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

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

by

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Abstract

Unemployment immediately upon graduation is associated with substantial and permanent future earnings losses. Even for very short unemployment spells the estimated earnings losses 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. This lends some support for the interpretation that unemployment upon graduation has the causal effect of reducing future earnings prospects.

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

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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. previous work experience or unobservable characteristics as e.g. ability or motivation. This suggests that, if these characteristics are not properly controlled for, we run the risk of getting a positive bias in the estimate of the absolute magnitude of the effect of on future earnings. 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 persistent.

This paper contributes to the existing literature by focusing on the college-to-work transition. Unemployment among college graduates is potentially very costly to society since higher education in Sweden is heavily subsidized by the government. While there are many studies dealing with the long-term consequences of unemployment, no previous study examines these effects for the first labour market experience immediately upon college graduation, and only one previous study considers highly educated individuals. Fares and Tingson (2007) using Bosnian Herzegovinian data show that unemployment has substantially larger negative effects on earnings for highly educated

¹ See Gregg (2001).

² See e.g. Edin and Gustavsson (2004) for an empirical study on time out of employment and skill depreciation.

individuals, about three times the estimated effect for individuals with vocational or secondary education. Not much evidence on long term consequences of unemployment on earnings exists using Swedish data. The one exception is Nordström Skans (2004), who examine long-term effects on earnings of the first labour market experience for youth graduating from vocational high school programs.³

Most previous studies focus on youth unemployment and find that it has serious long-term negative effects on incomes, but not as strong effects on future risk of unemployment.⁴ However, the substantial effects of early unemployment have been found to be temporary, i.e. to diminish with time since the unemployment experience.

A more recent literature examines the source of estimated long-term effects of unemployment. Lupid and Ordine (2002), using Italian data, and Biewen and Steffes (2008), using German data, show that unemployment is less serious in high unemployment environments. Fares and Tiongson (2007) show, as mentioned, that long-term effects of unemployment are substantially larger for more highly educated individuals. The results in these studies are interpreted as a consequence of signalling: that unemployment in high unemployment environments is considered as “normal” and therefore does not signal poor quality.

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. One possible interpretation is that recessions may initially lead workers to start a less attractive employment.

The data used in this study come from registers containing information on, inter alia, income, unemployment, and education. The sample studied consists of all graduates from Stockholm and Uppsala University during 1991-1999. The empirical strategy is to control for a rich set of observable covariates. Studying new entrants, there is e.g. no

³ There are a few somewhat related studies on Swedish data. Eliasson and Storrie (2004) study the effect of plant closure. Holmlund et al (2006) show that working experience subsequent graduation to is important for individual future earnings.

⁴ See e.g. Ellwood (1982), Corcoran (1982), Heckman and Borjas (1980), Mroz and Savage (2001), Arulampalam et al (2000), Arulampalam (2001, 2002), Gregory and Jukes (2001), Gregg (2001), Ollikainen (2006).

pre-unemployment wage that may be used. A detailed discussion about the empirical strategy and data is provided in section 2.

The results reveal a significant and negative association between unemployment at graduation and individual annual earnings five years later. The estimated coefficient is about -30% , which is approximately twice the estimated effect for high school graduates reported in Nordström Skans (2004). Moreover, in contrast to high school graduates, the effect is persistent over time, i.e. the estimated coefficient is about the same also ten years subsequent to graduation.

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.

2 Data and empirical setup

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

2.1 Empirical strategy

The fundamental empirical problem studying long-term effects of unemployment on earnings is that it may be the same factors that affect the risk of unemployment at graduation and future earnings. To be able to interpret estimated effects as causal, all factors that affect both the unemployment and future earnings must be controlled for. The main identification strategy used in this paper is to capture the joint determinants of unemployment at graduation and future earnings by using a rich set of observable covariates.

As an alternative method matching treated and non-treated observations on their observable characteristics, is applied.⁵ Matching methods basically relies on two assumptions. First, the conditional independence assumption, that requires that all variables affecting both the treatment and the outcome are included. Second, the assumption of common support, hence, that there exist comparable treated and non-treated observations. The main difference between OLS and matching is that whereas OLS relies on the

⁵ See e.g. Heckman et al (1998), Imbens (2004), Smith and Todd (2005), Dehejia and Wahba (1999, 2002) for a detailed description of the model.

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.

