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Does vocational training matter for young adults in the labour market?

The impact of vocational training on employment and income is investigated for young adults. Young adults without further education and training are compared to young adults with two-years and young adults with three-years of vocational training. The sample consists of 41 000 Swedish young adults born in 1974. The employment of these young adults was monitored from the age of 16 to 24. Their employment at age 24 was analysed by logistic regression and their income with linear regression controlling for gender, ethnic background, school achievement at age 16 and local unemployment. The results show that young adults with vocational training were employed significantly more often and they had significantly higher income than those without further education and training. The effect of a third year of vocational training was small and it was valid for only those with high or ordinary school achievement.

Background

Following the implementation of a compulsory nine-year comprehensive school in Sweden during the 1950s and 1960s, upper secondary education was reformed in the early 1970s. Two-year continuation schools and vocational schools were merged with the traditional gymnasium to form the new comprehensive upper secondary school. Vocational training programmes were re-organised as two-year upper secondary courses which also included some general education. Upper secondary school gradually encompassed ever larger groups of young people. In the 1980s, the educational goal of creating "one upper secondary school for all" was adopted, which aimed at ensuring that all young people moved on to upper secondary school. This continues to be an objective of Swedish educational policy. Almost all educational policy documents regard a completed upper secondary education as an essential requirement for a person to be able to compete in the labour market, and the most recent official report on the current state of upper secondary education in Sweden (Åtta vägar till kunskap, 2002) is no exception. In this respect, Sweden has followed a general trend prevalent throughout the European Union where enrolment in post-compulsory education has become increasingly common (Murray and Steedman, 2001). During the 1990s a new reform of upper secondary education was carried out. In this context, the two-year vocational courses were extended and developed into three-year programmes. Moreover, the standards of the academic subjects were raised. Also in other countries of the European Union, vocational training programmes have been reformed so as to become less oriented towards specific occupations (Lasonen, 1996).

The political objective of creating one upper secondary school for all has by no means escaped criticism. Which particular feature is it that makes this educational pathway so indispensable? Is it the actual vocational knowledge acquired or rather the knowledge acquired in the general subjects that is essential? These, according to Hill (1998), are questions that are rarely asked when young people's education and training is discussed.

According to Pettersson (1997), there ought to be an alternative pathway to competence for young people in Sweden alongside upper secondary school. Spending years on end in school can be a situation perceived as hopeless by those who find it difficult to adjust to the school's demands. Therefore, a labour market for young people should be re-established to provide an alternative to upper secondary school (Pettersson, 1997).

The political objectives of delivering an ever longer education to more and more young people have also been challenged by researchers focused on "overeducation". According to Wolf (2001), politicians tend to be overoptimistic as to the economic returns for society ensuing from a higher educational level of the workforce. There are still, and still will be for the foreseeable future, a large number of occupations which hardly require any qualifications other than compulsory schooling. Although the proportion of jobs with low qualification requirements has indeed declined in countries such as Sweden, the UK, the Netherlands and the United States, this change has been less dramatic than what many people seem to assume (Wolf, 2001; Åberg, 2002). At the end of the 1990's, around 30 per cent of jobs in Sweden, the UK and the Netherlands and 40 per cent of jobs in the United States did not require any particular qualifications. The

change in the proportion of low-qualified jobs was strikingly similar in these countries, despite differences in tax burden and the degree of international dependence (Åberg, 2002). Åberg (2002) also found that overeducation had become more widespread in Sweden, particularly during the 1990s. Among those holding positions with low educational requirements, the percentage of persons who had completed upper secondary education had increased from 10 per cent in 1975 to 30 per cent by the year 2000. The deterioration of the labour-market situation for low-qualified people in Sweden, not least among young adults (Edin et al., 2000; Schröder, 2000; Ekström and Murray, 2002) during the 1990's can be explained by the fact that they have been supplanted by people with upper secondary qualifications, rather than there being a shortage of jobs with no special qualification requirements (Åberg, 2002). Green et al. (2002) found that one out of five people in the British labour force were undereducated in the 1990s, while around one third were overeducated. In contrast to Sweden, this proportion rose only marginally from the mid-1980s until the late 1990s, despite an increase in the supply of highly educated labour, according to Green et al. (2002). The labour market had thus, to a large extent, absorbed the increasingly better educated workforce.

Why conduct a new study of young people with no upper secondary education?

