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Unemployment and subsequent earnings for Swedish college graduates

A study of scarring effects

Unemployment and subsequent earnings for Swedish college graduates: A study of scarring effects*

by

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Abstract

The purpose of this paper is to study the long term effects of the college-to-work transition. The results reveal that unemployment immediately upon graduation has substantial and permanent effects on individual future earnings. Even for very short unemployment spells, estimated effects are statistically significant. These results are stable for the inclusion of a rich set of observable control variables, including grade point average from high school and parental educational level, and for choice of method i.e. OLS and propensity score matching.

Keywords: Scarring, State dependence, Higher education, College-to-work
JEL-codes: J64, J24, J31

Sammanfattning
Ger glappet mellan högskola och arbete långsikta effekter?
Syftet med studien är att undersöka hur arbetslöshet i samband med examen från högskolan påverkar de framtida inkomsterna. Resultaten visar att arbetslöshet vid examen från högskolan har ett starkt, bestående och negativt samband med den framtida inkomsten. Individer som upplever arbetslöshet vid examen har i genomsnitt 30 procent lägre årlig arbetsinkomst fem år efter examen, jämfört med individer som får ett arbete i samband med examen. Det skattade sambandet för akademiker är ungefär dubbelt så stort jämfört med sambandet för gymnasieutbildade. Inte heller finns det tecken på att det skattade inkomstgapet skulle avta med tiden, vilket det gör för gymnasieutbildade.

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1   Introduction

It is a well documented result that individuals unemployed in one period are more likely to both earn less and to be unemployed in future periods. There are three fundamental associations between unemployment and future labour market outcomes.[1] First, *individual heterogeneity* implying that different individuals due to their characteristics are more vulnerable to unemployment, and that the very same characteristics will have a negative effect on future employment opportunities and earnings. This could be observable characteristics as e.g. work experience or unobservable characteristics as e.g. ability or attitudes. Second, *scarring* which means that the mere experience of unemployment will increase future unemployment risks and/or reduce future earnings, either through effects associated with human capital, signalling or other mechanisms. Human capital theory indicates that unemployment will reduce individual productivity due to e.g. deterioration of skills and foregone work experience.[2] Signalling suggests that, since information is costly and individual productivity might be imperfectly observed, employers take past periods of unemployment as signalling low productivity. Third, *labour market persistence* meaning that individuals get unemployed due to labour market conditions and this will affect future labour market outcomes if those conditions are persistence.

Previous work on scarring suggests that it is an empirically observable phenomenon.[3] Most studies find that youth unemployment has serious long-term negative effects on incomes, but not as strong results on future risk of unemployment. The substantial effects of early unemployment have though been found to be temporary, i.e. to diminish with time since experienced unemployment.

A more recent literature examines the source of estimated scarring effects. Lupid & Ordine (2002), using Italian data, and Biewen & Steffes (2008), using German data, show that unemployment is less serious in high unemployment environments. Fares & Tiongson (2007) using Bosnian Herzegovinian data show that scarring effects are

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[1] See Gregg (2001). Nordström Skans (2004) follow the same outline.
[2] See e.g. Edin & Gustavsson (2004) for an empirical study on time out of employment and skill depreciation.
[3] See e.g. Ellwood (1982), Corcoran (1982), Heckman & Borjas (1980), Mroz & Savage (2001), Arulampalam et al (2000), Arulampalam (2001, 2002), Gregory & Jukes (2001), Gregg (2001), Ollikainen (2006).

substantially larger for more highly educated individuals; about three times the estimated effect for individuals with vocational or secondary education. The results in these studies are interpreted as a consequence of signal effects, i.e. that unemployment in high unemployment environments is considered as "normal" and therefore not signal poor quality workers.

A related literature examines the importance of labour market conditions at graduation. Stevens (2007), using data on German men, and Oreopoulos et al (2008), studying Canadian college graduates, show that high unemployment rates at graduation will have a negative impact on future earnings. This is interpreted as e.g. that recessions may initially lead workers to start a less attractive employment.

Not much relevant evidence for Swedish data exists. The one exception is Nordström Skans (2004), who examines scarring effects on earnings of the first labour market experience for youth graduating from vocational high school programmes during 1991-1994.[4]

This paper contributes to the existing literature by focusing on the college-to-work transition. Very few previous studies on scarring consider highly educated individuals and no previous study examine unemployment immediately upon graduation and long-term consequences for this group.

Unemployment rates are relatively low and unemployment spells relatively short for more highly educated individuals, implying that unemployment is not as serious compared to other groups.[5] Though facing relatively low unemployment rates and short unemployment spells, unemployment upon graduation may have substantial long term effects. First, the amount of time it takes to gain stable employment following graduation has effects on the returns to education, and consequently it may have long-term effects on skill accumulation and incomes.[6] These effects may be even more

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[4] Another, somewhat related study, on Swedish data is Eliasson & Storrie (2004) who study the effect of plant closing due to recession.

[5] See Gartell et al (2007) who show that job creation and job destruction rates as well as hiring and separation rates are higher for more highly educated individuals indicating a labour market where unemployment spells, on average, are relatively short. Micro data studies on unemployment duration confirm this finding, see e.g. Gartell (2008a), Thoursie (1998)

[6] E.g. Holmlund et al (2006) show that working experience, subsequent to graduation, is important for individual incomes at 35 years of age. Nordström Skans (2004) show that unemployment during the first year after graduation for high school graduates have serious long term effects on earnings.

serious for more highly educated individuals since educational investments as well as foregone earnings generally are higher.[7] Second, as more highly educated individuals typically have relatively more career opportunities and hence a steeper wage curve, delayed labour market entry will have more serious consequences. Moreover, unemployment and earnings will have large effects on the tax income for the government.

Studying long-term effects of unemployment on earnings, the main empirical issue is unobserved heterogeneity. Thus, it may be the same characteristics that affect unemployment at graduation and future earnings. In this case, estimated effects will be upwardly biased. The empirical strategy in this paper is to control for a rich set of observable covariates.

Data is provided from IFAU (Institute for Labour Market Policy Evaluation), and consists of a number of administrative data sets that are merged. The sample studied consists of all graduates from Stockholm and Uppsala University during 1991-1999. A detailed discussion about empirical strategy and data is provided in section 2.

The results in this study e.g. reveal a significant and negative association between unemployment at graduation and individual annual earnings five years later. The estimated effect is about -30%, which is approximately twice the estimated effect presented for high school graduates in Nordström Skans (2004). Possible explanations for the larger effects for more highly educated individuals are e.g. that unemployment is not as frequent and therefore may either induces more negative selection into unemployment or more serious signal effects, or both. Moreover, in contrast to high school graduates, the effect is persistent over time, i.e. the estimated effect is about the same also ten years subsequent graduation. This can possibly be explained by that more highly educated individuals have more career opportunities and hence steeper wage curves. As a result, delayed labour market entry may have more long lasting consequences.

The paper proceeds as follows. The empirical setup and data are discussed in section 2. The results are presented in section 3. Section 4 concludes.

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[7] However, higher education is free of charge in Sweden. Grants and loans are available to cover living expenses. The

2 Empirical setup

In this section the empirical strategy, sample restrictions and data are presented. The empirical strategy includes a discussion of models used and empirical considerations.

2.1 Empirical strategy

The main identification strategy used in this paper is to capture joint determinants of unemployment at graduation and future earnings by using a rich set of observable covariates. To be able to interpret estimated effects as causal, all factors that affect both the unemployment and future earnings must be controlled for.