Previous studies have used a number of different approaches. Instrumental variables have been used, but good instruments are hard to come by and any instrument that is not exogenous may bias the results substantially.⁶ 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-differences technique. This technique relies on the assumptions of parallel trends and that pre-unemployment wages should capture any unobserved characteristics that influence wages so that the change in the 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 order to apply this estimator, wages prior to unemployment must be observable. Further, another option is to use sibling fixed effects. However, this reduces the sample and the precision of the estimates to a great extent.

In this study, as a starting point, the following equation is estimated;

$$\ln y_i = \beta_1 U_i + \beta_2 X_i + \theta_i + \varepsilon_i. \quad (1)$$

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

⁶ See e.g. Gregg (2001) and Gregg and Tominey (2004) for an overview of studies on unemployment scarring using different approaches.

Individuals registering at the public employment office are registered into different categories.⁷ 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. Moreover, the impact of unemployment duration is examined.⁸

To control for 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. To include the interaction variable will indicate whether experienced unemployment at graduation have different effects on future earnings dependent on aggregate unemployment rates, i.e. the business cycle.

To control for unobserved factors, parental level of education and average grades from upper secondary school are used. These variables are generally considered to be correlated with individual ability, and since the number of applicants often outnumbers available slots, grade point average from upper secondary school is usually used in the admission procedure.⁹ Further, it is a well-established finding that parental educational level is highly correlated with individual educational choice.¹⁰

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 using different sub-samples. 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. The effect of unemployment at graduation will be estimated for women and men separately and for natives and foreign born respectively.

Investigating whether the estimated effect of unemployment at graduation is temporary or persistent, the effect is estimated 1-10 years after graduation for graduates

⁷ 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.

⁸ See appendix *Table A 3* for the unemployment duration in different percentiles.

⁹ A single administrative authority on the national level handles the admission to all colleges. See National Agency for Higher Education (2004, 2006, 2007) for details on higher education in Sweden.

during 1991-1994. Further, since annual earnings combine hourly wages 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 effect of unemployment at graduation varies over the earnings distribution a quantile regression is estimated;¹¹

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

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.

2.2 Data

Data are provided by the IFAU and combines data from various administrative registers from Statistics Sweden and the Public Employment office. The main original data sources are the college examination registers which contain information as field and level of education, the high school examination registers which contains information about e.g. average grades from upper secondary education, a longitudinal income register (LOUISE) that hold information on demographics and socioeconomic factors, the employment register (RAMS) that contains information about earnings and an unemployment register (HÄNDEL) which includes all unemployment registered at a public employment office.

The data cover the whole population of 16-65 year olds in Sweden. In this study, all graduates from Stockholm and Uppsala University during 1991-1999 will be used. Graduate students are not included. Consequently, there are three main restrictions 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.

¹⁰ See e.g. Dryler (1998) and SOU 2008:23 for Swedish studies on social contexts and educational choice.

¹¹ See e.g. Koenker and Hallock (2001), Buchinsky (1994), Koenker and Basett (1974)

The main reason for including only graduates is that the time of finishing studies for non-graduates is not registered, and hence more uncertain. In total, out of all individuals with a university education lasting for three years or more about 80 % graduate.¹²

To be able to follow individuals for at least five years subsequent to graduation and since data are 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.¹³ 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.¹⁴

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, in general, there is only one college located in every county and the geographic mobility following graduation is limited, it would be hard to distinguish labour market effects from college effects. Stockholm and Uppsala students essentially graduate into the same labour market. About 80 % of graduates from Stockholm University worked within the county of Stockholm or Uppsala following 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.¹⁵ Moreover, Stockholm and Uppsala University attract a great number of students and provide education within most fields of education. As mentioned in the introduction, there is some evidence that scarring effects are more serious in low unemployment environments.¹⁶ When interpreting 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.

¹² National Agency for Higher Education (2005)

¹³ See Gartell (2008a) for a detailed background on the economic environment and the expansion of higher education during the studied period.

¹⁴ See appendix *Figure A 1* for unemployment rates during the studied period.

¹⁵ See e.g. Gartell and Regnér (2002), (2005)

¹⁶ 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).

As outcome variable, annual 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 to graduation will be dropped, which reduces the sample size by about 3.5 %.

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 the lowest grade and 5 the highest.

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. During the studied period a former student was entitled to benefits if he/she had been registered as unemployed for 90 days.¹⁷ This provided an incentive to register as soon as one realizes the risk of unemployment.¹⁸ However, the incentives to register may differ across individuals since the benefits may differ depending on e.g. previous employment experience.