The latest reform of upper secondary school has raised the educational level of the majority of young people; at the same time, however, the number of young people without upper secondary qualifications has increased somewhat. At least the attainment of an upper secondary education has been delayed by one more year for many young people (Elevpanel, 2003, p. 7). Before the reform of upper secondary education was passed, large scale pilot schemes involving three-year vocational courses were carried out (Utvärdering av försöksverksamhet, 1989). Individual municipalities applied for participation in the pilot scheme, usually on the initiative of a single upper secondary school. Thus, it was not the individual pupil who chose whether or not to take part in the trial; rather, the schools participating in the pilot scheme offered only three-year courses for certain vocational training programmes. Nevertheless, the students did have some options. They could opt for a different programme, or, in some cases, enrol on the corresponding two-year course in a different municipality. Considering how selective the choice of upper secondary education programme normally tends to be, the trial can be regarded as a natural experiment. The students who completed a three-year vocational programme differed very little from those who took the corresponding two-year course (they had quite similar grades from compulsory school and the proportion of immigrants was similar as well). During the first year of the trial, i.e. in 1988, almost 6 000 students took part in the three-year vocational programmes; in the second year, this number had risen to 10 000, and in the third year, to 11 000. This means that, for a number of years, both young adults with a two-year vocational upper secondary education and young adults with a three-year vocational upper secondary education entered the labour market at the same time. However, the number of young adults with vocational training did not increase during these years. The proportion of 20 year olds with vocational training was constant from 1992 to 1997 (Elevpanel, 2003 p. 9) and the number of 20 year olds decreased during this period (Statistical Yearbook of Sweden ´98 p.38).

We shall take advantage of the pilot scheme in the following study. The young adults whom we intend to study here were born in 1974 and left compulsory school in 1990 at age 16, just as 98 per cent of this cohort did. Table 1 shows which level of education this age cohort attained during the period from 1994 to 1998, i. e. from age 20 to 24.

Table 1 shows that those who had no upper secondary education in 1994 to a large extent continued to lack such qualifications four years later as well. Their proportion only declined from 13 to 12 per cent. Thus, young people who did not complete upper secondary education more or less directly after finishing compulsory education acquired upper secondary qualifications only to a very limited extent while they were young (i.e. before the age of 25). Young people who had completed a two-year upper secondary education did not participate in further education to a great extent either. The proportion of those who had completed a two-year upper secondary education, most of whom had completed a vocational programme, declined from 27 to 24 per cent. In contrast, young people who had completed a three-

Level of education attained, 1994 to 1998, for young people born in 1974. Per cent. **Table 1**

Level of education attained	1994 age 20	1995 age 21	1996 age 22	1997 age 23	1998 age 24
Compulsory school or lower	13	13	12	12	12
Upper secondary education, up to 2 yrs.	27	26	25	24	24
Upper secondary education, 3 yrs.	52	47	41	37	34
Post-secondary education	8	15	22	26	30
Total	100	100	100	100	100

Source: Statistics Sweden, Swedish Register of Education, own calculations. (Unfortunately, the database from which the data are derived contains no information as to whether the upper secondary education was vocational or academic.)

year upper secondary education, most of whom had pursued an academic programme, to a large extent moved on to post-secondary education. The proportion of those who had completed a three-year upper secondary education decreased from 52 per cent in 1994 to 34 per cent in 1998.

Aim

The aim of the following study is to examine how well young adults with and without vocationally oriented upper secondary education have managed to establish themselves in the labour market after leaving school. Does vocational training matter? Both young adults with a two-year or three-year vocational upper secondary education and young adults with no upper secondary education will be examined.

The research questions are:
To what degree have the young adults succeeded in finding a job in the regular labour market during the investigated period?

What effect has a two- and a three-year vocational upper secondary education on employment and income at age 24, controlling for background factors?

Method

To examine the transition from school to work, it is important to monitor them over a number of years. The following study will monitor young adults from the same age cohort born in 1974 who left compulsory school in 1990 at age 16 up to age 24 (1990-1998). Data is collected from various registers of the total population kept by Statistics Sweden (the Pupil register, the Register of Higher Education, the Swedish Register of Education, and Labour statistics based on administrative sources). Most young people have completed their upper secondary education at age 20 (table 1). That is why we have chosen 1994 as our point of time for measuring the educational attainment of the investigated young adults. The following investigation groups have been selected: ([1])

- young adults who, in 1994, i.e. four years after leaving compulsory school, were still lacking an upper secondary education (no upp. sec. ed.);
- young adults who had moved on to a two-year vocational course in upper secondary school in 1990 and had completed this type of education by 1994 at the latest (2 yrs. voc. ed.);
- young adults who had moved on to two-year vocational courses in upper secondary school in 1990 and had added a supplementary year to their education so that they had completed a two-year vocational upper secondary education plus one supplementary year by 1994 (2+1 yrs. voc. ed.). The character of the supplementary year is not documented. It is probably varying between municipalities and schools;
- young adults who had moved on to three-year vocational courses in upper secondary school in 1990 and had completed this type of education by 1994 at the latest (3 yrs. voc. ed.) This group have a more academic education than the group who have a two-year education and probably also than the group who have added a supplementary year to their two-year education.

The situation of young people and young adults in the labour market can be measured in various ways. Employment rates constitute a better measure of how well young in-

([1]) The corresponding categorical variable we call 'educational attainment'

dividuals do in the labour market than unemployment rates, since many young men and women alternate between periods of unemployment, study and participation in job-creation schemes (Åberg, 2002). We have looked at employment rates from November 1990 to 1998 as it was the measurement available.

We have investigated young adults' employment in the various investigation groups, descriptively for the entire period from 1990 to 1998, broken down by gender and also by means of logistic regression (Christensen, 1990). We model the likelihood of being employed in November 1998. In addition log annual income in 1998 is modelled by linear regression.

