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Evidence from Sweden

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Marie Gartell, April 2010

Abstract
This paper analyzes the time it takes for Swedish college graduates to start a full-time job that lasts for six month or more. The focus is on the transition from college-to-work during the period 1991–1999. This period covers both upturns and downturns of the business cycle, providing a unique opportunity to consider the importance of the timing of graduation. The results show that the risk of unemployment and the unemployment duration have varied considerably with the business cycle, both within and between cohorts. For example, field of education is more important for the studied outcomes during recessions. Further, the relative risk of unemployment has decreased across time for individuals with the highest degree of education whereas the unemployment duration has increased, indicating that the selection into unemployment for this group may have changed over time. This is interesting, not least in the light of the rapid expansion of the higher educational system during the studied period.

Sammanfattning
Den här rapporten undersöker övergången mellan högre studier och arbetsmarknad i Sverige under 1990-talet. Risken för arbetslöshet och arbetslöshetens längd i samband med examen studeras. 1990-talet var en period som kännetecknades både av en kraftig expansion av den högre utbildningen och av kraftiga konjunktursvängningar. Resultaten visar att både risken för arbetslöshet och arbetslöshetens längd har varierat kraftigt över konjunkturcykeln, både mellan och inom olika kohorter av examinerade. Till exempel visar resultaten att utbildningsinriktning spelar större roll för arbetsmarknadsutfallen i en lågkonjunktur än i en högkonjunktur, och att den relativa risken för arbetslöshet för individer med den högsta utbildningsnivån har minskat under perioden medan arbetslöshetens längd har ökat för samma grupp.

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Contents

1. Introduction

It is of great importance to study the transition from college to work. The time it takes to gain steady employment following graduation has effects on the returns to education; accordingly, it may have long-term effects on skill accumulation and incomes.[1] Consequently, it will affect the tax income for the government as well as the individual educational premium. Hence, the issue addressed in this paper is important both from an individual perspective and from an economic growth perspective. Moreover, to study the transition from college to work has become increasingly relevant during the last decades due to the rapid expansion of the higher educational system in Sweden.

There have been significant business cycle fluctuations in Sweden, which is likely to affect the transition to work.[2] The business cycle is likely to affect individual opportunities to get a job as well as the individual risk of exiting unemployment, e.g. there are fewer job offers in recessions. Moreover, human capital may depreciate with the unemployment duration, further reducing the possibility of employment.[3] In contrast, unemployment during economic upturns may send a relatively more negative signal to employers, or individuals getting unemployed during good times are a more negatively selected sample. These factors may increase the unemployment duration in good times as compared to bad. Two main points are investigated in this paper. First, does the pattern of transition to work differ between graduates at different points in time? Second, does the transition to work differ *within* cohorts of graduates?

Previous studies on Swedish data are mainly focusing on the re-employment due to different unemployment benefit systems.[4] No previous study on Swedish data emphasizes only highly educated, hence nor do they explore the transition to work for this group. There is one previous study, using Canadian data, which examines the unemployment duration at college graduation. Betts et al. (2000) estimate the time it takes for Canadian graduates to start a full-time job that

[1] E.g. Holmlund et al. (2006) show that working experience subsequent to graduation is important for individual incomes at 35 years of age. Skans Nordström (2004), studying high school graduates, shows that unemployment during the first year after graduation has serious long term effects on future incomes. Gartell (2009) shows that unemployment at college graduation is related to considerably lower incomes up to 10 years subsequent to graduation.
[2] Thoursie (1998) shows that the effects of education on the transition rates to work vary with the business cycle.
[3] See e.g. Edin & Gustavsson (2004)

lasts for six months or more. The speed of transition both within and between cohorts is investigated. Their results suggest that there are large differences in the speed of the transition to work, both within and between cohorts. Moreover, their results suggest that the differences in duration to first job across cohorts are not just driven by differences in business cycle conditions at the time of graduation. A related literature examines the long-term effect on earnings of graduation in a recession.[5]

Data, provided by IFAU (Institute for Labour Market Policy Evaluation), consists of a number of administrative data sets covering the whole population 16-64 years old. All graduates from Stockholm and Uppsala University during 1991–1999 are studied. The risk of unemployment is estimated using a probit model, whereas the duration to first job is analyzed using a proportional piece-wise linear hazard model. Examining the college-to-work transition, outcomes over the business cycle may be correlated with individual characteristics at graduation, observed or/and unobserved. One might expect that the distribution of individual observed and unobserved characteristics to be similar over the business cycle. However, it might be that the timing of graduation is endogenous. The main purpose of this paper is to describe the college-to-work transition and not to determine causal effects of the timing of graduation. However, parental background and grade point average from high school are used to control for unobserved ability; this is a common approach in the educational literature. Furthermore, a term for unobserved heterogeneity is included in the analysis, and the risk of unemployment and the unemployment duration is estimated simultaneously.

The results in this paper reveal that the risk of unemployment and the unemployment duration have varied considerably with the business cycle, both within and between cohorts. Moreover, the relative risk of unemployment has decreased across time for individuals with the highest degree of college education, i.e. at lest three years of college studies, at the same time the unemployment duration has increased. This may indicate that the selection into unemployment for this group has changed over time.

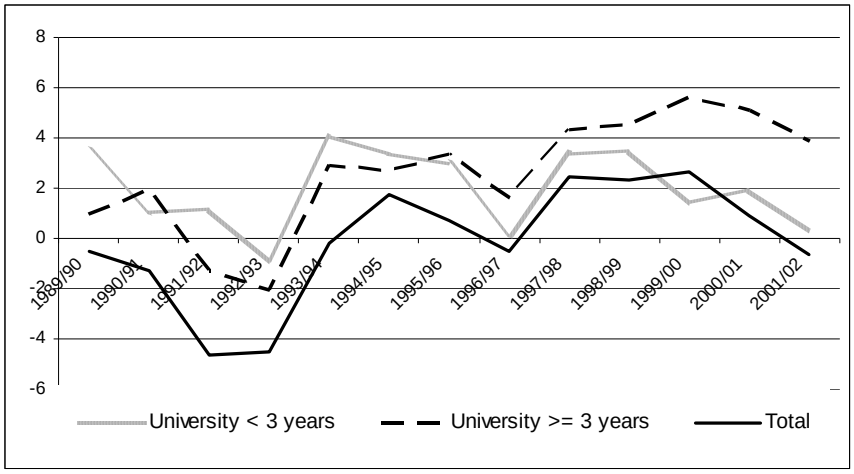
[4] See Albrecht et al. (1989), Carling et al. (1996), Edin (1989), Edin & Holmlund (1991), Harkman (1987), Höjgård (1994), Korpi (1995), Thoursie (1998), and Jans (2002).
[5] See e.g. Oreopoulos (2008), and Stevens (2007).

The paper proceeds as follows. The next section provides some background. In section 3 the theoretical framework is presented and in section 4 the data used is described. Empirical considerations are discussed in section 5. Section 6 presents the results of the analysis. Section 7 concludes.

2. Background

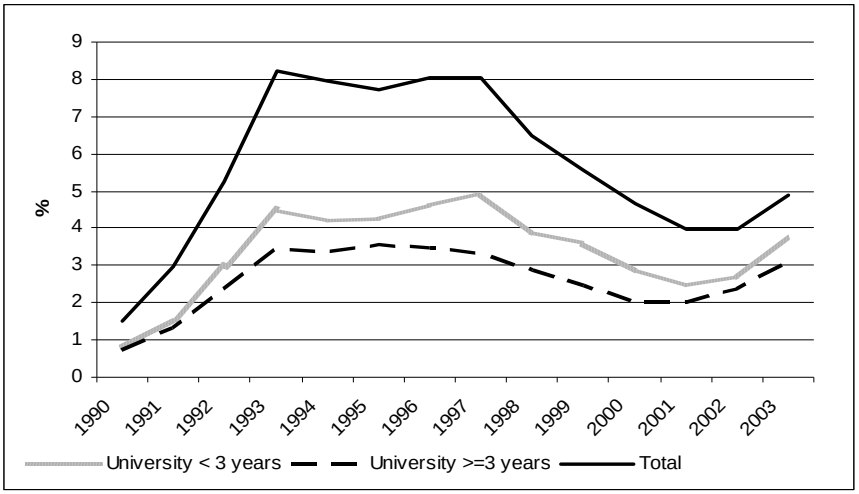
During the 1990s Sweden experienced the deepest recession since the Great Depression in the 1930s. Hence, the studied period covers extreme variations in the business cycle and a unique opportunity to study the importance of the business cycle for the college-to-work transition. However, the fluctuations for highly educated individuals were not as extreme as for other groups, i.e., they were not struck as hard by the recession. However, the net employment rates, hence, the difference between jobs created and jobs destroyed, has varied considerably for highly educated during the studied period. At the beginning of the 1990s there was a negative trend in the net employment rates, thereafter a stabilization followed by a positive trend. The corresponding trends hold for the unemployment rates (see figure 1 and 2). Figure 1 further suggests that there have been variations also *within* the group of highly educated. In terms of net employment rates, to have a higher level degree was more favourable during the second half of the 1990s, whereas during the first half of the 1990s it was more favourable to have a shorter university education.

