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Earnings effects of adult secondary education in Sweden

Erika Ekström

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Postal address: P.O. Box 513, 751 20 Uppsala
Visiting address: Kyrkogårdsgatan 6, Uppsala
Phone: +46 18 471 70 70
Fax: +46 18 471 70 71
ifau@ifau.uu.se
www.ifau.se

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Earnings effects of adult secondary education in Sweden[♣]

by

Erika Ekström[*]

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Abstract

In Sweden adult secondary education (ASE) has been offered since 1968, but we know little about its labour market effects. ASE offers courses at the compulsory and upper secondary level and is aimed to give adults who lack these types of education. This paper provides the first long-run annual earnings effect of participating in ASE using unique longitudinal individual data, the LINDA database. Controlling for pre-programme annual earnings, the estimates suggest that participating in adult secondary education significantly reduces the earnings of Swedish males with about 3.5 percent compared to non-participants. No effects are found for Swedish females, but the results indicate weakly significant positive effects, about 9 percent, for female immigrants.

Keywords: Adult education, rate of return, evaluation
JEL-codes: I21

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[*] Institute for Labour Market Policy Evaluation (IFAU), P.O. Box 513, SE-751 20 Uppsala, Phone: +46 18 471 70 75, E-mail: Erika.Ekstrom@ifau.uu.se.

Table of contents

1 Introduction

Adult secondary education (ASE)[1] courses have been provided in Sweden since 1968. Despite this long tradition, we still know little about its labour market effects. ASE is part of the Swedish public sector school system and offers courses at the compulsory and upper secondary level, and also at a post-secondary training level. Courses at ASE aim to give adults who lack these types of education the equivalent qualification that young people obtain in the regular nine-year compulsory and upper secondary schooling system.

Until recently, there have not been any studies evaluating the labour market effects of ASE (Alm Stenflo, 2000; Westerlund, 2000; Axelsson & Westerlund, 2001, Stenberg, 2003). The growing interest of evaluating ASE is due to the large investment within ASE in the form of the "Adult Education Initiative" (AEI).[2] Westerlund (2000) and Axelsson & Westerlund (2001) estimate the effect on unemployment duration, whereas Alm Stenflo (2000) and Stenberg (2003) estimate the short-run earnings effects. Alm Stenflo (2000) finds positive earnings effects for individuals who completed ASE in 1992 or 1993 compared with non-participants. Stenberg (2003), on the other hand, finds negative annual earnings effects for individuals participating in AEI in the autumn of 1997, compared with those in labour market training.

The motives for participating in ASE may vary between individuals, but the motives probably include increasing the individuals' possibilities to change their situation in the labour market, e.g. through a change of occupation. Such changes, in combination with a higher level of education, may in the long run also lead to changes in income levels.

This paper aims to provide the first evidence of the long-run earnings effects of participating in ASE. The long run is potentially important because, after participation in ASE some adults may enrol in higher education. The analysis is based on the Swedish Longitudinal Individual Data (LINDA) for the years 1983–2000. I examine the annual earnings effect in 2000 for those adults who

[1] The Swedish word is 'kommunal vuxenutbildning' and is often abbreviated 'komvux'. In this study I shall abbreviate it ASE.

[2] The AEI was introduced in July 1997, but came to an end in December 2002. The programme was aimed at unemployed people aged 25–55 who did not have three-year upper secondary education.

enter a spell in ASE at some point between the spring of 1988 and the spring of 1993, compared with non-participants.

The remainder of the paper is organised as follows: Section 2 briefly describes the features of the ASE. The data and empirical approach is presented in Section 3. Section 4 first presents the model and then discusses the results. Concluding remarks are found in Section 5.

2 What is adult secondary education?

Adult education may be defined differently between countries. Therefore, this section presents, particularly for the non-Swedish reader, the institutional features of ASE in Sweden.

ASE is part of the Swedish public sector school system and is one form of adult education. Other forms are, for example, labour market training, staff training or qualified vocational education and training.[3] Apart from ASE, the public school system for adults includes education for adults with learning disabilities and Swedish for immigrants.

The basic idea behind ASE is to give adults lacking a three-year upper secondary education or its equivalent a second chance of obtaining this education. ASE, however, targets different groups of adults. In addition to the core group of adults with no compulsory or upper secondary education, the programme targets new entrants into the labour market. Adults who already are in the labour force and, for example, would like to take a course for further training in their profession/occupation, or adults who want to take the opportunity to change their occupation are two further targeted groups. A final group is people who take supplementary courses in order to qualify for university studies.[4] In reality, ASE is open to all individuals aged 20 and above. However, adults with the shortest education have priority over other adults for all courses. Applicants with a higher education than a two-year upper secondary education are admitted to the programme if there are vacant slots.

[3] For further information about these, see National Agency for Education (2003) or Statistics Sweden (2001).

[4] Another group has evolved during the last few years. This group consists of young adults (aged less than 25) taking ASE courses for improving their grades in order to qualify to university.

ASE offers courses at three educational levels: i) basic adult education, ii) upper secondary schooling and iii) post-secondary training. Basic adult education is equivalent to the comprehensive nine-year compulsory school and should give adults qualifications in the four core subjects: Swedish (or Swedish as a second language), English, mathematics and social studies. The adults passing these four core subjects will obtain a compulsory school leaving certificate. Subjects other than the four core subjects can also be included in the certificate. Adult upper secondary education is equivalent to the regular upper secondary education, but is not identical. The courses provided in the former may differ with regard to emphasis, content and scope. A certain level of completion in the core subjects must be reached in order to obtain a leaving certificate from the adult secondary education system. The post-secondary training programme provides the adults with further training in a specific occupation or training for a new occupation.

Individuals can apply to ASE twice a year: in the spring and in the autumn. Thus, individuals can begin a course in either term. The advantage of ASE is that participants can decide their own rate of study. Therefore, participants can combine their studies with employment, particularly since ASE is offered during the evenings as well as in the daytime.

Figure 1 shows the number of participating students[5] in ASE from 1970–2001. Enrolment is also presented separately for men and women.

[5] A student is defined as a person who participates in ASE. In the statistics the person is counted as a student only one time, irrespective of how many courses the person is attending.

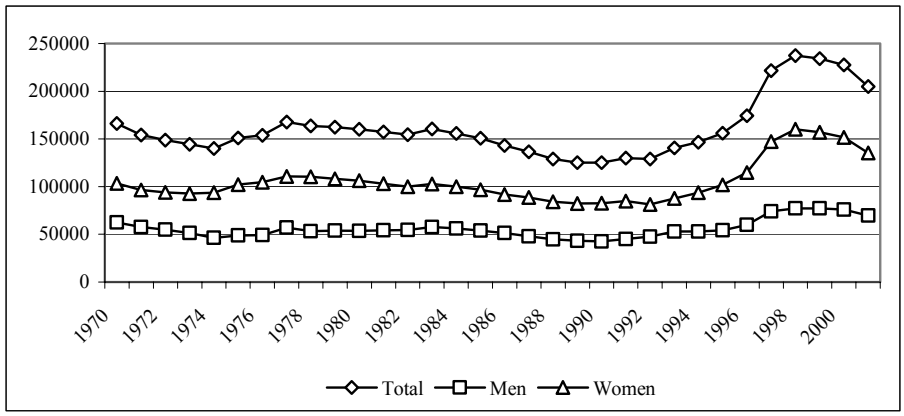

Figure 1 Students in ASE 1970–2001

Notes: The number of students is measured in the 42nd week in the years 1970–78. During 1979–91 the number of students is measured at the end of the term and, from 1992 and onwards the number is recorded in week 41 or 42 in October.

Source: Statistics Sweden, Statistical Yearbook for Sweden, various issues.

