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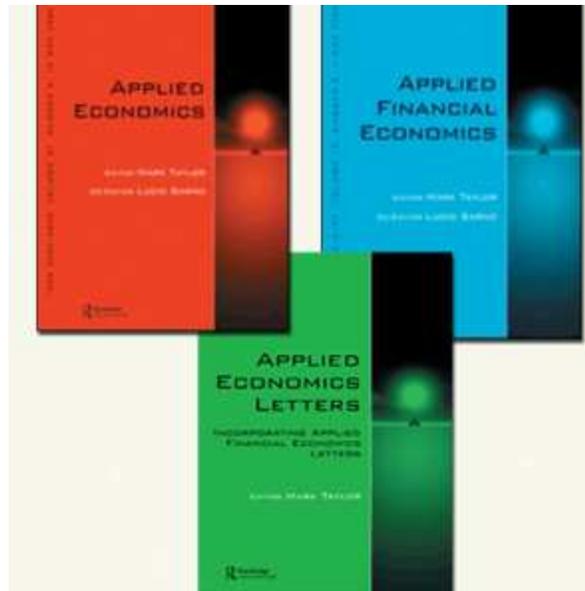
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## **The college-to-work transition during the 1990s: evidence from Sweden**

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This paper analyses the time it takes for Swedish college graduates to start a full time job that lasts for six months or more. The focus is on the transition over time during the period 1991 to 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 of more importance for the outcomes during recessions. Further, the relative risk of unemployment has decreased over 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 sharp expansion of the higher educational system during the studied period.

## I. 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, and accordingly it may have long-term effects on skill accumulation and incomes.<sup>1</sup> Consequently, it will affect the tax income for the government. 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 given the great expansion of the higher educational system, not least in Sweden.

There are very few previous studies on unemployment duration at graduation. Betts *et al.* (2000) estimate the time it takes for Canadian college graduates to start a full time job that lasts for six months or more. The speed of transition both within and between cohorts is investigated. A related literature examines the long-term effect on earnings of graduating in a recession.<sup>2</sup>

Previous studies on Swedish data are mainly focusing on re-employment due to different unemployment benefit systems.<sup>3</sup> No previous study on Swedish data emphasizes only highly educated, hence, nor do they explore the transition to work for

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<sup>1</sup> Gartell (2009) shows that Swedish college graduates who get unemployed at graduation have considerably lower future earnings as compared to college graduates who do not experience any unemployment at graduation. Holmlund *et al.* (2006) show that working experience subsequent to graduation is important for individual incomes at 35 years of age. Nordström Skans (2004), studying high school graduates, shows that unemployment during the first year after high school graduation has serious long term effects on future incomes.

<sup>2</sup> See e.g. Stevens (2007), Oreopoulos (2008).

<sup>3</sup> See e.g. Harkman (1987), Albrecht *et al.* (1989), Edin (1989), Edin and Holmlund (1991), Höjgård (1994), Korpi (1995), Carling *et al.* (1996), Thoursie (1998) and Jans (2002).

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3 this group. This paper adds to existing literature by specifically examining the transition  
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5 to work for college graduates.  
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10 During the 1990s the business cycle fluctuations were significant, which is likely to  
11  
12 have affected the transition to work during the period.<sup>4</sup> Business cycle variations are  
13  
14 likely to be related to individual opportunities to get a job at graduation as well as to the  
15  
16 individual risk of exiting unemployment (if unemployed at graduation), e.g. there are  
17  
18 fewer job offers in recessions. Moreover, human capital may depreciate with the  
19  
20 unemployment duration, further reducing the possibility of employment.<sup>5</sup> In contrast,  
21  
22 unemployment during economic upturns may send a relatively more negative signal to  
23  
24 employers, or individuals getting unemployed during good times are a more negatively  
25  
26 selected sample. These factors may increase the unemployment duration in good times  
27  
28 as compared to bad.  
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36 Graduates from Stockholm and Uppsala University during 1991 to 1999 are studied.  
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38 Data, provided by the Institute for Labour Market Policy Evaluation (IFAU), consists of  
39  
40 a number of administrative data sets covering the whole population of 16-64 years old.  
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46 The risk of unemployment is estimated using a probit model, whereas the duration to  
47  
48 first job is analyzed using a proportional piece-wise linear hazard model. Two main  
49  
50 points are investigated. First, do patterns of transition to work differ between graduates  
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56 <sup>4</sup> Thoursie (1998) studies individuals with different educational levels and shows that the effect of  
57  
58 education on the unemployment duration varies with the business cycle. Her study covers the population  
59  
60 24-54 years old in Sweden.

<sup>5</sup> See e.g. Edin and Gustavsson (2008).

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3 at different points in the business cycle? Second, given the same graduation year, does  
4  
5 the transition to work differ between graduates?  
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10 Examining the college-to-work transition, outcomes across the business cycle may be  
11  
12 correlated with individual characteristics, observed or/and unobserved. One might  
13  
14 expect the distribution of individual observed and unobserved characteristics to be  
15  
16 similar across cohorts of graduates, i.e. across the business cycle. However, the timing  
17  
18 of graduation might be endogenous. Although the main purpose of this paper is to  
19  
20 describe the college-to-work transition rather than to establish a causal relationship,  
21  
22 parental background and grade point average from high school are used to control for  
23  
24 unobserved ability. This is a common approach in the educational literature.  
25  
26 Furthermore, a term for unobserved heterogeneity is included, and the risk of  
27  
28 unemployment and the unemployment duration is estimated simultaneously.  
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36 The paper proceeds as follows. The next section provides some background. In section  
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38 3 the theoretical framework is presented and in section 4 data used is described.  
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40 Empirical considerations are discussed in section 5. Section 6 presents the results of the  
41  
42 analysis. Section 7 concludes.  
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## 48 **II. Background**

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51 During the 1990s Sweden experienced the deepest recession since the Great Depression  
52  
53 in the 1930s. Hence, the studied period covers extreme variations in the business cycle  
54  
55 and a unique opportunity to study the importance of the business cycle for the transition  
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3 to work. Fig. 1 shows the unemployment rates during the period. The fluctuations have  
4  
5 been significant during the period, but not as pronounced for highly educated as  
6  
7 compared to other groups. Fig. 2 displays the net employment rates, i.e. the difference  
8  
9 between jobs created and jobs destroyed, and shows that there is also variation *within*  
10  
11 the group of highly educated. For example, to have a higher level of degree was more  
12  
13 favourable in terms of net employment rates during the second half of the 1990s,  
14  
15 whereas it was more favourable to have a shorter university education during the first  
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17 half.  
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23  
24 < Fig. 1 about here >

25  
26  
27 < Fig. 2 about here >

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31 Furthermore, during the 1990s the share of college students in Sweden increased  
32  
33 dramatically, at the same time as the number of graduates was large. The number of  
34  
35 new students increased with 50% during the 1990s, and the number of individuals with  
36  
37 a university degree increased with 25%. Moreover, the share of the population with a  
38  
39 long university education increased relatively more as compared to individuals with a  
40  
41 shorter university education.<sup>6</sup> The share of a yearly cohort with a university degree has  
42  
43 been fairly constant for cohorts born before 1965, but has increased considerably for  
44  
45 cohorts born after 1965.<sup>7</sup>  
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52 In addition, the size of the cohorts has varied (see Fig. 3). The cohort one belongs to  
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54 will matter for the number of graduates, the educational level of the population and the  
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56

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58  
59 <sup>6</sup> The Swedish Labour Force Survey, See Gartell (2010) for details.  
60

1  
2  
3 size of the cohort exiting the labour force. This could possibly affect both the risk of  
4  
5 unemployment and the unemployment duration.<sup>8</sup>  
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10 <Fig. 3 about here>  
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### 13 14 15 **III. Theoretical framework** 16

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18 Search theory considers unemployed workers who maximize their utility. They do so by  
19  
20 choosing a set of acceptable wage offers at each point in time. This set is defined by the  
21  
22 reservation wage; the unemployed individuals will accept all offers above or equal to  
23  
24 their reservation wage and reject offers less than their reservation wage.<sup>9</sup> The  
25  
26 reservation wage chosen by the individual will affect the probability of accepting a job  
27  
28 offer, given that he/she has not previously done so.  
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35 The probability of acceptance is dependent on the individual reservation wage, the  
36  
37 probability of receiving a job offer and individual search activity. The higher the  
38  
39 reservation wage the lower the risk that an individual accepts a job offer and,  
40  
41 consequently, leaves unemployment. The reservation wage may be dependent on time  
42  
43 spent in unemployment, i.e. the duration. Theoretically, it will decrease with the  
44  
45 duration. Empirically, this means that the probability of leaving unemployment will  
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47 increase. On the other hand, the estimated probability of accepting a job offer is an  
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49 average of the probabilities of the surviving individuals at that time, this may be a  
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56 <sup>7</sup> National Agency for Higher Education (2001).