Good instruments are hard to come by and any instrument that is not exogenous may bias the results substantially.[8] Instruments previously used to approximate for individual unemployment are local unemployment rates. A few studies use random effect probit models including a Heckman correction term. Those models are however dependent on strong distributional assumptions on heterogeneity. Yet another method is the difference-in-difference technique. This technique relies on the assumptions of parallel trends and that pre-unemployment wage should capture any unobserved characteristics that influence wages so that the change in wage across affected and unaffected groups is net of such unobserved differences. Even if the parallel trends assumption holds the estimate will be biased if the reason for job loss was due to that e.g. the pre-unemployment wage being too high as a result of a poor match. In the case of transition from college-to-work, there exists no pre-unemployment wage. Further, another option is to use sibling fixed effects, this would however reduce the sample and the precision of the estimates to a great extent. Moreover, to use only siblings with a university degree may possibly induce selection problems.

As a starting point, the following equation is estimated;

$$\ln y_i = \beta_1 U_i + \beta_2 X_i + \theta_i + \varepsilon_{1i}. \qquad (1)$$

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amount is independent of parental wealth.
[8] See e.g. Gregg (2001) and Gregg & Tominey (2004) for an overview of studies on unemployment scarring using different approaches.

The dependent variable is yearly log-earnings (ln y) five years following graduation. X is a vector of control variables, Θ is an unobserved individual and family component and ε is the error term. The variable of interest is a binary indicator which is one if an individual was registered at the public employment office within a year from graduation, and zero otherwise (U).

However, not just the *occurrence* of unemployment at graduation may be important for the outcome. First, individuals registering at the public employment office are registered into different categories.[9] Three main categories are examined i) full time unemployed ii) individuals with some labour market connection, i.e. part time unemployed, employed by the hour or temporarily employed and iii) on the job searchers. Second, the unemployment duration differ across individuals. Therefore, also the length of the unemployment spell will be considered.[10]

To control for unobserved factors, parental level of education and average grades from high school are used. Since the number of applicants often outnumbers available slots the grade point average from high school is generally used in the admission procedure.[11] Further, it is a well-established finding that parental educational level is the most important factor for individual educational choice.[12]

Investigating whether the estimated effect of unemployment at graduation is temporary, i.e. diminishing over time, or persistent a sub-sample of graduates during 1991-1994 is used. The effect of unemployment is estimated on annual earnings 1-10 years following graduation.

Annual earning is a combination of hourly wage and number of hours worked. The impact of unemployment upon graduation could vary across the earnings distribution if e.g. the possibility of receiving employment, getting full-time employment or reach the top part of the earnings distribution is differently affected. To examine whether the

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[9] See appendix *Table A 2* for details. From here on unemployment is defined as including all individuals registered at the public employment office, if nothing else is specified.

[10] See appendix *Table A 3* for the unemployment duration in different percentiles.

[11] See National Agency for Higher Education (2004, 2006, 2007) for details on higher education in Sweden.

[12] See e.g. Dryler (1998), SOU 2008:23 for Swedish studies on social contexts and educational choice.

effect of unemployment at graduation varies over the earnings distribution a quantile regression is estimated;[13]

$$q_\theta(\ln y_i) = \beta_{1\theta} U_i + \beta_{2\theta} X_i + \varepsilon_{\theta i}.$$ (2)

The estimated coefficients are interpreted as the earnings effects in percentile θ of the earnings distribution. The method is robust to outliers of the dependent variable.

To check the robustness of estimated results and to further examine the issue of unobserved heterogeneity, the effect of unemployment at graduation on earnings will be estimated both using different sub-samples and a somewhat different method.

As an alternative method matching treated and non-treated observations on their observable characteristics, is applied.[14] The main difference between OLS and matching is that whereas OLS relies on the assumption that conditioning *linearly* on observed covariates is adequate to remove selection bias, matching methods handle the selection problem by non-parametric or semi-parametric techniques. Avoiding functional form assumptions and imposing a common support condition can be important for reducing selection bias. Further, matching guarantees that there exist comparable treated and non-treated observations for every X.

To estimate the effect of unemployment on earnings for different sub-samples means comparing more similar individuals, i.e. individuals with more similar observed characteristics are also likely to be more similar in terms of unobserved characteristics. Moreover, under the assumption that possible bias is similar for different groups of individuals, a comparison between sub-samples is of interest even if the estimates in themselves are biased. The effect of unemployment at graduation will be estimated for women and men separately and for natives and foreign born respectively.

To consider labour market conditions at graduation, year of graduation will be controlled for throughout. In addition, an interaction variable between unemployment at graduation and aggregate unemployment rates at graduation will be used.

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[13] See e.g. Koenker & Hallock (2001), Buchinsky (1994), Koenker and Basett (1974)

2.2   Sample restrictions

All graduates from Stockholm and Uppsala University during 1991-1999 will be used in this paper. Graduate students are not included. Consequently, there are three main issues to consider. First, only graduates are used. Second, the sample is restricted to individuals graduating during the 1990s. Third, only former students from Stockholm and Uppsala University are considered. Stockholm and Uppsala University are located within the same local labour market and attract a great number of students. Both Stockholm and Uppsala University provide education within most fields of education.

The main reason for including only graduates is that the time of finishing studies for non-graduates is not registered, and hence more uncertain. Students may be divided into two groups; *program students* who enter a program usually lasting for 3 years or more, and *course students* who register at separate courses that typically last for at most one semester. However, separate courses may later be combined as to correspond to a program. Seven years from graduation about half of the program students but only 10 % of course students have graduated. Eleven years from first registration the majority, about 70 %, of program students have graduated. In total, out of all individuals with a university education lasting for three years or more about 80 % graduate.[15]

To be able to follow individuals for at least five years subsequent to graduation and since data is available up to 2004; the sample is restricted to graduates during the 1990s. The 1990s was a period of both great business cycle fluctuations and a rapid expansion of the higher educational system in Sweden suggesting that estimated effects may vary across time.[16] The estimated effects in this paper are average effects across the 1990s. However, graduation year is controlled for throughout, and aggregate unemployment rates at time of graduation will be considered.[17]

The reason to include graduates only from Stockholm and Uppsala University is to reduce problems of separating local labour market effects from college effects. Since there is not the same college located in every county and the geographic mobility

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[14] See e.g. Heckman et al (1998), Imbens (2004), Smith and Todd (2005), Dehejia & Wahba (1999, 2002) for a detailed description of the model.
[15] National Agency for Higher Education (2005)
[16] See Gartell (2008a) for a detailed background on the economic environment and the expansion of higher education during the studied period.

following graduation is limited, it would be hard to distinguish labour market effects from college effects. Graduates from Stockholm and Uppsala University essentially graduates into the same labour market. About 80 % of graduates from Stockholm University worked within the county of Stockholm or Uppsala one, five and ten years from graduation. For graduates from Uppsala University the share working within the region was about 55 %. Individuals working outside the region were quite evenly distributed among other counties.[18]

Generalizing the results, it should be kept in mind that Stockholm, being the capital of Sweden and by far the largest city, on average has lower unemployment rates compared to most regions in Sweden. As mentioned in the introduction, there is some evidence that scarring effects are more serious in low unemployment environments.[19]

2.3 Data

Data is provided from IFAU and consists of a number of administrative data sets from Statistics Sweden and the Public Employment office. The data covers the whole population of 16-65 year olds in Sweden.

As outcome variable, yearly earnings five years subsequent to graduation is used throughout the paper. Earnings are adjusted to 1991 prices. Individuals not found in the data five years subsequent graduation will be dropped, the equivalent of about 3.5 % of the population.