Since educational attainment is correlated with young people's background and ability, it is important to control for these factors when trying to assess the value of a vocational upper secondary education in the labour market. Final grades from compulsory education (at age 16) have been found to be highly related to social background and ability and the best variable to predict educational attainment (Härnqvist, 1993 p. 67). The final grades used here as a control variable are the average overall grades obtained at the end of compulsory education in 1990. The grades have been divided into three categories: low (1.0 to 2.3), ordinary (2.4 to 3.1) and high (3.2 to 4.8). ([2]) Young people who lack grades in one or several subjects at the end of compulsory schooling have been classified as belonging to the low-grade category. ([3]) Each category contain a considerable proportion from each investigation group.

Previous research has also revealed a relationship between young adults' ethnic background and how well they did in the labour market of the 1990's (Arai et al., 2000; Vilhelmsson, 2000; Edin et al., 2000), which is why this factor needs to be controlled for. 'Ethnic origin' (or 'ethnic background') is here a dichotomous variable: born in Sweden or born abroad.

The control variable 'municipal unemployment rate' is the percentage of the labour force who were out of work (i.e. the relative rate of unemployment) in the home municipality of the young adult in 1998. For a number of additional details on the regression analyses, see the relevant footnote ([4]).

Those young adults who were in higher education have been excluded from the presented results, since they did not form part of the active labour force. They account for 5 to 8 per cent of the investigation groups. Furthermore, all individuals who have missing values on any one of the variables used in any of the logistic regression analyses (employment analyses) have been excluded from all logistic regressions. An analogous principle applies to the linear income regression analyses (income analyses).

The income analyses further comprise only those respondents who are considered to have been gainfully employed during 1998 to a more than insignificant extent. We have tried to achieve that the incomes used for the income analyses would not be too contingent on the degree of occupation by excluding those who were not gainfully employed at all in the course of 1998 or were so only to an insignificant degree. Since we do not have any direct information on the degree of occupation, we have chosen to base our criterion on annual income instead. By setting the limit at SEK 37 400, we exclude 24 per cent of those who otherwise meet the requirements for being included in the income analyses. This proportion, 24 per cent, has been chosen because it equals the proportion of individuals who were not employed in November 1998, i.e. the proportion of those who do not meet the criterion of employment used in the employment analyses. In 89 per cent of cases, those who had an annual income of less than SEK 37 400 in 1998 and those who were not employed in November 1998 are the same persons. We thus have relatively well-corresponding limits in our income and employment analyses.

Description of the data material

The size of the investigation groups in 1994 and 1998 is shown in table 2. The groups remained fairly constant from 1994 to 1998. An inspection of the first four columns reveals that the loss of data due to missing values was negligible in 1994 and 1998.

The number of observations used in the regression analyses is shown in the two columns to the right. The smaller number of observations in these columns is due to exclusion of university students and persons with low income, as explained above.

([2]) Swedish school grades were in 1990 awarded on a scale from 1 to 5, with 5 being the highest possible grade.

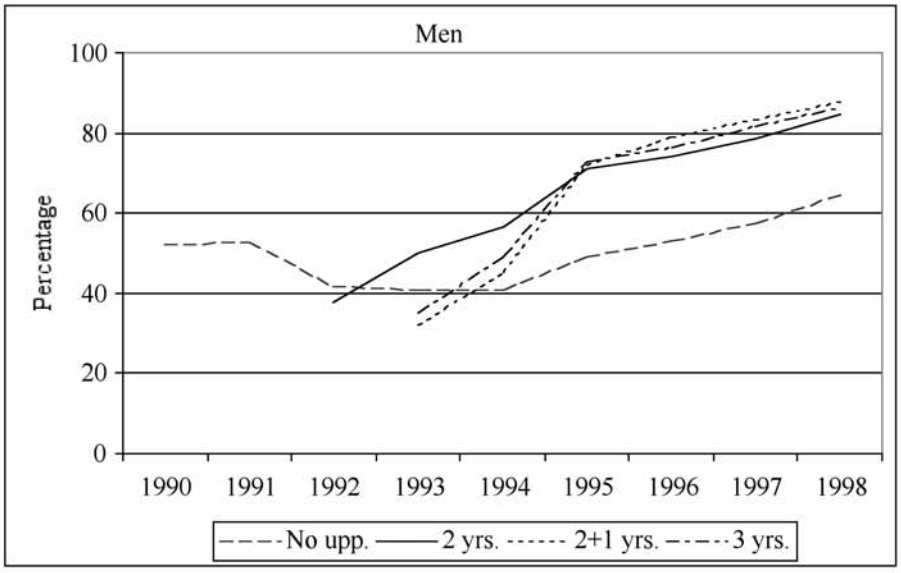
([3]) In the Swedish school system at this time, pupils were on some conditions, mainly too low attendance, not given any grade at all in the course or subject in question.