During most of the period the number of participants in ASE has been just above 150 000 or just below that number. During the whole period more women than men have participated in ASE. In the United States too, more women seem to enrol in adult education than men (see for example Gilford, 1975; and Gill & Leigh, 2000). The dramatic change between 1996 and 1997 was the introduction of the Adult Education Initiative. Total enrolment was low between 1986 and 1993.

3 Data and empirical approach

3.1 The data

The data used in this paper is the register-based Longitudinal Individual Data for Sweden (LINDA). LINDA consists of a representative sample of individuals and their household members. The individuals are the unit of observation in the present study. LINDA involves collection of different registers (see Edin & Fredriksson, 2000). In this study, I use the income register, local adult education register and higher education register. The crucial register is the local adult education register, which runs from 1988–95. This register contains

information about which term the individual was registered for ASE, the level at which she studied and what course(s) read. Unfortunately, the register has no information about whether the individual has completed or interrupted a course.[6] For this reason, participating in ASE should be referred to here as *registration* rather than completion.

To estimate the earnings effects of participating in ASE data on earnings are required some years before entering ASE. Since the local adult educational register begins in 1988, a pre-period of five years is included, which is the length of a normal business cycle. Therefore, the first year in my data is 1983. The last year of the period studied is 2000.

Before continuing to describe the participants in the ASE and the comparison group, two features of the data should be mentioned. First, there was no collection of data on registration in the autumn of 1992. Data was collected in the spring of 1993. Thus, individuals who registered in the autumn of 1992 and in the spring of 1993 were all registered in the spring of 1993. Second, the information about the individual's highest level of educational attainment is observed from 1990 and onwards. Therefore, in order to have a value for this variable prior to 1990, I have imputed the 1990 year value backwards. Although there are data prior to 1990, the pre-data are seriously incomplete, in particular for higher education. Individuals often do not take out their degree, which could explain the incomplete higher educational data. 1990 provides me with the most reliable educational data, since the information is obtained from the census.

3.2 Participants in ASE

As already mentioned, I have information on individuals participating in ASE sometime between the spring 1988 and the autumn 1995. There are, however, four main restrictions that the individuals must satisfy in order to be included in the analysis.

The first restriction rests upon an institutional change. From the academic year 1993/94 and onwards, additional public funds were invested in "unemployment courses"; these courses were introduced as a consequence of a redistribution of resources from labour market training conducted by the public employment office to the regular educational system (Government Bill

[6] According to official statistics the course drop out rate is between 14–19 per cent for the years 1988/89–92/93 (Statistics Sweden, 1990; 1991; 1992; 1993; 1994).

1992/93:150). To avoid the inclusion of adults participating in ASE for unemployment reasons, only those who decided to commence their studies before the autumn of 1993 are included. They are, to a greater extent, assumed to consider ASE as a choice of studies rather than an alternative to unemployment or labour market training. Individuals who decided to enter the ASE before the autumn of 1993, but who continued to study in the autumn of 1993 and the terms thereafter are included in the analysis. The reason for including these individuals is that the decision to enter ASE was taken before the autumn of 1993.

To make the second restriction easier to understand, consider the flow diagram in *Figure 2*. The figure represents different flows in ASE for two individuals, denoted A and B. The spring and the autumn spells are denoted S and A, respectively.

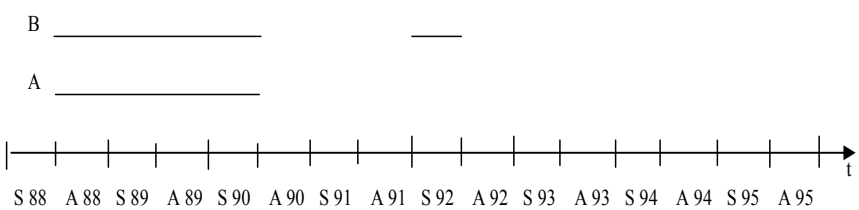

Figure 2 ASE inflows and outflows

Individual A and B both enter a first educational spell at the ASE in the autumn of 1988 and they participate in four terms terminating in the spring of 1990. In the spring of 1992 individual B embarks on a second spell. For both these individuals, the entry year in the ASE is 1988. Individual B's second educational spell is not included in the treatment group. I am only interested in the first educational spell, since this spell indicates the first decision to enter the programme. This means that each individual participating in ASE is only observed once, irrespective of the number of periods of ASE.

The third restriction is meant to alleviate the problems associated with the left-censoring of data in 1988. Preferably, one would prefer not to include individuals participating in a spell at ASE before 1988. Since data on participa-

tion in ASE are left-censored in 1988, I use auxiliary information. The information pertains to the use of study loans. I exclude individuals who have a positive study loan and who are not registered in higher education during the previous years 1983–87 for which I have data. This is not a perfect indicator of ASE participation, since it is possible to participate in ASE without taking a study loan. The assumption seems to be a good approximation for excluding potential participants in ASE before 1988, since, for example, 96 per cent of those who participated in the spring of 1992, had a positive study loan and were not registered in higher education during the previous years 1988–91.

Finally, the fourth restriction is that individuals must be between 25–55 years old when entering ASE. This restriction is because I am mainly interested in estimating the effect of ASE as a second chance for adults. The upper age limit of 55 years has been chosen due to the fact that individuals in Sweden may enter early retirement after this age. Therefore, participation in ASE after the age of 55 may not add anything extra to their working life.

I consider two different samples. Immigrants as a group may have a different motivation to commence ASE for example they need to learn Swedish to improve their possibilities to enter the Swedish labour market. As a result, immigrants who immigrated five years before entering ASE are excluded in the first sample. However, if the ASE is one of the key factors for immigrants to facilitate entry into the Swedish labour market, then this group should also be analysed. Thus, the second sample contains the immigrants who immigrated five years before commencing ASE.[7] The samples will be referred to the Swedish sample and the immigrant sample, respectively.

Appendix A presents the ASE characteristics of the participants for both samples. Male participants are found to be in upper secondary education, while female participants more frequently are at the post-secondary training level. It is evident that there is a change from participating more frequently in evening courses in the late 1980s towards participating more frequently in daytime courses during the 1990s. This change may be related to the Swedish recession. Language/linguistics is the most common main subject for male and female

[7] In the LINDA database, an immigration year is given for all individuals who immigrate to Sweden. Thus, even a Swedish born-individual who immigrates to Sweden after a job abroad is allotted an immigration year. Since I am only interested in people who are born outside Sweden, additional information about the country of birth is used when sampling immigrants.

participants. Finally, the year 1993 differs from the other years, but this may only be due to the data collection mentioned earlier.

3.3 Design of the comparison group

In evaluation studies using non-experimental data, a generated comparison group is required, since one is not able to observe participants in the non-participant state. In this study, the comparison group consists of individuals who were never registered for ASE. It should be noted, however, that I can only be certain that the individuals included in the comparison group did not participate in ASE in 1988–95, for which data are available. Thus, this group of non-participants may consist of individuals who potentially have participated in ASE before 1988 and after 1995. However, to alleviate the problems associated with the inclusion of individuals who may have participated before 1988, the third restriction – information on study loans – is also adopted to the comparison group. Further, in order to lessen the extent that individuals who may have participated after 1995 are included in the comparison group the educational information in the year of 2000 is used.[8] One feature of educational information for this year is that it indicates whether the individual concerned has acquired his/her education as a result of ASE. Individuals having this educational attainment are dropped from the comparison group.[9]

Furthermore, the comparison group is, as is the case for participants, generated by selecting individuals aged 25–55 from each year during the period 1988–93, where each year corresponds to an entrance year. Thus, the same individual is selected every year, unless the individual fails to meet the age criteria. In other words, a non-participant occurs in the data a maximum of six times.[10]

[8] The year 2000 is the first year for the revised Swedish standard classification of education. The revision had two main purposes: i) to adjust the Swedish standard to the international standard for classification of education (ISCED 97), ii) to generate greater clearness and a more functional system than the old one (Statistics Sweden, 2000).