Control variables used are age (and age squared), sex, country of birth, area of residence (big city), educational background such as length and field of education, year and semester of graduation, number of children, average grades from high school and parental educational level. See appendix *Table A 1* for details.

Grades from high school are only available for individuals having graduated from high school 1985 or later. Consequently, grades are not available for all individuals. Grading, during the period covered in this study, consisted of a scale from 1-5; 1 being

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[17] See appendix *Figure A 1* for unemployment rates during the studier period.
[18] See e.g Gartell & Regnér (2002), (2005)
[19] To check the robustness of the results, some of the analysis in this paper will also be done using very similar data, also used in Gartell (2008b), including all colleges. Here, labour market conditions are controlled for using county of birth (grouped together to avoid some of the correlation with college choice).

the lowest grade and 5 the highest. A single administrative authority on the national level handles the admission to all colleges.

The system of higher education is financed and regulated by the Swedish parliament and the government. There are no tuition fees at Swedish universities, and the government provides financial support for all students in form of grants and loans. Parental incomes or wealth does not affect the amount students are entitled to.[20]

Only registered unemployment periods are used, i.e. unemployment registered at the public employment office. All individuals may not choose to register as unemployed. However, registration at a public employment office is mandatory in order to participate in a labour market program. For a former student to be entitled to benefits he/she must have been registered as unemployed for 90 days.[21] This provides an incentive to register as soon as one realizes the risk of unemployment.[22] Individuals may not have equal incentives to register since the benefits may differ depending on e.g. previous employment experience.[23]

The individual-level records in the event database (Händel) are used to study unemployment. All individuals registered at the unemployment office within the first year from graduation are included in the analysis. Individuals are registered into different categories depending on their situation, e.g. if they are full-time or part-time unemployed.[24]

Further, the duration of the unemployment period, which starts within a year from graduation, will be considered. If the length between two subsequent unemployment periods is less than 6 months, it will be consider as ONE period.[25] The reason is to avoid having taken into account very temporary jobs as employment.[26]

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[20] See The National Agency for Higher Education (2004, 2006, 2007) for an overview of the higher educational system in Sweden.

[21] IAF (The Swedish Unemployment Insurance Board), Fakta-PM 3:2005.

[22] More than 90% of individuals reporting unemployment where registered as unemployed at a public employment office (See Statistics Sweden (1993)). Moreover, the share of individuals reporting unemployment who have been in contact with a public employment office has been rather stable during 1992-1997 (Swedish national Labour Market Board (1998)).

[23] Gartell (2008a) includes type of benefit studying the risk of unemployment.

[24] See Appendix *Table A 2* for details.

[25] See e.g Betts et al (2000), Gartell (2008a), where 6 months is used to define a stable employment.

[26] About 14 % have a period between two subsequent periods that are greater than zero, and about 5 % have a period that is greater than 20 days.

To identify the level and field of education SUN2000 is used. If the same individual has several graduation years, the latest is used. If an individual have several degrees at different levels the same year, the highest level degree is used. If an individual have several degrees the same year at the same level and within the *same* field of education an indicator is created to specify that there were actually several degrees within the same (broad) field, and then only one degree is kept. Finally, if an individual has two degrees the same year at the same level but within *different* fields, one is randomly chosen and an individual indicator for two degrees is created (0,003 % of the population). This procedure was chosen since it concerns a very small number of individuals and is readily done.

The total number of graduates 1991-1999 from Uppsala and Stockholm University were 39 376. After data processing, this number is reduced to 36 422.

3 Empirical results

3.1 Unemployment and future earnings

The effect of unemployment at graduation on future annual earnings is estimated. First, the model is estimated without including any control variables. Second, individual characteristics such as age, sex, region of residence and children are included. However, both region of residence and children may be outcomes of the dependent variable. The wage as well as number of hours worked could influence the choice of local labour market and children may be a substitute for unemployment. On the other hand, these variables may well be important for annual earnings. Third, educational characteristics, graduation year and parental level of education are included.

Estimated results show that individuals registered at the public employment office within a year from graduation have about 30 % lower annual earnings five years later compared to individuals not registered at the public employment office upon graduation (see *Table 1*).[27]

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[27] Using very similar data, also used in Gartell (2008b), show that the estimated affect of unemployment at graduation are similar when including all colleges. The estimated effect for Stockholm and Uppsala University is -30% whereas the estimated effect including all colleges is -26%. Results can be obtained from the author.

The estimated effect of unemployment upon graduation is considerably larger compared to the results for high school graduates presented in Nordström Skans (2004). This finding is in line with e.g. Lupid & Ordine (2002) and Fares & Tiongson (2007) who shows that unemployment is less serious in higher unemployment environments, which is the case for lower educated.

Table 1. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent graduation.

	1	2	3	4	5	6	7
Unempl	-0.345**	-0.352**	-0.310**	-0.311**	-0.311**	-0.173**	-0.168**
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.026)	(0.026)
Controls							
Individual characteristics	No	Yes	Yes	Yes	Yes	Yes	Yes
Educational characteristics	No	No	Yes	Yes	Yes	Yes	Yes
Parental background	No	No	No	Yes	Yes	Yes	Yes
Graduation year	No	No	No	No	Yes	Yes	Yes
Grades	No	No	No	No	No	No	Yes
Observations	36422	36422	36422	36422	36422	21023	21023
R-squared	0.01	0.05	0.06	0.06	0.07	0.11	0.11

Note: Robust standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

As shown in *Table 1*, specification 1-5, including different control variables do not influence the estimated coefficient of unemployment much.[28] Whether region of residence and children are included or not seems to be of little importance for the estimated coefficient of unemployment. However, both region of residence and children have a significant effect on earnings. Those variables will be included throughout the analysis.

To include field and level of education did have some effect on the estimated effect of unemployment at graduation. Both field and length of education are likely to be correlated with individual ability as well as with requirements at admission. To explore

this further, grade point average from high school is included (see *Table 1*, specification 6-7). Average grades from high school are generally used at admission and are also considered to be correlated with individual ability. Note that grades are only available for individuals who graduated from high school in 1985 or later. Consequently, the age composition for the grade sample differs compared to the full sample. Using the grade sample essentially means excluding individuals over age 30. In the full sample, 32 % of graduates are above 30 years old, and hence, the grade sample is not a representative sample of graduates.[29] However, to include average grades did not have any significant effect on the estimated coefficient.[30] Educational characteristics and parental background have most likely already captured effects associated with ability.[31]

Including graduation year did not have any effect on the estimated coefficient of unemployment at graduation. To further explore the importance of labour market conditions at graduation an interaction variable between unemployment at graduation and aggregate unemployment rates at graduation is used. The result reveals that to experience unemployment in times of high aggregate unemployment rates do not have as serious consequences on future earnings as being unemployed in times of low unemployment rates.[32] If the aggregate unemployment rate increases with 1 % point, the estimated effect of unemployment decreases with about 9 % points. This confirms the previous finding that unemployment is less scarring in high unemployment environments.

To further examine possible unobserved heterogeneity and to check the robustness of the estimated results propensity score matching has also been applied. Whereas OLS relies on the assumption that conditioning linearly on observed covariates is adequate to

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[28] Full estimates are presented in Appendix *Table A 5.*

[29] To exclude the top 5% of the oldest graduates of the full sample will only marginally affect estimated effects, i.e. the strong effects are not driven by very few and old graduates.The results can be obtained from the author.

