First Diploma	0.4	13	0.4	4
RSA Stage 3 or Advanced or Higher	0.3	6	0.1	2
C & G Operative, Part I, Craft, Intermediate, Insignia, Other	28	6	22	13
C & G Part II or III, Advanced, Final, Full Technological	13	1	9	2
ONC or OND or SNC/SND	7	2	5	1
HNC or HND or SNC/SHND	5	1	6	3
BTEC National Certificate or Diploma, First General Certificate or Diploma (including Scots)	3	2	13	11
BTEC Higher Certificate or Diploma (including Scots)	2	0.6	2	0.1
Number – Vocational	5563	5765	5448	5771

Note: All definitions include the Scottish equivalent.
Source: Authors'calculations from NCDS and BCS.

cohort, especially the young women. The proportion of women leaving school at the first available opportunity fell from 60 to 45 per cent. The proportionate rise between the 1958 and 1970 cohorts for men was smaller, but also showed a consistent growth over time. More than half the men in the 1970 cohort (54 per cent) still left school at or before 16, compared with 66 per cent of those born in 1958. The 1946 cohort, for whom exactly comparable data were not available, were even more likely to leave school at the minimum age, for them 15.

Table 6 illustrates the range of qualifications that the surveys cover and reports the incidence of several types of qualification, not just the highest. The list is not comprehensive, but includes the most common ones. The heading for O-levels covers O-levels (Ordinary) Grades A-E, CSE grade 1, GCSE Grades A-C and their Scottish equivalents.

The increasing importance of higher education is apparent from these data. 18% of men in the 1970 cohort had a degree compared with 13% of those born in 1958, while the increase for women – from 11% to 17% – was even larger. The change from the O-levels + CSE regime to GCSEs is reflected in the increased proportions with GCSE. It is clear that women in the 1970 cohort were doing better than men at all sub-degree level qualifications, but this was already largely the case among those born in 1958.

The distribution of vocational qualifications reflects the occupational segregation in the labour market. Women were far more likely to have the mainly clerical RSA qualifications (and, in the 2000 surveys, Pitman qualifications), while men were more concentrated in City and Guilds at various levels and ONC/OND (ordinary National Certificate/Diploma) and HNC/HND (Higher National Certificate/Diploma). The take-up of the BTEC (Business Technical Education Council) qualifications is interesting from the perspective of both gender and time. The proportions of men and women who had a BTEC qualification were much higher for the 1970 cohort than for the 1958 cohort. Further, the imbalance between men and women (13% compared with 11%), at least at the lower levels of this qualification, was not so pronounced as that for ONC/OND and HNC/HND, which were taken predominately by men.

Table 7 illustrates the change in qualification levels across the three cohorts. Since we wished to compare the structure of qualifications over time at similar ages, we used a broad classification of academic and vocational qualifications based on a scale related to National Vocational Qualification (NVQ) levels. (This classification is broadly similar to ISCD international standard for the classification of qualifications.) We adopted a definition that related to the 2000 surveys and mapped other survey information onto this scale. The top level, NVQ 4 and 5, covers all tertiary qualifications: diplomas, degrees and post-graduate qualifications, since several subjects like teaching and nursing acquired degree status during the period, and post-graduate degrees remain a minority. NVQ 3 covers two or more A-levels, or their academic or vocational equivalent (similar internationally to the baccalaureate or to US High School). NVQ 2 includes academic or vocational qualifications equivalent to GCSE or O-levels grades A-C. NVQ 1 includes other qualifica-

tions, such as lower grades of GCSE, O-level or CSE and the lowest level of vocational certificates. In addition to the educational changes noted earlier, there have been extensive changes in the structure of post-school qualifications awarded as part of vocational training or by higher education institutions.

Table 7. Highest educational attainment in each cohort in their early thirties, and in their early forties

	1970 cohort		1958 cohort		1946 cohort	
	Age 30 in 2000		Age 33 in 1991		Age 32 in 1978	
	Men (%)	Women (%)	Men (%)	Women (%)	Men (%)	Women (%)
No Quals	13	14	11	14	45	45
NVQ1	9	10	16	15	7	11
NVQ2	24	30	20	32	14	25
NVQ3	23	14	27	14	13	9
NVQ4-6	31	32	26	25	21	10
Total	100	100	99	100	100	100
No. of cases	5439	5763	5563	5765	3701	3683

	1958 cohort		1946 cohort	
	Age 42 in 2000		Age 43 in 1989	
	Men (%)	Women (%)	Men (%)	Women (%)
No Quals	11	13	41	43
NVQ1	13	13	7	11
NVQ2	20	30	15	25
NVQ3	26	14	14	10
NVQ4-6	30	30	23	11
Total	100	100	100	100
No. of cases	5620	5778	3133	3271

Source: Authors' calculations from NCDS, BCS and NSHD.

For the three cohorts shown in their early thirties in the top half of Table 7, we can see a clear increase over time in the proportion of each

gender in the top bracket of qualifications. There was a substantial increase for men, with the proportion rising from 22 per cent for the 1946 cohort in 1978, to 31 per cent for the 1970 cohort in 2000. The growth was even more spectacular for women, with the proportion with tertiary qualifications rising from 11 per cent among the 1946 cohort in 1978, to 25 per cent for the 1958 born women in 1991, and 32 per cent for the 1970 cohort in 2000. Indeed, women moved from a position in 1978, where the proportion of those in the highest qualification band was less than half that of men, to one in 2000 where they had overtaken men. This broad account of the 'catching up' of women's educational attainment with men's does not reveal the extent of the large differences in the subject studied by gender.

There are clear increases in the proportions of men and women with NVQ level 3 when we compare either of the later cohorts with the earlier cohort. However, the increase appears to be concentrated in the eighties since the proportions remain the same for women and actually fall for men[8], when we compare the statistics for the later cohorts. The relative performance of women has fallen between 1978 and 2000 at this level of qualification.

The lower half of Table 7 makes the same comparison when the 1946 and 1958 cohort members were in their early forties. Not surprisingly, the figures reflect the larger percentage for the highest-level qualifications in the 1958 cohort that we observed earlier, but there is some evidence that the upgrading of qualifications became more common over the 1990s. Members of the 1958 cohort increased the average percentages with NVQ 4–6 from 28 to 32 per cent for men and from 25 to 30 per cent for women between the ages of 33 and 42.

There was a dramatic fall in the percentage of the cohort with no qualifications between the 1946 and the later cohorts. Even at 43, 41 per cent of men in the 1946 cohort had no qualifications compared with 11 per cent in the 1958 cohort. This is a remarkable change, given that the 1946 and 1958 cohorts are only 12 years apart in age. However, when it comes to comparing the 1970 and the 1958 cohort, the proportions with no qualifications seem to have stalled at around 11 to 14 per cent. If allowance should, in fact, be made for under-reporting of qualifications at age 30, the argument concerning the increased acquisition of qualifications over time is strengthened.

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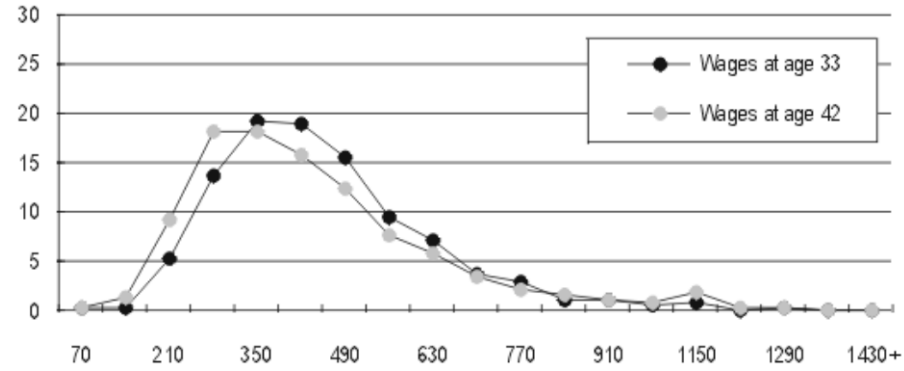
[8] This result is sensitive to the classification of City and Guilds qualifications.

4.3 The inequality generated by the education system and the labour market

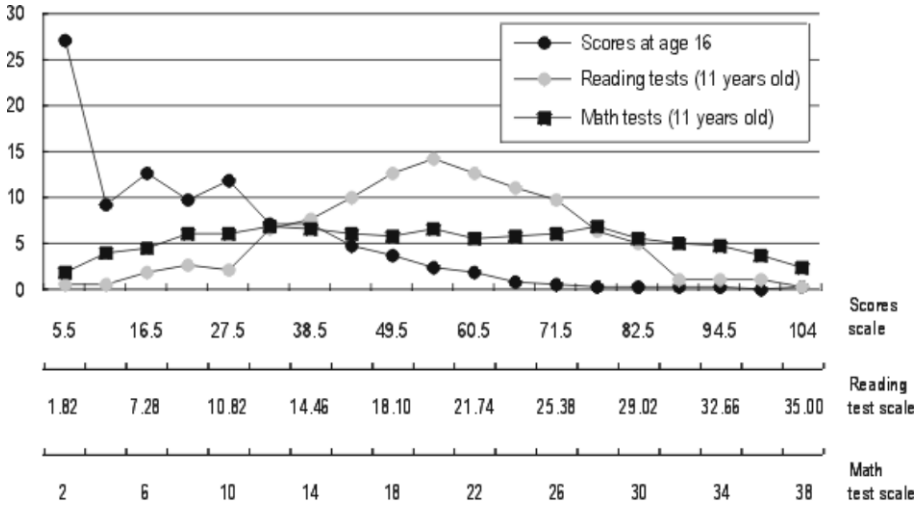
Having examined the basic differences in the educational experiences of the people in the cohort data, it is fitting that we should try to study how the overall distribution of inequality changes through a person's life-cycle. In Figures 12a to 12f we try to do this.

Figure 12a. Distribution of weekly wages at ages 33 and 42, men



Source: NCDS 1991 and 2000.

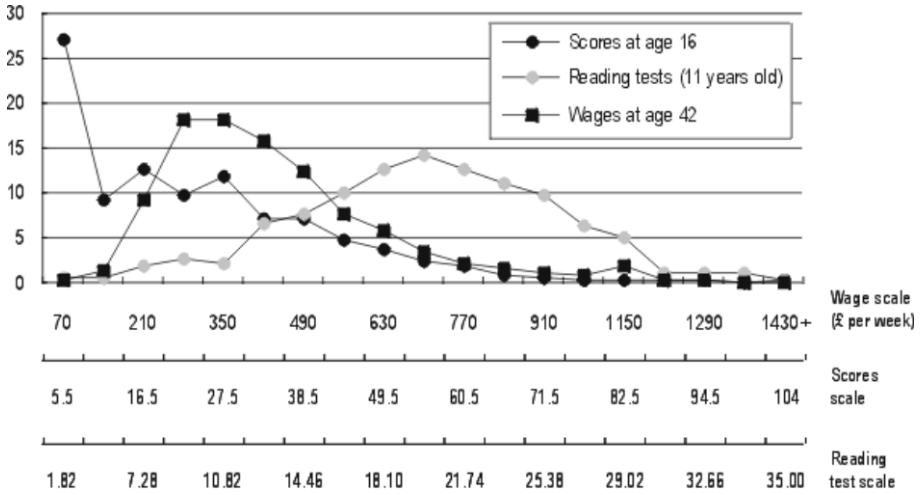
Figure 12b. Distribution of different proxies for ability in NCDS, men



Source: NCDS 1991and 2000.