Figure 1. Net employment rates 1989-2002 (percent)



(source: Gartell et al. (2007))

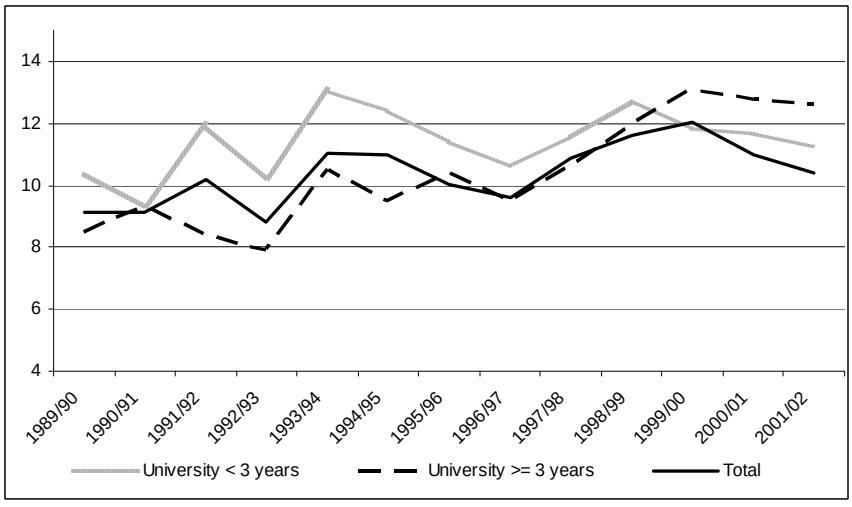
Figure 2. Unemployment rates 1990-2003 (percent)



(Source: Swedish Labour Force Survey)

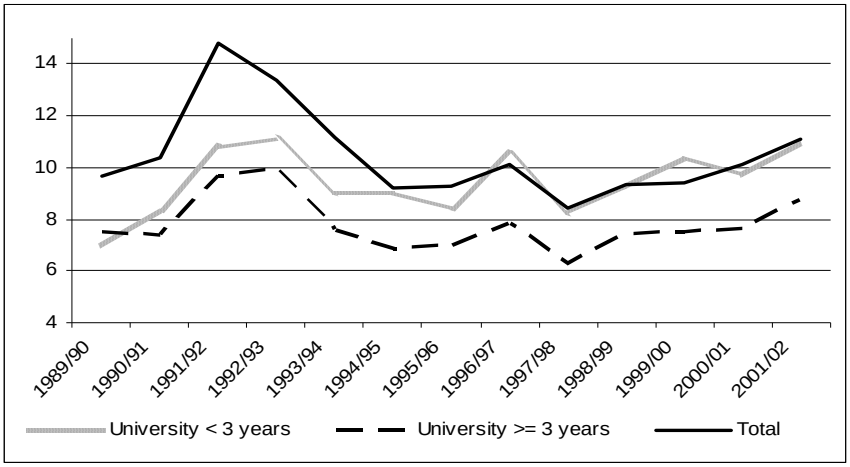
During the studied period the relative number of jobs created has been fairly constant, with a slightly positive trend (see figure 3). The trend has been more positive the higher the level of education. There have been more fluctuations in the job destruction rates, but no apparent trend (see figure 4).

Figure 3. Job creation rates (percent)



(Source: Gartell et al. (2007))

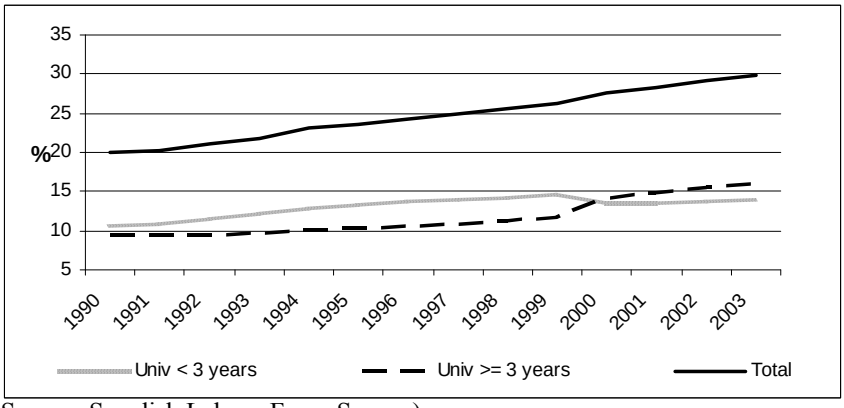
Figure 4. Job destruction rates (percent)



(Source: Gartell et al. (2007))

Furthermore, during the 1990s the share of college students in Sweden increased dramatically, at the same time as the number of graduates was large. The number of new students increased with 50% during the 1990s, and the number of individuals with a university degree increased with 25%. Moreover, the share of the population, with a long university education, i.e. three years or more, has increased relatively more (see figure 5). The share of a yearly birth cohort with a university degree has been fairly constant for cohorts born before 1965, but has increased considerably for cohorts born after 1965 (National Agency for Higher Education (2001)).

Figure 5: Share of the population with a university degree in Sweden.

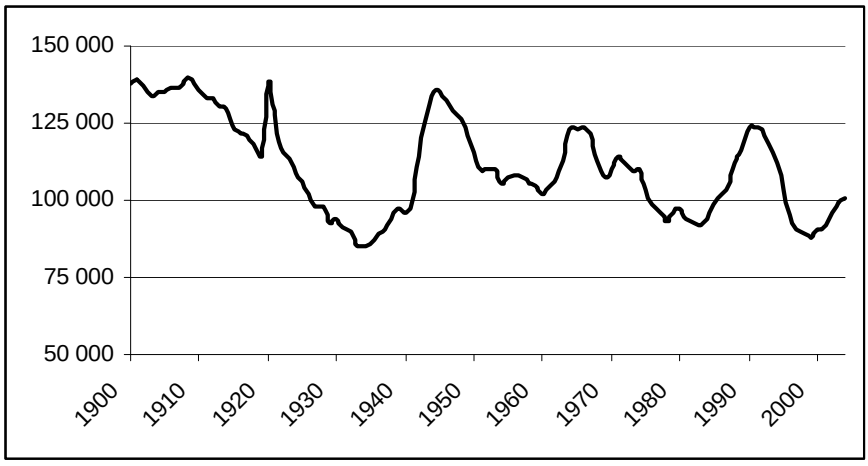


(Source: Swedish Labour Force Survey)

In addition, the size of the cohorts has varied (figure 6). The cohort one belongs to will, at a given point in time, matter for the number of graduates, the educational level of the population

and the size of the cohort exiting the labour force. These factors may affect both the risk of unemployment and the unemployment duration.[6] How to separate the time-, cohort- and other possible macro-effects is not obvious.

Figure 6: Number of individuals born in different years in Sweden.



(Source: Statistics Sweden)

3. Theory

In general search theory illustrates job search in terms of random job offers. Unemployed workers maximize their utility, and they do so by choosing a set of acceptable wage offers at each point in time. This set is defined by the reservation wage; the unemployed individuals will accept all offers above or equal to their reservation wage and reject offers less than their reservation wage.[7] The reservation wage of the individual will affect the probability of accepting a job offer, given that he/she has not previously done so.

Let p(.) be the probability of receiving a job offer and 1-G(r(t)) the probability of acceptance, where r(t) is the reservation wage (as a function of time), and G the distribution of wage offers evaluated at the reservation wage. The probability of leaving unemployment (after time t) is given by;

$$h(t)=p(t)*(1-G(r(t)))$$

[6] E.g. Nordström Skans (2002) shows that a large youth cohort has a positive effect on the local labor market in terms of unemployment rates for young workers.

i.e. the product of the probability of receiving a job offer and the probability of acceptance. The probability of acceptance depends on the individual reservation wage, the probability of receiving a job offer and the individual search activity. The higher the reservation wage the lower the risk that an individual accepts a job offer and, consequently, leaves unemployment. The reservation wage may depend on the time spent in unemployment, i.e., the unemployment duration. Theoretically, the reservation wage will decrease with the duration. Empirically, this means that the probability of leaving unemployment will increase. On the other hand, the estimated probability is an average of the probabilities of the surviving individuals at that time. This may well be a negatively selected sample, and the probability could, as a result, fall with the duration. Moreover, human capital might depreciate with time out of employment, or a longer unemployment spell may send a more negative signal to the employer.

The reservation wage is hard to observe. The most natural way to empirically specify a search model is by using duration data and estimate the variation in the probability of leaving unemployment (as a function of time). The duration is defined as;

$\xi = 1/h(t)$

Kettunen (1994, 1997) introduces a search theoretic model for the relationship between the educational level and re-employment. According to search theory, higher educated individuals have higher reservation wages. Hence, more highly educated individuals may have trouble finding acceptable jobs. In contrast, it is assumed that highly educated individuals will have more job opportunities. An individual can accept a job offer below his/her educational level, but will not receive job offers above its educational level. The effect of education is not clear-cut; there is a positive effect due to the number of job offers but a negative effect due to a higher reservation wage.

Looking at newly graduates, potentially, the reservation wage and job offer arrivals differ; e.g. the reservation wage on the *first* job might differ as compared to that at re-employment. Also

[7] See Lancaster (1979) for a more detailed model and Jans (2002) for a simplification of the same model.

other factors, as e.g. to find a job that corresponds to one's education, the business cycle, the sharp increase of highly educated and the demand for highly educated may be of significant importance. These factors could both negatively and positively link the individual educational level to the risk of unemployment and the unemployment duration. Van der Klaauw et al. (2004) develops a search theoretical model for the college-to-work transition. Their model explains why a large share of students starts working immediately upon graduation or even *before* graduation. As graduation approaches, students increase their job search effort and lower their reservation wage. Furthermore, they show that the unemployment rate at graduation is important; mean wage offers are significantly lower in periods when the unemployment rate is high. They also find substantial returns to work experience, which suggests that individuals are less selective in choosing their first job i.e. reservation wages are lower.

Additionally, the vacancy rate, i.e. the number of vacancies compared to the number of graduating individuals may be of importance; specialization may limit acceptable offers. In contrast, more highly educated individuals tend to be more mobile on the labour market, which means that at a given point in time, there will be relatively more vacancies.[8]

4. Data

Data are provided by IFAU and consist of a number of administrative data sets from Statistics Sweden and the Public Employment office, covering the whole population of 16–64 years old. In this paper, all graduates from Stockholm and Uppsala University during 1991–1999 are used. Unemployment immediately upon graduation (within a year) is considered. The unemployment spell is studied up to the point where individuals find a full-time job, lasting for six months or more. Durations are (right) censored after two years. Hence, individuals are followed for at most three years following graduation.

The individual-level records in the events database (Händel) are used to study the unemployment duration. Registration at a public employment office is compulsory for anyone receiving unemployment benefits. For a student to be entitled to benefits he/she must have been registered

[8] See Gartell et al. (2007) for a study on the reallocation of labour.

as unemployed for 90 days.[9] This provides an incentive to register as unemployed as soon as one anticipates a risk of unemployment. A benefit period consists of 300 days corresponding to 15 months (if on full time). This period can be prolonged at most one time with a maximum of 300 days.