([4]) **Details on the regression analyses:** We have elaborated regression models in a hierarchical order, including 1, 2, 3, 4, and 5 explanatory variables respectively. We entered gender as the first explanatory variable and then, step by step, added ethnic origin, grades in the 9th year of compulsory school, the municipality's unemployment rate and, finally, upper secondary education. The order of the variables is based on assumptions as to which of these are more primary causes (these are entered first) of a person's employment status. Furthermore, as upper secondary education is added last, we can examine its effect controlled for the other variables. We have also taken interaction effects into account. For example, an interaction between upper secondary education and grades in a logistic regression model means that upper secondary education has a different effect on the likelihood of being employed depending on what grade a person has achieved. For each new explanatory variable we have added a complete set of interactions with respect to the effects that were accepted in the previous model and subsequently eliminated all interaction effects that were not significant. This results in one accepted model for each set of explanatory variables. In total, we have produced five models, models 1 to 5, of which only the final model (model 5) is presented here.

Size of the investigation groups in 1994 and 1998. **Table 2**

Investigation groups	Size in 1994	Size in 1998	Number with all var's valid in 1994	Number with all var's valid in 1998	Number included in logistic regression analyses	Number included in income regression analyses
No upper secondary education	11 815	11 620	11 811	11 607	11 033	6 293
Two-year vocational education	17 422	17 255	17 416	17 228	16 319	12 864
Two-year vocational education plus one supplementary year	8 341	8 254	8 330	8 240	7 634	6 402
Three-year vocational education	7 341	7 253	7 337	7 245	6 629	5 457
Total	44 919	44 382	44 894	44 320	41 615	31 016

Proportion of men gainfully employed in November 1990 to 1998 among men with no upper secondary education and men with a two-year or three-year vocational education. **Figure 1**



The proportion of individuals born abroad was 7.6 per cent among young adults who had no upper secondary education, but it was lower (3.9 to 4.1 per cent) among young adults who had completed vocational upper secondary education. Young adults lacking an upper secondary education were also more likely to have low grades than young adults who had completed this type of education.

Results

Transition form school to work

The rates of transition to the labour market for men with no upper secondary education and men with a two-year or three-year vocational education can be seen in figure 1. It shows the proportion of individuals who were gainfully employed in November of each year.

When these young men left compulsory school in 1990, unemployment was still low. It was nonetheless difficult for 16-year-olds with no upper secondary education to find a job. Figure 1 shows that only one in two succeded in finding a job in the first two years after leaving compulsory school. When unemployment began to rise, the proportion of gainfully employed dropped to almost 40 per cent in 1992 and remained invariably low for another two years. Military service may be another reason for the declining proportion of young men in gainful employment. In spite of the fact that unemployment was still high in 1995, employment rates gradually began to increase among men with no upper secondary education, rising to 64 per cent in 1998.

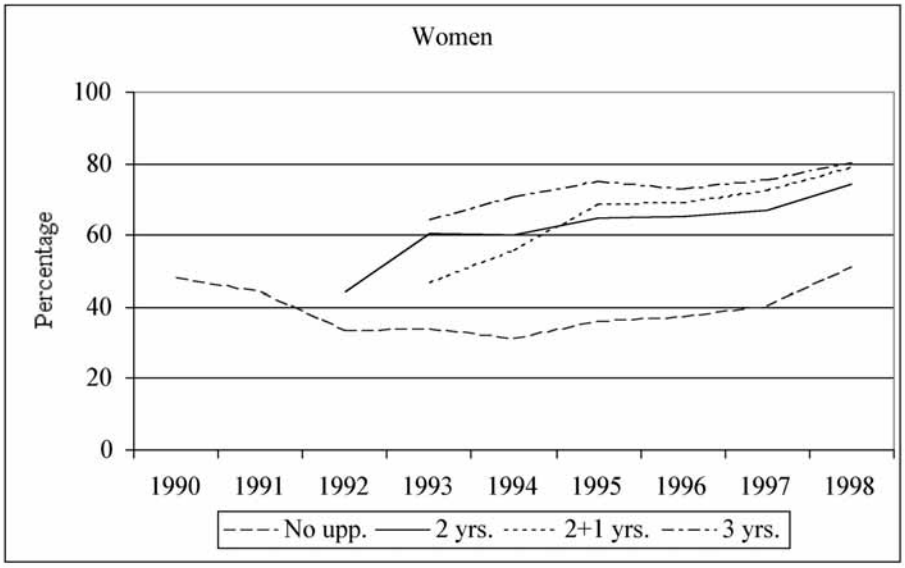
As early as in 1993, i.e. one year after leaving upper secondary school, men who had completed a two-year vocational upper secondary education had a higher employment rate than men with no upper secondary education. Subsequently, the employment rate of men with a two-year education increased faster than that of men with no upper secondary education for another two years. Men who had completed a three-year vocational upper secondary education also had a higher employment rate than men with no upper secondary education one year after leaving upper secondary school. During the following years their employment rate continued to rise sharply, reaching the same level as that of men with a two-year education. However, from 1995, employment rates increased at the same pace for all four groups of young men. A corresponding comparison of employment rates for women is presented in figure 2.