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 after graduation is 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.¹⁹ Graduates who can not be found the same year as graduation in any registers will be dropped. This is likely to be exchange students or non-Swedish citizens.

¹⁷ IAF (The Swedish Unemployment Insurance Board), Fakta-PM 3:2005.

¹⁸ More than 90% of individuals reporting unemployment were 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)).

¹⁹ See Appendix *Table A 2* for details.

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 considered as ONE period.²⁰ The reason is to avoid classifying very temporary jobs as employment.²¹

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 has several degrees the same year but at different levels, the highest-level degree is used. If there are several degrees the same year at the same level but within different fields, one is randomly chosen (about 0.003 % of the population).

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. In total, about 3000 individuals were dropped. The main reason was that those individuals were not found in the population register either by the time of graduation (about 1400 individuals) or five years from graduation (about 1600 individuals).

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.

Table 1 reports the results of unemployment at graduation on future earnings using different specifications. The estimated results show that individuals registered at the

²⁰ See e.g. Betts et al (2000), Gattell (2008a), where 6 months is used to define a stable employment.

²¹ About 14 % have a period of employment of at least one day between two subsequent unemployment spells, and about 5 % have an employment period which is greater than 20 days.

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*).²²

The estimated coefficient 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 and Ordine (2002) and Fares and Tjongson (2007) who shows that unemployment is less serious in higher unemployment environments, which is the case for lower educated. Both Lupid and Ordine (2002) and Fares and Tjongson (2007) interpret this as a consequence of signalling; e.g. human capital depreciation is not likely to be dependent on aggregate unemployment rates. However, selection into unemployment may differ depending on employment possibilities and, consequently, the long-term consequences of unemployment may differ due to individual heterogeneity.

²² Using very similar data, also used in Gartell (2008b), show that the estimated effect of unemployment at graduation is 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.

Table 1. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent to 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							
<i>Individual characteristics</i>	No	Yes	Yes	Yes	Yes	Yes	Yes
<i>Educational characteristics</i>	No	No	Yes	Yes	Yes	Yes	Yes
<i>Parental background</i>	No	No	No	Yes	Yes	Yes	Yes
<i>Graduation year</i>	No	No	No	No	Yes	Yes	Yes
<i>Grades</i>	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 an individual experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent to graduation.

As shown in *Table 1*, specification 1-5, including different control variables do not influence the estimated coefficient of unemployment much.²³ 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.

Both field and level of education are likely to be correlated with individual ability as well as with requirements at admission. The inclusion of field and level of education has some effect on the estimated coefficient. 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 from 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.²⁴ However, to include average grades did not have any significant effect on the estimated coefficient.²⁵ Educational characteristics as field and level of education and parental background have most likely already captured effects associated with ability.²⁶

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 are not associated with as serious future earnings losses as being unemployed in times of low unemployment rates.²⁷ If the aggregate unemployment rate increases with 1 percentage point, the estimated coefficient of unemployment decreases with about 9 percentage points. This is in line with results reported by e.g. Lupid and Ordine (2002) and Biewen and Steffes (2008) 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 is applied. Matching methods do not rely on the assumption that conditioning linearly on observed covariates is adequate to remove selection bias. Covariates included are the basic covariates included in the OLS. The estimated coefficient of unemployment at graduation on earnings is -0.30 which is very close to the estimated coefficient by OLS of -0.31 . Hence, choice of method is not important for the estimated result.²⁸ This somewhat strengthen the support for the

²³ Full estimates are presented in Appendix *Table A 5*.

²⁴ 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.

²⁵ Moreover, the models were 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 were 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.

²⁶ 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.

²⁷ The results may be obtained from the author.

²⁸ Psmatch2 with the “common” option, by Leuven and Sianesi (2003), in stat was used and single nearest neighbor matching with replacement was applied. Results are presented in appendix *Table A 7*, *Table A 8* and *Figure A 2*.

interpretation that unemployment upon graduation may have causal effects on future earnings.

3.1.1 Temporary or persistent effects

To examine whether the estimated effects are temporary or persists over time, the effect of being registered at the public employment office at graduation is estimated on annual earnings 1-10 years following graduation. Only graduates during 1991-1994 are used, which reduces the sample size to approximately 13 500 individuals.

The estimated coefficient of unemployment is stable over time (see *Table 2*). The strong negative association between unemployment and future earnings during the first few years following graduation should be interpreted carefully since these, in some cases, includes the unemployment period under study.