[9] However, the information suffers from problems, since one of the educational attainments – supplementary courses in upper secondary school – also covers those individuals who attend supplementary courses in the regular upper secondary school system. The individuals should not be eliminated, unless they received their qualification in the year 2000. This is the best possible way of eliminating potential participants after 1995, but since the educational information suffers from problems, I also included these individuals to see whether the results changed or not. Only small differences are found.

[10] The individual is repeated in the sample since he/she may commence in different entrance years. The observations from the same individual with different entrance year are correlated. To

Since ASE is targeted at specific groups of adults, selection into the programme is present. For example, individuals with a two-year upper secondary education or less are selected into ASE to a greater extent, since this is one of the target groups. In this respect, participants differ from non-participants in terms of the level of education. However, participants may also differ in other respects, such as age.

In order to match non-participants to participants on the observed characteristics that seem to induce selection into ASE, a weighting scheme is employed. The comparison group is weighted separately for each entrance year, so that age and the level of education match that of the treatment group (participants). The weighting approach is implemented using a number of cells. The cells are divided into six age intervals: i) 25–29, ii) 30–34, iii) 35–39, iv) 40–44, v) 45–49 and vi) 50–55, and four educational levels: i) compulsory education or less, ii) two-year upper secondary education, iii) three-year upper secondary education and iv) university education. Each cell contains a group of individuals in a particular age-interval and level of education. This group of individuals (a cell) represents a value of the particular characteristics. For example, if six per cent of the participants with a two-year upper secondary education are aged 25–29, whereas the corresponding figure is three per cent in the comparison group, the comparison group is weighted by a factor of two (six divided by three) in comparison with the participants with these characteristics in order to obtain the same distribution as the participants.

As a result of fewer observations in the immigrant sample, the cells are reduced to include five age cohorts (*v* and *vi* are combined) and three educational levels (*ii* and *iii* are combined). In addition, the weighting scheme is not applied separately for each entrance year. By examining the means of the explanatory variables included in the regressions, I can discern how well the weighting procedure has matched the comparison group to that of the participants. *Table 1* presents sample means for the Swedish sample. *Table B1* in Appendix B gives the corresponding results for the immigrant sample.

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correct for this I use cluster-adjusted standard errors. For a documentation of the cluster-adjusted standard error, see Rogers (1993) and Williams (2000).

Table 1 Means of explanatory variables by ASE participants and the comparison group for the Swedish sample

Variables	Male participants	Male comparison	Female participants	Female comparison
	Mean	Mean	Mean	Mean
Age, τ-1	34.5 (7.9)	34.5 (8.0)	36.3 (7.6)	36.3 (7.8)
Age squared, τ-1	1254.5 (578.0)	1257.8 (588.2)	1374.8 (564.9)	1382.1 (585.5)
Compulsory, τ-1	0.156	0.158	0.190	0.177
2-year upper secondary school, τ-1	0.361	0.374	0.384	0.388
3-year upper secondary school, τ-1	0.161	0.155	0.106	0.109
University, τ-1	0.239	0.227	0.244	0.236
Pre-programme earnings in τ-1	97 151 (54 664)	122 737 (72 883)	70 050 (40 283)	83 612 (50 350)
Pre-programme earnings in τ-2	88 179 (47 275)	106 675 (62 835)	61 688 (35 820)	72 288 (43 629)
Pre-programme earnings in τ-3	76 372 (39 567)	89 524 (50 910)	52 647 (30 263)	60 953 (35924)
Pre-programme earnings in τ-4	63 831 (33 240)	74 107 (42 264)	44 328 (25 472)	51 115 (29864)
Proportion of zero earnings in τ-1	0.032	0.027	0.031	0.043
Proportion of zero earnings in τ-2	0.025	0.025	0.039	0.042
Proportion of zero earnings in τ-3	0.023	0.023	0.034	0.042
Proportion of zero earnings in τ-4	0.020	0.023	0.037	0.044
Proportion of entrance in ASE 1989	0.149	0.157	0.176	0.160
Proportion of entrance in ASE 1990	0.140	0.163	0.156	0.165
Proportion of entrance in ASE 1991	0.155	0.168	0.147	0.170
Proportion of entrance in ASE 1992	0.067	0.179	0.059	0.175
Proportion of entrance in ASE 1993	0.169	0.180	0.117	0.174
Unmarried, τ-1	0.516	0.530	0.329	0.352
Divorced, τ-1	0.070	0.057	0.112	0.096
Widow(er), τ-1	0.003	0.002	0.008	0.008
Nordic, τ-1	0.030	0.031	0.046	0.044
Other immigrants, τ-1	0.062	0.039	0.049	0.038
No. of observations	2 645	262 590	5 752	228 822

Notes: Standard deviation is in parentheses. τ is the ASE entrance year.

The weighting procedure seems to have worked rather well. The low proportion of about 0.06 in the entrance year 1992 is due to the collection of the data in 1992. The proportion of divorced people and the proportion of other immigrants are somewhat higher for the participants than for the comparison group.

This is the case both for males and females. The proportion of unmarried females is somewhat lower than in the comparison female group. Further, the table indicates that the proportion of zero earnings in the pre-programme year differs between participants and non-participants. Note that the participating females have a lower proportion of zero earners than non-participants. One would have expected the reverse pattern, that is, a higher proportion of zero earnings, as in the case of males.

Since selection by pre-programme earnings might be an issue, a second weighting scheme is constructed. The second weighting scheme therefore adds the information on the individual's pre-programme earnings, which are defined as an indicator of zero earnings. The number of cells increases and some cells are empty as a result, if this information is added. For the Swedish sample, I therefore aggregate age-intervals to only include two age-intervals: i) 25–34 and ii) 35–55. The two- and three-years of upper secondary education programmes are also combined. *Table B2* and *Table B3* in Appendix B present the results using the second weighting scheme.

Another interesting aspect would be to see whether the Ashenfelter's (Ashenfelter, 1978) dip exists. The average relative earnings around τ (the ASE entrance year) are calculated to assess this. The participants' average relative income is the ratio of their earnings each year divided by the non-participants' weighted average earnings each year. The result is shown in *Figure 3*.

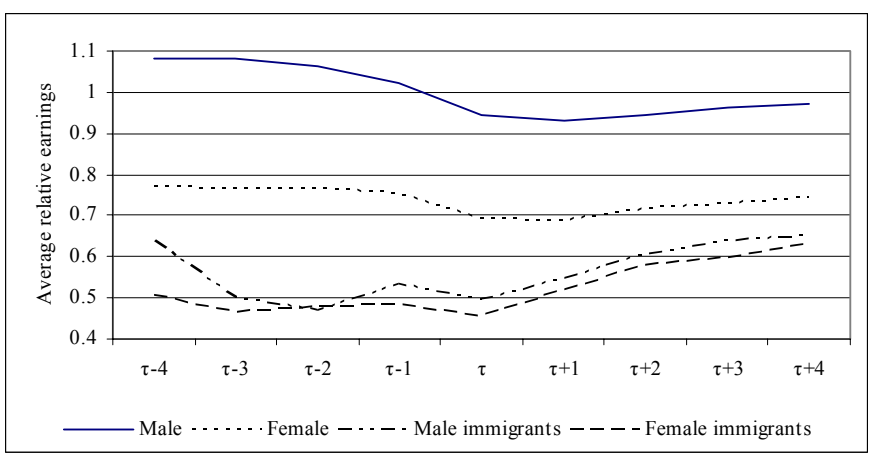

Figure 3 The participants' average relative earnings prior to, during and after entrance year in the ASE

The evidence is consistent with Ashenfelter's dip (Ashenfelter, 1978). There is a decline in the pre-programme earnings. The drop in the participants' relative earnings prior to the ASE entrance year (τ) is pronounced for Swedish males. Since few immigrants might be observed the further away one goes from τ, the result for the immigrant sample should be interpreted with caution. Nevertheless, it seems that the male immigrants do enjoy an increase prior to commencement of ASE.