[30] Moreover, the models where estimated separately for individuals with different grade point average from high school. The estimated effect was negative and significant throughout the grade distribution. The exception were individuals with top grades for whom the estimated results where negative but not significant. Similarly, estimated effects show that the higher the level of education the smaller the scarring effect of unemployment. The results may be obtained from the author.

[31] An alternative method to control for unobserved factors, that are constant across time, is to use a fixed effect model. Nordström Skans (2004) compares sibling fixed effect estimates with OLS estimates studying scarring effects of unemployment for high school graduates in Sweden. He finds that OLS estimates are slightly upward biased but within one or two standard errors from the sibling model.

[32] The results may be obtained from the author.

remove selection bias, matching methods handle the selection problem by non-parametric or semi-parametric techniques. Single nearest neighbor matching with replacement is used. Covariates included are the basic covariates included in the OLS. The estimated effect of unemployment at graduation on earnings is -0.30 which is very close to the estimated effect by OLS of -0.31. Hence, choice of method is not important for the estimated result. Further, to check for heterogeneous impacts also the average effect of unemployment at graduation fore individuals who actually did not experience unemployment at graduation (ATU) is estimated and the average effect of experience unemployment at graduation for a randomly selected individual (ATE). If impacts are heterogeneous the effects will differ from the estimated ATT. Those effects differ slightly from the estimated ATT effect; the estimated ATU is -0.36 and ATE -0.34.[33]

3.1.1 Temporary or persistent effects

To examine whether estimated effects are temporary or persists across time, the effect of being registered at the public employment office at graduation is estimated on annual earnings 1-10 years following graduation. Graduates during 1991-1994 are used.

The estimated effects of unemployment are stable across time (see *Table 2*). The strong negative effects on earnings during the first few years following graduation should be interpreted carefully since these, in some cases, includes the unemployment period under study.

The persistent effect is in contrast to the finding in e.g. Nordström Skans (2004) and Gregory & Jukes (2001), who show diminishing effects of unemployment over time. One possible explanation is that more highly educated individuals have more career opportunities and hence steeper wage curves; the wage increases relatively fast with work experience. Therefore, it may be hard to "catch up" and a delayed labour market entry may have more persistent effects on future earnings.

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[33] The results may be obtained from the author. Psmatch2 in stat is used by Leuven & Sianesi (2003).

Table 2. Estimated effects of unemployment at graduation on annual earnings 1-10 years subsequent graduation

	1	2	3	4	5	6	7	8	9	10
Unempl	-0.423*'	-0.414**	-0.392**	-0.392**	-0.341**	-0.347*'	-0.354**	-0.366**	-0.381**	-0.404**
	(0.032)	(0.033)	(0.034)	(0.034)	(0.035)	(0.036)	(0.036)	(0.037)	(0.037)	(0.038)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	13650	13625	13613	13636	13701	13537	13427	13360	13307	13290
R-sq	0.08	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.07

Note: Robust standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

3.1.2 Quantile regression

To investigate if unemployment upon graduation has effects on future earnings throughout the earnings distribution, a quantile regression is estimated.[34] The result reveals that the estimated effect is significant and negative throughout the earnings distribution (see *Table 3*). However, the estimated effect is significantly larger in the lower part of the earnings distribution, indicating that unemployment at graduation is important not only for future earnings but for number of hours worked as well.[35] The effect of unemployment on annual earnings in the 50th percentile is about half of the average effect estimated in previous section. The estimated effect is stable from the 50th percentile and up.[36]

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[34] See appendix *Table A 4* for earnings in the different percentiles used.

[35] Though, unemployment will have only a small but significant effect (-1.6 %) on the risk of receiving no earnings five years following graduation. The result may be obtained from the author.

[36] Even though individuals with no earnings are excluded, the estimated coefficients at the lower part of the earnings distribution will be lower but substantially larger compared to the median.

Table 3. Quantile regression. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent graduation throughout the earnings distribution.

	10	25	50	75	90
Unempl	-0.667**	-0.206**	-0.127**	-0.123**	-0.136**
	(0.062)	(0.015)	(0.006)	(0.005)	(0.007)
Controls	Yes	Yes	Yes	Yes	Yes
Constant	2.349*	7.011**	7.841**	8.101**	8.189**
	(1.097)	(0.236)	(0.077)	(0.058)	(0.069)
Observations	36422	36422	36422	36422	36422

Note: Bootstrapped standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

3.1.3 Unemployment heterogeneity

Up to now, all individuals registered at the public employment office within a year from graduation have been considered. However, there may be heterogeneity within the group of individuals registered at the employment office. Individuals differ both in their type of unemployment and their unemployment duration.

First, three types of unemployed individuals are considered i) full time unemployed ii) job changers iii) individuals with some labour market connection, i.e. part time unemployed, employed by the hour or temporarily employed.[37]

Being registered as full time unemployed will have a significant and negative effect on future annual earnings of about 40 %, which is four times the earnings penalty of being registered at the unemployment office but with some labour market connection (see *Table 4*).

To be registered at the unemployment office as a job changer will not have any significant effect on future earnings, compared to not being registered at the unemployment office at graduation.

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[37] See appendix *Table A 2* for details, and *Table A 6* for descriptives.

Table 4. Type of registration at the public employment office

	Full time unemployed	Job Changer	Some labour market connection
Unempl	-0.401**	-0.014	-0.100**
	(0.028)	(0.054)	(0.032)
Controls	Yes	Yes	Yes
Constant	6.172**	5.504**	5.601**
	(0.324)	(0.347)	(0.331)
Observations	30211	23436	25826
R-squared	0.07	0.06	0.06

Note: Robust standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one was registered in specified category at the public employment office at graduation and 0 otherwise. "Some labour market connection includes individuals registered as part-time unemployed, temporarily employed and employed by the hour. The dependent variable is annual earnings 5 years subsequent graduation.

Secondly, the unemployment duration is considered. As a starting point, including only individuals registered at the public employment office at graduation, the unemployment duration is included as a continuous variable. The result in *Table 5* reveals that the longer the unemployment duration, the more negative is the effect on future earnings.

Table 5. Estimated effects of unemployment duration at graduation, and estimated effects of unemployment at graduation on annual earnings 5 years subsequent graduation for individuals with short or long unemployment; i.e. unemployed for less than 3 month and for 3 month and more respectively.

			dur<3 month	dur>=3 month
Duration	-0.218**	Unempl	-0.080*	-0.366**
	(0.034)		(0.036)	(0.025)
Controls	Yes	Controls	Yes	Yes
Observations	14106	Observations	25253	33483
R-squared	0.07	R-squared	0.07	0.07

Note: Robust standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Duration* is a variable that measure the length of the unemployment period under study, i.e. number of days. The effect of the unemployment duration is estimated for all unemployed individuals. *Unempl* is a binary variable that is 1 if an individual was registered at the public employment office at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

Further, the effect of unemployment is estimated separately for individuals with short and long unemployment spells, i.e. individuals unemployed for less than three months

and individuals unemployed for three months or more.[38] At three months students are entitled to unemployment benefits and at this point the duration dependence goes from being positive to negative.[39]

The results in *Table 5* show that the effect of unemployment at graduation on future annual earnings is significant and negative both for individuals with short and long unemployment spells. Though the estimated effect is considerably larger for individuals with a long unemployment duration.