57 <sup>8</sup> See e.g. Nordström Skans (2005) who shows that a large youth cohort has a positive effect on the local  
58 labour market in terms of unemployment rates for young workers.

59 <sup>9</sup> See Lancaster (1979) for a more detailed model, and Jans (2002) for a simplification of the same model.  
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3 selected sample, and the probability could, as a result, fall with the duration.  
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8 The reservation wage is, however, hard to observe. The most natural way to empirically  
9  
10 specify a search model is by using duration data and estimate the variation in the  
11  
12 probability of leaving unemployment (as a function of time).  
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16  
17 According to search theory, higher educated individuals have higher reservation wage.<sup>10</sup>  
18  
19 This means that more highly educated individuals may have trouble finding acceptable  
20  
21 jobs. In contrast, it is assumed that highly educated individuals will have more job  
22  
23 opportunities. Theoretically, an individual can accept a job offer below his/her  
24  
25 educational level, but will not receive job offers above his/her educational level. The  
26  
27 effect of education is not clear-cut; there is a positive effect due to number of job offers  
28  
29 but a negative due to a higher reservation wage.  
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36 For new graduates other factors such as e.g. to find a job that corresponds to one's  
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38 education could be of great significance. Moreover, studying the transition to work  
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40 across time, the reservation wage may vary as a result of that e.g. *i*) the supply of highly  
41  
42 educated vary, *ii*) the demand for highly educated vary, and *iii*) the business cycle  
43  
44 fluctuations - there is e.g. a higher risk associated with turning down a job offer in a  
45  
46 recession due to fewer job offers. These factors could both negatively and positively  
47  
48 relate the educational level to the risk of unemployment and the unemployment  
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50 duration. Van der Klaauw *et al.* (2005) show that as graduation approaches, students  
51  
52 increase their job search effort and lower their reservation wage. Furthermore, they  
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3 show that the unemployment rate at graduation is important; mean wage offers are  
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5 significantly lower in periods when the unemployment rate is high. They also find  
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7 substantial returns to work experience, which suggests that individuals are relatively  
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9 less selective in choosing their first job i.e. reservation wages will be lower.  
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#### 14 15 **IV. Data**

16  
17 Data are provided by IFAU and consist of a number of administrative data sets from  
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19 Statistics Sweden and the Public Employment office, covering the whole population of  
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21 16-64 years old in Sweden. In this paper all graduates from Stockholm and Uppsala  
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23 University during 1991 to 1999 are used. Unemployment immediately (within a year)  
24  
25 upon graduation is considered. The unemployment spell is studied up to the point where  
26  
27 individuals find a full-time job, lasting for six months or more. Durations are (right)  
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29 censored after two years. Hence, individuals are followed for at most three years  
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31 subsequent graduation.  
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40 The individual-level records in the events database (Händel) are used to study the  
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42 unemployment duration. Registration at a public employment office is compulsory for  
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44 anyone receiving unemployment benefits. For a student to be entitled to benefits he/she  
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46 must have been registered as unemployed for 90 days.<sup>11</sup> This should provide an  
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48 incentive to register as soon as one realizes the risk of unemployment. A benefit period  
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50 consists of 300 benefit days corresponding to 15 months (if on full time). This period  
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52 can be prolonged at most one time with a maximum of 300 benefit days.  
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57 <sup>10</sup> Kettunen (1994, 1997).  
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6 Studying the risk of unemployment, all registrations at the public employment office are  
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8 considered. Whereas examining the unemployment duration only individuals registered  
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10 as full-time unemployed and able to accept employment immediately will be included.  
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12 Data further contains information regarding destination after exiting unemployment.  
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14 The reason for exiting unemployment is in the great majority of cases that individuals  
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16 received employment; regular, temporary or reemployment at previous employer. A  
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18 rather big group is the “contact broken” category (about 20%); these individuals will be  
19  
20 considered as having found employment. Further, some individuals return to regular  
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22 education, i.e., education outside the labour market programs. More than 80% of the  
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24 individuals are included in the employment categories or the contact broken category.  
25  
26 About 10% are found in the education category, and less than 10% leave for other  
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28 reasons. The reason for leaving unemployment does not vary considerably across  
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30 graduation years.<sup>12</sup>  
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55 The duration of unemployment, starting within a year following graduation, will be  
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57 considered. The unemployment spell may well start before graduation; 94% of the  
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59 unemployment spells however start the same semester as registered graduation, or later.  
60  
All unemployment spells 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.<sup>13</sup> The reason is to avoid considering very temporary jobs as employment. About

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<sup>11</sup> The Swedish Unemployment Insurance Board (IAF), Fakta-PM 3:2005.

<sup>12</sup> However, there are some changes in the coding of data over time. There are some previous studies using models for competing risks at reemployment; these studies show that different transitions are governed by different mechanisms. See e.g. Edin (1989) and Thoursie (1998).

<sup>13</sup> See e.g. Betts *et al.*, where 6 months is used to define a stable employment.

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3 14% have a gap between two subsequent periods that are greater than zero, and about  
4  
5 5% have a gap that is greater than 20 days.  
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10 Individuals will be censored if their unemployment spell exceeds 2 years (about 1%).  
11  
12 Also, they will be censored due to “other” reasons if disappearing out of the data for any  
13  
14 other (unknown) reason. Individuals not found in any other register the year of  
15  
16 graduation will be dropped. Hence, information about age, gender and so forth is  
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18 missing (less than 2% of the population); these are likely to be exchange students or  
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20 non-Swedish citizens.  
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27 The spring and fall semesters range from January 20 to August 30 and September 1 to  
28  
29 January 19 respectively. The semester of graduation is known, but not the exact date.  
30  
31 No time varying covariates are used because the unemployment spells, on average, are  
32  
33 too short to explore yearly variations. The duration in the 50<sup>th</sup> percentile is less than 6  
34  
35 months (see Appendix Table A1 and Fig. A1).<sup>14</sup>  
36  
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41 If an individual has several registered graduation years, the latest is used. If there are  
42  
43 several degrees, at different levels, the same year, then the highest-level degree is used.  
44  
45 Further, if an individual have several degrees within the same field of education, an  
46  
47 indicator is created to specify that there were actually several degrees within the same  
48  
49 field and only one degree is kept. Finally, if there are several degrees within different  
50  
51 fields, one is randomly chosen and a variable is created to indicate whether the  
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58 <sup>14</sup> This may be compared to the median duration for Canadian college students which is 15 month, see  
59 *Betts et al.* (2000).  
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3 individual have several degrees (about 0,003% of the population).  
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8 Fixed variables used, i.e. variables observed in the beginning or before the  
9 unemployment spell, are age (and age squared), sex, country of birth, educational  
10 background such as length and field of education, year and semester of graduation,  
11 children<sup>15</sup>, parental education. Moreover, an indicator for the type of unemployment  
12 benefit the individual is entitled to, year of first registration in higher education and  
13 grade point average from high school are included in some specifications (see Appendix  
14 Table A2 for details).  
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27 The total number of graduates in the period 1991 to 1999, from Uppsala and Stockholm  
28 University, were 39 376. After the data processing there are 38 013 individuals, out of  
29 which 14 644 experienced unemployment at graduation. Out of these 14 644, 7 288 are  
30 registered as unemployed and able to accept employment immediately. Only these  
31 7 288 individuals are used in the duration analysis.<sup>16</sup> For more detailed descriptive  
32 statistics see Appendix Table A3.  
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<Table 1 about here>

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49 <sup>15</sup> There is information about number of children in different age groups in the household but no  
50 information about whom the children belong to. Consequently, for students living at home, it is possible  
51 that they will be registered as having e.g. children older than 18, but those children are in fact themselves  
52 (or possibly siblings). Therefore, children above the age 18 will be excluded from the analysis. A variable  
53 for "had a child during the first year after graduation" will be included as a sensitivity analysis.