4 Model and results

4.1 The empirical model

Suppose that some individuals begin an educational programme at time τ and some individuals do not. Suppose also that I am interested in the earnings effect of the programme. The participants may differ from the non-participants in, for example, motivation. Now, motivation presumably influences both the probability of participating in ASE (the causing variable) and in earnings (the outcome variable), but is rarely observed in the data. A good predictor, which takes into account various individual characteristics such as motivation is pre-programme earnings. Pre-programme earnings may pick-up the differences between participants and non-participants. I consider the following model:

$$y_{ijt} = \delta D_{ij} + \beta X_{ij,\tau-1} + \sum_{s=1}^{4} \gamma_s y_{ij,\tau-s} + \sum_{s=1}^{4} \omega_s Z_{ij,\tau-s} + \alpha_\tau + \varepsilon_{ijt} \qquad \text{j=p, c} \qquad (1)$$

where j indicates the participation status, p for participant and c for the comparison group (non-participants), and τ is the ASE entrance year. y_{ijt} is the post-programme annual earnings in the year of 2000; D_{ij}=1 if j=p; $X_{ij,\tau-1}$ is a vector of individual characteristics one year prior to the programme entry; $y_{ij,\tau-s}$ is a vector of pre-programme annual earnings expressed in 2000 prices; $Z_{ij,\tau-s}$ is a vector of dummies taking the value one if pre-programme annual earnings are zero; α_τ is the time-fixed effect for entering the ASE and ε_{ijt} is the error term. δ is the parameter of interest representing the programme effect on annual earnings for the individual participating in ASE sometime during the period from spring 1988 to spring 1993.

It is worth noting that the equation is estimated with annual earnings in levels, including zero earnings. Investigating the data, there seem to be more

zeros in 2000 than in the pre-programme earning years in the 1980s. The aggregate increase in unemployment, which took place during the 1990s, may have been a factor influencing future employment opportunities, since some of those participating in ASE completed their studies during the economic recession in 1993. Furthermore, individuals may also continue into higher education, which implies to a higher extent that they have no income. Another explanation could be that adults in an older age group already have entered early retirement.

4.2 Results

After experimenting with different sets of the available explanatory variables, I decided to include the following variables: age, age squared, educational level, marital status, country of birth, county dummies and dummies for each entrance year in ASE and also four years of pre-programme earnings and the related dummies indicating whether the individual had zero earnings in these years. These explanatory variables form the basic specification. Note that in the Swedish sample I control for four years of pre-programme earnings, whereas only one pre-programme earnings year is controlled when the sample of immigrants is used. In this study, the programme effect should be interpreted as the effect of having participated on any occasion during the spring of 1988 to the spring of 1993.[11]

The estimates from the basic specification for males and females of the programme effect are presented in *Table 2*. The parameter estimates for the other variables included in the regressions are available in Appendix C. Note that columns (1) and (2) in *Table 2* presents the results using the weighting scheme (i) matched for age and level of education for each entrance year in ASE, while columns (3) and (4) re-estimate the programme effect using the weighting scheme (ii). The second scheme uses the pre-programme earnings (indicating one if the pre-programme earnings are zero, otherwise zero) as an additional matching variable for those in scheme (i).

[11] The duration of training is not taken into consideration. The reason for not doing so is that I only observe the number of terms, since an ASE course may, for example, only last for seven weeks, which is not a full term. In addition, it may also be endogenous.

Table 2 OLS estimates of the effect of adult participation in ASE on absolute earnings in the year of 2000, expressed in percentage terms

	Weighting scheme (i)		Weighting scheme (ii)	
	Male	Female	Male	Female
	(1)	(2)	(3)	(4)
The Swedish sample				
Programme effect	-0.0374***	0.0028	-0.0356***	0.0038
	(0.0107)	(0.0074)	(0.0108)	(0.0075)
No. of participants	2 645	5 752	2 645	5 752
No. of non-participants	262 590	228 822	261 406	228 430
The immigrant sample				
Programme effect	0.0606	0.0905*	0.0483	0.0902*
	(0.0559)	(0.0492)	(0.0623)	(0.0520)
No. of participants	393	385	393	385
No. of non-participants	3 777	3 000	3 642	2 964

Notes: Weighting scheme (i): Age and level of education by entrance year in ASE, where the entrance year is applied only to the Swedish sample. Weighting scheme (ii): Adds the dummy for pre-programme earning as a matching variable. The basic specification controls for age, age squared, educational level, marital status, country of birth, county dummies, dummies for the ASE entrance year, pre-programme earnings and related dummies for zero earnings in the pre-programme earning years. Cluster-adjusted standard errors are in parentheses. Level of significance: *** = 1 per cent level, * = 10 per cent level.

Beginning with the Swedish males and weighting scheme (i), the table shows that the effect of participating in ASE on earnings is significantly negative. For males, participating in ASE is associated with an earnings reduction of about 3.7 per cent.[12] In a recent study, Stenberg (2003) also finds a negative programme effect on earnings for those males who participated in the Adult Education Initiative (AEI) in the autumn of 1997 or 1998 compared with participants in labour market programmes. Stenberg (2003) reports a short-run negative effect of about SEK 19 000 using the outcome year of 1999 and 2000, respectively.[13] Leigh & Gill (1997) estimates the returns to community college. Males and females are separated into returning adults and continuing students.

[12] Expressed in absolute terms this is about SEK 9 500.
[13] When Stenberg (2003) used the outcome year 2000 for those participating in the autumn of 1997, the negative effect was reduced to about SEK 12 000.

They find a more positive effect on earnings for the returning males than males continuing to community college directly from upper secondary school studies.

No programme effect is found for the Swedish female participants. This result is in line with Leigh & Gill (1997), who also find small statistically insignificant results. Stenberg (2003), on the other hand, reports a significantly negative short-run programme effect for the females.

What happens with the result when the dummy for pre-programme earnings is added as a matching variable in the weighting procedure? Columns (3) and (4) of *Table 2* present the results. The Swedish male effect is somewhat less negative, whereas there is no change in the estimate for the Swedish females. In general, the two weighting scheme produces quite similar estimates.[14]

The programme effect for immigrants is more on the positive side, however. The estimate for female immigrants is significant at the ten per cent level. This result may suggest that immigrants (at least females), who are one of the target group in ASE, benefit more from participating than not participating in ASE. One feature of the result could be that knowledge of Swedish, which usually is a key requirement for employment, may give ASE participants greater chances of obtaining a more qualified job than non-participants. A more qualified occupation should eventually result in higher earnings in the long-run.

It should be noted, however, that the above results are robust to inclusion of different variables. In general, adding zero earnings in the pre-programme year as a matching variable does not seem to affect the programme effect to any considerable extent. However, it seems that the Swedish individuals with zero earnings in the pre-programme year benefit more from participating in ASE than other individuals, whereas this is not the case for the immigrants.