When studying the risk of unemployment, all registrations at the public employment office are used. Examining the unemployment duration, only individuals registered as full-time unemployed and able to accept employment immediately will be included. Data further contains information regarding the destination exiting unemployment; the reason for exiting unemployment is in the great majority of cases that individuals received employment – regular, temporary or reemployment at previous employer. A rather big category is the "contact broken" category (about 20%); these individuals will be considered as having found employment. Further, some individuals return to regular education (i.e. outside the labour market programs). More than 80% of the individuals are included in one of the employment categories or the contact broken category. About 10% are found in the education category, and less than 10% leave for other reasons. The reasons for leaving unemployment do not vary considerably across graduation years.[10]

The duration of unemployment, starting within a year following graduation, will be considered. The unemployment spell may start before graduation; 94% of the unemployment spells however starts the semester of graduation (registered graduation), or later. All unemployment periods ending before graduation are excluded. If the gap between two subsequent unemployment periods is less than 6 month, I will consider it as ONE period.[11] The reason is to avoid considering very temporary jobs as employment. About 14% of the individuals have a gap between two subsequent periods that is greater than zero, and about 5% have a gap that is greater than 20 days.

Individuals will be censored if their unemployment spell exceeds two years (about 1%). Also,

[9] The Swedish Unemployment Insurance Board (IAF), Fakta-PM 3:2005.
[10] However, some changes in the coding over time have been made. There are some previous studies using models for competing risks at re-employment; those studies show that different transitions are governed by different mechanisms. See e.g. Edin (1989), and Thoursie (1998).
[11] See e.g Betts et al, where 6 months is used to define a stable employment.

they will be censored due to "other" reasons if disappearing out of the data for any other (unknown) reason. Censoring occurs when the information about the duration is incomplete, i.e. the observation window ends before the unemployment period. This sort of right censoring is straightforward since the observation window is determined independently from the process under study. Individuals not found in any other record the year of graduation will be dropped; information about age, gender and so forth is missing (less than 2% of the population); these are likely to be exchange students or non-Swedish citizens.

The spring and fall semester range from January 20 to August 30 and September 1 to January 19 respectively. The semester of graduation is known, but not the exact date. No time varying covariates will be used since the durations on average are too short to use yearly variations; the duration in the 50th percentile is less than 6 months (see appendix table A1 and figure A1). This may be compared to the median duration for Canadian college graduates, which is 15 months.[12]

If an individual has several graduation years, the latest is used. If there are several degrees, at different levels, the same year, then the highest-level degree is used. Further, if an individual have several degrees within the same field of education, an indicator is created to specify that there were actually several degrees within the same field and only one degree is kept. Finally, if there are two degrees within different fields, one is randomly chosen and an indicator for whether the individual has two degrees is created (about 0,003 % of the population).

Time constant variables used, i.e. observed at the beginning of or before the spell, are age (and age squared), sex, country of birth, educational background such as length and field of education, year and semester of graduation, children[13] and parental educational level. Moreover, type of unemployment benefit, year of first registration at a college, and the grade point average from high school will be included in some specifications. See appendix table A2 for details.

The total number of graduates 1991–1999, from Uppsala and Stockholm University, were

[12] See Betts et al. (2000).
[13] There is information about the number of children in different age groups in the household but no information about whose child it is. Consequently, for students living at home it is possible that they will be registered as having e.g. children older than 18 years, but those children are in fact themselves. Moreover children could be siblings. Due

39 376. After data processing, there are 38 013 individuals left. Out of these 37 013 individuals, 14 644 experienced unemployment at graduation. And out of the 14 644, 7 288 are registered as unemployed and able to accept employment immediately. Only these 7 288 individuals will be used in the duration models.[14] For more detailed descriptive statistics see appendix table A3.

Table 1. Descriptives

Exam Year	Number of graduates	Share of students that experienced any unemployment at graduation
1991	3253	0.32
1992	3422	0.42
1993	3507	0.46
1994	4083	0.44
1995	4404	0.43
1996	4492	0.43
1997	4543	0.39
1998	5066	0.33
1999	5243	0.27
Total	38013	0.39

Table 1 shows that the number of graduates has increased during the 1990s and the share of students experiencing unemployment at graduation has varied with the business cycle. Further, the share of individuals getting unemployed at the end of the 90s is smaller as compared to the beginning of the 90s. The unemployment rates were somewhat higher towards the end of the 90s, but decreasing. This pattern corresponds to some evidence presented in Gartell et al. (2007). Gartell et al. find some evidence that the increased share of highly educated individuals, at least partly, has been driven by increased demand for this group. Granqvist & Regnér (2007) presents results showing that the income premium of higher education has increased during the same period.

5. Empirical considerations

I estimate the risk of unemployment at graduation using a probit model. To study the unemployment duration, I use a proportional piecewise linear hazard model using the aML

to this, children above 18 will be excluded from the analysis. A variable for ”had a child during the first year after graduation” will be included as a sensitivity test.

[14]The other unemployed individuals are not considered to be able to accept a job offer immediately for a number of different reasons. In previous duration studies only individuals able to accept a job immediately are studied since only those individuals may end their unemployment when receiving a job offer.

software.[15] This model allows the hazard to be different over each time interval. Moreover, it is possible to introduce a term for unobserved heterogeneity, i.e. the duration dependence may be estimated conditionally on observed covariates and unobserved heterogeneity. The assumptions made are that the heterogeneity is independent of the observed covariates, starting times and censoring times. Further, it is assumed that the heterogeneity has a known distribution and enters the hazard function multiplicatively. Those assumptions can not be tested; if the assumptions are not fulfilled the unobserved heterogeneity term can introduce errors into the model. However, one may argue for the likelihood of those conditions being fulfilled or not. The term can in any case be used to examine the stability of the results. If the results are stable for the inclusion of the unobserved heterogeneity, there is less reason to worry about omitted variable bias.

To examine the importance of the timing of graduation, dummies for each graduation year are included; moreover, the model is estimated separately for different graduation years. As already mentioned, there may be many factors linked to the year of graduation that may influence the result. First, there has been a rapid expansion of the higher educational system. Second, there have been fluctuations in cohort sizes and in the number of jobs created and destroyed for highly educated during the studied period. To try to disentangle those different effects is not attempted within this study.[16]

Only registered unemployments are considered. Considering only registered unemployments will on one hand avoid including individuals that e.g. did not have an employment but continue to study, or work abroad. On the other hand, individuals might be unemployed without being registered at the public employment office. However, the incentives to register are rather high.[17]

In this paper only graduates are used. Out of all individuals with a university education lasting for at least three years, about 80% graduate.[18] In general, students may be divided into two groups; *program students* and *course students*. Program students enter a program usually lasting

[15] see Lillard & Panis (2003), Bossfeld & Rohwer (2002) for descriptions of the model.
[16] See e.g. Andersson (2000) for a discussion of how to identify age, period and cohort effects.
[17] More than 90% of individuals reporting unemployment in a survey were registered as unemployed at a public employment office. Moreover, the share of individuals reporting unemployment who have been in contact with a public unemployment office has been rather stable during 1992-1997. See Statistics Sweden (1993), Swedish national Labour Market Board (1998)
[18] National Agency for Higher Education (2005).

for 3 years or more, whereas course students register at separate courses typically lasting for at most one semester. Separate courses may be combined as to correspond to a program. However, seven years from their first registration only 10% of the course students have a degree and another 10% have achieved three years of full time studies but not graduated. Eleven years from their first registration, about 70% of the program students have graduated. The main reason for using only graduates is that the time of graduation is registered. To define the time for completing college studies for non-graduates is quite uncertain. However, one should be aware that the registered date of graduation may not correspond to the actual time for finishing studies. Completing their studies, individuals do not routinely graduate but are required to hand in an application to receive their degree and, hence, to be registered as graduates.

Only graduates from Stockholm and Uppsala University are studied, the reason is to reduce potential problems of differences between universities and local labour markets. There is about one college located in each county making it diffucult to use regional variation to estimate the effect of the timing of graduation on labour market outcomes. Students from Stockholm and Uppsala University basically graduated into the same labour market. For graduates in 1991, about 80% of the graduates from Stockholm University worked within the county of Stockholm or Uppsala one, five and ten years following graduation. For graduates from Uppsala University about 55% worked within the region. Individuals working outside the region are quite evenly distributed among other counties.[19] The Stockholm region labour market differs in some aspects as compared to other regions. Stockholm is the capital of Sweden and by far the largest city. Unemployment rates are generally lower compared to other parts of the country.

Selection *into* university studies may vary depending on the business cycle at the time for admission. Furthermore, the expansion of the higher educational system may suggest less selection into university studies across time. A single administrative authority on the national level handles the admission; the number of applicants often outnumbers the number of available slots.[20] Grade point average from high school is generally used in the admission procedure.

Selection *out of* university studies may also vary with the business cycle. Individuals may e.g.

[19] See e.g. Gartell & Regnér (2002), (2005).

postpone graduation in recessions, potentially making graduates in recessions a selected sample. Consequently, individuals may differ in their ability, affecting the probability of unemployment and the risk of exiting unemployment. The option to postpone graduation is however somewhat limited by the possibility of financing. Moreover, the graduation frequency may fluctuate with the business cycle; during good times it might be more likely to receive a job offer without an actual degree. Variables commonly used to control for ability are grades from high school and parental educational level. Further, the quality of education is possibly affected by the expansion of the higher educational system.

In appendix, table A3, descriptive statistics for the different graduation years are presented. Year of the first registration at university will be used as a control. This should, in combination with information about graduation year, be a good estimate of circumstances at admission as well as the time spent in education. Moreover, the parental level of education and grade point average from high school are included in the analysis.

6. Results

Both the risk of unemployment and the unemployment duration are estimated across the 1990s. The risk of unemployment at graduation is estimated using a probit model.[21] The risk of exiting unemployment is estimated using a piece-wise linear proportional hazard model. Estimating the unemployment duration, only individuals registered as unemployed and able to accept a job offer immediately are included.