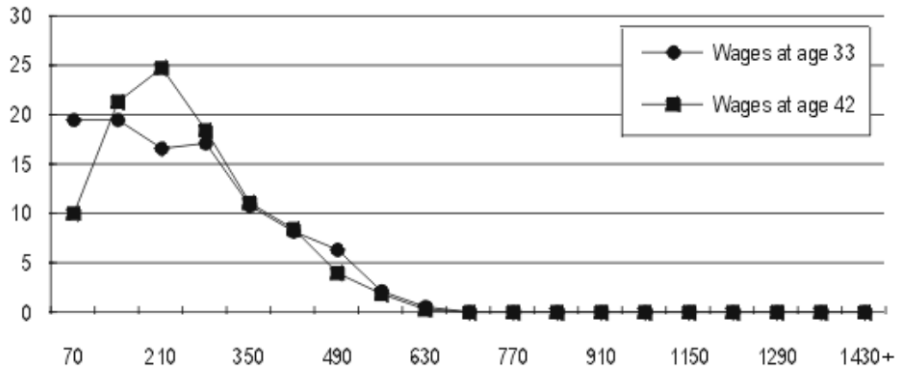
The idea of these graphs is that we wish to examine the distributions of: natural ability, achievement at 16 in school, and then examine the distribution of earnings in the labour market at age 33 and 42. The idea is that if we do this for the same people, then we will be portraying the extent of inequality in: initial endowments, achievement after the education system has done its work, and then the distribution of outcomes or rewards in the labour market. These diagrams were first used by Thurow (1969) to illustrate the nature of the process of inequality. The distinction

Figure 12c. Distribution of wages and ability proxies in NCDS, men



Source: NCDS 1991 and 2000.

Figure 12d. Distribution of weekly wages at ages 33 and 42, women



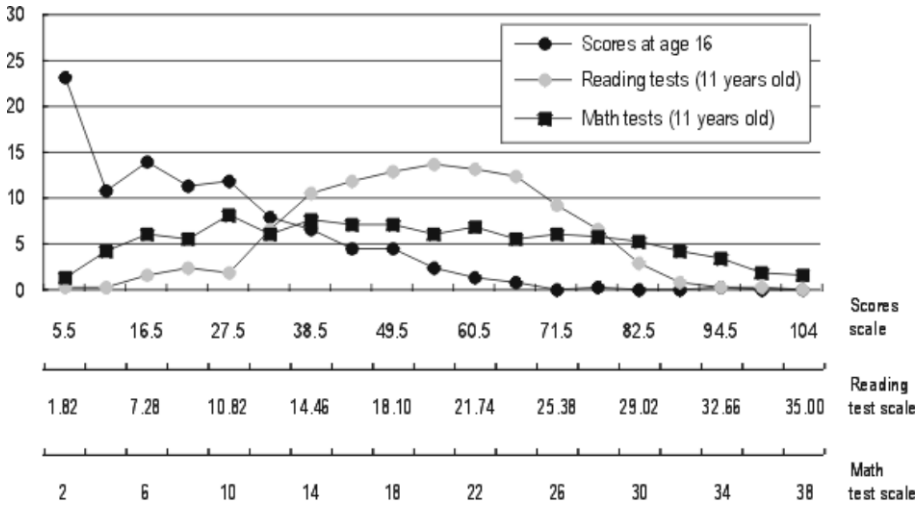
Source: NCDS 1991 and 2000.

is that in his graphs the underlying distributions of the relevant variables were derived from aggregate data on different samples. Here we are using the same individuals to construct these diagrams.

In Figures 12b and 12e we use Maths and Reading scores at age 11 to proxy for the distribution of underlying ability prior to much of the process of the education system. Clearly it would be preferable to have the distribution of IQ scores for these people measured prior to attending any school. Unfortunately this was not possible with our data. Nevertheless, this does give us an idea of the level of ability of these people when they were relatively young. Our second variable measures their score in public examinations at age 16 as derived from GCSE results. Our score is derived from the knowledge of their grades in these examinations and we add all the grades together to form a score where an A* in any subject is worth 7 points and an A – 6 points, a B – 5 points, C – 4 points, D – 3 points, E – 2 points, F – 1 point. In these graphs we have used weekly earnings to represent the outcome measure, which is a reward in the labour market for a specific set of educational achievements.

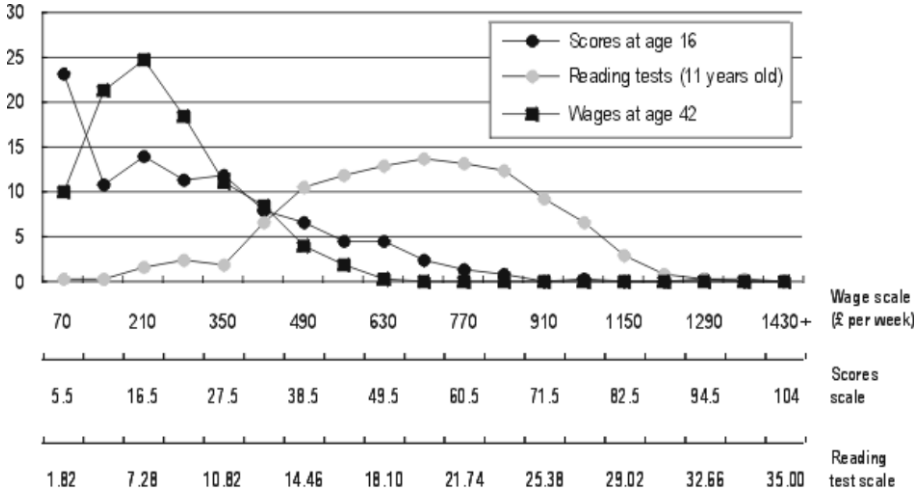
The idea of our graph is that if we centre each of these distributions at the median person with respect to each variable, then the difference in the distributions will measure the extent of inequality. The Maths and Reading scores measure (to a large extent) the innate ability of these people prior to much formal schooling. The age 16 score distribution

Figure 12e. Distribution of different proxies for ability in NCDS, women



Source: NCDS 1991 and 2000.

Figure 12f. Distribution of wages and ability proxies in NCDS, women



Source: NCDS 1991 and 2000

measures the effect of the educational system on the outcome measure of education at the end of compulsory schooling. Then the wage distribution measures the way in which the labour market will differentially reward the same individuals after some years of working.

Figures 12a to 12f show us that the effect of the educational system is to radically alter the distribution of ability approximating Normality to a distribution which is highly skewed. We see that most markedly the educational system in 1974 rewarded around 25% of young people with no formal educational achievement at all. The effect of the labour market is to perpetuate this uneven distribution of reward to the remuneration of them well into adulthood. Indeed, the distribution of earnings goes on getting more unequal as the cohort members get older.

5 Conclusion

This chapter has provided a contemporary assessment of the education and income inequality which exists in the UK, using the different data sets which are available. We examined the most recent literature and reviewed the empirical evidence from the trends in both education and income inequality. The chapter also examined the distribution of education and income inequality over the life-cycle by considering the changing fortunes of a cohort of people born in 1958. We provide an assessment

of the literature, and what we know and do not know and understand about the relationship between education and income inequality.

The chapter described the large increases in educational participation and achievement, and documented the massive rise in income inequality in the UK over the last 25 years. We examined the literature to assess the explanations for these changes. To a large extent, the economics literature ignores the question of educational inequality and focuses on the wage inequality issue. This economics literature has reached the conclusion that much of the increase in wage inequality is associated with an increase in returns to skills as a result of technological shifts in the demand for skilled workers.

Economists have also been concerned with the high rates of unemployment amongst qualified young people and the increasing trend of qualified workers working in jobs well below their qualifications. Much of the explanation for this phenomenon lies in the mismatch of the skills acquired in the education system and the technological skill needs of employers.

Literature

Acemoglu, D. (2003), Cross-country inequality trends, *Economic Journal* 113, F121–F149.

Berg, I. (1970), *Education and Jobs: The Great Training Robbery*. Penguin, London.

Blanden, J., S. Machin and C. Meghir (2003), *Changes in Educational Inequality*. CEP. Mimeo.

Blau, F.D. and L.M. Kahn (2000), *Gender Differences in Pay*. NBER Working Paper No. 7732.

Card, D., T. Lemieux and W. Craig (2003), *Unionization and Wage Inequality: A Comparative Study of the US, the UK, and Canada*. NBER Working Paper No. 9473.

Decker, R., A. De Grip and H. Heijke (2002), The effects of training and over-education on career mobility in a segmented labour market, *International Journal of Manpower* 23(2), 106–125.

Dickens, R. (2000), The Evolution of Individual Male Earnings in Great Britain, *Economic Journal* 110, 27–49.

DiNardo, J., N.M. Fortin and T. Lemieux (1996), Labour Market Institutions and the Distribution of Wages, 1973-1992: A Semiparametric Approach, *Econometrica* 65(5), 1001–1046.

Dolton, P. and M. Silles (2001), *Over-education in the Graduate Labour Market: Some Evidence from Alumni Data*. Centre for the Economics of Education, Discussion Paper Series No. 9.

Dolton, P. and A. Vignoles (2000), Incidence and Effects of Over-education in the UK Graduate Labour Market, *Economics of Education Review* 19(2), 179–198.

Ferri, E., J. Bynner and M. Wadsworth (eds) (2003), *Changing Britain, Changing Lives*. Institute of Education, London.

Freeman, R. (1976), *The Overeducated American*. Academic Press, New York.

Freeman, R. and L.F. Katz (eds) (1995), *Differences and Changes in Wage Structures*. University of Chicago Press, Chicago.

Galindo, F. and A. Vignoles (2002), *Class ridden or meritocratic? An economic analysis of recent changes in Britain*. CEP. Mimeo.

Glennerster, H. (2002), United Kingdom Education 1997-2001, *Oxford Review of Economic Policy* 18(2), 120–136.

Gosling, A. and T. Lemieux (2001), *Labour market reforms and changes in wage inequality in the United Kingdom and the United States*. NBER Working Paper No. 8413.