Would the estimate change if one adds an interaction between the dummy of having zero earnings in the pre-programme year and the participating dummy as a control, instead of weighting the comparison group with the former variable? This exercise is carried out as an assessment to the result using

[14] The results from a difference-in-difference technique, (a straightforward panel-data method) where the differences-in-differences estimator is the difference in earning growth between participants and non-participants, show somewhat different results. Using the pre-earnings year of 1985 and the post-earnings year of 2000 the programme effect is negative for both males and females at a magnitude of 9.6 per cent and 1.7 per cent, respectively. The results are statistically significant at the one per cent and five per cent level for males and the females, respectively. For males, this result implies that participating in ASE is still associated with negative earnings. For the females, participation in ASE is also associated with negative earning if this estimator is used, even though the negative effect is small.

weighting scheme (ii). Notice that this changes the interpretation of the effect: The programme effect should be interpreted as the effect for those with positive earnings in τ-1. For the Swedish sample, the estimate turns out to be the same as the estimates using weighting scheme (i). The estimate for female immigrants, changes marginally compared with scheme (ii), but is now statistically insignificant. The estimate for male immigrants is negative (-0.0322 log points) and is not statistically significant. This exercise shows that pre-programme earnings do not seem to matter.

It is puzzling to find that well-meaning programmes have a negative impact on individual outcomes. My result is, however, not new in Sweden. Several previous studies evaluating active labour market programmes appear to indicate that they are harmful for re-employment (see Calmfors *et al.*, 2002 for a review). However, my result seems to be in line with a previous study by Dickinson *et al.* (1986) who evaluate the participation in the Comprehensive Employment and Training Act (CETA) on earnings. They found a negative significant impact on earnings for males and a modest positive earnings effect for females, although not at a statistically significant level. However, in a later study by the same authors (Dickinson *et al*., 1987) they find a statistically significant positive effect even on females' earnings, which results from the fact that females who participated in CETA are, partly, more likely to be employed, but also because of a positive effect on hours worked per week and weeks worked per year among those who worked. Even though my results seem to be in line with previous research, one wonders what the potential explanation is for the negative effect for Swedish males. In this paper, individuals who also participate at the compulsory level are included. However, if individuals who participate at the compulsory level in ASE are eliminated and the sample is re-weighted with the new population distribution, the result still shows a negative earnings effect for males.

4.3 Sensitivity analysis of the basic results

In order to asses whether the findings are robust, this section provides further elaboration of the basic specification. The first sensitivity analysis concerns whether the introduction of interaction terms changes the basic results. Two sets of interaction terms are considered, but only one at a time. The first is a set of interaction terms between the fixed effects entry year (α_τ) with the dummy for pre-programme earnings ($DINC_{\tau-1}$). The second is a set of interactions between α_τ and pre-programme earnings ($INC_{\tau-1}$). These interaction terms are

introduced because the programme may have different effects in different stages of the business cycle. In addition, there may be different selection into the programme depending on the cycle. The interaction terms should take care of such concerns. The results of the basic specification, adding the interaction terms as controls, are shown in *Table 3*.

Table 3 OLS estimates of the effect of adult participation in ASE on absolute annual earnings in 2000, expressed in percentage terms

	Weighting scheme (i)		Weighting scheme (ii)	
	Male	Female	Male	Female
The Swedish sample				
BS adding interaction term $\alpha_\tau * DINC_{\tau-1}$				
Programme effect	-0.0370***	0.0014	-0.0349***	0.0040
	(0.0107)	(0.0073)	(0.0108)	(0.0075)
BS adding interaction term $\alpha_\tau * INC_{\tau-1}$				
Programme effect	-0.0315***	0.0027	-0.0292***	0.0046
	(0.0107)	(0.0074)	(0.0108)	(0.0075)
The immigrant sample				
BS adding interaction term $\alpha_\tau * DINC_{\tau-1}$				
Programme effect	0.0632	0.0926*	0.0507	0.0922*
	(0.0562)	(0.0495)	(0.0623)	(0.0522)
BS adding interaction term $\alpha_\tau * INC_{\tau-1}$				
Programme effect	0.0607	0.0854*	0.0531	0.0865*
	(0.0567)	(0.0493)	(0.0628)	(0.0522)

Notes: Weighting scheme (i): Age and level of education by entrance year in ASE, where the entrance year is applied only to the Swedish sample. Weighting scheme (ii): Adds the dummy for pre-programme earning as a weighting variable. The basic specification (BS) control for age, age squared, educational level, marital status, country of birth, county dummies, dummies for the ASE entrance year, pre-programme earnings ($INC_{\tau-1}$) and dummies for zero earnings in pre-programme earning years ($DINC_{\tau-1}$). Cluster-adjusted standard errors are in parentheses. Level of significance: *** = 1 per cent level, * = 10 per cent level.

Introducing interaction terms does not change the results much. Thus, the estimates of the basic specification seem to be robust. The general findings for the Swedish sample are that estimates for males are less negative, whereas no changes appear for females. In general, the estimates for both male and female immigrants are somewhat more positive compared with the basic specification.

Another interesting feature would be to see whether the programme effect differs by age. To investigate this issue, the sample is split into young adults (25–42 years of age) and older adults (43–55 years of age). In a recent study,

Hill (2001) finds that when women participated in post-school-age training at an age of 30–44, the wage effect of training was higher at a higher age.

Table 4 presents the results. This analysis is only performed on the Swedish sample, since most of the individuals in the immigrant sample contain young adults.

Table 4 OLS estimates of the effect of adult participation in ASE for the Swedish sample using two age-intervals on absolute annual earnings in 2000, expressed in percentage terms

	Weighting scheme (i)		Weighting scheme (ii)	
	Male	Female	Male	Female
Aged 25–42				
Programme effect	-0.0285**	0.0002	-0.0262**	-0.0006
	(0.0132)	(0.0097)	(0.0132)	(0.0095)
Aged 43–55				
Programme effect	-0.0575***	-0.0002	-0.0629***	0.0003
	(0.0107)	(0.0113)	(0.0191)	(0.0120)

Notes: Weighting scheme (i): Age and level of education by entrance year in ASE, where the entrance year is applied only to the Swedish sample. Weighting scheme (ii): Adds the dummy for pre-programme earning as a matching variable. The basic specification controls for age, age squared, educational level, marital status, country of birth, county dummies, dummies for the ASE entrance year, pre-programme earnings and related dummies for zero earnings in the pre-programme earning years. Cluster-adjusted standard errors are in parentheses. Level of significance: *** = 1 per cent level, ** = 5 per cent level.

The results in *Table 4* suggest that adult males who train at a young age, i.e. 25–42 have a lower earnings reduction than adult males entering training at a higher age (43–55 years of age). This implies that if males should participate in ASE, they should do so when they are young. No evidence is found for the females, however.

Since it is likely that participation in different courses may affect ASE participants differently I also investigate the programme effect if the main subject as a control is added. The estimated programme effect of course depends on the reference group. Therefore, all programme effects using the various main subjects as reference groups are presented. The analysis is only performed using the Swedish sample. The results are displayed in *Table 5*. Note that the main subject "art", which also include music and drama, is dropped due to too few observations.