The persistence in the results is in contrast to the finding in e.g. Nordström Skans (2004) and Gregory and Jukes (2001), who show diminishing effects of unemployment over time. One possible explanation is that, assuming individual heterogeneity is properly controlled for, more highly educated individuals have more career opportunities and hence steeper wage experience-profiles. Therefore, it may be harder to “catch up” and a delayed labour market entry has more persistent effects on future earnings.

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

Earnings	1	2	3	4	5	6	7	8	9	10
Unempl	-0.423** (0.032)	-0.414** (0.033)	-0.392** (0.034)	-0.392** (0.034)	-0.341** (0.035)	-0.347** (0.036)	-0.354** (0.036)	-0.366** (0.037)	-0.381** (0.037)	-0.404** (0.038)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13650	13625	13613	13636	13701	13537	13427	13360	13307	13290
R-squared	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 which equals 1 if the individual experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 1-10 years subsequent to graduation. Control variables included: sex, age, country of birth, children, local labour market, level and field of education, semester and year of graduation and parental educational level.

3.1.2 The effect for low and high earnings

To investigate if unemployment upon graduation is associated with future earnings losses throughout the earnings distribution, a quantile regression is estimated.²⁹ The result reveals that the estimated coefficient is significant and negative throughout the earnings distribution (see *Table 3*). However, the estimated coefficient is significantly larger in the lower part of the earnings distribution, indicating that unemployment at graduation is related not only to future earnings but to number of hours worked as well.³⁰ The estimated coefficient in the 50th percentile is about half of the estimated average effect. The estimated coefficient is stable in the upper half of the distribution.³¹

Table 3. Quantile regression results of the effect of unemployment at graduation on annual earnings 5 years subsequent to graduation.

	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 the individual experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent to graduation. Control variables included: sex, age, country of birth, children, local labour market, level and field of education, semester and year of graduation and parental educational level.

3.1.3 Different types of unemployment

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

²⁹ See appendix *Table A 4* for earnings in the different percentiles used.

³⁰ As an alternative, different income restrictions were applied. The results show that the estimated coefficient of unemployment is more substantial if no income restriction is imposed, indicating that both the earnings and the probability of having any income is affected. Further, the probability of receiving no earnings five years following graduation is somewhat larger (1.6%) for individuals who experience unemployment at graduation compared to individuals who did not. Moreover, the risk of getting an income that is less than 32 200 SEK (a base amount in 1991) or 100 000 SEK (often considered as fulltime employment) is affected; the estimated coefficients are 3.2 % and 5.7% respectively. Thus confirming the conclusion that the number of hours worked may be affected as well. The results may be obtained from the author.

³¹ 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.

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.³²

The estimated coefficient of being registered as full time unemployed is -40% , which is four times the estimated future earnings losses for individuals 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 does not have any significant effect on future earnings, compared to not being registered at the unemployment office at graduation.

Table 4. Type of registration at the public employment office

	Full time unemployed	Job Changer	Some labour market connection
Unempl	-0.401** (0.028)	-0.014 (0.054)	-0.100** (0.032)
Controls	Yes	Yes	Yes
Constant	6.172** (0.324)	5.504** (0.347)	5.601** (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 which equals 1 if the individual was registered in a specified category at the public employment office at graduation and 0 otherwise. Control variables included: sex, age, country of birth, children, local labour market, level and field of education, semester and year of graduation and parental educational level. "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 to graduation.

Secondly, the unemployment duration is considered. As a starting point, I restrict the analysis to only individuals who were registered at the public employment office. Unemployment duration is included as a continuous variable. The result in column one in *Table 5* reveals that the longer the unemployment duration, the more substantial are future earnings losses. Hence, for each extra month of unemployment future earnings are reduced by 1.8 %.

³² See appendix *Table A 2* for details on different categories, and *Table A 6* for descriptive statistics.

Table 5. The importance of unemployment duration for annual earnings 5 years subsequent to graduation

		dur<3 month		dur>=3 month
Duration	-0.018**	Unempl	-0.080*	-0.366**
	(0.003)		(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 month. 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 to graduation. Control variables included: sex, age, country of birth, children, local labour market, level and field of education, semester and year of graduation and parental educational level.

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.³³ At three months students are entitled to unemployment benefits and at this point the duration dependence goes from being positive, i.e. the risk of leaving unemployment increases with time spent in unemployment, to negative, i.e. the risk of leaving unemployment decreases with time.³⁴

The results in *Table 5* show that the estimated coefficient of unemployment at graduation is significant and negative both for individuals with short and long unemployment spells. However, the estimated coefficient is considerably larger for individuals with a long unemployment spells, which is consistent with the evidence in column one.