Gosling, A., S. Machin and C. Meghir (2000), The Changing Distribution of Male Wages in the UK, *Review of Economic Studies* 67, 635–666.

Haskel, J. and M. Slaughter (1999), *Trade, Technology and UK Wage Inequality*. NBER Working Paper No. 6978.

Katz, L.F., G. Loveman and D. Blanchflower (1995), A Comparison of Changes in the Structure of Wages in Four OECD Countries, in Freeman, R. and L.F. Katz (eds), *Differences and Changes in Wage Structures*. University of Chicago Press, Chicago.

LeGrand, J. (1982), *The Strategy of Equality*. Allen & Unwin, London.

Machin, S. (2001), Wage inequality in the 1970s, 1980s and 1990s, in Dickens R., P. Gregg and J. Wadsworth (eds), *The state of work in Britain: update 2001*. Centre for Economic Performance for Manchester University Press, London.

McIntosh, S. and H. Steedman (2000), *Low Skills: A Problem for Europe*. Final Report to DGXII of the European Commission on the *NewSkills* Programme of Research.

Nickell, S. and B. Bell (1996), *Would Cutting Payroll Taxes on the Unskilled Have a Significant Effect on Unemployment?* CEP Discussion paper No. 0276.

Nickell, S. and R. Layard (1999), Labour Market Institutions and Economic Performance, in Ashenfelter, O. and D. Card (eds), *The Handbook of Labor Economics*, *Volume III*. North-Holland.

OECD (1994), *Jobs studies*, V*ol. 1 and 2*. Paris.

Oulton, N. and M. O'Mahony (1994), *Productivity and Growth: A Study of British Industry 1954-1986*. Cambridge University Press, Cambridge.

Prais, S. (2001), Developments in Education and Vocational Training in Britain: Background Note on Recent Research, *National Institute Economic Review* 178.

Prasad, E. (2002), *Wage inequality in the United Kingdom, 1975-99*. IZA Discussion Paper No. 510.

Siebert, H. (1997), Labor market rigidities: At the root of unemployment in Europe, *Journal of Economic Perspectives* 11(3), 37–54.

Sicherman, N. (1991), Over-education in the labor market, *Journal of Labor Economics* 9, 101–122.

Sloane, P.J., H. Battu and P.T. Seaman (1999), Over-education, Undereducation and the British Labour Force, *Applied Economics* 31(11), 1437–1453.

Thurow, L.C. (1969), *Poverty and Discrimination*. Brookings Institute.

Table A1. A literature overview of inequality in the UK

Author	Time period	Sample	Estimation method	Inequality results	Notes
Acemoglu (2003)	1979-1995	LIS (Luxembourg Income Studies)	Comparisons between the predicted skill premium changes and the actual changes	UK and USA wage inequality increased more than in continental Europe.	Cross-country inequality trends
Card *et al*. (2003)	1983-2001	GHS (1983), LFS (1993, 2001)	Variance decomposition	Unions systematically reduce the variance of wages for men, however do not reduce wage inequality among women.	Comparative analysis of the link between unionisation and wage inequality in the USA, the UK and Canada.
Prasad (2002)	1975-1999	NES (New Earnings Survey)	Within- and between-group inequality	Sharp increases in wage inequality in the 1980s, moderated in the early 1990s, unchanged during the latter half of the 1990s.	Moderate influence of the convergence of the wage distributions for men and women.
Gosling and Lemieux (2001)	1978-1999	FES (1978-96), LFS (Labour Force Survey; 1997-99), GHS (1983)	Different inequality measures (standard deviation, 90^{th}-10^{th} differential, etc.)	Increase in wage inequality in the 1980s and modest growth in the 1990s.	Wage inequality is systematically lower for men than for women, and grew faster for men.
Machin (2001)	1974-1995	NES, FES (Family Expenditure Survey), GHS (General Household Survey)	Different inequality measures (90^{th}-50^{th}-10^{th} differential, Gini, etc.)	Slight fall in inequality in the 1970s, from the late 1970s and through the 1980s rose massively, in the early 1990s rises but at a slower rate.	Remarkable role of union decline and technological change on wage inequality.

Dickens (2000)	1975-1995	NES	Variance components models	The rise in earnings inequality since the late 1970s is driven by similar increases in both the permanent and transitory elements of earnings; the permanent component increases largely in the early 1980s and the transitory later in the decade.	Male wages only
Gosling *et al.* (2001)	1978-1995	FES, GHS	Quantile regressions	The increase in wage dispersion from the late seventies to mid-nineties is due to increases in educational differentials; the rest is due to a decline of the growth of entry-level wages and within-group wage dispersion.	Male wages only
Haskel and Slaughter (1999)	1958-1986	Manufacturing data collected by Oulton and O'Mahony (1994); panel based on the Census of Production	One- and two-stage mandated wage regressions	Changes in OECD prices and UK tariffs significantly raised 1980s skill premia through their effects on prices.	Results depend on whether the assumption is that price and TFP growth are exogenous or endogenous.

Table A2. Proportion of men and women by highest educational level achieved

Educational qualification	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Men												
Degree	4.0	4.7	4.4	6.8	6.7	7.1	7.1	7.1	7.8	6.6	6.9	7.8
Higher vocational	3.8	3.8	3.9	5.8	5.5	5.4	6.0	5.7	7.0	5.4	5.6	5.8
Teaching	1.0	0.9	1.1	1.3	1.1	1.0	1.1	1.3	1.1	2.4	3.0	3.3
A-levels	7.3	7.2	7.3	7.7	8.3	8.2	8.3	8.8	8.9	8.0	9.0	9.1
O-levels	14.4	15.8	16.2	14.6	15.6	15.0	16.4	15.6	15.2	20.7	21.3	21.9
Cse	9.9	10.0	10.0	12.2	12.8	11.7	12.5	12.8	12.9	11.8	11.5	10.6
Other qualifications	4.6	5.0	4.8	3.7	3.5	3.9	3.7	3.4	3.0	2.7	2.9	3.1
Women												
Degree	1.2	1.4	13.6	2.1	2.2	2.7	2.8	2.5	3.0	3.2	4.1	4.1
Higher vocational	0.6	0.5	0.5	0.8	0.9	1.0	0.9	1.1	1.2	1.2	1.4	1.4
Teaching	4.2	4.3	4.1	5.5	5.5	5.3	5.5	5.5	5.3	5.1	6.1	6.5
A-levels	3.4	3.3	3.3	2.6	3.2	3.2	3.6	3.9	4.4	4.7	5.4	5.9
O-levels	18.4	19.4	20.1	21.6	21.9	22.0	22.7	24.4	25.1	27.6	27.7	29.6
Cse	2.3	2.3	2.7	3.2	3.7	4.3	4.1	4.6	4.5	5.8	5.8	5.5
Other qualifications	3.5	3.7	3.5	3.1	3.0	3.0	3.3	3.2	3.0	2.0	2.5	2.6

Source: Authors' calculations from GHS.

Table A2. (cont.)

Educational qualification	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Men															
Degree	8.2	10.2	10.0	10.4	11.0	10.6	11.1	12.2	12.1	13.8	13.1	-	14.8	-	20.2
Higher vocational	6.4	8.5	9.0	9.9	9.0	9.3	10.0	9.7	9.2	10.3	10.3	-	10.7	-	12.8
Teaching	2.8	1.3	1.3	0.9	1.4	1.1	1.0	1.3	1.3	1.1	1.2	-	1.9	-	1.0
A-levels	9.2	11.5	11.6	11.7	12.8	12.8	14.3	15.9	14.6	14.9	14.9	-	16.8	-	17.0
O-levels	23.2	17.0	18.7	19.7	19.8	20.4	20.4	20.7	23.1	22.2	22.7	-	23.0	-	17.2
Cse	11.9	12.5	11.1	10.2	9.4	10.3	9.9	9.2	9.2	8.3	8.9	-	7.6	-	5.7
Other qualifications	3.0	2.7	3.3	3.6	2.9	3.1	2.9	2.9	2.8	2.7	2.4	-	3.1	-	3.9
Women															
Degree	4.2	4.7	4.8	5.0	5.6	5.7	6.2	6.6	7.0	8.2	8.3	-	11.8	-	15.8
Higher vocational	1.5	1.8	1.6	2.0	1.7	2.7	2.9	2.8	2.3	2.8	3.4	-	2.5	-	6.7
Teaching	6.5	6.2	6.5	6.3	6.7	6.0	6.7	6.6	6.1	6.4	6.0	-	7.0	-	6.1
A-levels	6.2	6.2	6.7	6.3	6.9	8.1	9.0	10.5	10.1	9.8	10.8	-	13.6	-	21.3
O-levels	30.1	28.6	30.0	30.8	31.3	30.7	33.6	31.5	34.4	33.1	32.0	-	32.0	-	16.9
Cse	6.1	4.9	4.9	4.9	4.7	4.6	4.0	4.0	4.2	4.2	4.4	-	4.0	-	3.5
Other qualifications	3.1	2.4	2.6	3.0	2.9	2.9	2.4	2.5	2.4	2.2	2.5	-	2.5	-	4.0

Source: Authors' calculations from GHS.

CHAPTER 12

Education and Inequality:
Evidence from Spain

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How do the family and personal characteristics of an individual influence his/her educational attainment? How do the labour market prospects change when he/she receives further education? This article intends to answer these two questions. To that purpose, it reviews the most recent literature for the Spanish case. The goal is to obtain fresh insights into the connection between education and economic inequality.

1 Introduction[1]

Education is a potential source of earnings inequality in at least two respects. First, more educated individuals tend to have lower unemployment rates, are paid higher wages, and enjoy higher earnings growth along their careers. Therefore, returns to education drive a wedge between the earnings profile of high and low educated workers. Second, the probabilities of undertaking further education – and benefiting from better labour market prospects – differ across individuals. Several studies have shown that family and personal characteristics influence the demand for further education. These differences are likely to promote economic inequality, since they give rise to inequality of opportunities among individuals.

This article explores the connection between education and economic inequality along these two dimensions. First, it describes the inequality in educational levels attained in Spain, discusses its recent evolution, and investigates socio-economic determinants of the demand for education. Second, it surveys new evidence on the connection between educational qualification and labour market prospects.

The rest of the article is organised as follows. Section 2 describes the most popular Spanish data sets used in the literature. Section 3 provides some basic facts on educational attainment by age and gender, and discusses socio-economic determinants of the demand for education. Section 4 provides recent evidence on returns to education in Spain. Section 5 presents concluding remarks.

2 Data sets

We start by describing the data sets that have been used most frequently in the empirical literature on Spain. The *Household Budget Surveys* (EPF, Encuesta de Presupuestos Familiares) were conducted in 1980 to 1981 and 1990 to 1991 by the Spanish National Statistical Office (INE, Instituto Nacional de Estadística). They contain information on annual net family income, expenditure, educational level, and employment status (hours worked not included) for about 20,000 households. In the

[1] I gratefully acknowledge financial support from the European Commission for the project HPSE-CT-2002-00108.