6.1 Transition to work between cohorts

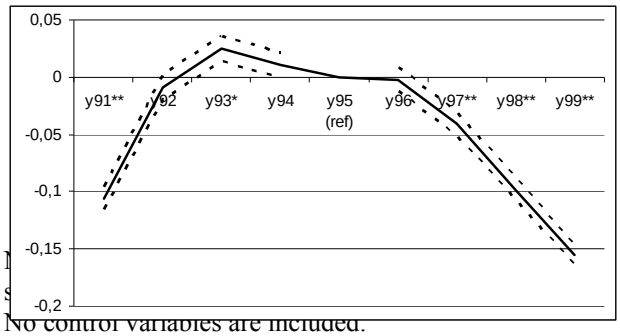
In this section, only year dummies are included to describe the link between the year of graduation and the probability of unemployment and the relative risk of leaving unemployment (the unemployment duration). Figure 7 shows that the probability of unemployment varies considerably across graduation years, the probability of unemployment in 1993 is 2.5% higher than 1995 and the probability in 1999 is 15.5% lower as compared to the reference year (results

[20] See National Agency for Higher Education (2004, 2006, 2007) for details on higher education in Sweden.
[21] Weights were applied, but did not influence the results. Hence; non-weighted estimates are presented.

are also presented in table A4 in appendix).

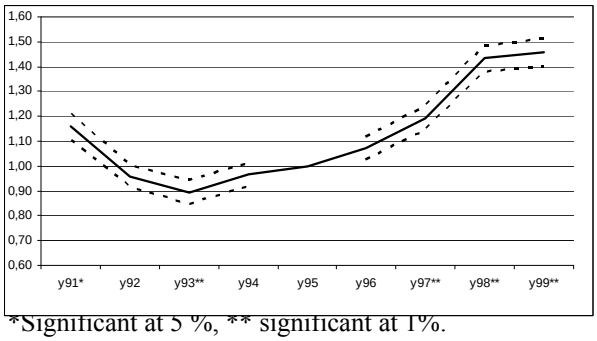
Figure 8 shows the relative risk of exiting unemployment across graduation years (results are also presented in table A5 in appendix). The result corresponds to the result for the probit model; the same years of graduation that increase the risk of unemployment will shift the baseline downwards, i.e. reduce the risk of exiting unemployment. And years with a relatively low risk of unemployment will shift it upwards.

Figure 7. Estimated marginal effects and confidence interval of the risk of unemployment



No control variables are included.

Figure 8. Estimated risk and confidence interval of exiting unemployment

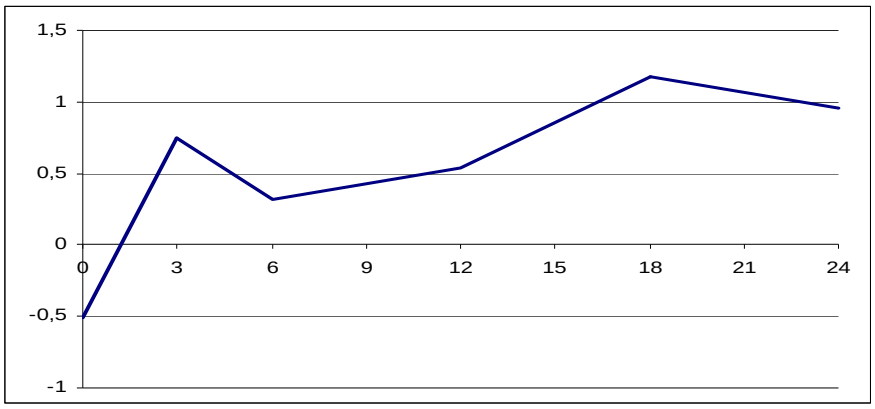


*Significant at 5 %, ** significant at 1%.
No control variables are included.

Further, figure 9 shows that there is a non-linear relationship between time and the risk of exiting unemployment. The time intervals used are 0–3 months, 3–6 months, 6–12 months, 12–18 months and finally 18–24 months. There is a peak at 3 months, most likely due to the fact that a former student in general has to be registered as unemployed for three months before receiving any unemployment benefits. Once benefits are received, the risk of exiting unemployment decreases up until about 6 months and then again increases until 18 months and thereafter flattens. At 18 months the benefit period expires, if no extension is accepted.[22]

[22] The shape of the base line is very similar across individuals graduating during the spring and fall semesters. The results are not presented but can be obtained from the author.

Figure 9. Log hazard baseline of exiting unemployment (month)



Note: no control variables are included.

6.1.1 The effect of observable covariates

Different covariates are added to investigate whether any of the variation across graduation years may be explained by observable factors. The coefficients of the graduation years are not much affected, for either for the risk of unemployment or for the unemployment duration, by the inclusion of various covariates, suggesting there is little selection on observables across time (see table A5 and A6 in appendix). Note that this result also holds including grade point average from high school and the parental educational level; traditionally considered to be highly correlated with individual ability.

Further, to include control variables indicate e.g. that the risk of unemployment is lower if graduating during the spring as compared to the fall, the probability of unemployment increases with age and reduces if having children between the ages 0–3 years and 11–15 years (see appendix table A5).[23] Examining the educational characteristics included reveals that to have a degree within sciences, technology or healthcare reduces the probability of unemployment as compared to having a degree within social science, whereas a degree within the fields arts/humanist and service/tourism increases the probability. More unexpectedly, the higher the level of education, the higher is the relative probability of unemployment at graduation.

[23] Also to have a child during the first year after graduation has a significant and negative effect. But it does not affect other estimates. I chose to leave this variable out of the basic specification since the exact timing of childbirth is unknown.

Moreover, the year of the first registration at a university were included, this in itself had some significant effect on the outcome but did not affect the coefficients of the graduation years much (78 individuals lack this information).[24] This indicates that the circumstances at admission are of little importance for the estimated link between graduation year and unemployment.

Turning to the risk of exiting unemployment; including different control variables indicate that e.g. to graduate during spring reduces the risk of exiting unemployment (increasing the unemployment duration), the risk of exiting unemployment reduces with age, to be born in Sweden increases the risk and to have children between 7–10 years reduce it.[25] To include information about the parental background did not have any affect the coefficients for the graduation years.[26] These results are analogue to the results for the probability of unemployment with the exception that the probit model showed that to graduate during spring reduced the risk of getting unemployed. Hence, to graduate during spring means a lower risk of unemployment but once unemployed the unemployment spell is longer. This might be explained by the fact that it is easier to find, at least a temporary job, during the summer.[27] A temporary job may be a stepping stone for a more stable employment avoiding unemployment during the first year subsequent graduation. However, once unemployed, the probability of exiting unemployment, i.e. to receive a job offer, may be relatively low due to e.g. vacations.

Further, examining the educational characteristics reveal that to have a degree within teaching, technology or health care increases the risk of exiting unemployment relatively to social science. This also corresponds to the result from the probit model, i.e. the same fields of education that generates a relative high risk of unemployment are also associated with longer unemployment durations. A higher level of education increases the risk of exiting unemployment i.e. of receiving a job. This is in contrast to the probit model, where the estimated risk of getting

[24] The results are not presented but can be obtained from the author. The year for first registration was included both as a continuous variable and as dummies.
[25] Had a child during the first year was included, the results where robust for this.
[26] Grades from high school where included for a sub sample of 4254 individuals. The estimated risk of exiting unemployment is 1.10, so higher grades means higher risk of exiting. The other estimates are stable for the inclusion, however the baseline between 18 and 24 month change to positive but is not significant.
[27] The majority of individuals who graduated during the spring and who experience unemployment have an unemployment period that begins before or during the summer.

unemployed was greater the higher the level of education. This may be due to that more highly educated individuals possibly are more selective in what jobs to accept, i.e., their reservation wage is higher. An alternative explanation may be that less employable individuals stay longer in education because they have a hard time to obtain employment. Once unemployed, their reservation wage decreases and the risk of accepting a job offer increases. For individuals with a lower educational level the relationship is reversed. The risk of unemployment is lower but once unemployed it is a more long-lasting problem.[28]

6.1.2 The importance of unemployment rates

To explore the importance of the unemployment rates at graduation, the unemployment rate for university educated is included as a continuous variable.[29] To avoid collinearity some graduation years are aggregated. First, both 1995 and 1996 are excluded as references. The year dummies for the graduation years are not much affected including the unemployment rate, and the coefficient on the unemployment rate is insignificant. Next, the years are grouped as 1991 and 1996–1999 which are considered as good years, and as 1992–1995 which are considered as bad. Alternatively, 1991 is excluded. In both cases, the estimated coefficient for the "good years" dummy is adjusted marginally downwards including the unemployment rate; the coefficient for the unemployment rate is significant and positive.[30]

Estimating the risk of exiting unemployment, the significance and direction of the coefficients for the graduation years are robust to including a continuous variable for the aggregated unemployment rate, but the coefficients get somewhat larger. The exception is the coefficient for 1992, which is now insignificant. Also, the years were aggregated as in the probit model, i.e., as good vs bad times. The coefficient for the good time dummy was robust including the unemployment rate.

To conclude, the unemployment rate does not seem to explain the estimated association

[28] Also the type of unemployment benefit is included; the results are stable for this inclusion. The results may be obtained from the author.
[29] Results are not presented, but can be obtained from the author.
[30] The unemployment rate used is the unemployment rate for individuals with a university degree.

between graduation year and unemployment. This indicates that year dummies may better capture the business cycle fluctuations, at least for highly educated. Though unemployment rates vary less for highly educated compared to other groups, the business cycle fluctuations are of great importance for the studied outcomes.

6.2 Transition to work within cohorts

In this section, the model is estimated separately for graduates from each graduation year, see table A6 and A7 in appendix.[31] The reason is to investigate the impact of different observeble variables at different points of the business cycle.