Figure 2 shows that women who had no upper secondary education experienced even greater difficulties in the labour market than men who lacked an upper secondary education. When unemployment went up, the

We have used SAS for all calculations. For the logistic regression analyses we have used proc genmod, proc nlmixed and the glimmix macro (Changes and Enhancements, 1996; Version 8, 1999). For the linear regression analyses we have used proc mixed. Two-level models with random components at the individual and municipal levels have been applied in glimmix, proc nlmixed and proc mixed. The odds ratios in tables 3 and 4 have been calculated in proc nlmixed.

proportion of women who were gainfully employed dropped from 48 per cent in 1990 to 31 per cent in 1994. Just as for the men, employment rates gradually began to increase in 1995. Figure 2 also reveals differences in employment rates between women with and without upper secondary qualifications. Already in November of the year in which they left upper secondary school (i.e. in 1992 and 1993 respectively), the employment rate of women who had completed vocational upper secondary education was somewhat higher than that of women with no upper secondary education. In 1994, the gap between women with and without upper secondary qualifications widened even further. After that, from 1995 to 1998, the difference between the groups compared remained fairly constant.

Proportion of women gainfully employed in November 1990 to 1998 among women with no upper secondary education and women with a two-year or three-year vocational education. **Figure 2**



The effect of vocational training on employment

We analyse how young adults' employment in November 1998 relates to their educational attainment, controlled for gender, ethnic origin, final grades from compulsory school and the home municipality's unemployment rate in 1998. When interpreting the results, one needs to bear in mind that a large variety of vocational upper secondary programmes have been subsumed within each educational category.

We have found a significant difference in the likelihood of being employed between men and women. The odds ratio between women's and men's employment is 0.54 (95 per cent confidence interval 0.52-0.57). The corresponding probabilities of being employed are 0.81 for men and 0.70 for women. These results are referred to as model 1. Hence, women have a considerably lower employment rate than men.

In three steps, which shall not be described here, we added the explanatory variables ethnic origin, final grades from compulsory school and local unemployment (models 2, 3 and 4). The effects of these variables are nevertheless apparent in the final model (model 5), in which we ultimately added educational attainment as an explanatory variable. We compare the employment rates of young adults with no upper secondary education with three vocational education alternatives: two-year, two+one-year, and three-year, controlled for the other variables. The Annex ([5]) contains an analysis of variance summary table listing tests of various effects in the final model.

All the main effects in the final model (gender, ethnic origin, grades, municipal unemployment rate and educational attainment) are strongly significant. Gender interacts significantly with three variables: ethnic origin, final grades from compulsory school and the municipal unemployment rate. It is therefore advisable to break down the presentation of odds ratios into partial models ([6]) for men and women. The odds ratios are applicable within each partial model, so that men are compared to men and women to women. For either partial model we have a reference group, consisting of men or women, respectively, with ordinary grades and a two-year upper secondary education.

Furthermore, educational attainment interacts significantly (p=0.0002) with final grades, i.e. the relation between the employment rate and educational attainment varies between grade groups. Therefore, odds ratios are specified for all combinations of grades and educational attainment within each partial model, see table 3.

The following essential characteristics shown in table 3 apply to both men and women:

- a high employment rate is typically displayed by young adults with high grades and an upper secondary education as well as by

([5]) See Table 6 in the Annex.

([6]) The partial models are so-called conditional models. We have one single final model and work out what this model tells us given (in other words, conditioned upon) the gender of the person in question. (A roughly equivalent alternative would be to work out two separate models for women and men respectively. This should produce approximately the same result. However, it is necessary to have men and women in the same model to be able to test the differences between them.)

Odds ratios (95 per cent confidence intervals) for young adults being gainfully employed by gender, ethnic origin, grades, municipal unemployment rate and educational attainment (model 5). **Table 3**

	Partial model for men	Partial model for women
Average grades and educational attainment		
High grades		
No upper secondary education	0.43 (0.37-0.49)	0.57 (0.50-0.64)
2-year vocational education	1.27 (1.12-1.43)	1.69 (1.51-1.87)
2+1-year vocational education	1.62 (1.38-1.87)	2.15 (1.83-2.48)
3-year vocational education	1.47 (1.25-1.68)	1.95 (1.69-2.21)
Ordinary grades		
No upper secondary education	0.45 (0.41-0.49)	0.45 (0.41-0.49)
2-year vocational education	1	1
2+1-year vocational education	1.18 (1.07-1.30)	1.18 (1.07-1.30)
3-year vocational education	1.31 (1.16-1.46)	1.31 (1.16-1.46)
Low grades		
No upper secondary education	0.27 (0.24-0.29)	0.26 (0.23-0.28)
2-year vocational education	0.66 (0.58-0.73)	0.63 (0.56-0.71)
2+1-year vocational education	0.96 (0.78-1.14)	0.93 (0.75-1.11)
3-year vocational education	0.71 (0.58-0.85)	0.69 (0.56-0.83)
Ethnic origin		
Born in Sweden	1	1
Born abroad	0.37 (0.32-0.42)	0.55 (0.48-0.62)
Unemployment rate of the municipality in 1998		
Per percentage point of higher unemployment*	0.85 (0.82-0.88)	0.93 (0.90-0.96)