1980/81 survey this information is only available for household heads, while in the 1990/91 survey it covers all household members.

The *Continuous Household Budget Survey* (ECPF, Encuesta Contínua de Presupuestos Familiares) is issued by the INE at a quarterly basis since 1985. It is a sample of 3,200 households that report data on a continuous income variable which includes all monetary household income, and a wide range of household socio-economic characteristics. It has a rotating panel structure, in which 1/8 of the sample is rotated every quarter.

The *Survey on Class Structure, Consciousness and Biography* (ECBC, Encuesta de Estructura, Conciencia y Biografía de Clase) was conducted by the Spanish National Institute of Statistics, the Regional Government of Madrid, and The Woman Institute. It dates from 1991, has a sample size of 6,632 individuals, and contains data on personal characteristics and family background as well as on wages and hours of work.

The *Spanish Labour Force Survey* (EPA, Encuesta de Población Activa) is carried out every quarter since 1987, with a sample of about 60,000 individuals. It is designed to be representative of the total Spanish population, and it contains information on the educational status (including the highest educational level attained and the education undertaken in the reference week) and family characteristics (except for family income) of people aged 16 and older.

The *Living and Working Conditions Survey* (ECVT, Encuesta de Condiciones de Vida y Trabajo) is a nation-wide household survey conducted yearly from 1999 to 2001. Its goal was to obtain information about the labour market participation and time allocation of about 60,000 individuals, aged 14 and older, that were working in the week of the survey. They were asked to report their net monthly wage (though using intervals), educational attainment, on-the-job skill requirements, and information on their family environment.

The *Wage Structure Survey* (EES, Encuesta de Estructura Salarial) is an employer survey of 175,000 individuals. It was conducted in 1995 by the National Institute of Statistics (INE, Instituto Nacional de Estadística) among a sample of firms from the manufacturing, construction and service industries. The sample was selected by use of a two-stage method. In the first stage, firms were selected according to their size, economic activity and region, while the number of workers within each group were selected in the second stage. Firms with less than 10 workers are not included. The survey provides on-the-job characteristics such as kind of contract, skill requirements, type of job, sector, firm size, ownership, as well as gross hourly, monthly and yearly wages.

Finally, the *European Community Household Panel* (ECHP) is available from 1994 to 2001 for Spain. It has a sample size of about 8,000 households and 17,000 individuals, who are interviewed over time. They report personal and family characteristics, including marital, educational and occupational status, as well as gross and net monthly wages and worked hours.

3 Determinants of educational attainment

Over the last two decades, the human capital level of Spanish workers experienced a significant uprise. Enrolment rates at universities rose from 13 per cent (330,000 students) in 1971 to 44 per cent (1,500,000 students) in 1995. Younger cohorts are much more educated than the older ones. The labour force with a post-compulsory degree rose from 15 per cent in 1980 up to 35 per cent in 1998. Among individuals with secondary education, the number of those aged 25 to 35 is about 2.5 times larger than the number of those aged 45 to 54, and 4.5 times larger than the number of those aged 55 to 64. These proportions are almost identical for higher education.

The skill upgrading experienced by the Spanish population has been leaded by women. The number of female students in universities has doubled over the nineties, yielding a fraction of women relative to men in universities of 52 per cent. In secondary education, the female enrolment rate has risen to 84 per cent, six percentage points higher than for males.

Despite the educational upgrade experienced by the labour force, educational levels in Spain are still low as compared to OECD standards. Only 28 per cent of the population aged 25 to 64 have completed post-compulsory schooling, while the corresponding figures for the EU and the OECD are, respectively, 54 and 62 per cent. The proportion of those who have completed a university degree in the 25–64 age bracket is 16 per cent in Spain, which is far from the OECD average of 22 per cent.[2] Furthermore, Spanish enrolment rates are low: 83 per cent among people aged 16 against 88 per cent for the whole OECD.[3]

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[2] As a matter of fact, about 3.7 per cent of the adult Spanish population is illiterate, 13.5 per cent have no schooling, 31.2 per cent have a primary education, 32.3 per cent have completed secondary education, 9 per cent have undertaken vocational education, and 20 per cent have acquired a university degree (see CIDE, 1999).

[3] The data presented here is taken from San Segundo (1997), CIDE (1999) and Cantó *et al.* (2000).

In the rest of this section, we review the literature on inequality in access to education. We place emphasis on those variables that primarily determine the level of educational attainment of Spanish youngsters such as gender, parental and family background (education, income and professional status), and regional conditions (regional average income, educational level and unemployment rate). Table 1 summarises the main findings.

3.1 Parental education

According to the literature, there is strong evidence that parental education plays a paramount role in the children's access to education (Modrego, 1987; Ginés-Mora, 1996, 1997a, 1997b; Dávila and González, 1998; Peraita and Sánchez, 1998; Aldás and Uriel, 1999; De Dios and Salas, 1999; Albert, 1998, 2000; Beneito *et al.*, 2001; Petrongolo and San Segundo, 2002).

Ginés-Mora (1996) uses EPF 1990/91 to explore the relationship between the demand for education and the personal and family background among individuals aged 17 to 25. The author shows that the probability of demanding higher education is greatly influenced by the parental education level. Using a logit model for the probability of accessing university, he finds that having a parent with a university education increases the probability by a factor of about 3, as compared to having a parent with no educational qualification. This evidence is in line with Ginés-Mora (1997a,b). According to the data, about 83 per cent of the families whose household head has a university degree have at least one son enrolled in a university. If the household head has completed secondary education, this percentage falls to 65 per cent, and to 10 per cent if the household head has no formal education. Despite the strong relationship between parental education and university attendance, most university students come from families with average education. This is due to the fact that having a university degree is rather infrequent among older cohorts.

Dávila and González (1998) use EPF 1990/91 to run a logit model for access to university education among 8,651 youths aged between 18 and 24. According to their estimates, having a household head with a higher education increases, by a factor of 23, the probability of demanding university education compared to having a household head without educational qualification. Aldás and Uriel (1999) obtain a sensitively lower effect. They design a logit model to explain the probability of undertaking secondary or higher education, and find that having a

Table 1. Socio-economic determinants of the demand for education

Study	Data set	Educational decision	Model	*Gender*	*Family background*				*Regional variables*			
				Female	Father's education	Mother's education	Income	Professional status of the household head	Average education	Average income	Unemployment rate	Town size
Albert (1998)	EPA 1987-1997	Tertiary	Binomial logit	+	++	+++		+ (a)			=	
Albert (2000)	EPA 1977-1994	Post-compulsory, Tertiary	Binomial logit	+	++	++		+ (a)			+	
Dávila and González (1998)	EPF 1990-1991	Tertiary	Binomial logit	+	+++		+ (b)	+ (c)		+	=	+
Aldás and Uriel (1999)	EPF 1990-1991	Post-compulsory, Tertiary	Binomial logit		++	++	+ =	+ (c)	+ =	+	+	+
Petrongolo and San Segundo (2002)	EPA 1987, 1991, 1996	Post-compulsory	Binomial logit, Multinomial logit (d)	+	++	++		+ (c)	+	=	+ for men - for women	=
Peraita and Sánchez (1998)	ECVT 1985	All levels	Multinomial logit	+	++ (e)	++ (e)	+					+ for women
Ginés-Mora (1996)	EPF 1990-1991	Tertiary	Binomial logit	+	++	++	+		+	=		+
De Dios and Salas (1999)	Own design 1995 (f)	5-year against 3-year tertiary degree	Binomial logit	-	++	++	+					+

Notes: '+' indicates small positive effect; '++' indicates moderate positive effect; '+++' indicates strong positive effect; '-' indicates small negative effect; '=' indicates no effect.

(a) In particular, having a working mother, a father who is Director, Department head or an employer has a positive effect on the children's educational attainment.
(b) It also affects positively the probability of enrolling into long-cycle degrees.
(c) Past status can be important as well. It was found that previous unemployment experience of the household head had a negative effect on the access to education.
(d) Three decisions are considered: staying-on at school, working, or being out of work and school.
(e) The ECVT data set does not report information on parental education. To overcome this problem, Peraita and Sánchez (1998) use a proxy called education equipment, which includes the father's occupational status, activity development (such as reading, theatre, cinema), and enjoyment of social and unemployment benefits. The reported effect '++' applies to this variable.
(f) A sample of about 500 students at the University of Granada.

household head with post-compulsory education increases between 4 and 6 times the probability of undertaking post-compulsory education compared to having a household head with no qualification.

Peraita and Sánchez (1998) use the ECVT to explore the impact of family background on the probability of various educational outcomes. They use household data on single individuals aged between 16 and 28, who are living with their parents and, moreover, declare that they have quitted or finished their schooling. Using an ordered logit model to account for the highest schooling level attained by these youngsters, they find that the probability of studying further is primarily governed by the parental level of education. Moreover, this effect is stronger for secondary education than for tertiary education. Additionally, the educational equipment of the family has a positive and significant effect on the children's access to education.[4]

De Dios and Salas (1999) use a binomial logit model to estimate the probability of enrolling into a long-cycle university degree instead of a short-cycle degree. Using a sample from students of economics at the University of Granada, they show that students with more educated parents are more prone to undertake the long-cycle degree. This is in line with the evidence reported in CIDE (1999). Using nation-wide data, this study reports that 58 per cent of the university students whose father has no educational qualification follow long-cycle degrees, while this proportion climbs to 80 per cent among the students whose parents have a higher education.

Albert (2000) uses the EPA from 1977 to 1994 to estimate a two-stage logit model. In the first stage, the probability of completing secondary education is estimated. The second stage estimates the probability of demanding higher education given the probability of completing secondary education. The variables which explain youngsters' educational demand most convincingly over the sample period are the ones related to personal and family characteristics, particularly those concerning parental education. There are two channels through which father's education affects the demand for higher education. On the one hand, it increases the probability of finishing secondary education successfully. On the

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[4] The ECVT does not contain information on parental education. To overcome this problem, Peraita and Sánchez (1998) construct a variable called educational equipment as a proxy for family educational background. This variable is composed from the father's occupational status, activity development (such as reading, theatre, cinema), and enjoyment of social and unemployment benefits.

other hand, it increases the probability of enrolling into university once the secondary level is completed. These two effects are larger when the mother's educational level is considered. Albert (1998) presents similar evidence. Using the EPA from 1977 to 1997, she finds that those youngsters whose parents have a university degree are more prone to complete higher educational levels. The data is very illustrative. For instance, only 13 per cent of the families with an illiterate household head have one or more members in a university. By contrast, this proportion rises up to 70 per cent if we consider instead household heads with a university degree.