54 <sup>16</sup>The other unemployed individuals are not considered to be able to accept a job offer immediately for a  
55 number of different reasons. In previous studies on unemployment duration only individuals able to  
56 accept a job immediately are considered; only these individuals may end their unemployment immediately  
57 upon receiving a job offer.  
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1  
2  
3 Table 1 shows that the number of graduates has increased during the 1990s and that the  
4  
5 share of students experiencing unemployment at graduation has varied with the business  
6  
7 cycle. Further, the share getting unemployed at the end of the period are smaller as  
8  
9 compared to the beginning. This pattern corresponds to some evidence presented in  
10  
11 Gartell *et al.* (2010). Gartell *et al.* find quite strong evidence that the increased share of  
12  
13 highly educated individuals, at least partly, has been driven by increased demand for  
14  
15 this group. Granqvist and Regnér (2007) present results showing that the income  
16  
17 premium of higher education have increased during the same period.  
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## 24 **V. Empirical considerations**

25  
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28 The risk of unemployment at graduation is estimated using a probit model. To study the  
29  
30 unemployment duration, a proportional piecewise linear hazard model will be estimated  
31  
32 using aML software.<sup>17</sup> This model allows the hazard to be different over each time  
33  
34 interval. Moreover, it is possible to introduce a term for unobserved heterogeneity, i.e.  
35  
36 the duration dependence can be estimated conditioning on observed covariates and  
37  
38 unobserved heterogeneity. Assumptions made are that the heterogeneity is independent  
39  
40 of the observed covariates, starting times and censoring times. Further, it is assumed  
41  
42 that the heterogeneity has a known distribution and enters the hazard function  
43  
44 multiplicatively. These assumptions can not be tested; if the assumptions are not  
45  
46 fulfilled the unobserved heterogeneity term can introduce errors into the model.  
47  
48  
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50 However, one may argue for the likelihood of those conditions being fulfilled or not.  
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54 The unobserved heterogeneity term can though be used to test the stability of the results.  
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3 If the results are stable for the inclusion, there is less reason to worry about omitted  
4  
5 variable bias.  
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10 To examine the importance of the timing of graduation, dummy variables for each  
11  
12 graduation year are included and the model is estimated separately for different  
13  
14 graduation years. As already mentioned, there may be other factors linked to the year of  
15  
16 graduation that may influence the result. First, there has been a great expansion of the  
17  
18 higher educational system. Second, there have been fluctuations in cohort sizes and in  
19  
20 the net employment rates for highly educated during the studied period. To try and  
21  
22 identify or disentangle these different effects are not within this study.<sup>18</sup>  
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28  
29 Only registered unemployment spells are considered. Considering only registered  
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31 unemployment will on one hand avoid including individuals that e.g. did not have an  
32  
33 employment but continue to study, or work abroad. On the other hand, individuals  
34  
35 might be unemployed without being registered at the public employment office.  
36  
37 However, the incentives to register are rather high.<sup>19</sup>  
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44 In this paper only graduates are used. Out of all individuals with a university education  
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46 corresponding to three years or more, about 80% graduate.<sup>20</sup> In general, students may be  
47  
48 divided into two groups; *program students* and *course students*. Program students enter  
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51  
52 <sup>17</sup> See Bossfeld and Rohwer (2002) and Lillard and Panis (2003) for description of the model.

53 <sup>18</sup> See e.g. Andersson (2000) for a discussion of how to identify age, period and cohort effects  
54 respectively.

55 <sup>19</sup> More than 90% of individuals reporting unemployment were registered as unemployed at a public  
56 employment office. Moreover, the share of individuals reporting unemployment who have been in contact  
57 with a public unemployment office has been rather stable during 1992-1997. See Statistics Sweden (1993)  
58 and the Swedish National Labour Market Board (1998).  
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3 a program usually lasting for 3 years or more, whereas course students register at  
4  
5 separate courses typically lasting for at most one semester. Separate courses may be  
6  
7 combined to correspond to a program. However, 7 years from their first registration  
8  
9 only 10% of the course students have a degree and another 10% have achieved three  
10  
11 years full time study without graduating. Eleven years from their first registration, about  
12  
13 70% of the program students have graduated. The main reason for using only graduates  
14  
15 is that the time of graduation is registered. However, the registered date of graduation  
16  
17 may not necessarily correspond to the actual date of graduation. Completing their  
18  
19 studies, individuals do not routinely graduate but are required to hand in an application  
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21 to be registered as graduates.  
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29 Only graduates from Stockholm and Uppsala University are studied, the reason is to  
30  
31 reduce potential problems of differences between universities and local labour markets.  
32  
33 Moreover, the focus is on the importance of the timing of graduation not on regional  
34  
35 differences. Students from Stockholm and Uppsala University basically graduated into  
36  
37 the same labour market. For graduates in 1991, about 80% of the graduates from  
38  
39 Stockholm University worked within the county of Stockholm or Uppsala one, five and  
40  
41 ten years following graduation. For graduates from Uppsala University about 55%  
42  
43 worked within the region. Individuals working outside the region are quite evenly  
44  
45 distributed among other counties.<sup>21</sup> The Stockholm region labour market differs in some  
46  
47 aspects compared to other regions. Stockholm is the capital of Sweden and by far the  
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49 largest city, and unemployment rates are generally lower as compared to other parts of  
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57 <sup>20</sup> National Agency for Higher Education (2005).

58 <sup>21</sup> See e.g. Gartell and Regnér (2002, 2005).

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3 the country.  
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8 The selection of individuals *into* university studies may vary with the business cycle at  
9 the time for admission. Furthermore, the increasing supply of graduates over time may  
10 suggest less selection into university studies. A single administrative authority on the  
11 national level handles the admission; number of applicants often outnumber available  
12 slots.<sup>22</sup> Grade point average from high school is generally used in the admission  
13 procedure.  
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24 The selection *out of* university studies may also vary with the business cycle.  
25 Individuals may e.g. postpone graduation in recessions, potentially making graduates in  
26 recessions a relatively selected sample. Consequently, cohorts of graduates can differ in  
27 their ability, affecting the probability of unemployment and the risk of exiting  
28 unemployment. The option to postpone graduation is however somewhat limited by the  
29 possibility of financing. Moreover, the graduation frequency may fluctuate with the  
30 business cycle; during good times it might be more likely to receive a job offer without  
31 an actual degree. Variables commonly used to control for ability are grades from high  
32 school and parental education. Further, the quality of education is possibly affected by  
33 the expansion of the higher educational system.  
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51 In Appendix, Table A3, descriptive statistics for the different graduation years are  
52 presented. The year of first registration at a university will be included as a control  
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57 <sup>22</sup> See National Agency for Higher Education (2004, 2006, 2007) for details on higher education in  
58 Sweden.  
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3 variable. This should, in combination with information about graduation year, be a good  
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5 estimate of circumstances at admission as well as the time spent in education.  
6  
7 Moreover, the level of education and grade point average from high school are included  
8  
9 in the analysis.  
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## 12 13 14 15 **VI. Results**

16  
17 Both the risk of unemployment and the unemployment duration across the 1990s are  
18  
19 estimated. The risk of unemployment at graduation is estimated using a probit model.<sup>23</sup>  
20  
21 The unemployment duration is estimated using a piece-wise linear proportional hazard  
22  
23 model. Estimating the unemployment duration, only individuals registered as  
24  
25 unemployed and able to accept a job offer *immediately* are included.  
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### 34 ***Transition to work between cohorts***