First, the results for the probit model are discussed (see table A6). The estimated coefficients of the covariates do differ between individuals who graduated different years. In most cases though, the coefficients have the same direction across time. The one exception is the coefficient of humanities that vary between –10% and +13%. The results indicate that the estimated coefficients of field of education in general are larger during periods of higher aggregate unemployment rates. Moreover, the estimated coefficient of having a university education of at least three years has a relative negative trend across time, i.e., the risk of unemployment decreases over time.[32]

Estimating the hazard model, to obtain a sufficient number of observations, the graduation years will be aggregated as follows; 1991–1993, 1992–1994, 1993–1995, 1994–1996, 1995–1997, 1996–1998 and 1997–1999 (see table A7 in appendix). There is some variation in estimated coefficients across years, though for the most part, the coefficients have the same sign. The estimated coefficients of field of education vary considerably across years. Again, the effect of humanities change sign between years, i.e. it varies between 1.19 and 0.86. And, as in the probit model, there is some indication that field of education is more important for the outcome during bad times. Hence, estimated coefficients are larger during recessions. The only apparent trend found is a relative decreasing trend in the risk of exiting unemployment for individuals with the

[31] I have estimated some models on a sub-sample of only Swedish born to check that the results are not driven by individuals born outside Sweden. The results were robust. The results can be obtained from the author.

highest level of education. Remember, during the studied period there has been a sharp increase in the number of highly educated individuals, and the decrease has been even more apparent the higher the level of education. However, as suggested in the probit model, the relative risk of unemployment for the highest educated did decrease over time. The decreasing risk of exiting unemployment may possibly, therefore, be explained by a more negative selection into unemployment. For the other covariates there is no apparent trend.

6.3 Sensitivity analyses

In the sensitivity analyses I will include a term for unobserved heterogeneity, both to test for exit selection and the robustness of the results. Further, potential entry selection into unemployment will be considered estimating the probit and hazard models simultaneously.

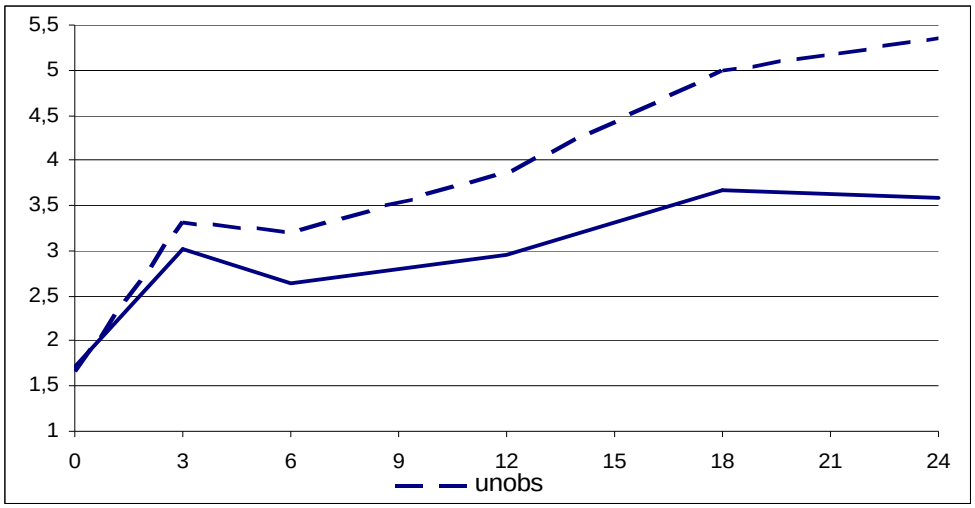
6.3.1 Exit and Entry selection

To test for exit selection, i.e., if individuals who receive a job (exit unemployment) are a selected sample as compared to individuals still in unemployment at time t, a term for unobserved heterogeneity is included in the hazard model. Moreover, this exercise will indicate whether the results are stable for omitted variable bias.

The model is estimated including all control variables from the previous section, and additionally, a term for unobserved heterogeneity (UHG) (See appendix table A8 and figure 10). Normal distribution of the UHG component is assumed. As is shown in figure 10, the duration dependence gets more positive including the UHG component.

[32] Moreover, average grades from high school were included for a sub sample of 21 959 individuals. The coefficient is significant and negative (-0.09), i.e. higher grades means a lower risk of unemployment. However, including grades does not have much effect on the other estimates.

Figure 10 Log hazard baseline of exiting unemployment, excluding and including unobserved heterogeneity (month)



This result is expected; the UHG component is expected to control for that the sample is getting more selected with the duration, i.e. less employable people are left in data (unemployed). Further, this is in line with the search theory discussed in section 3. Hence, there is a positively selected sample of individuals exiting unemployment. The term for unobserved heterogeneity is significant and positive. Moreover, to include the term for unobserved heterogeneity shows that the direction and significant levels of the coefficients on the covariates are stable. However, most coefficients gets larger.

It is possible that the same factors that affect the probability of getting unemployed will influence the unemployment duration, i.e. the outcome in the probit model may be linked to the outcome in the hazard model. By estimating the two models simultaneously it is possible to investigate the role of entry selection into unemployment for the estimated coefficients in the duration model (see table A9 in appendix).[33] In the probit model, graduation years are grouped together as 1991–1993, 1994–1996 and 1997–1999, rather than using all graduation years separately. This is necessary to get a sufficient number of observations and to get the model to

[33] In this case only the individuals included in the hazard are included in the probit. The result for the probit at this sample is presented in appendix table A10.

converge. Control variables for observable characteristics are included in the models, as well as components for unobserved heterogeneity (omitted variables). Further a new term, *Rho*, is included. *Rho* measures the correlation between the two UHG components.

The UHG component is significant also in the probit model (sigma 2); to introduce the UHG term will neither change the significance levels nor the direction of the coefficients. However, the coefficients are now much larger, the size of the coefficients about doubles in most cases. Further, the result suggests that there is no significant correlation between the UHG components in the probit and hazard models, implying that it is not the same unobserved characteristics that influence the risk of unemployment and the unemployment duration. Moreover, the results for the hazard model are stable indicating that there is no obvious entry selection. These results imply that there are no systematic differences in the unobserved characteristics in the selection into unemployment that will influence the unemployment duration. Hence, suggesting that there is no selection due to the risk of unemployment that will bias the results in the hazard model; the coefficients for graduation years are robust.

7. Conclusions

The results in this paper show that the risk of getting unemployed and the unemployment duration varies considerably both within and across graduation years, i.e. individuals graduation different years. The variation across years cannot be explained by either observable covariates or the aggregated unemployment rates.

Theoretically, there are many explanations for the variation over time and across the business cycle. First, the demand for highly educated is likely to be of importance. Previous studies suggest that the demand for highly educated individuals varies with the business cycle, and has increased over time. An increased demand means more *job offers*. Second, the *reservation wage* may or may not adjust properly to variations over time. Third, *search activity* is also likely to affect both the risk of unemployment and the unemployment duration.

The estimated coefficients of different covariates vary across time. There is some variation in the coefficients of field of education consistent with the business cycle fluctuations; field of

education seems to matter more for the risk of unemployment and the unemployment duration during recessions. In general, there are no trends across time. The one exception is the relative decreasing trend in the risk of unemployment and the risk of exiting unemployment across time for individuals with the highest level degree. This may suggest that the increased supply of more highly educated individuals has not posed a problem of finding a job, but for those who don't, the unemployment is a more persistent problem.

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Appendix

Table A1. Duration months, percentiles

	5	25	50	75	95	Nbr of obs
1991	0.7	2.4	4.9	9.7	17.8	575
1992	1.0	3.4	6.6	11.4	18.7	859
1993	0.8	3.4	6.7	12.1	20.2	792
1994	1.1	3.0	6.1	11.8	19.4	943
1995	1.0	3.0	6.0	10.8	19.2	971
1996	1.0	2.9	5.3	10.7	18.1	901
1997	0.7	2.5	4.4	9.8	17.4	822
1998	0.6	2.0	3.8	7.8	15.7	739
1999	0.6	2.0	4.1	7.8	15.5	686
Good	0.7	2.3	4.2	8.8	16.8	2822
Bad	1.0	3.1	6.1	11.4	19.1	4466
All	0.8	2.8	5.3	10.3	18.4	7288