Note: If the number 1 is not within the confidence interval, there is a significant difference at the 5 per cent level as compared to the reference categories men and women with ordinary grades and a two-year upper secondary education.
* The reference categories for different education groups and genders are municipalities with an unemployment rate that is one percentage point lower, ceteris paribus.

young adults with ordinary grades and three years of upper secondary education;

❑ an ordinary employment rate is typically displayed by young adults with ordinary grades and a two-year or a two+one-year upper secondary education as well as by young adults with low grades and a two+one-year upper secondary education;

❑ a low employment rate is typically displayed by young adults with low grades and a two-year or a three-year upper secondary education.

❑ a very low employment rate is typically displayed by young adults with no upper secondary education, particularly those who have low grades.

The following fundamental features, on the other hand, are gender-specific:

❑ women seem to benefit more from high grades than men;

❑ young adults born abroad are far less likely to be employed than young adults born in Sweden; this difference is particularly marked among men (odds ratio 0.37);

❑ quite naturally, a high unemployment rate in the municipality has a negative impact, and in this respect, men seem to be more vulnerable than women (odds ratio 0.85 as compared to 0.93), probably because men more often than women are privately employed.

The differences in patterns between men and women in table 3 are moderate, except with regard to ethnic origin, the effect of high grades, and, to a certain extent, the impact of the municipality's unemployment rate. The main difference between the two genders is their different rate of employment. For young adults with ordinary grades, the partial models for men and women are actually identical when it comes to the impact of grades and educational attainment. ([7])

([7]) They are, of course, not identical in reality, but are indeed so close that the difference between them disappears in the idealised situation represented by the model. Mathematically, this is due to the fact that a number of terms cancel each other out when forming (logarithmic) odds ratios. For ordinary grades, this results in the same remaining terms for log odds of the same type (e.g. no upper secondary education/two-year upper secondary education) for both men and women. This, in turn, can be attributed to the interactions that are significant according the Table 6 in the Annex.

The most interesting type of comparison for our purposes is to compare the investigation groups within each grade category. For young men and women with ordinary grades, appropriate odds ratios are listed in table 3. For both men and women, the following results are found (as mentioned above, these are identical in the model):

❑ those who lack an upper secondary education have a considerably and significantly lower employment rate than those who have completed an upper secondary education;

❑ those who have completed a three-year or two+one-year upper secondary education have a moderately, yet significantly higher employment rate than those who have completed a two-year upper secondary education.

In order to facilitate comparisons within the low and high grade groups, respectively, the odds ratios have been recalculated using reference categories within each group; see table 4. Those with two years of upper secondary education within each grade category have been used as reference categories. The ratios calculated on the basis of model 5 are the same for men and women and are therefore presented together. ([8])

The results for young adults with high grades (table 4) are similar to the results for those with ordinary grades:

❑ those with no upper secondary education have a considerably and significantly lower employment rate than those who have completed upper secondary education;

❑ those who have completed a three-year or two+one-year upper secondary education have a moderately, yet significantly higher employment rate than those who have completed a two-year upper secondary education.

For young adults with low grades, the following results are found:

❑ those who have no upper secondary education have a considerably and significantly lower employment rate than those who have completed upper secondary education;

❑ those who have completed a two+one-year upper secondary education have a moderately, yet significantly higher employment rate than those who have completed a two-year upper secondary education;

❑ those who have completed a three-year upper secondary education, on the other hand, do not have a significantly higher employment rate than those who have completed a two-year upper secondary education.

Odds ratios (95 per cent confidence intervals) for employment by educational attainment, for young adults with high and low grades, respectively. **Table 4**

	Applies to both men and women born in Sweden and born abroad
High grades	
No upper secondary education	0.34 (0.29-0.38)
2-year vocational education	1
2+1-year vocational education	1.28 (1.08-1.47)
3-year vocational education	1.15 (1.00-1.31)
Low grades	
No upper secondary education	0.41 (0.37-0.45)
2-year vocational education	1
2+1-year vocational education	1.47 (1.18-1.75)
3-year vocational education	1.09 (0.88-1.30)

Why young adults with low grades and two+one-year did better in the labour market than those with a three year education is difficult to explain. Perhaps they profited of a less academic education. It could also be an effect of selection. Motivated two-year students added a supplementary year.

The effect of a third year in another recent study

By controlling for background factors, we intend to diminish the effect of selection on our estimates of the effect of education. Yet, this method has its limitations. For instance, there may be factors not taken into account by us which could also affect the results. Examples of such factors include social background. If more background factors had been controlled for, the advantage of having completed an upper secondary education would probably have decreased, as would the advantage of a three-year education in relation to a two-year education. Ekström (2003), who compared inactivity (i.e. neither gainful employment nor participation in higher education) between young adults with a two-year and those with a three-year vocational upper secondary education, even found a positive effect on inactivity of a third

([8]) See the previous note. Essentially, the same explanation applies here.