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36 In this section, only year dummies are included to estimate the effect of graduation year  
37  
38 on the probability of unemployment and the relative risk of leaving unemployment.  
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40 Fig. 4 shows that the probability of unemployment varies considerably across  
41  
42 graduation years; the probability of unemployment for graduates in 1993 is 2.5% higher  
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44 than for graduates in 1995, the probability for graduates in 1999 is 15.5% lower as  
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46 compared to the reference year (results are also presented in Table A4 in Appendix). It  
47  
48 is interesting to note that the probability of unemployment is lower for individuals  
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50 graduating towards the end of the 1990's, considering the increasing supply of highly  
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52 educated during the decade.  
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6 Fig. 5 shows the relative risk of exiting unemployment, if unemployed at graduation,  
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8 across graduation years (results are also presented in Table A4 in Appendix). The result  
9  
10 corresponds to the result for the probit model; the same years that increase the risk of  
11  
12 unemployment will shift the baseline down, i.e. reduce the risk of exiting  
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14 unemployment. And years with a relative low risk of unemployment will shift it up.  
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20 <Fig. 4 about here>

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22 <Fig. 5 about here>

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27 Further, Fig. 6 shows that there is a nonlinear relationship between time and the risk of  
28  
29 exiting unemployment. The time intervals used are 0-3 months, 3-6 months, 6-12  
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31 months, 12-18 months and finally 18-24 months. There is a peak at 3 months, most  
32  
33 likely due to the fact that an individual has to be registered as unemployed for three  
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35 months before receiving any unemployment benefits. Once benefits are received, the  
36  
37 risk of exiting unemployment decreases up to 6 months and then change direction and  
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39 increases until 18 months and thereafter flattens. At 18 months the benefit period  
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41 expires, if no extension is accepted.<sup>24</sup>  
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48 <Fig. 6 about here>

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56 <sup>23</sup> Weights were applied, but did not influence the results. Hence; nonweighted estimates are presented.

57 <sup>24</sup> The shape of the base line is very similar across individuals graduating during the spring and fall  
58 semesters respectively. The results are not presented but may be obtained from the author upon request.  
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3 **The effect of observable covariates.** Different covariates are included to investigate  
4 whether any of the variation across graduation years may be explained by observable  
5 factors. For neither the risk of unemployment nor the unemployment duration, are the  
6 coefficients of graduation year much affected by the inclusion of various covariates,  
7 suggesting little selection on observables across time (see Appendix Table A4). Note  
8 that this result also holds including grade point average from high school and parental  
9 educational level; traditionally considered to be highly correlated with individual ability.  
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22 Further, the inclusion of control variables reveals that the risk of unemployment is  
23 lower if graduating during the spring as compared to the fall, the probability of  
24 unemployment increases with age and is reduced if having children between the ages 0-  
25 3 years and 11-15 years (see Appendix Table A4).<sup>25</sup> Examining the educational  
26 characteristics included show that to have a degree within sciences, technology or  
27 healthcare reduces the probability of unemployment compared to having a degree  
28 within social science, whereas a degree within the fields arts/humanities and  
29 service/tourism increases the probability. More unexpectedly, the higher the level of  
30 education the higher the relative probability of unemployment at graduation.  
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46 Moreover, the year the individual first registered at a university was included. The year  
47 of first registration had some significant effect but did not affect the coefficients of the  
48 graduation years much (78 individuals lack this information), indicating that the  
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56 <sup>25</sup> Also, to have a child during the first year after graduation has a significant and negative effect.  
57 However, it does not affect the other estimates. I chose to leave this variable out of the basic specification  
58 since the exact timing of childbirth is unknown.  
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3 circumstances at admission are of little importance for the estimated effects.<sup>26</sup>  
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8 Turning to the risk of exiting unemployment, if unemployed at graduation, the inclusion  
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10 of different control variables reveal that to graduate during spring reduces the risk of  
11  
12 exiting unemployment, the risk of exiting unemployment is reduced with age, to be born  
13  
14 in Sweden increases the risk and to have children between 7-10 years reduce it.<sup>27</sup> To  
15  
16 include information about the parental background did not have any significant  
17  
18 effects.<sup>28</sup> These results are analogous to the results for the probability of unemployment  
19  
20 at graduation; with the exception that the probit model showed that to graduate during  
21  
22 spring reduced the risk of getting unemployed. Hence, to graduate during spring means  
23  
24 a lower risk of unemployment but once unemployed the unemployment spell is longer.  
25  
26 This might be explained by the fact that it is easier to find, at least a temporary job,  
27  
28 during the summer.<sup>29</sup> A temporary job may work as a stepping stone for a more stable  
29  
30 employment avoiding unemployment during the first year subsequent graduation.  
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32 However, once unemployed, the probability of exiting unemployment i.e. to receive a  
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34 job offer may be relatively low due to e.g. vacations.  
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52 Further, examining the educational characteristics reveals that to have a degree within  
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54 teaching, technology or health care increases the risk of exiting unemployment  
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56 relatively to social science. This corresponds to the results from the probit model, i.e.  
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<sup>26</sup> The results are not presented but may be obtained from the author upon request. The year of first registration was included both as a continuous variable and as dummy variables.

<sup>27</sup> A variable for “had a child during the first year” was included; the results were robust for this inclusion.

<sup>28</sup> Grades from high school were included for a sub sample of 4254 individuals. The estimated risk of exiting unemployment is 1.10, i.e., higher grades mean a higher risk of exiting unemployment. The other estimates are stable for the inclusion, however, the baseline between 18 and 24 months changes to positive but are not significant.

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3 the same fields of education that are associated with a relative high risk of  
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5 unemployment at graduation are also associated with relatively long unemployment  
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7 spells. A higher level of education increases the risk of exiting unemployment i.e. of  
8  
9 receiving a job. This is in contrast to the results in the probit model, where the estimated  
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11 risk of getting unemployed was greater the higher the level of education. One  
12  
13 explanation may be that more highly educated individuals are possibly more selective in  
14  
15 what jobs to accept, i.e. their reservation wage is higher. An alternative explanation may  
16  
17 be that less employable individuals stay longer in education because they have a hard  
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19 time to obtain employment. And once unemployed, their reservation wage decreases  
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21 and the risk of accepting a job offer increases. For individuals with a lower educational  
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23 level the relationship is reversed. The risk of unemployment is lower but once  
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25 unemployed it is a more long-lasting problem.<sup>30</sup>  
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### 35 *Transition to work within cohorts*

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37 In this section, the model is estimated separately for graduates in different years (see  
38  
39 Appendix Table A5 and A6).<sup>31</sup> The reason is to examine the importance of different  
40  
41 covariates at different times of the business cycle.  
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47 First, the results for the probit model are discussed (see Appendix Table A5). The  
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49 estimated effects of the covariates do differ between years of graduation though in most  
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53 <sup>29</sup> A majority of students that graduate during spring and who experience unemployment have an  
54 unemployment period that begins before or during the summer.

55 <sup>30</sup> Also type of unemployment benefit was included; the results are stable for this inclusion. The results  
56 may be obtained from the author upon request.

57 <sup>31</sup> Some estimations have been done on a sub-sample including only Swedish born individuals, and the  
58 results are robust. The results can be obtained from the author upon request.  
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3 cases the estimates have the same direction over time. One exception is the estimates for  
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5 humanities that vary between a significant estimate of -10% and a significant and  
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7 positive estimate of 13%. There is some evidence that the estimated effects of field of  
8  
9 education in general are larger during periods of relatively high aggregate  
10  
11 unemployment rates. The importance of the level of education also differs across years.  
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13 The effect of having a higher degree has a relative negative trend over time, i.e. the  
14  
15 relative risk of unemployment decreases.<sup>32</sup>  
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22 Estimating the hazard model, the graduation years will be grouped as follows; 1991-  
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24 1993, 1992-1994, 1993-1995, 1994-1996, 1995-1997, 1996-1998 and 1997-1999 to  
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26 obtain more observations (see Appendix Table A6). There is some variation in the  
27  
28 estimated effects of the covariates across graduation years, though for the most part the  
29  
30 estimates have the same sign. The effects of field of education vary considerably across  
31  
32 years. The effect of humanities changes sign between years, i.e. it varies between 1.19  
33  
34 and 0.86. Again there is some indication that field of education is more important  
35  
36 during times considered as bad. Hence, estimated effects are relatively large during  
37  
38 recessions. The only apparent trend found is the decreasing trend of exiting  
39  
40 unemployment for individuals with the highest level of education. Remember, during  
41  
42 the studied period there has been a sharp increase of the number of highly educated, and  
43  
44 even more so the higher the level of education. However, as suggested in the probit  
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46 model, the risk of unemployment did decrease across time. The decreasing risk of  
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48 exiting unemployment may possibly, therefore, be explained by that the selection into  
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56 <sup>32</sup> Moreover, average grades from high school were included for a sub sample of 21 959 individuals. The  
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58 estimate is significant and negative (-0.09), i.e. higher grades means lower risk of unemployment.  
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60 However, to include grades did not have much effect on the other estimates.