Figure A1. Unemployment duration

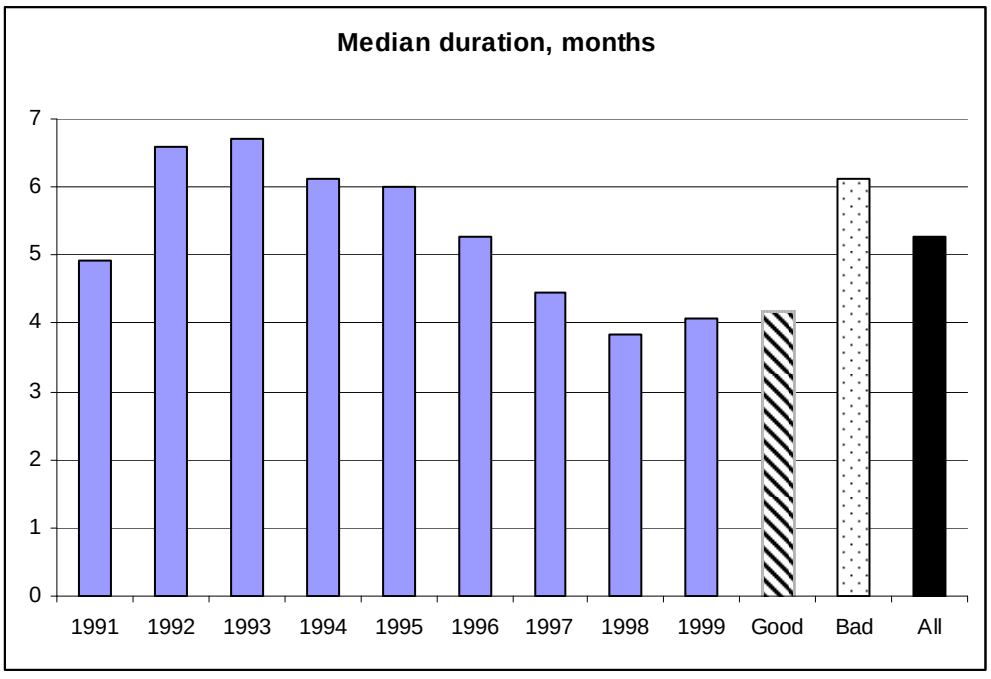

Table A2. Variable list

Spring	Dummy variable = 1 Graduated during spring semester, Jan 20- Aug 30	**Technology**	Dummy variable, field of education; technology=1
Women	Dummy variable = 1 If a woman	**Healthcare**	Dummy variable, field of education; health care=1
Age	Age at year of graduation	**Service**	Dummy variable, field of education; service/tourism=1
Age^2		**Educ < 3 y**	Dummy variable, education less than 3 years at least two=1
Swe	Dummy variable, Born in Sweden=1	**Educ 3 y**	*Reference* Education less than four years but at least three years=1
Nordic & W eu	*Reference* Born in the Nordic countries or western europe	**Educ > 3 y**	Dummy variable, education four years or more =1
Outside W eu	Dummy variable, Born outside Western Europe=1	**M < high sch**	Dummy variable, mothers education less than high school =1
Child y1	Dummy variable, Had a child during first year after graduation=1	**M high sch**	*Reference* Mothers education high school =1
Child 0-3y	Dummy variable, Have child/children between the age 0-3 years	**M univ**	Dummy variable, mothers education university =1
Child 3-6y	Dummy variable, Have child/children between the age 3-6 years	**M unknown**	Dummy variable, mothers education unknown=1
Child 7-10y	Dummy variable, Have child/children between the age 7-10 years	**F< high sch**	Dummy variable, fathers education less than high school =1
Child 11-15 y	Dummy variable, Have child/children between the age 11-15 years	**F high sch**	*Reference* Fathers education high school =1
Child 16-17 y	Dummy variable, Have child/children between the age 16-17 years	**F univ**	Dummy variable, fathers education university =1
Teacher	Dummy variable, field of education; teacher=1	**F unknown**	Dummy variable, fathers education unknown=1
Hum	Dummy variable, field of education; humaniora=1	**Unemp**	Continuous variable, unemployment rates for highly educated
		Akassa	*Reference* Type of benefit; Akassa=1
Science	Dummy variable, field of education; natural science=1		
		Kas	Type of benefit; kas=1
Social science	*Reference* field of education; social science=1	**Noinfo**	Type of benefit; no info about type of benefit=1
		Unemp grad	Dummy variable, unemployment at graduation=1
		First reg univ	Year of first registration in higher education

Table A3. Mean and standard deviations for the samples

	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Unemp grad	0.32	0.42	0.46	0.44	0.43	0.43	0.39	0.33	0.27
Unemp grad (dur sample)	0.21	0.30	0.29	0.29	0.28	0.26	0.23	0.18	0.15
Spring	0.66	0.67	0.67	0.67	0.67	0.67	0.66	0.67	0.66
Woman	0.60	0.61	0.62	0.60	0.59	0.60	0.61	0.61	0.62
Age	30.10	30.38	30.20	30.33	30.25	29.86	29.82	29.79	30.12
Age2	958.74	972.52	960.85	971.18	965.27	938.15	937.02	932.05	954.61

Swe	0.93	0.92	0.92	0.92	0.92	0.91	0.92	0.90	0.90
Nordig 6 W eu	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03
Outside W eu	0.04	0.04	0.05	0.05	0.05	0.06	0.05	0.06	0.07
Child y1	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03
Child 0-3y	0.09	0.09	0.10	0.09	0.09	0.09	0.08	0.08	0.08
Child 4-6y	0.05	0.05	0.06	0.05	0.06	0.06	0.06	0.06	0.06
Child 7-10y	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Child 11-15y	0.26	0.27	0.25	0.26	0.25	0.25	0.23	0.24	0.23
Child 16-17y	0.21	0.19	0.19	0.19	0.18	0.17	0.16	0.17	0.16
Teacher	0.06	0.09	0.11	0.10	0.09	0.10	0.08	0.09	0.09
Hum	0.09	0.09	0.09	0.10	0.14	0.13	0.14	0.13	0.13
Science	0.12	0.11	0.10	0.11	0.12	0.13	0.12	0.12	0.14
Social science	0.53	0.51	0.50	0.51	0.48	0.47	0.46	0.43	0.42
Thechnology	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04
Healthcare	0.17	0.17	0.17	0.15	0.15	0.13	0.14	0.17	0.17
Service	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
Educ< 3y	0.10	0.13	0.11	0.10	0.09	0.07	0.06	0.05	0.04
Educ= 3y	0.61	0.57	0.55	0.49	0.47	0.48	0.43	0.43	0.41
Educ >3y	0.29	0.30	0.35	0.41	0.44	0.45	0.51	0.52	0.55
M< high sch	0.35	0.34	0.31	0.30	0.26	0.26	0.24	0.23	0.21
M high sch	0.18	0.18	0.18	0.19	0.19	0.20	0.22	0.23	0.23
M univ	0.46	0.48	0.51	0.51	0.54	0.55	0.55	0.55	0.55
M unknown	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03
F< high sch	0.32	0.32	0.29	0.28	0.26	0.25	0.23	0.23	0.22
F high sch	0.15	0.16	0.16	0.17	0.16	0.17	0.20	0.20	0.21
F univ	0.52	0.53	0.55	0.55	0.57	0.58	0.57	0.57	0.57
F unknown	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.03	0.04
Average grade	4.03	3.95	3.93	3.92	3.89	3.87	3.87	3.86	3.85
Kas	0.03	0.05	0.12	0.11	0.11	0.11	0.08	0.07	0.09
Akassa	0.22	0.25	0.28	0.31	0.30	0.32	0.32	0.31	0.27
Noinfo	0.19	0.21	0.15	0.13	0.13	0.13	0.13	0.11	0.10
Unemp	1.50	2.70	4.00	3.80	3.90	4.10	4.30	3.50	3.10
First reg univ	1984.81	1985.55	1986.52	1987.25	1988.03	1989.01	1989.91	1990.81	1991.47
obs	3253	3422	3507	4083	4404	4492	4543	5066	5243

Table A4. Probability of getting unemployed at graduation.

y91	-0.106**	-0.106**	-0.099**	-0.101**
	(0.010)	(0.010)	(0.010)	(0.010)
y92	-0.009	-0.008	0.002	0.001
	(0.011)	(0.011)	(0.011)	(0.011)
y93	0.025*	0.024*	0.029**	0.029**
	(0.011)	(0.011)	(0.011)	(0.011)
y94	0.011	0.012	0.014	0.014
	(0.011)	(0.011)	(0.011)	(0.011)
y96	-0.002	-0.006	-0.007	-0.007
	(0.010)	(0.010)	(0.010)	(0.010)
y97	-0.041**	-0.046**	-0.049**	-0.049**
	(0.010)	(0.010)	(0.010)	(0.010)
y98	-0.098**	-0.104**	-0.106**	-0.106**
	(0.009)	(0.009)	(0.009)	(0.009)
y99	-0.155**	-0.162**	-0.162**	-0.162**
	(0.009)	(0.009)	(0.009)	(0.009)
Spring		-0.076**	-0.073**	-0.074**
		(0.005)	(0.005)	(0.005)
Women		0.052**	0.051**	0.051**
		(0.005)	(0.005)	(0.005)
Age		0.035**	0.026**	0.025**
		(0.003)	(0.003)	(0.003)
Age2		-0.001**	-0.000**	-0.000**
		(0.000)	(0.000)	(0.000)
Swe		-0.047**	-0.040**	-0.047**
		(0.014)	(0.014)	(0.015)
Outside W eu		0.063**	0.088**	0.089**
		(0.018)	(0.019)	(0.019)
Child 0-3y		-0.027**	-0.032**	-0.031**
		(0.009)	(0.009)	(0.009)
Child 4-6y		0.000	0.008	0.008
		(0.012)	(0.012)	(0.012)
Child 7-10y		-0.024*	-0.008	-0.009
		(0.012)	(0.012)	(0.012)
Child 11-15y		-0.071**	-0.050**	-0.050**
		(0.011)	(0.011)	(0.011)
Child 16-17y		-0.043**	-0.024	-0.024
		(0.015)	(0.015)	(0.015)
Teacher			0.003	0.001
			(0.009)	(0.009)
Hum			0.035**	0.035**
			(0.008)	(0.008)
Science			-0.155**	-0.156**
			(0.007)	(0.007)
Technology			-0.163**	-0.163**
			(0.012)	(0.012)
Healthcare			-0.112**	-0.113**
			(0.008)	(0.008)
Service			0.160**	0.159**
			(0.037)	(0.037)

Educ< 3y			-0.101**	-0.104**
			(0.010)	(0.010)
Educ> 3y			0.025**	0.026**
			(0.005)	(0.005)
M< high sch				-0.009
				(0.008)
M univ				-0.010
				(0.007)
M unknown				-0.014
				(0.016)
F< high sch				0.021**
				(0.008)
F> high sch				-0.003
				(0.007)
F unknown				-0.005
				(0.015)
Observations	38013	38013	38013	38013

Note: Discrete changes. Robust standard errors in parentheses. significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

Tabel A5. Risk of leaving unemployment

3 month	5.015**	5.227**
	(0.243)	(0.242)
6 month	-1.714**	-1.545**
	(0.185)	(0.185)
12 month	0.450**	0.603**
	(0.106)	(0.107)
18 month	1.271**	1.455**
	(0.142)	(0.142)
24 month	-0.437	-0.165
	(0.308)	(0.306)
Constant	0.599**	2.859**
	(0.054)	(0.310)
y91	1.157**	1.103
	(0.054)	(0.055)
y92	0.960	0.920
	(0.045)	(0.047)
y93	0.895*	0.863**
	(0.0489	(0.048)
y94	0.966	0.974
	(0.045)	(0.045)
y96	1.074	1.070
	(0.0469	(0.046)
y97	1.192**	1.189**
	(0.048)	(0.048)
y98	1.434**	1.428**
	(0.052)	(0.052)
y99	1.458**	1.497**
	(0.053)	(0.053)
Spring		0.833**
		(0.025)
Women		0.998

		(0.025)
Age		0.902**
		(0.018)
Age2		1.001**
		(0.000)
Swe		1.125*
		(0.058)
Outside W eu		0.880
		(0.072)
Child 0-3y		1.004
		(0.045)
Child 4-6y		1.069
		(0.059)
Child 7-10y		1.203**
		(0.059)
Child 11-15y		1.085
		(0.064)
Child 16-17y		1.085
		(0.079)
Teacher		1.371**
		(0.044)
Hum		0.951
		(0.039)
Science		1.028
		(0.042)
Technology		1.360**
		(0.077)
Healthcare		1.761**
		(0.046)
Service		0.938
		(0.165)
Educ< 3y		0.893
		(0.069)
Educ> 3y		1.101**
		(0.026)
M< high sch		0.978
		(0.037)
M univ		1.035
		(0.032)
M unknown		0.927
		(0.078)
F< high sch		0.988
		(0.038)
F> high sch		1.023
		(0.034)
F unknown		0.966
		(0.073)
obs	7285	7285

Note: Exp (coeff)..Robust standard errors in parenthesis.
significant at 5 %, ** significant at 1%. References are;
y95, Nordic & W eu, social science, M high sch, F high sch.