Traditionally, more educated men have married more educated women (Carabaña, 1994). Despite this association, however, some studies have found that the effect of the father's and the mother's education on children's demand for education can be different. Thus in Dávila and González (1998), for example, the father's educational level appears as a major determinant of the demand for higher education, while the mother's education has a significant effect on daughters only. Petrongolo and San Segundo (2002) use data from the EPA and construct a binomial logit model to estimate the probability of continuing in formal education among youngsters aged 16 and 17. The results indicate that this probability is greatly influenced by the parental education level, particularly when the mother's is taken into account.

Related to education, professional and social status are additional determinants of the demand for education. Beneito *et al.* (2002) estimate an equation for household demand for both secondary and university education using the EPF 1991. The results show that the social and economic status of the family has a comparatively greater impact on household expenditure on secondary education than on university education. The opportunity cost associated with the decision to invest in education is also shown to be a decisive variable in the decision to invest in secondary education. The results are less conclusive in the case of university education. Albert (1998, 2000) finds that students from families whose household head belongs to the lowest professional category have a lower probability of accessing to university, while having a working mother, or a father who is a director, department head or an employer, increases this probability. According to Petrongolo and San Segundo (2002), Aldás and Uriel (1999) and Dávila and González (1998), having an unemployed parent has a negative effect on the youngster's educational outcome. The preference for short university careers is also influenced by the father's professional category. As documented in CIDE (1999), 22 per cent of the university students whose father is a director follow short-cycle de-

grees, while this percentage is 42 for those students whose parent is an agricultural worker. Additional evidence shows that students with more educated parents tend to choose technical or health degrees, rather than social science or humanities degrees.

According to the evidence presented so far, it can be concluded that parental background appears as a key source of economic inequality, since (i) low educated parents act as a cultural barrier to the youths' demand for education, and (ii) the student's choice of the type and length of his university education is related to his parental background. On the one hand, (i) results in a source of inter-generational persistence of inequality. On the other hand, (ii) gives rise to differences in the labour market performance of individuals with the same education level, insofar different university careers are associated with different wage and employment prospects.[5]

3.2 Income and scholarships

Several authors have suggested that family income may act as an important barrier to education. This introduces limitations both on equity and efficiency in the provision of human capital, since (i) poor individuals have little chances to obtain educational qualifications, and (ii) individuals with a higher qualification are not necessarily the ones with more innate ability. Grants to education may improve the system along dimensions (i) and (ii), as long as they are perceived by youths coming from poor families. In the following, we review studies that have explored the impact of family income on the demand for education. We also ask to what extent the Spanish system of grants promotes equity and efficiency in the provision of education.

Peraita and Sánchez (1998) show that higher family income is associated with higher levels of youngsters' educational attainment. This connection is stronger for female students. Aldás and Uriel (1999) find that family income explains the demand for secondary education better than the parental level of education, while the opposite occurs with the demand for higher education. Dávila and González (1998) find that the probability of enrolling into a university rises by 9 per cent with each additional 600 Euro of family income. This elasticity is somewhat smaller

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[5] In Section 4 we report the unemployment rates of the four main university branches.

in Ginés-Mora (1996), who estimates that 600 additional Euro of family income increase the probability of accessing university by 6 per cent. This author shows that the percentage of university students increases sharply when moving towards higher income deciles. For instance, the fraction of university students over all individuals aged from 17 to 25 jumps from about 9.5 per cent within the lowest income decile up to 65 per cent within the highest decile. As an additional finding, lower income promotes enrolment into shorter university degrees, which coincides with the findings in Dávila and González (1998) and De Dios and Salas (1999). Albert (1998, 2000) and Petrongolo and San Segundo (2002) do not use family income as an explanatory variable.[6]

Calero (1998), Lassibille and Navarro (1998) and Aldás and Uriel (1999) evaluate to what extent public scholarships promote the equality of opportunities in higher education. Using the EPF, 1980/81 and 1990/91, they conclude that the Spanish system of scholarships helps little in reducing social inequalities. The percentage of students receiving a grant is almost evenly distributed throughout the family income distribution. As a consequence, individuals from middle and high income classes receive practically as many grants as those belonging to the lower deciles. Furthermore, the percentage and the size of the grants devoted to higher education students are larger as compared to other types of grants. Hence, individuals from poor families, who are more likely to have left the education system at earlier stages, benefit to a much lower proportion from public aids to education.[7]

Aldás and Uriel (1999) specify two logit models; one for the probability of receiving a grant, and one for the probability of undertaking secondary or tertiary education. Their goal is twofold. On the one hand, they investigate to what extent family income reduces the probability of receiving a grant. On the other hand, they ask whether or not the probability of demanding secondary or tertiary education is significantly affected by family income. They find that the major determinant of the probability of receiving a grant is family income, both for middle and high educational levels. However, a deeper analysis reveals that there ex-

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6 These studies use the EPA, which does not include family income.

7 Early displacement from the education system is more frequent among youths from poor families. Aldás and Uriel (1999) report that the percentage of individuals aged between 14 and 18 in secondary education is 39 per cent within the lowest income decile, while it jumps to 74 per cent within the highest decile. If we consider instead higher education, the percentage of individuals aged between 18 and 25 in a university is 6 per cent whithin the lowest decile, which starkly contrasts with the 42 per cent of the highest decile.

ist some limitations on equity. Even though the percentage of students that receive a grant is decreasing in the income decile, the progressivity vanishes when one considers the percentage of students receiving a grant over the total number of potential students in the family. Furthermore, there is a large number of frauds in the provision of grants. About 50 per cent of them are received by individuals whose families exceed the maximum income level that is permitted for a grant. The study shows that the demand for higher education is influenced by family income despite public policies. Hence, it concludes that the public system of grants helps less than expected in reducing social disparities.

Ginés-Mora (1996) reports that the proportion of students with a grant is significantly higher among families from the agricultural sector and/or without a primary education. However, he argues that the public scheme is far from being equitable. His estimates show that the coverage of poor families is relatively low. Thus, for example, 54, 74 and 80 per cent of the university students from the lowest three deciles of the income distribution do not benefit from a grant. In addition, frauds are frequent: 40 per cent of the students with a grant belong to families with higher-than-average income. The large number of frauds of the Spanish system of scholarships has also been highlighted by Jiménez *et al.* (1994).

Lassibille and Navarro (1998) estimate that only 21 per cent of the students with a grant belong to families in the first three deciles of the income distribution, with only 4.6 per cent of them being from the first decile. Surprisingly, the percentage of students with a grant among families belonging to the highest decile is as high as 8 per cent.

The vision of Dávila and González (1998) is somewhat more optimistic. They find that receiving a grant has a large positive impact on the probability of enrolling in university. According to their estimates, 14 per cent of university students would not be at the university had they not received financial aid. These findings lead them to conclude that in Spain, the policy of granting scholarships promotes access to higher education among individuals with poor family conditions.

Further evidence suggests that poor families might intend to overcome the limitations of the Spanish public system of scholarships by making more economic efforts when it comes to the educational investments of their children. Lassibille and Navarro (1998) find that the elasticity of higher education expenditure with respect to income is higher among poor families. That is, poorer families devote a larger fraction of their disposable income to investment in the education of their children,

even though they expend less in absolute terms.[8] Michavila and Calvo (1998) and Sánchez (1996) show that the percentage of students with a grant varies substantially across university careers. In particular, they are under-represented in short-cycle and technical degrees. A candidate explanation is that students from low income families are exposed to a higher cost, in terms of family resources, if they fail in completing their studies. Hence, they tend to choose careers with a higher probability of success and shorter duration.

According to the evidence presented here, the Spanish public system of scholarships presents serious limitations on equity and efficiency. First, the number of frauds is large, and a significant fraction of grants goes to families belonging to the upper deciles of the income distribution. Second, family income appears as a determinant of the demand for education despite public policies. Third, grants fail in providing support to poor families at those stages where the lack of resources is a determinant barrier. Fourth, grants cannot alter the parental education background, which is a major determinant of the youngsters' demand for education. On top of this, the scope of the Spanish system of scholarships is somewhat narrow by OECD standards.[9]

3.3 Region

Living in small towns and low-income regions decreases the probability of demanding higher education, according to Aldás and Uriel (1999) and Dávila and González (1998). These effects turn out to be non-significant in Petrongolo and San Segundo (2002) and Ginés-Mora (1996), however.

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[8] From a temporal perspective, the private funding of education and the expenditure per student increased by 22 and 9 per cent, respectively, during the eighties. Other things equal, one would expect that (the lack of) family income became more determinant in the children's access to education during this period. In relative terms, however, the fraction of family educational expenditures relative to total family consumption declined by about 25 per cent. This could be partially due to the improvement of the public system of grants.

[9] Along the following dimensions, the Spanish system is among the bottom four of the European Union: (i) the coverage rate, which measures the percentage of students benefiting from a grant – about 20 per cent in secondary and 14 per cent in university education; (ii) the fraction of public expenditure on grants over total expenditure on higher education – 8 per cent; (iii) the direct financial aid to students as a percentage of the national GDP – 0.06 per cent; (iv) the average public expenditure on financial aid per university student – about 26 Euro. For further evidence, see Ginés-Mora (2001).

These authors find that living in a region with a higher average level of education enhances university enrolment, while the regional average income appears to be irrelevant. In Peraita and Sánchez (1998), living in a rural region affects negatively the demand for education. This effect is larger for women than for men, which can be a consequence of the traditional separation of tasks among men and women in Spanish rural areas. Lassibille and Navarro (1998) detect that families from smaller cities tend to spend less on education per student, which might affect the educational performance of these students.

3.4 Labour market signals

The human capital of Spanish workers has been steadily increasing over the last two decades. According to Albert (2000) and Dávila and González (1998), this trend has been rather insensitive to labour market signals. Their estimates suggest that the regional employment rate does not influence the demand for education. There is, however, also a set of studies that finds that labour market conditions may be important. The evidence is contradictory, though. Aldás and Uriel (1999) conclude that regional unemployment enhances enrolment into further education. Martinez-Granado and Castillo (2003), in contrast, obtain a negative effect of regional unemployment on the probability of studying. Petrongolo and San Segundo (2002) detect a positive impact of local unemployment on enrolment rates for males, while the effect is negative for females. When differentiating between adult and youth unemployment rates, they find that youth unemployment has a positive impact on educational demand, while the adult rate has a negative impact for both males and females. Hence, youth jobless rates seem to be a proxy for the opportunity cost of studying versus working, thus reducing the incentives for an early entry into the labour market. By contrast, adult rates seem to account for unemployment expectations, thus lowering future returns to education. Fernández and Shioji (2000) differentiate between the unemployment rate of non-graduates and graduates, and find that while the former has a positive impact on enrolment decisions, the latter has a negative impact.