Ratios between geometric mean values (95 per cent confidence intervals) for young adults' incomes according to gender, ethnic origin, grades, municipal unemployment rate and educational attainment (model 5). **Table 5**

	Partial model for men	Partial model for women
Average grades and educational attainment		
High grades		
No upper secondary education	0.93 (0.89-0.98)	0.94 (0.90-0.99)
2-year vocational education	1.05 (1.02-1.09)	1.07 (1.04-1.10)
2+1-year vocational education	1.12 (1.08-1.16)	1.13 (1.09-1.17)
3-year vocational education	1.08 (1.05-1.12)	1.10 (1.06-1.14)
Ordinary grades		
No upper secondary education	0.90 (0.88-0.93)	0.90 (0.88-0.93)
2-year vocational education	1	1
2+1-year vocational education	1.04 (1.01-1.07)	1.04 (1.01-1.07)
3-year vocational education	1.07 (1.04-1.10)	1.07 (1.04-1.10)
Low grades		
No upper secondary education	0.83 (0.81-0.86)	0.80 (0.77-0.83)
2-year vocational education	0.94 (0.91-0.97)	0.90 (0.86-0.94)
2+1-year vocational education	1.04 (0.99-1.09)	1.00 (0.95-1.06)
3-year vocational education	0.99 (0.94-1.04)	0.95 (0.89-1.01)
Ethnic origin		
Born in Sweden	1	1
Born abroad	0.82 (0.79-0.85)	0.91 (0.88-0.95)
Unemployment rate of the municipality in 1998		
*Per percentage point of higher unemployment**		
No upper secondary education	0.959 (0.949-0.969)	0.970 (0.959-0.981)
2-year vocational education	0.965 (0.958-0.973)	0.976 (0.967-0.985)
2+1-year vocational education	0.961 (0.951-0.971)	0.972 (0.961-0.983)
3-year vocational education	0.978 (0.966-0.989)	0.989 (0.977-1.000)

Note: If the number 1 is not within the confidence interval, there is a significant difference at the 5 per cent level as compared to the reference categories men and women with ordinary grades and a two-year vocational education.
* The reference categories for different education groups and genders are municipalities with an unemployment rate that is one percentage point lower, ceteris paribus.

year. Ekström's study (2003) is based on the same register data as our present study and we use mainly the same explanatory variables. The differences in results are probably due to methodological differences. We use logistic regression and also investigate interaction effects extensively, which improves the fit of our models. Ekström (2003) has an econometric approach and uses linear regression without interaction effects combined with instrumental variable estimation. The pilot scheme is used as an instrument to remove the selection effects from the estimates. Another difference in methodology is that Ekström (2003) excluded students who had completed three-year programmes in the pilot scheme which did not have a corresponding programme in the regular two-year system and vise versa. To evaluate this potential source of varying results, we repeated our analyses excluding the same programmes. However, this did not change our results. Finally, Ekström (2003) also uses the proportion of highly educated in the municipality as a control variable, which we did not.

The effect of vocational training on income

We analyse how young adults' income from employment and self-employment during 1998 relates to their educational attainment. The income analyses correspond to those carried out for employment and use the same explanatory variables. The difference is that here we use log income as our outcome variable and we use a linear regression model.

In general terms, the results obtained are very similar to those of the logistic regression analyses. Women who are gainfully em-

ployed have (model 1) a significantly lower annual income than gainfully employed men, i.e. SEK 116 800 as compared to SEK 161 200. The confidence interval (95 per cent) for women is 115 400-118 200 and for men 159 500-163 000.

In four steps, we add the explanatory variables ethnic origin, grades obtained at the end of the 9th year of compulsory schooling, unemployment rate of the municipality and, finally, educational attainment (models 2-5). Only the final model (model 5) is presented here. Endnote ([9]) contains an analysis of variance summary table listing tests of various effects in the final model.
By and large, the significant effects are the same as in the logistic regression analyses. Here too, and for the same reasons, the presentation is broken down into two conditional models, one for men and one for women. The results are presented in a way that is analogous to our presentation of odds ratios: differences in least square means of log income for all categories compared to the same categories as in the logistic regression analyses. The differences have been exponentiated, which transforms them into ratios between geometric means of income in SEK, with the comparison category in the denominator. Thus, they express average income relative to the comparison category. The comparisons are applicable within each partial model, so that men are compared to men and women to women. For comparisons of average income between men and women see, model 1, which has been described above.

Educational attainment interacts significantly (p=0.0004) with grades obtained in the 9th year of compulsory school, i.e. the relation between income and educational attainment varies by grade group. Therefore, income ratios are specified for all combinations of grades and educational attainment within each partial model, see table 5. In addition, there is also a moderately significant (p=0.022) interaction between the municipal unemployment rate and educational attainment, which is why the same breakdown is carried out for the municipal unemployment rate, as well.