3.2   Sub-sample analysis

To check the robustness of the results and to further examine the potential unobserved heterogeneity, the impact of unemployment on future earnings is estimated for different sub-samples. Individuals that are similar on their observable characteristics are also more likely to be similar in terms of unobserved characteristics. The model is estimated separately for men and women as well as for natives and foreign-born individuals.[40]

3.2.1   Gender and country of birth

To estimate the effect of being registered at the public employment office at graduation separately for men and women show that there is a relatively large earnings penalty for men (*Table 6*).[41] This is in line with results presented in e.g. Gregg (2001) and Ollikainen (2006), who show that previous unemployment is particularly scarring on future male labour market outcomes.

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[38] See appendix *Table A 6* for descriptives.

[39] Gartell (2008a) investigates the unemployment duration at graduation for the same sample used in this study. The shape of the baseline is very similar across graduates during spring and fall semester.

[40] See appendix *Table A 6* for descriptives.

[41] Using very similar data used in Gartell (2008), including all colleges, reveals that the different effects for men and women do not hold including all colleges. This is likely to be due either to the labour market conditions in the region or that female and male graduates from Stockholm and Uppsala University send different signals on the labour market. See e.g. Gartell & Regnér (2008) for a discussion of college choice and subsequent earnings for men and women.

Table 6. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent graduation for men and women.

	Women	**Men**
Unempl	-0.287**	-0.379**
	(0.056)	(0.068)
Controls	Yes	Yes
Observations	22161	14261
R-squared	0.08	0.09

Note: Robust standard errors in parentheses. * Significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

Table 7 show the estimated effect of unemployment at graduation for natives and foreign-born individuals respectively. The result for the two groups is very similar.

Further, the foreign-born sample was divided into individuals born in Western Europe and individuals born outside Western Europe. Interestingly, this division reveals that there is no significant effect of unemployment at graduation on future earnings for individuals born outside Western Europe. There are several possible explanations for this finding. First, individuals born outside Western Europe do not have as widespread earnings distribution, i.e. career opportunities are limited and individuals are consequently not punished for previous unemployment. Second, since unemployment is more frequent among individuals born outside Western Europe, unemployment may not send as negative signal to employers.[42] Third, if earnings penalties from previous unemployment can be explained by individual heterogeneity, i.e. selection into unemployment, the finding that there is no significant effect of unemployment for individuals born outside Western Europe may be explained by discrimination. Hence, foreign-born individuals get unemployed due to other reasons than individual productivity, i.e. individuals experiencing unemployment vs. those not experiencing unemployment are similar in terms of productivity and therefore unemployment is less scarring.

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[42]Arai & Vilhelmsson (2004)

Table 7. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent graduation for natives and foreign born individuals

	Natives	Foreign born	W_europe	Other
Unempl	-0.322**	-0.318**	-0.389*	-0.175
	(0.022)	(0.102)	(0.152)	(0.138)
Controls	Yes	Yes	Yes	Yes
Observations	33481	2941	1135	1806
R-squared	0.06	0.05	0.08	0.06

Note: Robust standard errors in parentheses. * significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. *W_europe* includes individuals from western Europe and *other* includes individuals from outside western Europe. The dependent variable is annual earnings 5 years subsequent graduation.

4 Conclusions

The novelty of this study was to estimate the earnings penalty of unemployment at graduation for Swedish college graduates. Very few previous studies on unemployment scarring consider highly educated individuals, and no previous study examines long-term effects of unemployment at graduation for this group.

The results in this study show that unemployment at graduation on average is associated with 30 % lower annual earnings five years after graduation compared to not being registered as unemployed at graduation. The estimated effects are considerably larger and more persistent compared to estimated results for high school graduates in Nordström Skans (2004). The estimated results are robust for the inclusion of a rich set of observable covariates including parental educational level and grade point average from high school as well as for choice of method, i.e. OLS and propensity score matching.

Investigating estimated effects across the earnings distribution reveals that the effect is substantially larger at the lower part of the earnings distribution and that the effect at the median is about half of the average effect estimated. Moreover, type of unemployment, particularly if an individual was registered as full-time unemployed or not, is important for the outcome.

Further, the results show that i) even very short unemployment spells are associated with significant lower future earnings ii) to experience unemployment at times of low

aggregate unemployment is associated with relatively lower future earnings compared to experiencing unemployment at times of high aggregate unemployment rates iii) there are no significant effects of unemployment at graduation on future earnings for individuals born outside western Europe. This last point may be explained by the fact that unemployment is more frequent in this group. Consequently there is no negative signal effect of individual unemployment, or individuals in this group may get unemployed due to other reasons than individual productivity. However, none of these results are likely to be explained by human capital depreciation.

Given the high persistence of individual unemployment at graduation, labour market policies should devote resources to the prevention of unemployment at graduation. Moreover, if signalling is the main explanation for the estimated effects, individuals are punished for unemployment despite the fact that their productivity is not much affected. In the case of college graduates, the waste of resources are more costly compared to other groups; investments as well as productivity effects are larger.

References

Arai M & R Vilhelmsson (2004), "Unemployment-Risk Differentials between Immigrant and Native Workers in Sweden", *Industrial relations,* 43(3), 690-698.

Arulampalam W (2001), "Is Unemployment Really Scarring? Effects of Unemployment on Wages", *Economic Journal,* 111, 585-606.

Arulampalam W (2002), State dependence in Unemployment Incidence: Evidence for British men Revisited, Discussion paper 630, IZA.

Arulampalam W, A L Booth & M P Taylor (2000), "Unemployment Persistence", *Oxford Economic Papers,* 52, 24-50.

Betts J, C Ferrall & R Finnie (2000), "The transition to Work for Canadian University Graduates: Time to First Job, 1982-1990", No. 141, Statistics Canada.

Buchinsky M (1994), "Changes in the US wage structure 1963-1987: Application of quantile regression", *Econometrica,* 62(2), 405-458.

Biewen M & S Steffe (2008), Unemployment Persistence: Is There Evidence for Stigma Effects?, Discussion paper No. 08-057, ZEW.

Corcoran M (1982), "The employment and Wage Consequence of Teenage Women's nonemployment", in Freeman R B and D A Wise (Eds.), *The youth Labour Market Problem: Its nature Causes and Consequences*, Chicago, University of Chicago Press, 391-419.

Dehejia R & S Wahba (1999), "Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs", *Journal of Labor Economics,* 13(2), 1053-1062.

Dehejia R & S Wahba (2002), "Propensity Score-matching Methods for Nonexperimental Causal Studies", *Review of Economics and Statistics,* 84(1), 151-161.

Dryler H (1998), *Educational choice in Sweden: Studies on the importance of gender and social contexts*, Thesis, Swedish Institute for Social Research (SOFI), Stockholm University, Stockholm.

Edin P-A & M Gustavsson (2004), Time out of work and skill Depreciation, in Gustavsson M, *Empirical Essays on Earnings Inequality*, Economic Studies 80, Uppsala University, Uppsala.

Eliasson M & D Storrie (2006), "Latent or Lasting Scars: Swedish evidence on the long-term effects of job displacement", *Journal of Labor Economics*, 24(4), 831-56.

Ellwood D T (1982), "Teenage Unemployment: Permanent Scars Temporary Blemishes", in Freeman R B and D A Wise (Eds.) *The youth Labour Market Problem: Its nature Causes and Consequences*, Chicago, University of Chicago Press, 349-390.

Fares J & E R Tinongson (2007), "Youth unemployment, labor market transitions and scarring: Evidence from Bosnia and Herzegovina, 2001-2004", No 4183, *Policy Research Working Paper Series*, The World Bank.

Gartell M (2008a), The college-to-work transition during the 1990s: A study of Swedish college graduates, forthcoming.