The results found in this section may partly explain the large negative coefficients in the lower half of the earnings distribution found in previous section. Hence, individuals registered as full-time unemployed and/or with a long unemployment spell at graduation may be more likely to be found in the lower half of the earnings distribution five years later. Further, the results reveal that even very short unemployment spells are associated with significant future earnings losses; this may not likely be explained by human capital depreciation or foregone work experience. However, the longer the unemploy-

³³ See appendix *Table A 6* for descriptives.

³⁴ Gartell (2008a)

ment spells the more substantial is individual future earnings losses. This, on the other hand, fits well with explanations in line with human capital theory.

3.2 Sub-sample analysis

To check the robustness of the results and to examine the potential for heterogeneous effects, the impact of unemployment on future earnings is estimated for different sub-samples. The model is estimated separately for men and women as well as for natives and foreign-born individuals.³⁵

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 unemployment is associated with relatively large earnings penalty for men (see *Table 6*).³⁶ 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.

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

	Women	Men
Unempl	-0.287** (0.056)	-0.379** (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 an individual experienced any unemployment at graduation and 0 otherwise. The dependent variable is annual earnings 5 years subsequent to graduation. Control variables included: age, country of birth, children, local labour market, level and field of education, semester and year of graduation and parental educational level.

Table 7 shows the estimated coefficients of unemployment at graduation for natives and foreign-born individuals respectively. The results for the two groups are 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

³⁵ See appendix *Table A 6* for descriptives.

³⁶ Using very similar data, also used in Gartell (2008), including all colleges reveal that the different effects for men and women do not hold. 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 and Regnér (2005) for a discussion of college choice and subsequent earnings for men and women.

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, for individuals born outside Western Europe career opportunities may be limited and, hence, individuals are not punished for previous unemployment to the same extent. Second, since unemployment is more frequent among individuals born outside Western Europe³⁷, unemployment may not convey a negative signal to employers to the same extent as for the other two groups. Third, if individual heterogeneity is not properly controlled for, i.e. if estimated effects of unemployment upon graduation on future earnings are a result of selection into unemployment, the finding that there is no significant effect of unemployment for individuals born outside Western Europe may be explained by discrimination.³⁸ 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.

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** (0.022)	-0.318** (0.102)	-0.389* (0.152)	-0.175 (0.138)
Controls	Yes	Yes	Yes	Yes
Observatio	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 an individual 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 to graduation. Control variables included: sex, age, children, local labour market, level and field of education, semester and year of graduation and parental educational level.

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

³⁷Arai and Vilhelmsson (2004)

³⁸ See e.g. Carlsson and Rooth (2007), Arai and Skogman Thoursie (2009) for studies on discrimination.

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 to be registered at the public employment office upon graduation on average is associated with about 30 % lower annual earnings five years after graduation compared to not being registered as unemployed at graduation. The estimated coefficients are considerably larger and more persistent compared to the estimated effect for high school graduates in Nordström Skans (2004). The results are robust to the inclusion of a rich set of observed 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. This lends some support for the interpretation that unemployment upon graduation has the causal effect of reducing future earnings prospects.

Further, the results show that i) even very short unemployment spells are associated with significantly lower future earnings ii) to experience unemployment at times of low aggregate unemployment is associated with relatively more substantial future earnings losses 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. None of these results are likely to be explained by human capital depreciation. On the other hand, the longer the unemployment spell the more substantial are future earnings losses, which fit well with human capital theory, i.e. implying that individual productivity is affected.

To summarize, the results reveal that there is a strong and negative association between unemployment upon graduation and individual future earnings. The results are stable for including a rich set of observed covariates and for applying propensity score matching, which lends some support for that estimated effects may be interpreted as causal. It is hard to draw any conclusion about the source of the effects; most results fits well with the explanation that unemployment signals low productivity, but there is also some evidence that support explanations in line with human capital theory.

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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 in month
Women	Dummy variable=1 if women
Age	Age at graduation
Age sq	
<u>Country of birth</u>	
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
<u>Children</u>	
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
<u>Field of education</u>	
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
<u>Level of education</u>	
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
<u>Parental education</u>	
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 labour market program	101
14	Unemployed, other registered	654
Some labour 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	Labour 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.