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3 unemployment for this group may have changed across time. The level of the baseline  
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5 for the different samples is not really comparable; though the shape is similar.  
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### 10 11 *Sensitivity analyses* 12

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14 To test for exit selection and the robustness of the results a term for unobserved  
15 heterogeneity is included in the model. Further, potential entry selection is considered  
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17 estimating the probit and hazard model simultaneously.  
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24 **Exit and Entry selection.** To test for exit selection, i.e. if individuals who receive a job  
25 are a selected sample compared to individuals still unemployed at time  $t$ , a term for  
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27 unobserved heterogeneity is included in the hazard model. Moreover, this will indicate  
28  
29 whether the results are robust for omitted variable bias.  
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36 The model is estimated including all control variables from the previous section and a  
37 term for unobserved heterogeneity (UHG), assuming normal distribution of the UHG  
38 component (see Appendix Table A7 and Fig. 7). As is shown in Fig. 7, the duration  
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40 dependence gets more positive including the UHG component.  
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48 <Fig. 7 about here>  
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53 This result is expected; the UHG component controls for that the sample is getting more  
54 selected with the unemployment duration, i.e. less employable individuals are still  
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56 unemployed after some time  $t$ . Further, this is in line with search theory discussed in  
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3 section 3. Hence, there is a positively selected sample of individuals exiting  
4 unemployment. The term for unobserved heterogeneity is significant and positive.  
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6 Moreover, to include a term for unobserved heterogeneity shows that the direction and  
7 significant levels of the estimates are stable. However, most estimates get larger.  
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15 It is possible that the same factors that affect the probability of unemployment will  
16 influence the unemployment duration, i.e. the outcome in the probit model may affect  
17 the outcome in the hazard model. By estimating the two models simultaneously it is  
18 possible to examine the role of entry selection into unemployment for the estimated  
19 effects in the duration model (see Appendix Table A7).<sup>33</sup> In the probit model,  
20 graduation years are grouped together as 1991-1993, 1994-1996 and 1997-1999. The  
21 reason is to get the model to converge. Control variables for observable characteristics  
22 are included in the models, as well as components for unobserved heterogeneity  
23 (omitted variables). Further a new term, *Rho*, is included. *Rho* measures the correlation  
24 between the two UHG components.  
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41 The UHG component is significant also in the probit model ( $\sigma^2$ ), but the inclusion  
42 does not change the significance or the direction of the estimates. However, the  
43 estimated effects are now much stronger, the size of the estimates about doubles for  
44 most of the estimates. Further, the result suggests that there is no significant correlation  
45 between the UHG in the two models, implying that it is not the same unobserved  
46 characteristics influencing the risk of unemployment and the unemployment duration.  
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57 <sup>33</sup> In this case only the individuals included in the hazard are included in the probit model. The result for  
58 the probit model using this sample is presented in Appendix Table A10.  
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3 Moreover, the results for the hazard model are stable indicating there is no obvious  
4 entry selection. These results imply that there seems to be no systematic differences in  
5 the unobserved characteristics in the selection into unemployment that will influence the  
6 unemployment duration, suggesting there is no selection due to the risk of  
7 unemployment that will bias the results in the hazard model; the estimates for  
8 graduation years are robust.  
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## 20 VII. Conclusions

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23 The results in this paper show that the risk of getting unemployed at graduation and the  
24 unemployment duration vary considerably both within and across graduation years. The  
25 variation across years can not be explained by observable covariates. Consequently,  
26 there is no evidence of selection *into* or *out of* university studies across years.  
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35 Theoretically, there are many explanations for variation across time and over the  
36 business cycle. First, the demand for highly educated is likely to be of importance.  
37 Previous studies suggests that the demand for highly educated varies with the business  
38 cycle and has increased across time. An increased demand means more *job offers*.  
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The estimated effect of different covariates varies across time. There is some variation  
in field of education consistent with the business cycle fluctuations; field of education

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3 matters more for the risk of unemployment and the unemployment duration during  
4 recessions. In general, there are no trends over time. The one exception is the relative  
5 decreasing trend in the risk of unemployment and the risk of exiting unemployment  
6 across time for individuals with the highest level degree. This indicates that the  
7 increased supply of more highly educated individuals has not posed a problem of  
8 finding a job, but for those who don't the unemployment is a more long lasting problem.  
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29 anonymous referee and seminar participants at SUDSWEc 2007, Institute for Futures  
30 Studies 2007, IFAU 2008 and ESPE 2008.  
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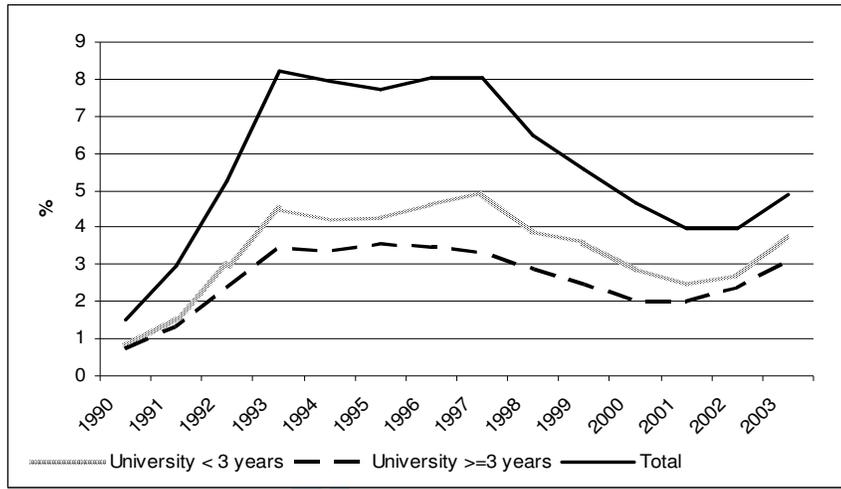
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49 search intensity and the transition from college to work, Working Paper 2005:9,  
50 Institute for Labour Market Policy Evaluation (IFAU), Uppsala.  
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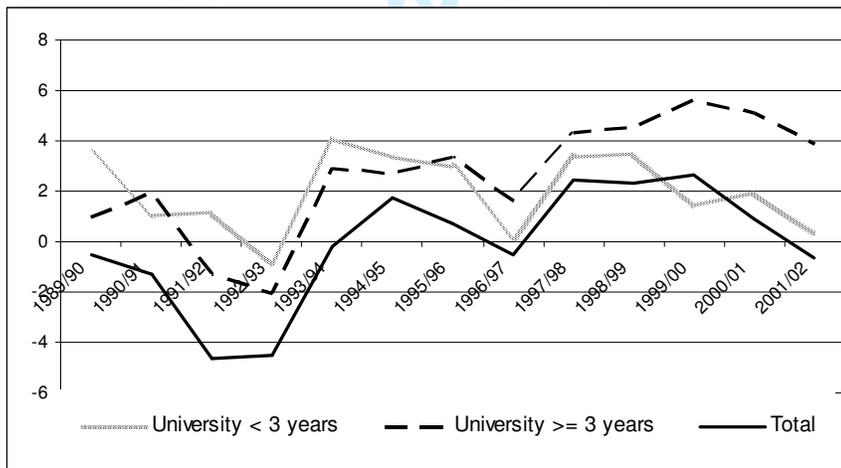
## Figures