Gartell M (2008b), How robust is the ranking of colleges? Evidence from Sweden, forthcoming.

Gartell M & H Regnèr (2005), "Sambandet mellan val av högskola och inkomster efter examen för kvinnor och män", Report 2005:12, IFAU.

Gartell M, A-C Jans & H Persson (2007), "The reallocation of labor and the importance of education and age: A study on Swedish linked employer-employee data 1986-2002", Working paper 2007:14, IFAU.

Gregg P (2001), "The impact of Youth Unemployment on Adult Unemployment in the NCDS", *Economic journal,* 111, 626-653.

Gregg P & E Tominey (2004), "The Wage Scar from Youth Unemployment", Working paper Series No. 04/097, CMPO.

Gregory M & R Jukes (2001), "Unemployment and Subsequent Earnings: Estimation Scarring among British Men 1984-1994", *Economic Journal,* 111, 607-625.

Heckman J J & G J Borjas (1980), "Does Unemployment Cause future Unemployment? Definitions, questions and Answers from a Continuous Time Model of Heterogeneity and State Dependence", *Economica,* 47, 247-283.

Heckman J, H Ichimura & P Todd (1998), "Matching as an Econometric Evaluation Estimator", *Review of Economic Studies,* 65(2), 261-294.

Homlund B, Q Liu & O Nordström Skans(2006), "Mind the Gap? Estimating the Effects of Postponing Higher Education", Working paper 2006:17, Department of Economics, Uppsala University, Uppsala.

IAF (The Swedish Unemployment Insurance Board), *Fakta-PM* 3:2005.

Imbens G (2004), "Nonparametic Estimation of Average Treatment Effects under Exogeneity: A Review", *Review of Economics and Statistics,* 86(1), 4-29.

Koenker R. & K F Hallock (2001), "Quantile regression", *Journal of Economic Perspectives,* 15 (4), 143-156.

Koenker R & G Jr Basett (1974), "Regression Quantiles", *Econometrica,* 46(1), 33-50.

Lupid C & P Ordine (2002), "Unemployment scarring in high unemployment regions", *Economics Bulletin*, 10, 1-8.

Leuven E & Sianesi B (2003), PSMATCH2: Stata Module to Perform Full Mahalanobis Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing, http://ideas.repec.org/c/boc/bodode/s432001.html.

Mroz T A & T H Savage (2006), "The Long-Term Effects of Youth Unemployment", *Human Resources,* XLI(2), 259-293.

National Agency for Higher Education (2001), *Swedish universities and university colleges: Annual report*.

National Agency for Higher Education (2004), *Swedish higher education: A survey 1977-2000*.

National Agency for Higher Education (2005), *Higher education: Throughput and result in undergraduate education up to 2003/2004*.

National Agency for Higher Education (2006), *OECD thematic review of tertiary education: Country background report for Sweden*, Rapportserie 2006:41R. Stockholm: National Agency for Higher Education.

National Agency for Higher Education (2007), The Swedish higher education system, *HsvFs 2007:5*. Stockholm: National Agency for Higher Education.

Nordström Skans O (2004), "Scarring effects of the first labour market experience: A sibling based analysis", working paper 2004:14, IFAU.

Ollikainen V (2006), "Gender Differences in Transitions from Unemployment: Micro Evidence from Finland", *LABOUR,* 20(1), 159-198.

Oreopoulos P, T von Wachter & A Heisz (2008), "The Short- and Long-Term Career Effects of Graduation in a Recession: Hysteresis and Heterogeneity in the Market for college Graduates", Discussion Paper No. 3578, IZA.

Regnér H & M Gartell (2002), "Arbetsmarknaden för högskoleutbildade. Inkomstutveckling och geografisk rörlighet under 1990-talet", SACO (Swedish Confederation of Professional Associations).

Smith J & P Todd (2005), "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?", *Journal of Econometric,* 125(1-2), 305-353.

SOU 2008:69, *Välja fritt och välja rätt. Drivkrafter för rationella utbildningsval.* [Chose freely and chose right. Incentives for rational educational choices], Bilaga 8 till Långtidsutredningen 2008.

Statistics Sweden (1993), *Studie av arbetslösa enligt AMV och enligt SCB. Bakgrundsfakta till arbetsmarknads- och utbildningsstatistiken*, Statistics Sweden, Stockholm.

Stevens K (2007), "Adult Labour Market Outcomes: the Role of Economic Conditions at Entry into the Labour market", preliminary version March 22 2007, University College London.

Swedish National Labour Market Board (1998), *Arbetsförmedlingens marknadsandelar*, Uin 98:3. Swedish National Labour Market Board, Stockholm.

Thoursie A (1998), *Transitions from Unemployment to Employment: What are the effects of Education?*, Phd-thesis, Swedish Institute for Social Research, no 35.

Appendix

Table A 1. Variable list (*observed the same year as earnings (the outcome))

Earnings*	Annual earnings in 1991 year prices
Earnings=0*	Annual earnings equals zero
Unempl	Dummy variable=1 if any unemployment with in a year from gradation, 0 otherwise
Duration	Length of unemployment as share of a year, eg 3 month=0.25.
Women	Dummy variable=1 if women
Age	Age at graduation
Age sq	
Country of birth	
Swedish	Dummy variable=1 if born in Sweden, 0 otherwise
W_europe	Dummy variable=1 if born outside Sweden but in western Europe (Finland, Denmark, Island, Norway, Great Britain, Germany, France, Andorra, Belgium, Lichtenstein, Luxemburg, Netherlands, Switzerland, Austria), 0 otherwise
Other	Dummy variable=1 if born outside western Europe, 0 otherwise
Children	
Child 0-3 y*	Dummy variable=1 if have child/children at the age 0-3 years
Child 4-6 y*	Dummy variable=1 if have child/children at the age 4-6 years
Child 7-10 y*	Dummy variable=1 if have child/children at the age 7-10 years
Child 11-15 y*	Dummy variable=1 if have child/children at the age 11-15 years
Child 16-17 y*	Dummy variable=1 if have child/children at the age 16-17 years
Child 18+ y*	Dummy variable=1 if have child/children at the age 18+ years
Big city*	Dummy variable=1 if living in big city(Stockholm/Uppsala or Gothenburg)
Spring semester	Dummy variable=1 if graduating during spring semester, 0 otherwise
Field of education	
Teacher	Dummy variable=1 if field of education is teaching, 0 otherwise
Humaniora	Dummy variable=1 if field of education is humaniora, 0 otherwise
Science	Dummy variable=1 if field of education is science, 0 otherwise
Social science	Dummy variable=1 if field of education is social science, 0 otherwise
Technology	Dummy variable=1 if field of education is technology, 0 otherwise
Healthcare	Dummy variable=1 if field of education is healthcare, 0 otherwise
Service	Dummy variable=1 if field of education is service, 0 otherwise
Level of education	
Educ<3 y	Dummy variable=1 if education less than 3 years but at least two years
Educ=3 y	Dummy variable=1 if education equals 3 years
Educ>3 y	Dummy variable=1 if education more then 3 years
Parental education	
M< high sch	Dummy variable=1 if mothers education less than high school
M high sch	Dummy variable=1 if mothers education is high school
M univ	Dummy variable=1 if mothers education is university
M unknown	Dummy variable=1 if mothers education is unknown
F< high sch	Dummy variable=1 if fathers education less than high school
F high sch	Dummy variable=1 if fathers education is high school
F univ	Dummy variable=1 if fathers education is university
F unknown	Dummy variable=1 if fathers education is unknown
Average grades	Average grades from high school