Table 5 OLS estimates of the effect of adult participation in ASE for the basic specification of the Swedish sample adding main subject as a control for absolute annual earnings in 2000, expressed in percentage terms

Programme effect when each of the following main subject is the reference group	Weighting scheme (i)		Weighting scheme (ii)	
	Male	Female	Male	Female
Behavioural science, art subjects	0.0740	0.0024	0.0686	-0.0020
	(0.0472)	(0.0306)	(0.0468)	(0.0308)
Business economics, administration	-0.0160	0.0256	-0.0098	0.0311
	(0.0345)	(0.0227)	(0.0348)	(0.0232)
Maths, science	-0.0394	0.0323	-0.0400	0.0333
	(0.0255)	(0.0257)	(0.0256)	(0.0262)
Medicine, health services, nursing	-0.2258***	0.0227	-0.2219***	0.0191
	(0.0831)	(0.0277)	(0.0839)	(0.0281)
Social science, information technology	-0.0676***	-0.0052	-0.0636***	-0.0014
	(0.0239)	(0.0161)	(0.0241)	(0.0164)
Language and linguistics	-0.0313*	0.0067	-0.0302	0.0069
	(0.0183)	(0.0119)	(0.0186)	(0.0121)
Technology	-0.0358	-0.0565	-0.0323	-0.0575
	(0.0219)	(0.0363)	(0.0220)	(0.0370)
No related subjects	-0.2075**	-0.0252	-0.2105**	-0.0245
	(0.0823)	(0.0158)	(0.0825)	(0.0161)

Notes: Weighting scheme (i): Age and level of education by entrance year in ASE, where the entrance year is applied only to the Swedish sample. Weighting scheme (ii): Adds the dummy for pre-programme earning as a matching variable. The basic specification controls for age, age squared, educational level, marital status, country of birth, county dummies, dummies for the ASE entrance year, pre-programme earnings and related dummies for zero earnings in the pre-programme earning years. Cluster-adjusted standard errors are in parentheses. Level of significance: *** = 1 per cent level, ** = 5 per cent level, * =10 per cent level.

Following addition of the main subject as a control, the basic pattern still seems to apply. That is, the programme effect for males are still negative and in some cases even statistically significant; whereas no evidence is found for the females. Furthermore, the males' distribution of main subjects differs from the females' distribution of main subjects. Is it the male distribution over subjects that give the negative estimate for males? Would females have a similar negative effect had they chosen "male" subjects? The answer to the latter question is no. The weighted average of the female estimate, using the male distribution as weights, is still positive. Thus, differences in the gender distribution over main subjects do not seem to drive the different point estimates for males and females result.

5 Concluding remarks

Very little attention has been paid to the labour market effects of participation in adult secondary education (ASE), although the programme has been offered since 1968. The only two previous studies focus solely on the short-run earnings effects of participating in the ASE (Alm Stenflo, 2000; Stenberg, 2003).

The short run effects may be very misleading as a basis for evaluation, since one of the objectives of the program is to prepare for higher education. Consequently, the purpose of this paper has been to provide the first evidence of the long-run earnings effects of participating in ASE. The analysis is based on a unique database; the Longitudinal Individual Data for Sweden. The analysis estimates earnings effects for males and females and also for Swedish persons and immigrants.

The main results are the following. In the case of Swedish males, participation in ASE is associated with a reduction in earnings. Their reduction is around three and a half per cent. No evidence is found for the Swedish females, however. The programme effect for the female immigrants is, on the other hand, positive and significant on the ten per cent level. For the female immigrants, the earning increase is around nine per cent. These findings appear to be robust to reasonable alternative specifications. For males, the size of the programme effect depends on age. The effects are less negative for young adults and more negative for old adults compared with the main result. For old male adults, the reduction is almost six per cent.

Thus, the earnings effects of ASE are rather dismal, at least for the Swedish population. This may suggest that the value of larger-scale interventions such as the Adult Education Initiative (AEI) is limited. It seems to me that the long-run effects of the AEI are an important topic for future research.

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Appendix A – ASE characteristics of the participants

Table A1 ASE characteristics of the participants by entrance year, the Swedish sample

	Male						*Female*					
	1988	1989	1990	1991	1992	1993	1988	1989	1990	1991	1992	1993
Educational level in ASE												
Compulsory	15.1	20.3	22.2	22.9	26.0	34.5	19.6	20.3	20.0	22.6	23.4	31.5
Upper secondary	51.0	35.8	38.7	42.0	48.6	54.6	37.3	30.5	39.8	34.0	36.1	49.5
Post-secondary training	32.9	43.7	39.2	34.6	24.9	11.0	42.6	49.1	50.1	42.8	39.9	18.9
Unknown	0.9	0.3	0.0	0.5	0.6	0.0	0.5	0.1	0.1	0.6	0.6	0.2
Day or evening course in ASE												
Day	32.7	37.6	40.3	43.2	55.9	66.4	37.4	44.4	42.1	47.9	51.5	64.4
Evening	66.4	62.2	59.7	56.3	43.5	33.6	62.1	55.5	57.8	51.5	47.9	35.5
Unknown	0.9	0.3	0.0	0.5	0.6	0.0	0.5	0.1	0.1	0.6	0.6	0.2
Main subjects in ASE												
Behavioural science, art subjects	4.4	3.3	4.1	5.4	4.0	9.0	6.4	5.5	4.1	5.6	6.8	10.2
Art, music, drama	0.1	0.0	0.0	0.0	0.0	0.0	0.9	0.5	0.6	0.7	0.3	0.2
Business economics, administration	21.3	17.0	10.0	13.4	11.9	11.4	23.6	15.5	16.5	13.0	11.5	13.9
Maths, science	33.3	27.7	33.5	34.9	43.5	51.5	25.3	19.4	20.0	23.8	27.8	39.8
Medicine, health services, nursing	0.8	0.5	1.4	0.5	0.6	0.2	3.7	4.4	5.3	5.6	5.0	6.7
Social science, IT	28.3	33.3	34.3	31.5	34.5	41.2	30.3	27.9	29.8	28.4	32.5	37.3
Language and linguistics	54.3	40.9	45.7	52.0	53.1	70.5	50.7	42.6	40.8	48.9	49.1	60.7
Technology	21.7	16.2	14.1	12.4	6.8	9.8	5.4	3.1	3.3	4.6	6.8	7.0
No related subjects	2.7	1.5	0.8	1.2	1.7	1.3	16.0	17.8	14.7	12.4	9.5	6.1
Unknown	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.0	0.3
Mean number of main subjects	1.7	1.4	1.4	1.5	1.6	2.0	1.6	1.4	1.4	1.4	1.5	1.8

Table A2 ASE characteristics of the participants by entrance year, the immigrant sample

	Male						*Female*					
	1988	1989	1990	1991	1992	1993	1988	1989	1990	1991	1992	1993
Educational level in ASE												
Compulsory	54.9	67.7	75.5	62.3	58.8	84.9	54.2	62.5	46.7	67.2	70.8	80.3
Upper secondary	35.3	14.7	10.2	18.9	20.6	11.6	27.1	15.6	10.0	17.2	12.5	14.5
Post-secondary training	9.0	17.7	14.3	17.0	20.6	3.5	18.8	21.9	43.3	15.5	16.7	4.7
Unknown	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Day or evening course in ASE												
Day	43.1	44.1	40.8	49.1	58.8	79.1	47.9	56.3	66.7	48.3	58.3	83.9
Evening	56.9	55.9	59.2	49.1	41.2	20.9	52.1	43.8	33.3	51.7	41.7	15.5
Unknown	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Main subjects in ASE												
Behavioral science, art subjects	5.9	0.0	2.0	1.9	2.9	1.7	4.2	0.0	0.0	3.5	12.5	4.2
Art, music, drama	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
Business economics, administration	15.7	2.9	0.0	1.9	5.9	2.9	12.5	6.3	6.7	3.5	0.0	2.1
Maths, science	45.1	20.6	26.5	18.9	35.3	32.6	20.8	18.8	16.7	15.5	16.7	33.2
Medicine, health services, nursing	0.0	2.9	0.0	0.0	2.9	0.6	2.1	0.0	0.0	3.5	0.0	3.1
Social science, IT	29.4	23.5	32.7	35.9	41.2	19.2	35.4	31.3	26.7	22.4	33.3	19.7
Language and linguistics	80.4	85.3	81.6	84.9	73.5	93.6	77.1	75.0	56.7	84.5	87.5	92.2
Technology	3.9	5.9	2.0	5.7	2.9	2.9	10.4	0.0	3.3	10.3	4.2	3.6
No related subjects	3.9	0.0	0.0	1.9	0.0	1.7	2.1	9.7	26.7	3.5	0.0	0.5
Mean number of main subjects	1.8	1.4	1.4	1.5	1.6	1.6	1.6	1.4	1.4	1.5	1.5	1.6