**Fig. 1. Unemployment rates 1990-2003 (per cent)**

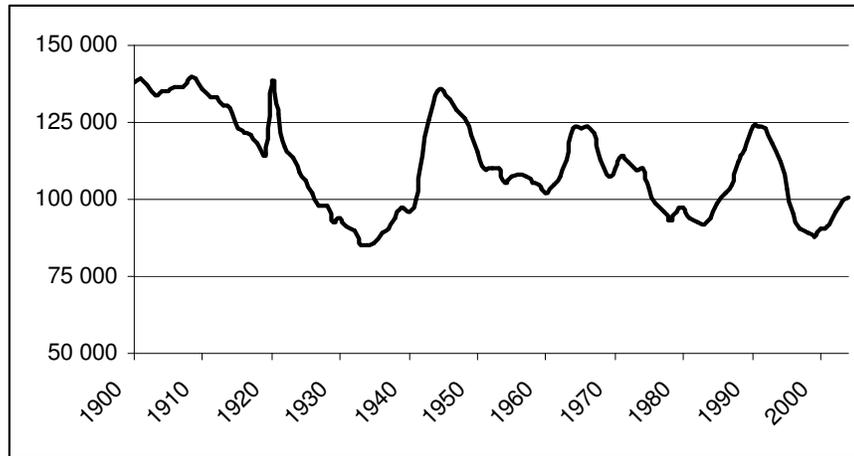


Source: Swedish Labour Force Survey

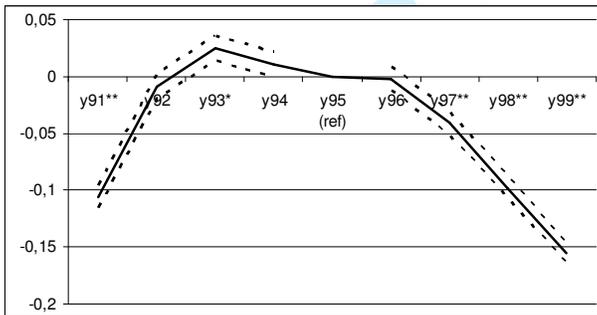
**Fig. 2. Net employment rates 1989-2002 (percent)**



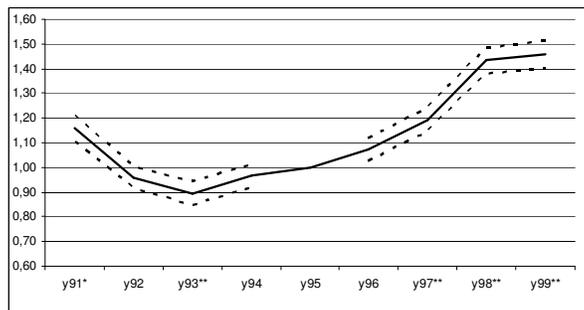
Source: Gartell *et al.* (2010)

**Fig. 3: Number of individuals born in different years in Sweden.**

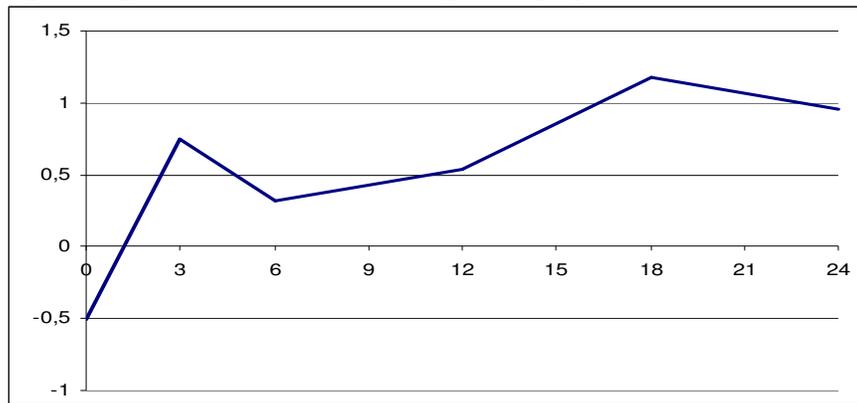
Source: Statistics Sweden

**Fig. 4. Estimated marginal effects and confidence interval of the risk of unemployment**

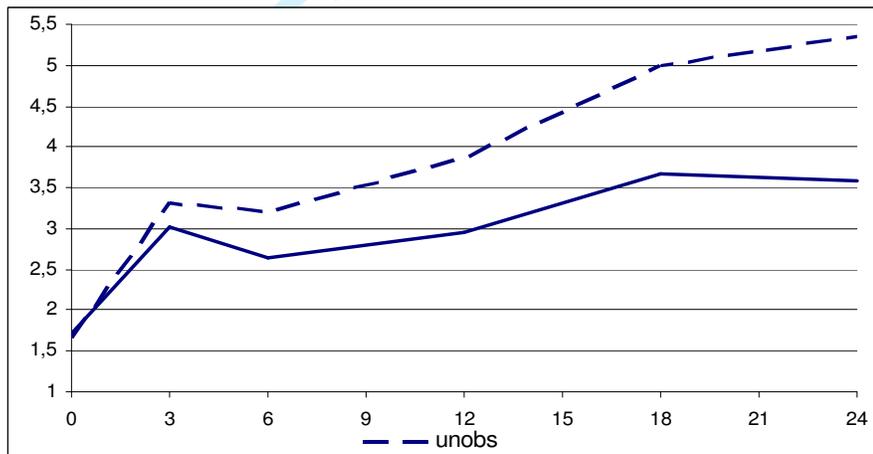
Notes: 1995 is the reference. Discrete changes. Robust SE. \*significant at 5%, \*\* significant at 1%. No control variables are included.

**Fig. 5. Estimated risk and confidence interval of exiting unemployment**

Notes: 1995 is the reference. The risk is presented i.e.  $\exp(\text{coeff})$ . Robust SE. \*significant at 5%, \*\* significant at 1%. No control variables are included.

**Fig. 6. Log hazard baseline of exiting unemployment (month)**

Notes: No control variables are included.

**Fig. 7 Log hazard baseline of exiting unemployment, excluding and including unobserved heterogeneity (month)**

## Tables

**Table 1. Descriptives**

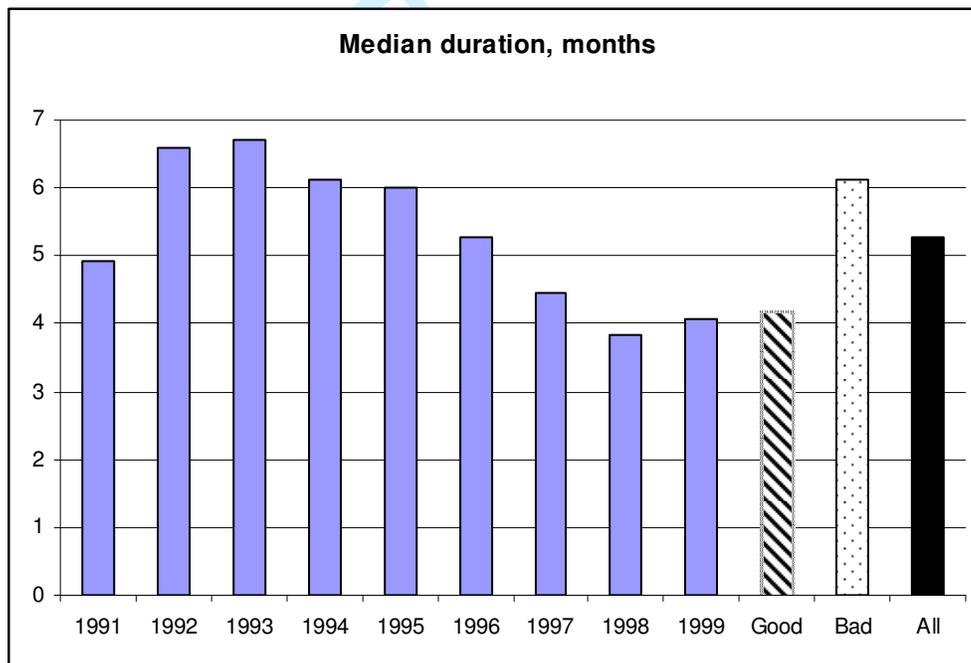
Exam Year	Number of graduates	Share of students that experienced any unemployment at graduation
1991	3253	0.32
1992	3422	0.42
1993	3507	0.46
1994	4083	0.44
1995	4404	0.43
1996	4492	0.43
1997	4543	0.39
1998	5066	0.33
1999	5243	0.27
Tot	38013	0.39