Table A 2. Different categories of registered unemployment at the unemployment office

Code	Description and comments	Nbr Observations
Full time unemployed		**7897**
11	Unemployed, placement service	7003
12	Unemployed, guidance service	139
13	Unemployed, offered a labor market program	101
14	Unemployed, other registered	654
Some labor market connection		**3512**
21	Part-time unemployed	1354
22	Employed by the hour	652
31	Temporary employed	1506
Job changer		**1122**
41	Job changer	1122
Other		**1577**
34	Looking for employment in the EES area	16
42	Wage subsidy	17
44	Recruitment subsidy	85
45	Individual hiring subsidy	10
46	Start-up grant	100
47	-	5
48	-	4
51	Relief work	123
52	Work experience scheme	215
53	Replacement scheme	72
54	Immigrant vocational training	33
55	Work place introduction	286
57	Active use of unemployment benefits	1
58	Resource jobs	2
61	Youth practice	67
62	University graduate vocational training	140
64	Computer/activity center	36
65	Municipal youth programme	
66	Youth measures	2
71	Employability institute programme	13
72	-	1
81	Labor market training	171
82	Information technology training programme	10
91	Category which is not registered	168
	Total	14108

Table A 3. Unemployment duration at graduation in different percentiles of the unemployment duration distribution.

Percentile	Month
10	1.8
25	3.4
50	6.8
75	12.4
90	17.4

Table A 4. Earnings in different percentiles, in 100 SEK.

	10	25	50	75	90
Earnings	335.78	1571.66	2488.81	3365.67	5119.37

Figure A 1. Unemployment rates in Sweden for the population and for university graduates.
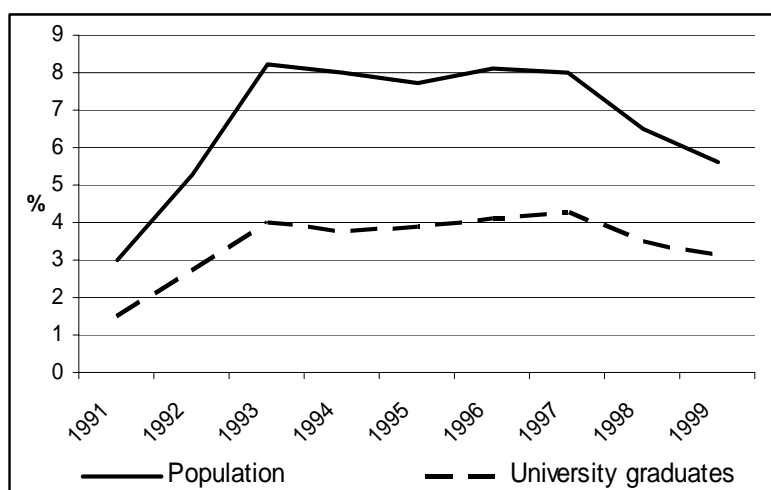
Table A 5. Estimated effects of unemployment at graduation on earnings 5 years subsequent graduation

	1	2	3	4	5	6	7
Unempl	-0.345**	-0.352**	-0.310**	-0.311**	-0.311**	-0.173**	-0.168**
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.026)	(0.026)
Controls							
Individual Characteristics							
Women		-0.355**	-0.354**	-0.356**	-0.360**	-0.465**	-0.472**
		(0.021)	(0.022)	(0.022)	(0.022)	(0.026)	(0.027)
Age		0.073**	0.079**	0.075**	0.074**	-0.024	-0.010
		(0.017)	(0.017)	(0.017)	(0.017)	(0.108)	(0.108)
Age sq		-0.001**	-0.001**	-0.001**	-0.001**	0.000	-0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Swedish		0.351**	0.334**	0.311**	0.304**	0.184	0.186
		(0.071)	(0.071)	(0.071)	(0.071)	(0.139)	(0.139)
Other		-0.496**	-0.541**	-0.536**	-0.552**	-0.418*	-0.408*
		(0.098)	(0.097)	(0.097)	(0.097)	(0.181)	(0.181)
Child 0-3 y		-0.449**	-0.465**	-0.464**	-0.463**	-0.550**	-0.550**
		(0.022)	(0.022)	(0.022)	(0.022)	(0.026)	(0.026)
Child 4-6y		0.040	0.069*	0.070*	0.083*	0.064	0.065
		(0.033)	(0.033)	(0.033)	(0.033)	(0.049)	(0.049)
Child 7-10y		0.013	0.024	0.025	0.018	0.016	0.013
		(0.038)	(0.038)	(0.038)	(0.038)	(0.078)	(0.078)
Child 11-15y		0.297**	0.277**	0.276**	0.270**	0.032	0.034
		(0.038)	(0.038)	(0.038)	(0.038)	(0.135)	(0.135)
Child 16-17y		0.295**	0.240**	0.237**	0.241**	0.436	0.428
		(0.060)	(0.059)	(0.059)	(0.059)	(0.416)	(0.417)
Child 18+ y		-0.680**	-0.693**	-0.693**	-0.690**	-2.267**	-2.268**
		(0.059)	(0.058)	(0.058)	(0.058)	(0.124)	(0.124)
Big City			0.078**	0.081**	0.075**	0.104**	0.104**
			(0.022)	(0.022)	(0.022)	(0.027)	(0.027)
Educational characteristics							
Spring			0.022	0.021	0.019	0.032	0.031
			(0.022)	(0.022)	(0.022)	(0.027)	(0.027)
Teacher			-0.005	-0.010	-0.026	-0.158**	-0.142**
			(0.035)	(0.035)	(0.035)	(0.044)	(0.045)
Humaniora			-0.568**	-0.566**	-0.593**	-0.616**	-0.615**
			(0.039)	(0.039)	(0.039)	(0.050)	(0.050)
Science			-0.103**	-0.106**	-0.114**	-0.148**	-0.142**
			(0.034)	(0.034)	(0.034)	(0.038)	(0.038)
Technology			0.264**	0.262**	0.249**	0.164**	0.163**
			(0.046)	(0.046)	(0.045)	(0.047)	(0.047)
Healthcare			0.301**	0.299**	0.290**	0.042	0.040
			(0.031)	(0.031)	(0.031)	(0.040)	(0.040)
Service			-0.090	-0.090	-0.130	-0.217	-0.212
			(0.138)	(0.138)	(0.138)	(0.176)	(0.175)
Educ< 3y			0.007	0.002	0.010	-0.233**	-0.218**
			(0.042)	(0.042)	(0.042)	(0.067)	(0.068)
Educ> 3y			0.174**	0.177**	0.148**	0.148**	0.135**
			(0.022)	(0.022)	(0.022)	(0.027)	(0.028)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Parental background							
M< high sch				-0.021	-0.004	-0.018	-0.019
				(0.030)	(0.030)	(0.037)	(0.037)
M univ				-0.039	-0.037	-0.032	-0.036
				(0.026)	(0.026)	(0.031)	(0.031)
M unknown				-0.106	-0.107	-0.126	-0.124
				(0.071)	(0.072)	(0.090)	(0.090)
F< high sch				0.000	0.015	0.034	0.034
				(0.030)	(0.030)	(0.037)	(0.037)
F> high sch				-0.046	-0.038	-0.039	-0.043
				(0.027)	(0.027)	(0.032)	(0.032)
F unknown				0.074	0.062	0.099	0.101
				(0.060)	(0.060)	(0.068)	(0.068)
Graduation year							
Y 91					-0.324**	-0.297**	-0.300**
					(0.044)	(0.068)	(0.068)
Y 92					-0.178**	-0.165**	-0.167**
					(0.041)	(0.057)	(0.057)
Y 93					-0.181**	-0.176**	-0.178**
					(0.042)	(0.055)	(0.055)
Y 94					-0.121**	-0.121*	-0.123*
					(0.041)	(0.050)	(0.050)
Y 96					0.007	0.016	0.017
					(0.041)	(0.048)	(0.048)
Y 97					0.016	0.062	0.064
					(0.040)	(0.046)	(0.046)
Y 98					-0.019	0.015	0.016
					(0.040)	(0.047)	(0.047)
Y 99					-0.072	-0.024	-0.022
					(0.041)	(0.048)	(0.048)
Grades							
Average grades						0.059**	0.054*
						(0.026)	(0.026)
Constant	7.360**	6.375**	6.137**	6.270**	6.392**	8.337**	7.903**
	(0.012)	(0.294)	(0.292)	(0.295)	(0.297)	(1.452)	(1.473)
Obs	36422	36422	36422	36422	36422	21023	21023
R-squared	0.01	0.05	0.06	0.06	0.07	0.11	0.11