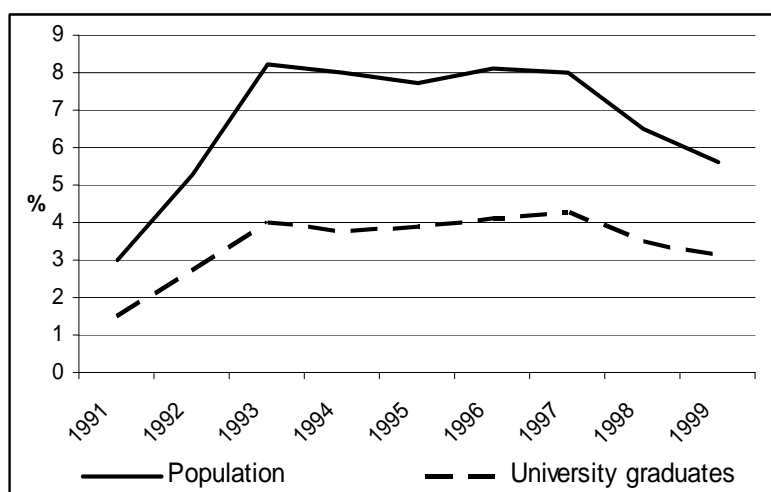


Table A 5. Estimated effects of unemployment at graduation on earnings 5 years subsequent to graduation

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

Table A 6. Descriptives, different sub-samples.

	No reg Unempl at grad	Unempl at grad	Reg as full-time unempl at grad	Reg as job Changer at grad	Reg as part-time unempl temporarily or employed by the hour at grad	Unempl less than 3 month at grad	Unempl for at least 3 month at grad
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)
<u>Country of birth</u>							
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
<u>Children</u>							
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
<u>Field of education</u>							
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
<u>Level of education</u>							
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
<u>Parental education</u>							
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 (1289.75)	3015.50 (3150.66)	2487.65 (2295.98)	2254.94 (1921.98)	2133.89 (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 (7.58)	29.52 (5.81)	29.84 (6.81)	34.10 (8.43)	32.59 (7.28)
<u>Country of birth</u>					
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
<u>Children</u>					
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
<u>Field of education</u>					
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
<u>Level of education</u>					
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
<u>Parental education</u>					
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 to graduation. Grades are only available for a sub-sample, i.e. individuals graduating from high school 1985 or later.

Figure A 2. Propensity scores for untreated and treated

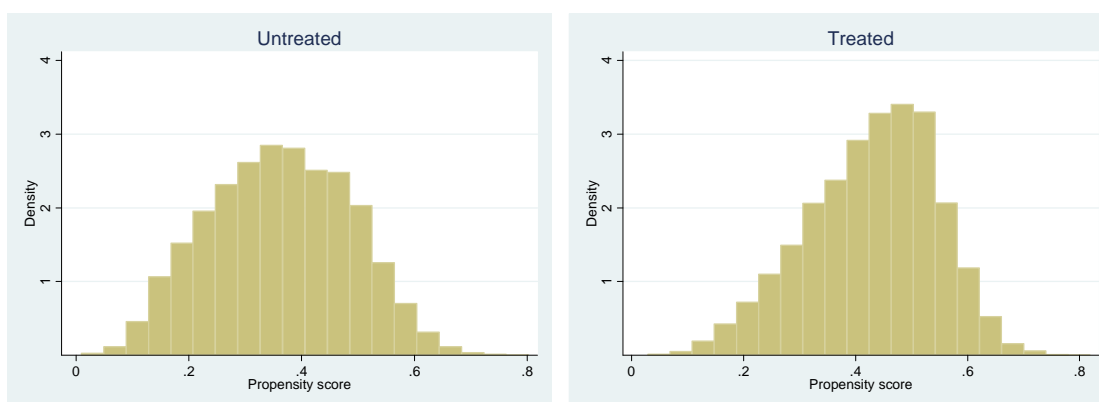


Table A 7. Support, propensity score matching.

	Off support	On support	Total
Untreated	5	22309	22314
Treated	1	14107	14108
Total	6	36416	36422

Table A 8. Estimated effects of unemployment at graduation on annual earnings 5 years subsequent to graduation

Unmatched	-0.345 (0.021)
ATT	-0.295** (0.033)
ATU	-0.362
ATE	-0.336

Note: bootstrapped standard errors (200 reps) in parenthesis. ATT is the average treatment effect of the treated, ATU is the average treatment effect of the untreated and ATE is the average treatment effect for a randomly selected individual.

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