## 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

Fig. A1. Unemployment duration



**Table A2. Variable list**

Variables	Description
Spring	Dummy variable = 1 if graduated during spring semester (Jan 20- Aug 30)
Women	Dummy variable = 1 If a woman
Age	Age at year of graduation
Age^2	Age squared
Swe	Dummy variable, Born in Sweden=1
Nordic and W eu	Born in the Nordic countries or western Europe ( <i>Reference</i> )
Outside W eu	Dummy variable, Born outside Western Europe=1
Child y1	Dummy variable, Had a child during first year after graduation=1
Child 0-3y	Dummy variable, Have child/children between the age 0-3 years
Child 3-6y	Dummy variable, Have child/children between the age 3-6 years
Child 7-10y	Dummy variable, Have child/children between the age 7-10 years
Child 11-15 y	Dummy variable, Have child/children between the age 11-15 years
Child 16-17 y	Dummy variable, Have child/children between the age 16-17 years
Teacher	Dummy variable, field of education; teacher=1
Hum	Dummy variable, field of education; humaniora=1
Science	Dummy variable, field of education; natural science=1
Social science	<i>Dummy variable, field of education; social science=1 (Reference)</i>
Technology	<i>Dummy variable, field of education; technology=1</i>
Healthcare	<i>Dummy variable, field of education; health care=1</i>
Service	<i>Dummy variable, field of education; service/tourism=1</i>
Educ < 3 y	<i>Dummy variable, education less than 3 years at least two=1</i>
Educ 3 y	<i>Dummy variable, education less than 4 years but at least 3 years=1 (Reference)</i>
Educ > 3 y	<i>Dummy variable, education 4 years or more =1</i>
M < high sch	<i>Dummy variable, mothers education less than high school =1</i>
M high sch	<i>Dummy variable, mothers education high school =1 (Reference)</i>
M univ	<i>Dummy variable, mothers education university =1</i>
M unknown	<i>Dummy variable, mothers education unknown=1</i>
F < high sch	<i>Dummy variable, fathers education less than high school =1</i>
F high sch	<i>Dummy variable, fathers education high school =1 (Reference)</i>
F univ	<i>Dummy variable, fathers education university =1</i>
F unknown	<i>Dummy variable, fathers education unknown=1</i>
Unemp	<i>Continuous variable, unemployment rates for highly educated</i>
Akassa	<i>Type of benefit; Akassa=1 (Reference)</i>
Kas	<i>Type of benefit; kas=1</i>
Noinfo	<i>Type of benefit; no info about type of benefit=1</i>
Unemp grad	<i>Dummy variable, unemployment at graduation=1</i>
First reg univ	<i>Year of first registration in higher education</i>

**Table A3. Mean and SD 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	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

1										
2										
3	Science	0.12	0.11	0.10	0.11	0.12	0.13	0.12	0.12	0.14
4	Social science	0.53	0.51	0.50	0.51	0.48	0.47	0.46	0.43	0.42
5	Thechnology	0.03	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04
6	Healthcare	0.17	0.17	0.17	0.15	0.15	0.13	0.14	0.17	0.17
7	Service	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
8	Educ< 3y	0.10	0.13	0.11	0.10	0.09	0.07	0.06	0.05	0.04
9	Educ= 3y	0.61	0.57	0.55	0.49	0.47	0.48	0.43	0.43	0.41
10	Educ >3y	0.29	0.30	0.35	0.41	0.44	0.45	0.51	0.52	0.55
11	M< high sch	0.35	0.34	0.31	0.30	0.26	0.26	0.24	0.23	0.21
12	M high sch	0.18	0.18	0.18	0.19	0.19	0.20	0.22	0.23	0.23
13	M univ	0.46	0.48	0.51	0.51	0.54	0.55	0.55	0.55	0.55
14	M unknown	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03
15	F< high sch	0.32	0.32	0.29	0.28	0.26	0.25	0.23	0.23	0.22
16	F high sch	0.15	0.16	0.16	0.17	0.16	0.17	0.20	0.20	0.21
17	F univ	0.52	0.53	0.55	0.55	0.57	0.58	0.57	0.57	0.57
18	F unknown	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.03	0.04
19	Average grade	4.03	3.95	3.93	3.92	3.89	3.87	3.87	3.86	3.85
20	Kas	0.03	0.05	0.12	0.11	0.11	0.11	0.08	0.07	0.09
21	Akassa	0.22	0.25	0.28	0.31	0.30	0.32	0.32	0.31	0.27
22	Noinfo	0.19	0.21	0.15	0.13	0.13	0.13	0.13	0.11	0.10
23	Unemp	1.50	2.70	4.00	3.80	3.90	4.10	4.30	3.50	3.10
24	First reg univ	1984.81	1985.55	1986.52	1987.25	1988.03	1989.01	1989.91	1990.81	1991.47
25	Obs	3253	3422	3507	4083	4404	4492	4543	5066	5243

**Table A4. Probability of getting unemployed at graduation, and the risk of exiting unemployment.**

	Probit model: the probability of getting unemployed at graduation				Hazard model: the risk of exiting unemployment if unemployed at graduation	
y91	-0.106**	-0.106**	-0.099**	-0.101**	1.157**	1.103
	(0.010)	(0.010)	(0.010)	(0.010)	(0.054)	(0.055)
y92	-0.009	-0.008	0.002	0.001	0.960	0.920
	(0.011)	(0.011)	(0.011)	(0.011)	(0.045)	(0.047)
y93	0.025*	0.024*	0.029**	0.029**	0.895*	0.863**
	(0.011)	(0.011)	(0.011)	(0.011)	(0.0489)	(0.048)
y94	0.011	0.012	0.014	0.014	0.966	0.974
	(0.011)	(0.011)	(0.011)	(0.011)	(0.045)	(0.045)
y96	-0.002	-0.006	-0.007	-0.007	1.074	1.070
	(0.010)	(0.010)	(0.010)	(0.010)	(0.0469)	(0.046)
y97	-0.041**	-0.046**	-0.049**	-0.049**	1.192**	1.189**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.048)	(0.048)
y98	-0.098**	-0.104**	-0.106**	-0.106**	1.434**	1.428**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.052)	(0.052)
y99	-0.155**	-0.162**	-0.162**	-0.162**	1.458**	1.497**
	(0.009)	(0.009)	(0.009)	(0.009)	(0.053)	(0.053)
Spring		-0.076**	-0.073**	-0.074**		0.833**
		(0.005)	(0.005)	(0.005)		(0.025)
Women		0.052**	0.051**	0.051**		0.998
		(0.005)	(0.005)	(0.005)		(0.025)
Age		0.035**	0.026**	0.025**		0.902**
		(0.003)	(0.003)	(0.003)		(0.018)
Age2		-0.001**	-0.000**	-0.000**		1.001**
		(0.000)	(0.000)	(0.000)		(0.000)
Swe		-0.047**	-0.040**	-0.047**		1.125*
		(0.014)	(0.014)	(0.015)		(0.058)
Outside W eu		0.063**	0.088**	0.089**		0.880
		(0.018)	(0.019)	(0.019)		(0.072)

Child 0-3y	-0.027**	-0.032**	-0.031**	1.004
	(0.009)	(0.009)	(0.009)	(0.045)
Child 4-6y	0.000	0.008	0.008	1.069
	(0.012)	(0.012)	(0.012)	(0.059)
Child 7-10y	-0.024*	-0.008	-0.009	1.203**
	(0.012)	(0.012)	(0.012)	(0.059)
Child 11-15y	-0.071**	-0.050**	-0.050**	1.085
	(0.011)	(0.011)	(0.011)	(0.064)
Child 16-17y	-0.043**	-0.024	-0.024	1.085
	(0.015)	(0.015)	(0.015)	(0.079)
Teacher		0.003	0.001	1.371**
		(0.009)	(0.009)	(0.044)
Hum		0.035**	0.035**	0.951
		(0.008)	(0.008)	(0.039)
Science		-0.155**	-0.156**	1.028
		(0.007)	(0.007)	(0.042)
Technology		-0.163**	-0.163**	1.360**
		(0.012)	(0.012)	(0.077)
Healthcare		-0.112**	-0.113**	1.761**
		(0.008)	(0.008)	(0.046)
Service		0.160**	0.159**	0.938
		(0.037)	(0.037)	(0.165)
Educ< 3y		-0.101**	-0.104**	0.893
		(0.010)	(0.010)	(0.069)
Educ> 3y		0.025**	0.026**	1.101**
		(0.005)	(0.005)	(0.026)
M< high sch			-0.009	0.978
			(0.008)	(0.037)
M univ			-0.010	1.035
			(0.007)	(0.032)
M unknown			-0.014	0.927
			(0.016)	(0.078)
F< high sch			0.021**	0.988
			(0.008)	(0.038)
F> high sch			-0.003	1.023
			(0.007)	(0.034)
F unknown			-0.005	0.966
			(0.015)	(0.073)
3 month	-	-	-	5.015**
				(0.243)
6 month	-	-	-	-1.714**
				(0.185)
12 month	-	-	-	0.450**
				(0.106)
18 month	-	-	-	1.271**
				(0.142)
24 month	-	-	-	-0.437
				(0.308)
Constant	-	-	-	0.599**
				(0.054)
Observations	38013	38013	38013	7285
				7285

Notes: Discrete changes. Robust SE in parenthesis. significant at 5%, \*\* significant at 1%. References are; y95, Nordic and W eu, social science, M high sch, F high sch.