To a very high degree, table 5 displays the same tendencies as table 3. That is to say the relationships between incomes and the explanatory variables are strikingly similar to those which hold between employment and the same explanatory variables. Given the substantial similarities with table 3, we shall here mainly refer back to the comments made after table 3 and table 4. Neither do we find it necessary to compile a table corresponding to table 4.

However, one difference between tables 5 and 3 needs to be commented on. Due to a significant interaction between municipal unemployment and educational attainment, the impact of the municipal unemployment rate has been broken down by educational groups in table 5. With both men and women, the group of individuals with a three-year vocational education display the highest ratio - or exponentiated regression coefficient - (0.978 and 0.989 respectively), meaning that the regression line with municipal unemployment is relatively flat in their case and, hence, their vulnerability to municipal employment relatively low. The three remaining educational groups have lower ratios of approximately the same magnitude and thus higher vulnerability, both for men and for women. The fact that women are less vulnerable to the local labour market situation than men is a recurrent aspect, which we have already seen in the logistic regression analyses.

Conclusion

Young people (born in 1974) with no upper secondary education had great difficulties in getting a job when they entered the labour market at age 16 in 1990, while the proportion of gainfully employed quickly increased among young men and women with a vocational upper secondary education two and three years later. Soon they were more gainfully employed than those lacking an upper secondary education. However, from 1995 the gap between those with and those without a vocational upper secondary education did not increase any longer. Thus, the advantage of having vocational training was particularly evident in the beginning of the 1990s during the economic recession in Sweden.

Young adults with a vocational upper secondary education are, however, better equipped to compete in the labour market even if one disregards their upper secondary education (Murray, 1997). In order to investigate more closely the actual significance of vocational training itself for young adults in the labour market, we have analysed their

employment in 1998, the last year of the investigated period, by means of logistic regression analysis and their income by means of linear regression analysis controlling for the background factors gender, ethnic origin, final grades from compulsory school and local unemployment in the individual's home municipality in 1998.

The results indicate that both with respect to employment and income, it is a clear advantage to have completed a vocational upper secondary education as compared to lacking an upper secondary education. A three-year vocational education, however, produces only a moderate advantage over a two-year education. For young adults with low grades and a three-year education, no statistically significant advantage has been established at all compared to those who have completed a two-year programme. In another study on the effect of a third year (Ekström, 2003), no advantage was found on employment.

The monitoring period is fairly short for investigating the effects of education and training. In a longer perspective, the effects of vocational upper secondary education and of having completed a third year could prove to be more substantial. Also, the three-year vocational upper secondary education programmes were new and unknown to employers, whereas the two-year courses had existed since the 1970s.

Finally, an important conclusion is that it is not exclusively the education completed, but also other background factors that have an impact on young adults' situation in the labour market. The effects of gender, ethnic origin and grades respectively are of approximately the same magnitude as having or not having completed vocational upper secondary education. The unemployment rate of the home municipality also influenced young people's employment and incomes, men's more so than women's. The fact that employment increased at the same pace for all investigation groups during the latter part of the 1990s also means that it was not only a lack of education that caused the low employment rates of young adults without upper secondary qualifications at the beginning of the 1990s. They were also a result of the low demand for labour.

Acknowledgements

Helge Bennmarker compiled the basic data material for this study, and Erika Ekström collected data and worked out certain results. The study was financed by the Swedish Council for Working Life and Social Research.

Annex

([5]) **Table 6. Test of effects in the final model of the logistic regression analyses** (model 5): Printout from SAS macro glimmix, slightly modified. (NDF and DDF are the numerator and denominator degrees of freedom in the source of variation and the error term, respectively.)

Source	NDF	DDF	Type III F	Pr > F
Ethnic origin	1	41314	271.15	0.0001
Gender	1	41314	99.89	0.0001
Ethnic origin * gender	1	41314	17.00	0.0001
Grade group	2	41314	144.71	0.0001
Gender * grade group	2	41314	12.31	0.0001
Municipal unemployment	1	282	60.12	0.0001
Municipal unemployment * gender	1	41314	22.26	0.0001
Education attainment	3	41314	434.79	0.0001
Grade goup * education attainment	6	41314	4.30	0.0002

([9]) **Table 7. Test of effects in the final model of the income regression analyses (model 5):** Printout from SAS proc glimmix, slightly modified. (NDF and DDF are the numerator and denominator degrees of freedom in the source of variation and the error term, respectively.)

Type 3 Tests of Fixed Effects				
Effect	Num DF	Den DF	F Value	Pr > F
Ethnic origin	1	204	121.35	<.0001
Gender	1	204	121.35	<.0001
Ethnic origin * gender	1	101	16.22	0.0001
Grade group	2	565	88.06	<.0001
Gender * grade group	2	530	4.68	0.0096
Municipal unemployment	1	282	75.41	<.0001
Municipal unemploym * gender	1	31E3	7.58	0.0059
Education attainment	3	832	156.77	<.0001
Grade group * education attainment	6	1278	4.15	0.0004
Municipal unemploym* educ attainment	3	31E3	3.21	0.0220

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Key words

Gender,
ethnic background,
grades,
educational attainment,
employment,
income.