

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 mandator-

¹ The authors wish to thank the European Commission funded EDWIN project (HPSE-CT-2002-00108) for financial support.

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.

ship 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

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.

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

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; Raffé 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 results⁷

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.

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.

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