Appendix B – Descriptive statistics

Table B1 Means of explanatory variables by ASE participants and the comparison group for the immigrant sample using weighting scheme (i)

Variables	Male participants	Male comparison	Female participants	Female comparison
	Mean	Mean	Mean	Mean
Age, τ-1	31.2 (6.3)	31.3 (6.3)	32.5 (6.6)	32.6 (6.7)
Age squared, τ-1	1011.9 (444.3)	1017.9 (443.9)	1101.4 (466.0)	1107.7 (480.1)
3-year upper secondary school, τ-1	0.399	0.403	0.351	0.351
University, τ-1	0.321	0.318	0.312	0.310
Pre-programme earnings in τ-1	28 260 (41 024)	64 280 (69 422)	25 761 (35 846)	46 232 (50 260)
Proportion of zero earnings in τ-1	0.430	0.227	0.403	0.266
Proportion of entrance in ASE 1989	0.087	0.114	0.083	0.113
Proportion of entrance in ASE 1990	0.125	0.153	0.078	0.149
Proportion of entrance in ASE 1991	0.135	0.173	0.151	0.176
Proportion of entrance in ASE 1992	0.087	0.220	0.062	0.223
Proportion of entrance in ASE 1993	0.438	0.245	0.501	0.248
Unmarried, τ-1	0.445	0.417	0.210	0.216
Divorced, τ-1	0.061	0.057	0.073	0.075
Widow(er), τ-1	0.003	0.001	0.013	0.009
Other immigrants, τ-1	0.954	0.844	0.914	0.771
No. of observations	393	3 777	385	3 000

Notes: Standard deviation is in parentheses. τ is the ASE entrance year.

Table B2 Means of explanatory variables by ASE participants and the comparison group for the Swedish sample using weighting scheme (ii)

Variables	Male participants	Male comparison	Female participants	Female comparison
	Mean	Mean	Mean	Mean
Age, τ-1	34.5 (7.9)	35.7 (8.5)	36.3 (7.6)	37.5 (8.7)
Age squared, τ-1	1254.5 (578.0)	1344.5 (644.3)	1374.8 (564.9)	1483.7 (663.3)
Compulsory, τ-1	0.156	0.143	0.190	0.158
2-year upper secondary school, τ-1	0.361	0.359	0.384	0.382
3-year upper secondary school, τ-1	0.161	0.169	0.106	0.113
University, τ-1	0.239	0.227	0.244	0.236
Pre-programme earnings in τ-1	97 151 (54 664)	124 482 (75 786)	70 050 (40 283)	84 704 (49 909)
Pre-programme earnings in τ-2	88 179 (47 275)	108 382 (65 289)	61 688 (35 820)	73 344 (43 286)
Pre-programme earnings in τ-3	76 372 (39 567)	91 234 (52 538)	52 647 (30 263)	61 984 (35 816)
Pre-programme earnings in τ-4	63 831 (33 240)	75 891 (43 573)	44 328 (25 472)	52 122 (29 828)
Proportion of zero earnings in τ-1	0.032	0.033	0.031	0.036
Proportion of zero earnings in τ-2	0.025	0.028	0.039	0.035
Proportion of zero earnings in τ-3	0.023	0.025	0.034	0.036
Proportion of zero earnings in τ-4	0.020	0.025	0.037	0.038
Proportion of entrance in ASE 1989	0.149	0.157	0.176	0.160
Proportion of entrance in ASE 1990	0.140	0.163	0.156	0.165
Proportion of entrance in ASE 1991	0.155	0.168	0.147	0.170
Proportion of entrance in ASE 1992	0.067	0.179	0.059	0.175
Proportion of entrance in ASE 1993	0.169	0.180	0.117	0.174
Unmarried, τ-1	0.516	0.498	0.329	0.329
Divorced, τ-1	0.070	0.063	0.112	0.102
Widow(er), τ-1	0.003	0.002	0.008	0.011
Nordic, τ-1	0.030	0.032	0.046	0.045
Other immigrants, τ-1	0.062	0.042	0.049	0.038
No. of observations	2 645	261 406	5 752	228 430

Notes: Standard deviation is in parentheses. τ is the ASE entrance year.

Table B3 Means of explanatory variables by ASE participants and the comparison group for the immigrant sample using weighting scheme (ii)

Variables	Male participants	Male comparison	Female participants	Female comparison
	Mean	Mean	Mean	Mean
Age, τ-1	31.2	31.3	32.5	32.6
	(6.3)	(6.3)	(6.6)	(6.6)
Age squared, τ-1	1011.9	1018.8	1101.4	1106.2
	(444.3)	(448.9)	(466.0)	(475.2)
3-year USS, τ-1	0.229	0.172	0.190	0.177
University, τ-1	0.321	0.318	0.312	0.310
Pre-programme earnings in τ-1	28 260	47 738	25 761	37 659
	(41 024)	(66 592)	(35 846)	(48 852)
Proportion of zero earnings in τ-1	0.430	0.430	0.403	0.403
Proportion of entrance in ASE 1989	0.087	0.105	0.083	0.114
Proportion of entrance in ASE 1990	0.125	0.144	0.078	0.148
Proportion of entrance in ASE 1991	0.135	0.162	0.151	0.170
Proportion of entrance in ASE 1992	0.087	0.227	0.062	0.225
Proportion of entrance in ASE 1993	0.438	0.276	0.501	0.255
Unmarried, τ-1	0.445	0.396	0.210	0.203
Divorced, τ-1	0.061	0.053	0.073	0.069
Widow(er), τ-1	0.003	0.001	0.013	0.008
Other immigrants, τ-1	0.954	0.875	0.914	0.800
No. of observations	393	3 642	385	2 964

Notes: Standard deviation is in parentheses. τ is the ASE entrance year.

Appendix C – Parameter estimates

Table C1 Parameter estimates for the Swedish sample from the basic specification using weighting scheme (i)

Variables	*Male*		*Female*	
	Parameter estimates	Cluster-adjusted standard error	Parameter estimates	Cluster-adjusted standard error
Programme effect	-9 528.705	2 729.085	475.5337	1 252.567
Age, τ-1	6 274.3	1 146.7	13 707.9	506.9
Age square, τ-1	-167.9	14.7	-216.2	6.3
Compulsory, τ-1	-30 250.9	2 814.3	7 519.7	1 590.0
2-year upper secondary school, τ-1	-17 902.9	3 226.0	15 284.4	1 387.7
3-year upper secondary school τ-1	26 490.2	4 044.5	38 068.3	2 230.8
University, τ-1	101 072.0	2 817.4	63 856.5	2 737.7
Pre-programme earnings in τ-1	1.029	0.147	0.936	0.138
Pre-programme earnings in τ-2	0.309	0.103	0.111	0.016
Pre-programme earnings in τ-3	0.055	0.075	0.030	0.069
Pre-programme earnings in τ-4	0.113	0.129	0.209	0.045
Dummy for zero earnings in τ-1	37 635.2	12 162.9	388.3	6 580.1
Dummy for zero earnings in τ-2	4 623.1	5 681.3	-441.8	1 576.1
Dummy for zero earnings in τ-3	-11 696.6	4 882.7	-3 546.0	1 701.9
Dummy for zero earnings in τ-4	-16 613.1	7 352.6	-1 935.1	1 789.9
Dummy for entrance in ASE 1989	-17 784.8	970.0	-8 278.6	549.9
Dummy for entrance in ASE 1990	-36 171.7	2 068.6	-20 814.6	1 281.1
Dummy for entrance in ASE 1991	-65 368.5	4 342.2	-39 872.8	2 852.8
Dummy for entrance in ASE 1992	-96 525.1	5 816.1	-56 750.4	3 592.0
Dummy for entrance in ASE 1993	-106 296.7	4 789.3	-64 756.2	2 610.7
Unmarried, τ-1	-18 524.4	2 399.6	-15 770.4	1 260.7
Divorced, τ-1	-20 213.2	2 675.6	-13 681.4	2 065.5
Widow(er), τ-1	-9 670.5	11 181.3	-8 419.9	3 937.7
Nordic, τ-1	-18 926.4	4 576.3	-12 451.3	2 130.8
Other immigrants, τ-1	-41 867.4	3 320.7	-33 153.7	2 581.3
Constant	157 264.0	23 004.7	-98 631.1	9 581.6
R^2-adjusted	0.1904		0.3302	
F-value	257.58		411.37	
Mean income	254 918.3		170 330.6	

Notes: The regression also controls for county dummies. τ is the ASE entrance year.