Table A6. Probability of getting unemployed at graduation, across graduation years.

	1991	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
Spring	-0.029	-0.069**	-0.046*	-0.064**	-0.081**	-0.073**	-0.099**	-0.089**	-0.080**
	(0.018)	(0.019)	(0.018)	(0.017)	(0.016)	(0.016)	(0.016)	(0.015)	(0.014)
Women	0.012	0.040*	0.060**	0.073**	0.057**	0.055**	0.048**	0.073**	0.033*
	(0.018)	(0.019)	(0.019)	(0.017)	(0.016)	(0.016)	(0.016)	(0.014)	(0.013)
Age	0.006	-0.022	-0.002	0.031**	0.032**	0.049**	0.046**	0.027**	0.034**
	(0.012)	(0.012)	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)	(0.008)	(0.007)
Age2	-0.000	0.000	-0.000	-0.001**	-0.001**	-0.001**	-0.001**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Swe	-0.062	-0.110*	-0.111*	-0.019	-0.001	0.015	-0.112*	0.020	-0.061
	(0.049)	(0.046)	(0.048)	(0.043)	(0.045)	(0.043)	(0.044)	(0.038)	(0.037)
Outside W eu	0.047	0.033	0.041	0.131*	0.099	0.151**	-0.008	0.167**	0.079
	(0.066)	(0.064)	(0.062)	(0.056)	(0.057)	(0.053)	(0.052)	(0.050)	(0.045)
Child 0-3y	-0.011	-0.054	0.007	-0.026	-0.061*	-0.027	0.014	-0.046	-0.059**
	(0.031)	(0.031)	(0.031)	(0.030)	(0.027)	(0.028)	(0.028)	(0.025)	(0.022)
Child 4-6y	-0.039	0.048	-0.002	-0.067	0.041	0.018	-0.021	0.027	0.012
	(0.042)	(0.044)	(0.040)	(0.038)	(0.037)	(0.036)	(0.034)	(0.032)	(0.029)
Child 7-10y	0.018	-0.014	-0.068	0.026	-0.011	-0.026	-0.005	-0.040	0.022
	(0.041)	(0.039)	(0.039)	(0.036)	(0.037)	(0.035)	(0.036)	(0.030)	(0.029)
Child 11-15y	-0.061	0.001	-0.046	-0.030	-0.052	-0.052	-0.069	-0.049	-0.064*
	(0.035)	(0.037)	(0.038)	(0.035)	(0.035)	(0.034)	(0.035)	(0.030)	(0.026)
Child 16-17y	-0.016	0.017	-0.023	-0.039	-0.077	0.008	0.078	-0.045	-0.046
	(0.042)	(0.049)	(0.048)	(0.046)	(0.044)	(0.048)	(0.051)	(0.041)	(0.037)
Teacher	0.180**	0.100**	0.015	-0.045	-0.062*	0.019	-0.008	-0.002	-0.014
	(0.039)	(0.034)	(0.029)	(0.028)	(0.028)	(0.026)	(0.028)	(0.024)	(0.022)
Hum	0.064*	-0.026	-0.102**	-0.027	0.023	0.053*	0.003	0.128**	0.089**
	(0.032)	(0.032)	(0.030)	(0.028)	(0.024)	(0.024)	(0.023)	(0.022)	(0.021)
Science	-0.142**	-0.194**	-0.200**	-0.196**	-0.197**	-0.210**	-0.147**	-0.092**	-0.066**
	(0.023)	(0.026)	(0.026)	(0.023)	(0.022)	(0.021)	(0.021)	(0.020)	(0.018)
Technology	-0.067	-0.099*	-0.121*	-0.222**	-0.188**	-0.253**	-0.208**	-0.188**	-0.053
	(0.046)	(0.050)	(0.052)	(0.038)	(0.038)	(0.032)	(0.031)	(0.026)	(0.029)
Healthcare	-0.042	-0.112**	-0.143**	-0.166**	-0.177**	-0.121**	-0.085**	-0.062**	-0.083**
	(0.028)	(0.027)	(0.028)	(0.026)	(0.023)	(0.025)	(0.024)	(0.020)	(0.017)
Service	0.181	-0.101	0.155	0.240	0.135	0.211*	0.227**	0.109	0.253**
	(0.150)	(0.108)	(0.195)	(0.132)	(0.162)	(0.100)	(0.077)	(0.082)	(0.096)
Educ< 3y	-0.075*	-0.146**	-0.088*	-0.157**	-0.125**	-0.047	-0.106**	-0.096**	-0.039
	(0.035)	(0.030)	(0.035)	(0.032)	(0.031)	(0.036)	(0.034)	(0.030)	(0.031)
Educ> 3y	0.076**	0.054**	-0.032	0.034*	0.064**	0.036*	0.001	0.014	0.012
	(0.020)	(0.021)	(0.019)	(0.017)	(0.017)	(0.016)	(0.016)	(0.014)	(0.013)
M< high sch	0.026	0.007	0.005	0.054*	-0.022	-0.018	-0.036	-0.021	-0.037*
	(0.025)	(0.026)	(0.027)	(0.025)	(0.024)	(0.024)	(0.023)	(0.021)	(0.019)
M univ	0.006	-0.013	-0.040	0.067**	-0.011	-0.025	-0.021	-0.014	-0.019
	(0.023)	(0.025)	(0.024)	(0.022)	(0.021)	(0.021)	(0.020)	(0.018)	(0.016)
M unknown	-0.093	-0.079	0.060	-0.062	0.031	-0.013	0.071	-0.067	-0.005
	(0.053)	(0.057)	(0.055)	(0.052)	(0.049)	(0.048)	(0.047)	(0.039)	(0.037)
F< high sch	0.008	-0.005	0.011	-0.016	-0.011	0.022	0.097**	0.010	0.054**
	(0.027)	(0.027)	(0.028)	(0.025)	(0.025)	(0.025)	(0.024)	(0.021)	(0.021)
F> high sch	-0.019	-0.025	0.018	-0.014	-0.041	-0.005	0.048*	-0.019	0.029
	(0.025)	(0.026)	(0.026)	(0.023)	(0.023)	(0.022)	(0.020)	(0.018)	(0.017)
F unknown	0.050	0.074	-0.023	-0.005	-0.050	-0.003	-0.035	0.007	-0.025
	(0.063)	(0.061)	(0.054)	(0.050)	(0.049)	(0.046)	(0.038)	(0.039)	(0.033)
Observations	3253	3422	3507	4083	4404	4492	4543	5066	5243

Note: Discrete changes. Robust standard errors in parentheses.* significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

Tabel A7. Risk of leaving unemployment, across graduation years

	1991-1993	**1992-1994**	**1993-1995**	**1994-1996**	**1995-1997**	**1996-1998**	**1997-1999**
3 month	4.386**	5.259**	6.045**	6.403**	6.123**	5.336**	4.881**
	(0.466)	(0.447)	(0.440)	(0.422)	(0.419)	(0.395)	(0.388)
6 month	-0.577	-1.006**	-1.563**	-1.813**	-1.833**	-2.047**	-2.116**
	(0.337)	(0.318)	(0.308)	(0.300)	(0.303)	(0.319)	(0.334)
12 month	0.457*	0.635**	0.727**	0.712**	0.581**	0.510**	0.601**
	(0.186)	(0.174)	(0.173)	(0.171)	(0.175)	(0.187)	(0.201)
18 month	1.525**	1.374**	1.232**	1.429**	1.654**	1.870**	1.473**
	(0.241)	(0.218)	(0.219)	(0.218)	(0.233)	(0.255)	(0.290)
24 month	-0.473	0.172	0.557	0.349	-0.414	-0.955	-0.653
	(0.529)	(0.437)	(0.412)	(0.430)	(0.504)	(0.622)	(0.735)
Constant	3.601*	3.401*	5.246**	4.481**	9.048**	9.573**	7.638**
	(0.607)	(0.568)	(0.540)	(0.506)	(0.521)	(0.482)	(0.503)
Spring	0.741**	0.814**	0.829**	0.863**	0.869**	0.879**	0.898*
	(0.045)	(0.042)	(0.041)	(0.040)	(0.041)	(0.043)	(0.044)
Women	1.021	0.981	0.978	0.996	1.013	1.283	0.989
	(0.045)	(0.042)	(0.041)	(0.040)	(0.040)	(0.042)	(0.045)
Age	0.914*	0.903**	0.878**	0.886**	0.864**	0.876**	0.898**
	(0.035)	(0.033)	(0.031)	(0.029)	(0.030)	(0.028)	(0.028)
Age2	1.001	1.001	1.001**	1.001*	1.001**	1.001**	1.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Swe	1.101	1.228*	1.241	1.261*	1.036	1.052	1.070
	(0.095)	(0.095)	(0.108)	(0.112)	(0.103)	(0.100)	(0.099)
Outside W eu	0.808	0.911	0.930	1.023	0.880	0.858	0.861
	(0.138)	(0.126)	(0.132)	(0.129)	(0.123)	(0.119)	(0.119)
Child 0-3y	0.964	0.940	0.866	1.003	0.986	1.061	1.017
	(0.089)	(0.081)	(0.076)	(0.071)	(0.075)	(0.077)	(0.082)
Child 4-6y	0.926	1.084	1.321*	1.294**	1.181	1.013	1.021
	(0.123)	(0.118)	(0.109)	(0.092)	(0.092)	(0.086)	(0.096)
Child 7-10y	1.400**	1.326**	1.091	1.027	0.981	1.164	1.215*
	(0.104)	(0.089)	(0.107)	(0.103)	(0.108)	(0.096)	(0.094)
Child 11-5y	0.923	1.086	1.133	1.188	1.066	1.193	1.118
	(0.111)	(0.101)	(0.107)	(0.111)	(0.115)	(0.110)	(0.099)
Child 16-17y	1.235	1.041	1.057	0.967	1.142	1.051	1.109
	(0.109)	(0.133)	(0.150)	(0.173)	(0.162)	(0.153)	(0.116)
Teacher	1.502**	1.674**	1.579**	1.381**	1.192*	1.223**	1.273**
	(0.080)	(0.076)	(0.074)	(0.070)	(0.074)	(0.074)	(0.076)
Hum	1.199*	1.085	1.023	0.938	0.920	0.857**	0.914
	(0.083)	(0.071)	(0.064)	(0.057)	(0.057)	(0.060)	(0.066)
Science	1.101	1.084	1.023	1.036	1.030	1.019	0.799
	(0.078)	(0.069)	(0.069)	(0.072)	(0.071)	(0.069)	(0.068)
Technology	1.141	1.178	1.772**	1.648**	1.708**	1.265	1.426**
	(0.125)	(0.126)	(0.148)	(0.130)	(0.123)	(0.157)	(0.131)
Healthcare	1.798**	1.682**	1.770**	1.800**	1.946**	1.758**	1.773**
	(0.088)	(0.084)	(0.080)	(0.076)	(0.080)	(0.077)	(0.074)
Service	0.905	0.911	0.609	0.832	0.831	0.808	0.966
	(0.653)	(0.604)	(0.415)	(0.261)	(0.021)	(0.178)	(0.212)
Educ< 3y	0.808*	0.947	0.871	0.814	0.811	0.980	1.381*
	(0.103)	(0.108)	(0.122)	(0.125)	(0.128)	(0.138)	(0.132)
Educ> 3y	1.195**	1.191**	1.151**	1.135**	1.104*	1.115*	1.050