From a temporal perspective, Petrongolo and San Segundo (2002) find that enrolment rates have been rather insensitive to the economic cycles experienced by the Spanish economy during the last two decades. Similarly, in Albert (2000) the demand for higher education responds only mildly to the unemployment rates of the previous five or six years.

3.5 Gender differences in access to education

Some of the reviewed studies show that women, relative to men, are more likely to remain in the schooling system at secondary education, and to enrol into universities (Ginés-Mora 1996; Dávila and González, 1998; Albert, 1998, 2000; Petrongolo and San Segundo, 2002). This reflects that, nowadays in Spain, women tend to be more educated and exhibit lower dropout rates at every educational level as compared to men. Additionally, women tend to choose different university careers. They represent 23, 68, 58 and 66 per cent of the university students following, respectively, a technical, health, social sciences and humanities field of study. These differences hold roughly for both short- and long-cycle careers.

These particularities are likely to affect the labour market performance of the Spanish women. In Section 4 we report some facts on female returns to education.

3.6 Access to education of minorities

Traditionally, gypsies have been the most important minority in Spain.[10] In 1993, the Spanish Ministry of Education estimated that the gypsy population was about 400,000 individuals (1 per cent of the total Spanish population), 70 per cent of whom were aged below 25. The adults tend to have low-paid jobs (manual or agricultural workers) and low educational levels. This situation is not likely to revert in the short term, insofar as the educational attainment of the young cohorts is rather poor. The Asociación Secretariado General Gitano estimates that more than 25 per cent of the gypsy children do not attend compulsory school, 20 per cent enrol primary school with at least a one-year delay, 18 per cent are below their corresponding academic year, 21 per cent go to school due to intervention of the social services, 43 per cent are absent from school during more than three months per academic year, and 65 per cent exhibit an academic performance below the average.[11]

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[10] The gipsy minority has been surpassed in number by the catch-all category Inmigrants. In 1995, there were at least half a million inmigrants in Spain. They constitute a very heterogeneous group, so that exploring their access to education would require more than allowed here. For some interesting statistics, see CIDE (1999).

[11] Asociación Secretariado General Gitano, 1994, *Evaluación de la incorporación de los niños y niñas gitanos a la enseñanza básica*, cited in CIDE (1999).

4 Returns to education

Many studies have explored the returns to different forms of human capital in Spain. For a review of the literature on this issue that appeared during the nineties, see Barceinas *et al.* (2000a).

4.1 Some basic results

Most conclusions arising from the previous literature are drawn together in Barceinas *et al.* (2000b), which is probably the most complete work on returns to education in Spain to date. They use three different data sets (EPF, ECPF, EES) and different estimation procedures to describe the returns to education over the sample period 1980 to 1996. Using the basic Mincerian framework as a benchmark (years of education and potential experience and its square as independent variables, and the logarithm of hourly wages as the dependent variable), they estimate the return to education for full-time workers to be about 8 per cent. Despite some variation, this estimation is fairly robust to alternative specifications: (i) among women, the inclusion of a dummy variable for part-time work raises the estimated return by 2 percentage points; (ii) when experience and tenure are accounted for in the wage regression, returns are about 7.5 per cent for men and 8 per cent for women; (iii) introducing additional control variables such as sector and regional dummies has no significant impact on these estimates; (iv) when female sample selection bias problems are corrected for, the return for women drops by about 1 percentage point[12]; (v) when ability bias is corrected for, the estimated returns turn out to be almost identical to those obtained with the standard OLS procedure[13].

With respect to the sector of employment, the returns to education are between 1 and 1.5 percentage points higher in the private sector than in the public sector, with the gap being larger for women. With respect to

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[12] They use a modified version of Heckman's two-step procedure. Two probit models are estimated: one for the probability of entering the labour market, one for the probability of being employed. These probabilities are then introduced into the wage regression.

[13] The ability bias arises if more capable individuals complete more years of schooling. Then, the error term in the Mincerian wage regression is correlated with the regressor measuring education, and the corresponding estimate is inconsistent. The authors control for this bias by using age as an instrumental variable for education.

other forms of human capital, the returns to tenure and experience are higher for women than for men, but notably lower – about 4 percentage points on average – than the returns to education.

Barceinas *et al.* (2000b) present results from two additional experiments. First, they test whether the returns to education are linear in the years of schooling. For that purpose, the years-of-schooling variable in the wage regression is substituted by a set of educational level dummies. The estimates reveal some degree of convexity in the return function, with large differentials between lower and upper secondary education, as well as between lower and upper vocational levels.

As a second experiment, Barceinas *et al.* (2000b) compare the Mincerian approach with the Internal Rate of Return (IRR) approach. Their IRR is based on the private cost (including the opportunity cost) of investing in education and the unemployment risk associated with each educational level. They obtain an IRR that is about 2 percentage points higher than the Mincerian estimate, and show that this gap disappears once employment probabilities are accounted for in the analysis. The intuition is that the opportunity cost of further education falls as the risk of unemployment is taken into account. In addition, the expected wage gap between educated and non-educated workers increases, since the unemployment rate tends to be decreasing in the level of education.[14]

Also Arrazola *et al.* (2001) compare the IRR approach with the Mincerian approach. They find that once the ability bias is controlled for in the Mincerian setting, the estimated returns are almost identical under the two methods. Salas (2002), in turn, uses the IRR approach to estimate the returns to long-cycle university degrees. His estimates, which do not control for the risk of unemployment, are relatively high when compared to the existing literature. According to his results, investing in long-cycle university degrees attracts a 22 per cent premium per year.

Calero (1998), finally, explores the link between returns to education and family educational background. His findings suggest that the academic and professional qualifications of the household head may be of particular importance. The returns to schooling are 3.4 per cent for students whose parents received no education, and 12.8 per cent for students whose parents have attained the highest educational level. This sheds some doubts on the meritocratic principle of wages, as variables other than personal characteristics influence students' labour market performance. However, this evidence can be interpreted in an alternative

[14] See Table 2 below.

way as well. If more able individuals attain higher levels of education, then the children of more educated parents possess more ability. Consequently, they end up obtaining higher marginal returns from their educational investments. In that case, observed wages do not reflect discrimination, but a positive interaction between education and ability.

4.2 Signalling

Barceinas *et al.* (2000b) explore the existence of signalling effects in education. They compare the returns to education across population groups that differ in tenure. The idea is that as time passes, employers increase their knowledge about the real productivity of their employees. Therefore, wages are likely to reflect differences in productivity rather than in education as tenure increases. Their finding is that the return to education is even increasing in tenure, which is at odds with the signalling theory. As a second test, they compare the returns for self-employed against those of wage earners. The hypothesis is that the self-employed need not signal their ability, so that educational pay-offs must capture returns to human capital. The results show that the returns to education are slightly higher for wage earners, which suggests that there might be some signalling in the determination of wages. As a third test, they compare the returns to education in the public and the private sector. The hypothesis is that in the private sector, returns are more likely to represent additional productivity as it is supposedly more competitive than the public sector. The estimates show that the returns are higher in the private sector, which does not support the signalling theory. The authors conclude that the presence of signalling effects cannot be rejected, even though the major part of the observed wage differentials is accounted for by differences in human capital.

These findings are in line with those reported by Lassibille (1994), Corugedo (1998) and Barceinas *et al.* (2001). The study by Corugedo (1998) allows for interactions between human capital and signalling effects in the determination of wages. In particular, he uses a sample of 1,175 workers who have completed a Bachelor's degree in economics and live in the region of Madrid. The hypothesis is that individuals are screened according to the number of years they spent at the university, and then payed according to their experience and some other personal characteristics. The resulting model exhibits more forecasting power than standard Mincerian models. This suggests that there is an interaction between human capital and signalling effects in the determination of wages.

4.3 Employment opportunities

The evidence indicates that education is also related to employment opportunities. Álvarez *et al.* (2001) show that the probability of finding a job and keeping it over time is increasing in education. Lassibille *et al.* (2001) find that the level of education exerts a strong influence on the length of youth unemployment. Cantó (2002) studies the probability of entering or escaping a low income spell. Her results suggest that more educated individuals are less likely to fall into economic deprivation, insofar they exhibit more persistent income profiles.

For illustrative purposes, Table 2 reports unemployment rates and normalised wages for different levels of education. The unemployment rate tends to be decreasing in education.[15] However, Dolado *et al.* (2000) have documented, using the Spanish Labour Survey, that this is not the case for all age cohorts. Thus, for example, those in the 25–29 age group with a lower or upper secondary education are exposed to lower unem-

Table 2. Education, wages and employment

	Normalised wage[(a)]		**Unemployment rate[(b)]**	
	Men	Women	Men	Women
Illiterate	-	-	35	31
No qualification	100	100	22	26
Primary	106	119	16	27
Lower secondary	117	134	22	40
Upper secondary	158	184		
Lower vocational	142	164	8	14
Upper vocational	159	187		
Short university cycle	190	212	10	18
Long university cycle	218	248		

Notes: (a) Hourly wage in 1994. The reference wage (100) corresponds to the 'No qualification' group within each gender; (b) Second semester of 1997.

Source: CIDE (1999) and Barceinas *et al.* (2000b).

[15] The jobless rate is rather high among those with a secondary education, particularly for women. As reported in CIDE (1999), this can be partially explained by the changes in the compositition of the labour force that have taken place over the last years. As the population has become more educated, the proportion of those with a secondary education has increased within the jobless population.

Table 3. University education, employment rate, and women

University career		Unemployment rate[a]	Percentage of women[b]
Technical	Long cycle	7.5	24.8
	Short cycle	13.6	22.2
Health	Long cycle	8.9	63.0
	Short cycle	8.7	76.2
Social sciences	Long cycle	21.0	55.3
	Short cycle	16.7	63.3
Humanities	Long cycle	19.5	65.8
	Short cycle	28.9	77.4

Notes: (a) Second quarter of 1995; (b) Academic year 1993/94.

Source: CIDE (1999) and San Segundo (1997).

ployment rates than those with a higher degree. Traditionally, the unemployment rate of young workers with a university degree has been seemingly high in Spain. So, while the jobless rates for the youngest cohorts with, at most, a secondary education almost doubles the average unemployment rate within the OECD (37.4 against 21.9 per cent for the 21–24 age group, and 32.3 against 16.9 per cent for the 25–29 age group, respectively), the corresponding rates for the higher education levels are about four times as large as the OECD averages (53.1 against 15.3 per cent for the 21–24 age group, and 33.2 against 8.5 per cent for the 25–29 age group, respectively).

Apart from the educational level, the type and duration of the degree might influence employment opportunities as well. Table 3 reports unemployment rates for different university branches. The differences across them are large, with technical and health studies exhibiting a much lower jobless rate than social sciences and humanities degrees. Additionally, short- and long-cycle degrees within university branches display different jobless rates. These facts reveal that the educational choice within a particular level of education is an additional source of economic inequality.