Table C2 Parameter estimates for the immigrant sample from the basic specification using weighting scheme (i)

Variables	*Male*		*Female*	
	Parameter estimates	Cluster-adjusted standard error	Parameter estimates	Cluster-adjusted standard error
Programme effect	9 649.262	8 902.603	10 947.29	5 956.828
Age, τ-1	-3 210.6	5 357.8	13 650.9	3 769.8
Age square, τ-1	-7.9	72.2	-208.1	53.5
3-year upper secondary school τ-1	18 476.9	7 818.4	30 322.2	6 538.5
University, τ-1	100 203.2	12 085.2	73 940.0	8 764.0
Pre-programme earnings in τ-1	0.899	0.120	0.664	0.093
Dummy for zero earnings in τ-1	7 099.7	9 987.7	-2 375.5	6 246.3
Dummy for entrance in ASE 1989	-14 480.2	7 444.9	-6 625.3	5 289.9
Dummy for entrance in ASE 1990	-30 045.0	11 300.9	-17 241.1	6 282.9
Dummy for entrance in ASE 1991	-53 234.0	14 123.9	-28 323.5	7 210.1
Dummy for entrance in ASE 1992	-69 469.5	14 848.8	-40 843.0	7 637.0
Dummy for entrance in ASE 1993	-66 075.6	14 508.3	-44 603.6	7 558.6
Unmarried, τ-1	-34 109.5	9 069.7	19 126.1	8 363.8
Divorced, τ-1	-10 961.4	14 164.8	9 879.8	13 111.8
Widow(er), τ-1	19 228.5	46 956.9	3 179.8	19 803.1
Other immigrants, τ-1	-66 239.2	17 840.7	-15 320.1	9 906.5
Constant	291 202.3	99 242.3	-116 579.2	63 816.7
R^2-adjusted	0.2448		0.2414	
F-value	7.20		9.30	
Mean income	159 145		121 028.8	

Notes: The regression also controls for county dummies. τ is the ASE entrance year.

Table C3 Parameter estimates for the Swedish sample from the basic specification using weighting scheme (ii)

Variables	*Male*		*Female*	
	Parameter estimates	Cluster-adjusted standard error	Parameter estimates	Cluster-adjusted standard error
Programme effect	-8 938.204	2 723.887	631.337	1 244.489
Age, τ-1	6 062.6	1 250.7	1 4826.6	503.9
Age square, τ-1	-164.4	15.7	-231.2	6.2
Compulsory, τ-1	-34 544.2	2 795.2	5 368.5	1 581.9
2-year upper secondary school, τ-1	-21 486.6	3 025.4	12 546.5	1 341.6
3-year upper secondary school τ-1	19 407.6	3 717.8	33 983.4	2 201.6
University, τ-1	92 179.5	3 075.9	59 242.0	2 517.6
Pre-programme earnings in τ-1	0.962	0.107	0.931	0.126
Pre-programme earnings in τ-2	0.374	0.118	0.093	0.035
Pre-programme earnings in τ-3	0.042	0.079	0.067	0.045
Pre-programme earnings in τ-4	0.111	0.121	0.190	0.042
Dummy for zero earnings in τ-1	45 098.1	11 245.9	8 024.6	6 166.0
Dummy for zero earnings in τ-2	10 152.1	7 013.8	1 391.5	1 530.3
Dummy for zero earnings in τ-3	-12 330.4	5 100.9	-2 342.9	1 667.7
Dummy for zero earnings in τ-4	-17 286.4	7 057.5	-1 513.3	1 801.3
Dummy for entrance in ASE 1989	-14 383.1	703.4	-7 792.8	440.4
Dummy for entrance in ASE 1990	-33 773.7	1 809.9	-18 956.7	1 080.9
Dummy for entrance in ASE 1991	-64 118.2	3 920.5	-37 409.5	2 439.7
Dummy for entrance in ASE 1992	-92 647.1	5 718.7	-53 374.5	2 995.9
Dummy for entrance in ASE 1993	-101 574.7	4 874.7	-60 096.7	2 146.9
Unmarried, τ-1	-19 060.8	2 288.5	-14 822.0	1 254.8
Divorced, τ-1	-19 607.7	2 550.6	-11 797.4	1 909.3
Widow(er), τ-1	-9 125.9	10 274.7	-4 400.1	3 701.8
Nordic, τ-1	-19 362.1	4 322.5	-12 756.3	2 086.3
Other immigrants, τ-1	-39 627.6	3 323.5	-32 369.4	2 545.5
Constant	164 210.9	24 957.7	-118 375.5	9 644.8
R^2-adjusted	0.2054		0.3333	
F-value	280.61		435.77	
Mean income	251 218.5		166 798	

Notes: The regression also controls for county dummies. τ is the ASE entrance year.

Table C4 Parameter estimates for the immigrant sample from the basic specification using weighting scheme (ii)

Variables	*Male*		*Female*	
	Parameter estimates	Cluster-adjusted standard error	Parameter estimates	Cluster-adjusted standard error
Programme effect	6 959.33	8 973.423	10 402.66	6 001.525
Age, τ-1	-1 952.6	4 910.6	12 260.9	3 537.9
Age square, τ-1	-21.5	66.2	-189.7	49.8
3-year upper secondary school τ-1	24 696.2	10 913.2	28 676.7	7 882.3
University, τ-1	87 198.8	11 583.3	65 999.8	8 529.6
Pre-programme earnings in τ-1	0.873	0.117	0.687	0.096
Dummy for zero earnings in τ-1	3 352.8	10 041.6	-3 584.3	6 499.3
Dummy for entrance in ASE 1989	-12 346.3	7 922.4	-10 143.7	5 620.6
Dummy for entrance in ASE 1990	-25 241.2	10 870.1	-23 076.1	6 672.4
Dummy for entrance in ASE 1991	-49 802.3	12 593.9	-31 465.1	7 548.4
Dummy for entrance in ASE 1992	-63 147.0	13 184.4	-44 705.9	7 810.5
Dummy for entrance in ASE 1993	-58 492.1	12 760.2	-48 548.9	7 821.4
Unmarried, τ-1	-34 283.5	8 958.6	18 390.3	8 130.1
Divorced, τ-1	-3 229.9	15 605.2	14 214.6	13 041.7
Widow(er), τ-1	11 484.8	53 986.5	-885.2	17 331.0
Other immigrants, τ-1	-60 594.3	17 084.0	-16 810.2	9 935.8
Constant	264 405.6	90 162.73	-80 239.4	60 596.4
R^2-adjusted	0.2400		0.2479	
F-value	7.37		9.54	
Mean income	144 013.8		115 358.7	

Notes: The regression also controls for county dummies. τ is the ASE entrance year.

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