	(0.049)	(0.044)	(0.042)	(0.041)	(0.041)	(0.043)	(0.046)
M< high sch	0.950	0.994	1.028	1.161	1.008	0.976	0.969
	(0.064)	(0.062)	(0.061)	(0.060)	(0.063)	(0.065)	(0.066)
M univ	1.066	1.052	1.021	1.009	0.977	0.957	1.007
	(0.059)	(0.055)	(0.053)	(0.052)	(0.052)	(0.055)	(0.056)
M unknown	0.931	0.910	1.074	1.007	1.088	0.956	0.841
	(0.139)	(0.119)	(0.108)	(0.109)	(0.101)	(0.109)	(0.130)
F< high sch	0.971	0.980	1.035	1.041	0.977	0.901	0.940
	(0.066)	(0.062)	(0.060)	(0.061)	(0.062)	(0.066)	(0.069)
F> high sch	0.987	0.991	1.035	1.062	1.029	0.967	1.003
	(0.063)	(0.057)	(0.054)	(0.053)	(0.054)	(0.057)	(0.061)
F unknown	1.039	1.004	0.934	0.936	0.973	0.950	0.972
	(0.121)	(0.113)	(0.117)	(0.109)	(0.116)	(0.120)	(0.135)
obs	2224	2592	2706	2815	2693	2461	2246

Note: Exp (coeff) are presented..Robust standard errors in parentheses.* significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

Tabel A8. Including unobserved heterogeneity

3 month	6.613**	Child 0-3y	1.009
	(0.378)		(0.064)
6 month	-0.447	Child 4-6y	1.119
	(0.254)		(0.081)
12 month	1.309**	Child 7-10y	1.260**
	(0.153)		(0.083)
18 month	2.264**	Child 11-5y	1.140
	(0.181)		(0.092)
24 month	0.739*	Child 16-17y	1.084
	(0.365)		(0.109)
Constant	5.267**	Teacher	1.593**
	(0.446)		(0.644)
y91	1.176*	Hum	0.811
	(0.076)		(0.055)
y92	0.893	Science	1.057
	(0.064)		(0.058)
y93	0.831**	Technology	1.545**
	(0.067)		(0.102)
y94	0.968	Healthcare	2.245**
	(0.063)		(0.777)
y96	1.118	Service	0.965
	(0.065)		(0.233)
y97	1.304**	Educ< 3y	0.921
	(0.067)		(0.097)
y98	1.698**	Educ> 3y	1.132**
	(0.072)		(0.035)
y99	1.805**	M< high sch	0.991
	(0.075)		(0.052)
Spring	0.792**	M univ	1.050
	(0.034)		(0.043)
Women	1.005	M unknown	0.911
	(0.034)		(0.097)
Age	0.872**	F< high sch	0.971

	(0.026)		(0.052)
Age2	1.001**	F> high sch	1.031
	(0.000)		(0.045)
Swe	1.206*	F unknown	0.926
	(0.083)		(0.096)
Outside W eu	0.835	Sigma	2.202
	(0.103)		(0.078)
		obs	7285

Note: Exp (coeff) are presented. Robust standard errors in parenthesis.* significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

Tabel A9. Models estimated simultaneously

Hazard		**Probit**			
3 month	6.621**	Constant	-3.319**	Sigma1	2.208**
	(0.377)		(0.505)		(0.077)
6 month	-0.440	1991-1993	0.005	Sigma2	2.847**
	(0.254)		(0.040)		(0.483)
12 month	1.312**	1997-1999	-0.621**	Roh	-0.003
	(0.152)		(0.037)		(0.004)
18 month	2.267**	Spring	-0.429**		
	(0.181)		(0.034)		
24 month	0.749*	Women	0.065		
	(0.366)		(0.034)		
Constant	5.291**	Age	0.144**		
	(0.448)		(0.025)		
y91	1.176*	Age2	-0.002**		
	(0.076)		(0.000)		
y92	0.893	Swe	-0.454**		
	(0.065)		(0.096)		
y93	0.831**	Outside W eu	0.331*		
	(0.067)		(0.131)		
y94	0.968	Child 0-3y	-0.195**		
	(0.063)		(0.059)		
y96	1.118	Child 4-6y	0.090		
	(0.065)		(0.073)		
y97	1.306**	Child 7-10y	-0.021		
	(0.067)		(0.073)		
y98	1.701**	Child 11-15y	-0.293**		
	(0.072)		(0.073)		
y99	1.809**	Child 16-17y	0.002		
	(0.075)		(0.094)		
Spring	0.792**	Teacher	0.062		
	(0.034)		(0.053)		
Women	1.004	Hum	0.238**		
	(0.034)		(0.056)		
Age	0.872**	Science	-0.678**		
	(0.026)		(0.050)		
Age2	1.001**	Technology	-0.691**		
	(0.004)		(0.082)		
Swe	1.207*	Healthcare	-0.551**		
	(0.083)		(0.052)		

Outside W eu	0.834	Service	0.923
	(0.104)		(0.315)
Child 0-3y	1.010	Educ< 3y	0.184**
	(0.064)		(0.034)
Child 4-6y	1.120	Educ> 3y	-0.269**
	(0.081)		(0.069)
Child 7-10y	1.260**	M< high sch	-0.026
	(0.084)		(0.047)
Child 11-15y	1.142	M univ	-0.014
	(0.093)		(0.042)
Child 16-17y	1.084	M unknown	0.017
	(0.110)		(0.099)
Teacher	1.594**	F< high sch	0.074
	(0.064)		(0.048)
Hum	0.979	F> high sch	-0.018
	(0.055)		(0.043)
Science	1.059	F unknown	-0.064
	(0.058)		(0.092)
Technology	1.548**		
	(0.102)		
Healthcare	2.249**		
	(0.078)		
Service	0.963		
	(0.234)		
Educ< 3y	0.922		
	(0.097)		
Educ> 3y	1.132**		
	(0.035)		
M< high sch	0.991		
	(0.052)		
M univ	1.050		
	(0.043)		
M unknown	0.911		
	(0.097)		
F< high sch	0.971		
	(0.052)		
F> high sch	1.032		
	(0.046)		
F unknown	0.926		
	(0.096)		
obs	7285	obs	30657

Note: Exp (coeff) are presented for the hazard model and coefficients for the probit. Robust standard errors in parenthesis.* significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

Table A10. Probit model estimated using the simultaneous sample

Constant	-1.203**	Teacher	0.044
	(0.196)		(0.029)
1991-1993	-0.007	Hum	0.104**
	(0.020)		(0.026)
1996-1999	-0.334**	Science	-0.365**
	(0.019)		(0.027)
Spring	-0.220**	Technology	0.375**
	(0.017)		(0.045)
Women	0.032	Healthcare	-0.310**
	(0.017)		(0.028)
Age	0.072**	Service	0.379**
	(0.011)		(0.114)
Age2	-0.001**	Educ< 3y	0.100**
	(0.000)		(0.017)
Swe	-0.224**	Educ> 3y	-0.164**
	(0.044)		(0.038)
Outside W eu	0.125*	M< high sch	-0.013
	(0.055)		(0.025)
Child 0-3y	-0.100**	M univ	-0.004
	(0.031)		(0.022)
Child 4-6y	0.053	M unknown	0.007
	(0.039)		(0.052)
Child 7-10y	-0.012	F< high sch	0.029
	(0.039)		(0.026)
Child 11-15y	-0.156**	F> high sch	-0.014
	(0.039)		(0.023)
Child 16-17y	0.001	F unknown	-0.034
	(0.049)		(0.049)
		obs	30657

Note:Robust Coefficients are presented. Standard errors in parenthesis.* significant at 5 %, ** significant at 1%. References are; y95, Nordic & W eu, social science, M high sch, F high sch.

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