4.4 Change over time

The evidence suggests that during the second half of the eighties and the first half of the nineties wage inequality increased in Spain. This phenomenon is partially accounted for by the evolution of wage differentials

between educational groups. Barceinas *et al.* (2000b) report that the average return to education in Spain exhibited a steady increase from 5.9 per cent in 1980 to 7.6 per cent in 1985, then a decreasing trend down to 6.7 per cent in 1993, and then again a sharp increase to 8.1 per cent by 1996. Cantó *et al.* (1998, 2000) show that the Spanish wage premium for highly educated workers has increased in Spain over the last two decades. As documented in Albert (2000), Ginés-Mora and Vila (1998) and San Segundo (1998), the increasing trend in the returns to education has, somewhat surprisingly, been accompanied by a steady increase in the supply of highly educated workers. A candidate explanation is skill-biased technical change. Technological upgrading increased the demand of high-skilled workers relative to low-skilled workers across most sectors in the economy, which resulted in lower wages and higher unemployment for low-educated workers. This trend has been parallel to an increasing proportion of workers who declare that they are over-educated for their actual jobs. The phenomenon of over-education has had consequences for the labour market prospects of both high- and low-educated workers. In the next sub-section, we analyse this issue more deeply.

Oliver *et al.* (2001) analyse income inequality rather than wage inequality. Using the ECPF, they find that from 1985 to 1996, the Spanish income distribution became more compressed, and that this finding is robust to alternative definitions of income. Education appears as one of the socio-economic variables that are responsible for this trend, insofar as income inequality fell over the sample period both between and within educational groups. This outcome seems to contradict the facts on wage inequality. However, as indicated in Cantó *et al.* (2000), the reduction in income inequality over this time period was basically due to the growing re-distributive role of transfers.

4.5 Over-education

Over the last years, the transition from school to work in Spain has involved young workers accepting jobs for which the required level of education is lower than the level they have attained. Alba (2002) uses the ECHP to document this trend towards over-education. In the ECHP, individuals are asked to report whether or not (i) they have skills to do a more demanding job than the one they have, and (ii) their formal education or training provided them with the skills needed to perform their current job. The response to the first question allows the author to split

the sample into over-educated and non-over-educated workers. He finds that over-educated workers tend to have higher educational degrees. Additionally, in an earlier study Alba (1993) notes that over-educated workers have less experience and on-the-job training.

Using the two ECHP categories of job match, the author runs a wage regression to explore whether being over-educated exerts a negative impact on wages. He finds that among those workers whose formal education or training provided them with the skills needed to perform their current job, there are no substantial differences between over-educated and non-over-educated workers. However, over-educated workers whose previous training did not provide them with the skills needed to perform their current job earn significantly less than non-over-educated workers whose previous training provided them with those skills. Rather than absolute levels, Alba (1993) investigates the returns to surplus education. He finds that these returns are about 50 per cent lower than the returns to education when an appropriate job has been obtained.

Garcia-Serrano and Malo (2003) use the ECBC to explore the relationship between educational mis-match and within-firm mobility. Individuals are required to report their (subjective) probability of being promoted in the firm. They also report whether they are overqualified, adequately qualified, or underqualified for their actual jobs. This allows the authors to split the sample into three different categories of job match. As a second measure of fit, the authors use the difference between the individuals' highest educational level and the minimum educational level required for the job.

The main finding is that over-educated workers tend to report a lower probability of being promoted. This can be due to the fact that employers do not see workers' over-education as a good signal for promotions, or that employers observe other non-related characteristics. Garcia-Serrano and Malo (1996) neither detect a positive influence of over-education on external mobility. Therefore, over-education might be a more permanent phenomenon at the individual level than previously thought.

Dolado *et al.* (2000) analyse the occupational structure of the jobs that youth workers take after education. They consider five different occupational groups, ranging from highly skilled jobs (professionals and technicals) to jobs that hardly require any education (unskilled services and labourers). They show that, over the period 1977 to 1998, less educated workers were crowded out from their traditional jobs towards jobs that require no educational qualifications. At the same time, a large proportion of high-educated workers has entered jobs that require less school-

ing than they have obtained. This evidence confirms the arguments in Carabaña (1987), who showed that workers with a secondary or lower education were displaced to lower quality jobs during the seventies and the first half of the eighties. This tendency towards over-education thus appears to offer an explanation to the high unemployment of less educated young workers in Spain.

As a subjective measure of over-education, Dolado *et al.* (2000) report the proportion of under 30 year-old workers that declare to be overqualified in their current jobs. According to this subjective perception, there is no relationship between education and overqualification, nor between overqualification and the occupational category. This is somewhat surprising as one would expect the more educated workers within a given occupational category to declare to be overqualified more frequently than the less educated workers. This turns out to be the case only for the lowest occupational category (unskilled services and labourers).

4.6 Gender differences in returns to education

Several studies have investigated wage discrimination between male and female workers (see De la Rica and Ugidos (1995), Hernández (1995, 1996), Rodríguez *et al.* (1995), Cantó *et al.* (1998), Ugidos (1997), Arrazola and Hevia (2001), García *et al.* (2001), Palacio and Simón (2002), Dolado *et al.* (2002), De la Rica and Felgueroso (2002), De la Rica (2003) and Gardeazábal and Ugidos (2004), among others). According to the reported estimates, the gender wage gap ranges from 20 to 30 per cent, depending on the data set and the procedure used. The typical approach consists of decomposing this gap into (i) one part attributable to (observable) differences in worker characteristics and (ii) another part attributable to differences in the returns associated with these characteristics. Although there is no consensus on whether (i) or (ii) accounts for a larger fraction of the wage differential, the evidence shows that the rewards to both observable and unobservable skills are higher for males than for females.[16] These studies show that there exists wage discrimina-

[16] Additional findings reveal that the gender wage gap is increasing in the pay scale. At the same time, the explanatory power of (ii) is increasing as we move towards the upper tail of the wage distribution. Additionally, labour structures with a higher participation of women or a larger proportion of part-time jobs are associated with lower wages.

tion within all educational levels. Some of them suggest that discrimination may affect more directly women with a higher education or with a high professional status.

As Table 2 shows, the gap between the male and the female unemployment rate is substantial for all educational levels. In 1997, the jobless rate for women with a secondary education was 40 per cent, and almost 18 per cent among women with a university degree. For their male counterparts, the corresponding rates were 22 and 10 per cent, respectively. Two observations are worth noting. First, the gap between these two educational levels is much wider for women than for men, which suggests that the employment opportunities improve relatively more for women than for men when they decide to enrol into a university. Álvarez *et al.* (2001) estimate that not only employment opportunities, but also expected earnings increase relatively more for women than for men when they complete university studies. Second, and somewhat surprising to us, the gap between the employment rate of men and women is higher among the population with secondary and university education than among the population with primary education or less. This suggests that, although enrolling into a university improves substantially the employment opportunities of women, high-educated women face much more difficulties in finding a job as compared to men. As a consequence, women are exposed to longer unemployment spells, as shown in CIDE (1999).

Indeed, the sharp skill upgrading of the young female cohorts has been accompanied by an increasing trend in the female unemployment rate. From 1980 to 1994, the female jobless rate rose from 12 per cent up to 30 per cent. This might seem contradictory at first sight. However, it should not be so if we take into account that, over the sample period, female participation in the labour market has increased steadily. From 1983 to 1995, the female participation rate increased from 35 to 47 per cent, and among women aged 25 to 54, it rose from 44 per cent in 1990 to 58 per cent in 1997.[17] Furthermore, the male unemployment rate has also risen, from 11 per cent in 1980 to 20 per cent in 1994. The increase has been somewhat smaller than in the female case, though. This can be partly due to the fact that the participation rate among males has, unlike

[17] Higher educational levels are associated with higher participation rates. The female participation rate is 26 per cent among women with primary education, 45 per cent among women with a secondary education, and as high as 75 per cent among those with a university degree.

that of females, declined over the past years, moving from 69 per cent in 1987 to 64 in 1997.[18]

The upgrading in the human capital of women has not resulted in a reduction of the gender wage gap. Dolado *et al.* (2002) document that such a reduction has taken place only among workers with a tertiary education, while it has remained more or less constant for other educational levels. They also find that, in line with the USA and most European economies, female occupational segregation across age cohorts decreased substantially among workers with a tertiary education. De la Rica and Felgueroso (2002) show that female occupational segregation decreased over the last decade, and that the employment gap between males and females also decreased. They find that these two changes were particularly sharp among women with a high education.

Finally, as mentioned in Section 3, women tend to choose different university careers. In particular, they are more prone to avoid technical studies and to enrol into humanities or health studies. This might have additional effects on their labour market results, as technical careers are associated with higher wages and employment rates.

5 Conclusions

This survey intends to provide further insight on the connection between education and inequality. From the available evidence, two main conclusions can be established. First, we find that more educated workers benefit from better wages and employment opportunities, relative to less educated workers. Moreover, the most recent evidence shows that both the return to education and the wage premium for high-educated workers have increased over the last decade. Second, there are important differences in the access to education. Individuals with a poor family background and living in small towns and rural areas tend to participate less in education. Somewhat disturbing, the Spanish public system of scholarships helps only moderately to reduce barriers to education, insofar as the number of frauds is large and the degree of coverage among poor families is relatively low. These two conclusions suggest that as long as unequal access to education results in inequalities in labour market outcomes, parental education, social class, and family income appear

[18] The evidence reported here is drawn from CIDE (1999), and Petrongolo and San Segundo (2002).

as major explanatory components of the inter-generational transmission of inequality in Spain.

Despite the available evidence, we identify some knowledge gaps in the Spanish literature. We still know relatively little about the link between education and wage inequality for different cohorts, the social returns to education, the link between cognitive skills (instead of formal schooling) and wages, the impact of school quality upon wages, and whether or not public policies have helped to reduce barriers to education over the last years. Scope for further research includes investigation of these topics. Moreover, evaluation of new policy instruments aimed to improve the equity and efficiency of the funding and scholarship system seems to be in order as well.

Literature

Alba, A. (1993), Mismatch in the Spanish Labour Market. Overeducation?, *Journal of Human Resources* 28, 259–278.

Alba, A. (2002), Types of Job Match, Overeducation, and Labour Mobility in Spain, in Büchel, F., A. de Grip and A. Meitens (eds), *Overeducation in Europe: Current Issues in Theory and Policy*. Edward Elgar Publishing, Cheltenham, UK.

Albert, C. (1998), *La evolución de la demanda de enseñanza superior en España* (*The evolution of the demand for higher education in Spain*). Hacienda Pública Española, Monográfico de Economía de la Educación.

Albert, C. (2000), Higher education demand in Spain: the influence of labor market signals and family background, *Economics of Education Review* 14(2), 155–166.