Note: Robust standard errors in parentheses. * significant at 5%; ** significant at 1%. *Unempl* is a dummy variable that is 1 if one experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent graduation.

Table A 6. Descriptives, different sub-samples.

	No Unempl	Unempl	Full-time unempl	Job Changer	Part-time unempl temp. or empl by the hour	Unempl <3 month	Unempl > 3 month
Earnings*	2652.94 (2655.86)	2162.20 (1360.37)	2229.55 (1467.82)	2539.21 (1473.76)	2239.75 (1334.75)	2332.72 (1403.66)	2195.37 (1403.26)
Earnings=0*	0.48	0.066				0.046	0.07
Unempl	0.00	1.00	1.00	1.00	1.00	1.00	1.00
Spring semester	0.69	0.63	0.60	0.72	0.67	0.59	0.63
Women	0.60	0.63	0.59	0.70	0.70	0.63	0.63
Age	30.48 (30.48)	29.53 (6.11)	29.26 (5.86)	30.12 (6.47)	29.85 (6.43)	28.45 (5.44)	29.81 (6.24)
Country of birth							
Swedish	0.93	0.91	0.90	0.92	0.92	0.93	0.90
W_europe	0.03	0.03	0.04	0.03	0.03	0.03	0.03
Other	0.04	0.06	0.06	0.05	0.06	0.04	0.07
Children							
Child 0-3 y*	0.31	0.29	0.28	0.33	0.30	0.32	0.28
Child 4-6 y*	0.11	0.10	0.10	0.08	0.08	0.10	0.09
Child 7-10 y*	0.08	0.08	0.08	0.07	0.09	0.07	0.08
Child 11-15 y*	0.08	0.07	0.06	0.08	0.08	0.06	0.07
Child 16-17 y*	0.03	0.02	0.02	0.03	0.03	0.02	0.03
Child 18+ y*	0.08	0.06	0.06	0.06	0.06	0.05	0.07
Big city	0.64	0.64	0.64	0.72	0.62	0.62	0.64
Field of education							
Teacher	0.09	0.10	0.10	0.10	0.13	0.13	0.09
Humaniora	0.10	0.14	0.14	0.07	0.15	0.14	0.14
Science	0.43	0.54	0.09	0.06	0.07	0.45	0.56
Social science	0.14	0.09	0.53	0.64	0.48	0.08	0.09
Technology	0.04	0.02	0.03	0.01	0.01	0.04	0.02
Healthcare	0.19	0.11	0.11	0.12	0.14	0.17	0.10
Service	0.00	0.01	0.01	0.01	0.01	0.01	0.01
Level of education							
Educ<3 y	0.10	0.05	0.05	0.03	0.06	0.06	0.05
Educ=3 y	0.47	0.50	0.48	0.55	0.53	0.46	0.51
Educ>3 y	0.43	0.45	0.47	0.41	0.42	0.48	0.44
Parental education							
M< high sch	0.28	0.26	0.25	0.28	0.26	0.24	0.26
M high sch	0.20	0.21	0.21	0.23	0.21	0.22	0.21
M univ	0.52	0.53	0.54	0.49	0.53	0.54	0.53
M unknown	0.03	0.03	0.03	0.03	0.03	0.02	0.03
F< high sch	0.27	0.27	0.25	0.28	0.29	0.25	0.27
F high sch	0.18	0.18	0.18	0.19	0.16	0.19	0.17
F univ	0.55	0.56	0.57	0.53	0.55	0.55	0.56
F unknown	0.03	0.03	0.03	0.04	0.03	0.03	0.03
Average grades	3.92	3.84	3.85	3.83	3.82	3.89	3.82
Observations	22314	14108	7897	1122	3512	2939	11167

Table A6. (cont.)

	Women	Men	Natives	Born in W Europe	Born outside W Europe
Earnings*	2107.22	3015.50	2487.65	2254.94	2133.89
	(1289.75)	(3150.66)	(2295.98)	(1921.98)	(1601.76)
Earnings=0*	0.056	0.052	0.048	0.096	0.148
Unempl	0.40	0.37	0.38	0.41	0.48
Spring semester	0.68	0.64	0.67	0.69	0.65
Women	1.00	0.00	0.61	0.71	0.55
Age	30.49	29.52	29.84	34.10	32.59
	(7.58)	(5.81)	(6.81)	(8.43)	(7.28)
Country of birth					
Swedish	0.92	0.92	1.00	0.00	0.00
W_europe	0.04	0.02	0.00	1.00	0.00
Other	0.04	0.06	0.00	0.00	1.00
Children					
Child 0-3 y*	0.31	0.29	0.31	0.23	0.23
Child 4-6 y*	0.10	0.13	0.11	0.11	0.12
Child 7-10 y*	0.08	0.08	0.08	0.11	0.13
Child 11-15 y*	0.09	0.05	0.07	0.14	0.13
Child 16-17 y*	0.04	0.01	0.03	0.07	0.05
Child 18+ y*	0.09	0.06	0.07	0.11	0.12
Big city	0.63	0.65	0.63	0.70	0.70
Field of education					
Teacher	0.12	0.06	0.10	0.07	0.06
Humaniora	0.12	0.11	0.12	0.16	0.12
Science	0.43	0.53	0.47	0.47	0.39
Social science	0.09	0.16	0.12	0.10	0.18
Technology	0.01	0.07	0.04	0.02	0.02
Healthcare	0.21	0.08	0.16	0.17	0.22
Service	0.01	0.00	0.01	0.01	0.01
Level of education					
Educ<3 y	0.11	0.03	0.08	0.06	0.06
Educ=3 y	0.50	0.45	0.48	0.54	0.46
Educ>3 y	0.39	0.52	0.44	0.40	0.48
Parental education					
M< high sch	0.29	0.24	0.29	0.15	0.07
M high sch	0.20	0.20	0.21	0.09	0.07
M univ	0.51	0.55	0.50	0.76	0.85
M unknown	0.03	0.03	0.03	0.02	0.03
F< high sch	0.28	0.24	0.28	0.12	0.07
F high sch	0.18	0.18	0.19	0.05	0.04
F univ	0.54	0.58	0.53	0.83	0.89
F unknown	0.03	0.03	0.03	0.01	0.02
Average grades	3.93	3.82	3.89	3.93	3.77
Observations	22161	14261	33481	1135	1806

Note: * indicates that the variable is observed 5 years subsequent graduation.

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