Aldás, J. and U. Uriel (1999), *Equidad y eficacia del sistema español de becas y ayudas al studio* (*Equity and efficacy of the Spanish system of scholarships and aids to schooling*). IVIE Working Paper EC 99-11.

Álvarez, G., J.M. Da Rocha and F.X. Lores (2001), *El valor de la educación: estimación de perfiles de ingreso de ciclo vital* (*The value of education: estimation of life-cycle earnings profiles*). Mimeo.

Arrazola, M. and J. Hevia (2001), *Rendimiento de la educación en España: nueva evidencia de las diferencias entre hombres y mujeres* (*Returns to education in Spain: new evidence on the differences between men and women*). Instituto de Estudios Fiscales Working Paper 24/01.

Arrazola, M., J. Hevia, M. Risueño and J.F. Sanz (2001), *Estimación y comparación de tasas de rendimiento de la educación en España* (*Estimation and comparison of rates of return to education in Spain*). Instituto de Estudios Fiscales Working Paper 2/01.

Barceinas, F., J. Oliver, J.L. Raymond and J.L. Roig (2000a), Returns to human capital in Spain: a survey of the evidence, in Asplund, R. and P.T. Pereira (eds), *Returns to Human Capital in Europe*. The Research Institute of the Finnish Economy ETLA, Series B156, Helsinki.

Barceinas, F., J. Oliver, J.L. Raymond and J.L. Roig (2000b), *Private rates of return to human capital in Spain: new evidence*. Fundación de las cajas de ahorro confederadas para la investigación económica y social, Working Paper 162/2000.

Barceinas, F., J. Oliver, J.L. Raymond and J.L. Roig (2001), Hipótesis de señalización frente a capital humano. Evidencia para el caso español

(Hypothesis of signalling against human capital. Evidence for the Spanish case), *Revista de Economía Aplicada* 9(26).

Beneito, P., P. Ferri, M.L. Molto and E. Uriel (2001), Determinants of the Demand for Education in Spain, *Applied Economics* 33, 1541–1551.

Calero, J. (1998), *El gasto público en educación superior y la equidad* (*Public expenditure in higher education and equity*). Hacienda Pública Española, Monográfico de Economía de la Educación.

Cantó, O. (2002), Climbing out of poverty, falling back in: low incomes' stability in Spain, *Applied Economics* 34, 1903–1916.

Cantó, O., A.R. Cardoso, C. Farinha, M. Izquierdo and J.F. Jimeno (2000), *Integration and Inequality: Lesson from the Accessions of Portugal and Spain to the EU*. FEDEA Working Paper 2000-10.

Cantó, O., A.R. Cardoso and J.F. Jimeno (1998), *Earnings Inequality in Portugal and Spain: Constrasts and Similarities*. FEDEA Working Paper 1998-08.

Carabaña, J. (1987), Desplazan en el mercado de trabajo español los que tienen más estudios a los que tienen menos? (Do people with more education displace people with less education in the Spanish labour market?), *Revista de Educación* 283, 101–130.

Carabaña, J. (1994), La constante homogamia educativa (The constant education monogamy), *Economía y Sociedad, Revista de Estudios Regionales de la Comunidad de Madrid* 11, 43–66.

CIDE (1999), *Las desigualdades de la educación en España II* (*The inequalities of education in Spain*). Ministerio de Educación y Cultura, Madrid.

Corugedo, I. (1998), *Las hipótesis del capital humano y del credencialismo: una comprobación empírica para España* (*The hypothesis of human capital and credentialism: an empirical investigation for Spain*). Hacienda Pública Española, Monográfico de Economía de la Educación.

Dávila, D. and B. González (1998), Economic and cultural impediments to university education in Spain, *Economics of Education Review* 17(1), 93–103.

De Dios, J. and M. Salas (1999), *Análisis económico de la elección de carrera universitaria. Un modelo logit binomial de demanda privada de educación* (*Economic analysis of the choice of a higher education degree. A binomial logit model of private demand for education*). IVIE Working Paper EC 99-03.

De la Rica, S. (2003), *Decomposing the Gender Wage Gap: The Effects of Firm, Occupation and Job Stratification*. Mimeo.

De la Rica, S. and F. Felgueroso (2002), *Intrafirm gender wage differences: A worker's matching approach*. Mimeo.

De la Rica, S. and A. Ugidos (1995), Son las diferencias en capital humano determinantes de las diferencias salariales observadas entre hombres y mujeres? (Are there differences in human capital determinants of the observed earnings differences between men and women?), *Investigaciones Económicas* XIX(3), 395–414.

Dolado, J.J., F. Felgueroso and J.F. Jimeno (2000), *Explaining Youth Labor Market Problems in Spain: Crowding-out, Institutions, or Technology Shifts?*. IZA Discussion Paper 142.

Dolado, J.J., F. Felgueroso and J.F. Jimeno (2002), *Recent Trends in Occupational Segregation by Gender: A Look Across the Atlantic*. IZA Discussion Paper 524.

Fernández, R.M. and E. Shioji (2000), *Human Capital Investment in the Presence of Unemployment: Application to University Enrolment in Spain*. Oxford University Working Paper.

García, J., J. Hernández and A. López-Nicolás (2001), How wide is the gap? An investigation of gender wage differences using quantile regression, *Empirical Economics* 26(1), 149–168.

García-Serrano, C. and M.A. Malo (1996), Desajuste Educativo y Movilidad Laboral en España (Education Mismatch and Job Mobility in Spain), *Revista de Economía Aplicada* 4, 105–131.

García-Serrano, C. and M.A. Malo (2003), *Educational Mismatch and Expected Promotions*. Mimeo.

Gardeazábal, J. and A. Ugidos (2004), Measuring the gender gap at different quantiles of the wage distribution, *Journal of Population Economics* 44, 224–236.

Ginés-Mora, J. (1996), Equidad en el acceso a la educación superior, para quiénes son las becas? (Equity in the access to higher education: who are the scholarships for?), *Revista de Educación* 309, 239–259.

Ginés-Mora, J. (1997a), Equity in Financing and Access to Higher Education, *Higher Education in Europe* XXII(2), 145–154.

Ginés-Mora, J. (1997b), Equity in Spanish Higher Education, *Higher Education* 33, 233–249.

Ginés-Mora, J. (2001), Los sistemas de ayudas a los estudiantes universitarios: la situación española en el contexto europeo (Aid systems to university students: the Spanish situation in the European context), in Ginés-Mora, J., F. Solá and J.M Vilalta (eds), *Cambios y ayudas a los estudios universitarios en Europa*. Barcelona, UPC y Generalitat de Catalunya.

Ginés-Mora, J. and L. Vila (1998), Changes in returns to education in Spain during the 80's, *Economics of Education Review* 17(2), 173–178.

Hernández, P.J. (1995), Análisis Empírico de la discriminación salarial de la mujer en España (Empirical analysis of wage discrimination against women in Spain), *Investigaciones Económicas* 19(2).

Hernández, P.J. (1996), Segregación ocupacional de la mujer y discriminación salarial (Occupational segregation of women and wage discrimination), *Revista de Economía Aplicada* 4(11).

Jiménez, J., D. Moreno and J. Sánchez (1994), *Quiénes se Benefician de las Becas para Cursar Estudios Universitarios en España?* (*Who Benefits from the Scholarships to Undertake University Education in Spain?*). Planificación, Evaluación y Financiación de Sistemas Educativos, Oroval Ed., Civitas, Madrid.

Lassibille, G. (1994), *La distribución de rentas de los asalariados y de los trabajadores por cuenta propia: un test de las teorías del filtro y del capital humano* (*The distribution of income among wage earners and self-employed: a test of filter and human capital theories*). Hacienda Pública Española, Monográfico de Economía de la Educación.

Lassibille, G. and G.L. Navarro (1998), *Los gastos privados de la enseñanza superior en España* (*Private expenditure of higher education in Spain*). Hacienda Pública Española, Monográfico de Economía de la Educación.

Lassibille, G., G.L. Navarro, R.I. Aguilar and C. de La O Sanchez (2001), Youth transition from school to work in Spain, *Economics of Education Review* 20(2), 139–149.

Martínez-Granado, M. and J. Ruiz-Castillo (2002), The Decisions of Spanish Youth: A Cross-section Study, *Journal of Population Economics* 15, 305–330.

Michavila, F. and B. Calvo (1998), *La universidad española hoy. Propuestas para una política universitaria* (*The Spanish university today. Proposals for a university policy*). Sintesis Ed., Madrid.

Modrego, A. (1987), Demanda de Educación: resultados de la estimación de un modelo de demanda de educación superior para la provincia de Vizcaya (Demand for education: results from the estimation of a model of demand for higher education for the province of Vizcaya), *Economiaz* 14(1), 87–96.

Oliver, J., X. Ramos and J.L Raymond (2001), *Recent trends in Spanish Income Distribution: A robust picture of falling income inequality*. Fundación de las cajas de ahorro para la investigación económica y social, Working paper 166/2001.

Palacio, J.I. and H.J Simón (2002), *Segregación laboral y diferencias salariales por sexo en España* (*Labour segregation and earnings differences by gender in Spain*). FEDEA Working Paper EEE 151.

Peraita, C. and M. Sánchez (1998), The effect of family background on children's level of schooling attainment in Spain, *Applied Economics* 30, 1327–1334.

Petrongolo, B. and M.J San Segundo (2002), Staying-on at school at 16: the impact of labor market conditions in Spain, *Economics of Education Review* 21(4), 353–365.

Rodríguez, J.M., J. Vera and G. Moreno (1995), La discriminación salarial de la mujer en el mercado de trabajo español (Wage discrimination against women in the Spanish labour market), in Dolado, J.J. and J.F. Jimeno (eds), *Estudios sobre el funcionamiento del mercado de trabajo español.* FEDEA.

Salas, M. (2002), Estimación de la rentabilidad de la inversión en educación universitaria de ciclo largo (Estimation of the returns to investment in long-cycle university degrees), *Estadística Española* 44(149), 89–112.

San Segundo, M. (1997), Decentralization and Diversification in Spain, *Higher Education Management* 9(3).

San Segundo, M. (1998), *Universidad y Economía. Son rentables los Estudios Superiores en España?* (*University and Education: Are Higher Education Studies in Spain Worthwhile?*). Política y Reforma Universitaria, J. M. de Luxán Ed., Barcelona, 1998.

Sánchez, J. (1996), *Los efectos distributivos del gasto público destinado a enseñanza superior en la Universidad de Granada y en España* (*Distributional effects of public expenditure aimed to higher education in the University of Granada and in Spain*). Biblioteca CEE, 8, University of Granada Ed.

Ugidos, A. (1997), Gender Wage Discrimination in the Spanish Labor Market, *Revista Española de Economía* 14(1), 3–21.