**Table A5. Probability of getting unemployed at graduation, across graduation years**

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

Notes: Discrete changes. Robust SE in parenthesis. \* significant at 5%, \*\* significant at 1%. References are; y95, Nordic and W eu, social science, M high sch, F high sch.

**Tabel A6. 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** (0.466)	5.259** (0.447)	6.045** (0.440)	6.403** (0.422)	6.123** (0.419)	5.336** (0.395)	4.881** (0.388)
6 month	-0.577 (0.337)	-1.006** (0.318)	-1.563** (0.308)	-1.813** (0.300)	-1.833** (0.303)	-2.047** (0.319)	-2.116** (0.334)
12 month	0.457* (0.186)	0.635** (0.174)	0.727** (0.173)	0.712** (0.171)	0.581** (0.175)	0.510** (0.187)	0.601** (0.201)
18 month	1.525** (0.241)	1.374** (0.218)	1.232** (0.219)	1.429** (0.218)	1.654** (0.233)	1.870** (0.255)	1.473** (0.290)
24 month	-0.473 (0.529)	0.172 (0.437)	0.557 (0.412)	0.349 (0.430)	-0.414 (0.504)	-0.955 (0.622)	-0.653 (0.735)
Constant	3.601* (0.607)	3.401* (0.568)	5.246** (0.540)	4.481** (0.506)	9.048** (0.521)	9.573** (0.482)	7.638** (0.503)
Spring	0.741** (0.045)	0.814** (0.042)	0.829** (0.041)	0.863** (0.040)	0.869** (0.041)	0.879** (0.043)	0.898* (0.044)
Women	1.021 (0.045)	0.981 (0.042)	0.978 (0.041)	0.996 (0.040)	1.013 (0.040)	1.283 (0.042)	0.989 (0.045)
Age	0.914* (0.035)	0.903** (0.033)	0.878** (0.031)	0.886** (0.029)	0.864** (0.030)	0.876** (0.028)	0.898** (0.028)
Age2	1.001 (0.000)	1.001 (0.000)	1.001** (0.000)	1.001* (0.000)	1.001** (0.000)	1.001** (0.000)	1.001** (0.000)
Swe	1.101 (0.095)	1.228* (0.095)	1.241 (0.108)	1.261* (0.112)	1.036 (0.103)	1.052 (0.100)	1.070 (0.099)
Outside W eu	0.808 (0.138)	0.911 (0.126)	0.930 (0.132)	1.023 (0.129)	0.880 (0.123)	0.858 (0.119)	0.861 (0.119)
Child 0-3y	0.964 (0.089)	0.940 (0.081)	0.866 (0.076)	1.003 (0.071)	0.986 (0.075)	1.061 (0.077)	1.017 (0.082)
Child 4-6y	0.926 (0.123)	1.084 (0.118)	1.321* (0.109)	1.294** (0.092)	1.181 (0.092)	1.013 (0.086)	1.021 (0.096)
Child 7-10y	1.400** (0.104)	1.326** (0.089)	1.091 (0.107)	1.027 (0.103)	0.981 (0.108)	1.164 (0.096)	1.215* (0.094)
Child 11-5y	0.923 (0.111)	1.086 (0.101)	1.133 (0.107)	1.188 (0.111)	1.066 (0.115)	1.193 (0.110)	1.118 (0.099)
Child 16-17y	1.235 (0.109)	1.041 (0.133)	1.057 (0.150)	0.967 (0.173)	1.142 (0.162)	1.051 (0.153)	1.109 (0.116)
Teacher	1.502** (0.080)	1.674** (0.076)	1.579** (0.074)	1.381** (0.070)	1.192* (0.074)	1.223** (0.074)	1.273** (0.076)
Hum	1.199* (0.083)	1.085 (0.071)	1.023 (0.064)	0.938 (0.057)	0.920 (0.057)	0.857** (0.060)	0.914 (0.066)
Science	1.101 (0.078)	1.084 (0.069)	1.023 (0.069)	1.036 (0.072)	1.030 (0.071)	1.019 (0.069)	0.799 (0.068)
Technology	1.141 (0.125)	1.178 (0.126)	1.772** (0.148)	1.648** (0.130)	1.708** (0.123)	1.265 (0.157)	1.426** (0.131)
Healthcare	1.798** (0.088)	1.682** (0.084)	1.770** (0.080)	1.800** (0.076)	1.946** (0.080)	1.758** (0.077)	1.773** (0.074)
Service	0.905 (0.653)	0.911 (0.604)	0.609 (0.415)	0.832 (0.261)	0.831 (0.021)	0.808 (0.178)	0.966 (0.212)
Educ< 3y	0.808* (0.103)	0.947 (0.108)	0.871 (0.122)	0.814 (0.125)	0.811 (0.128)	0.980 (0.138)	1.381* (0.132)
Educ> 3y	1.195** (0.049)	1.191** (0.044)	1.151** (0.042)	1.135** (0.041)	1.104* (0.041)	1.115* (0.043)	1.050 (0.046)
M< high sch	0.950 (0.064)	0.994 (0.062)	1.028 (0.061)	1.161 (0.060)	1.008 (0.063)	0.976 (0.065)	0.969 (0.066)
M univ	1.066 (0.059)	1.052 (0.055)	1.021 (0.053)	1.009 (0.052)	0.977 (0.052)	0.957 (0.055)	1.007 (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

Notes: Exp (coeff) are presented..Robust SE in parenthesis.\* significant at 5%, \*\* significant at 1%.  
References are; y95, Nordic and W eu, social science, M high sch, F high sch.

**Table A7. Models; (i) The hazard model including unobserved heterogeneity (ii) The probit and Hazard model estimated simultaneously and (iii) The probit model, estimated using the simultaneous sample.**

	(i)	(ii)		(iii)
	Hazard (including unobserved heterogeneity)	Hazard	Probit	Probit (estimated using the simultaneous sample)
Spring	0.792** (0.034)	0.792** (0.034)	-0.429** (0.034)	-0.220** (0.017)
Women	1.005 (0.034)	1.004 (0.034)	0.065 (0.034)	0.032 (0.017)
Age	0.872** (0.026)	0.872** (0.026)	0.144** (0.025)	0.072** (0.011)
Age2	1.001** (0.000)	1.001** (0.004)	-0.002** (0.000)	-0.001** (0.000)
Swe	1.206* (0.083)	1.207* (0.083)	-0.454** (0.096)	-0.224** (0.044)
Outside W eu	0.835 (0.103)	0.834 (0.104)	0.331* (0.131)	0.125* (0.055)
Child 0-3y	1.009 (0.064)	1.010 (0.064)	-0.195** (0.059)	-0.100** (0.031)
Child 4-6y	1.119 (0.081)	1.120 (0.081)	0.090 (0.073)	0.053 (0.039)
Child 7-10y	1.260** (0.083)	1.260** (0.084)	-0.021 (0.073)	-0.012 (0.039)
Child 11-5y	1.140 (0.092)	1.142 (0.093)	-0.293** (0.073)	-0.156** (0.039)
Child 16-17y	1.084 (0.109)	1.084 (0.110)	0.002 (0.094)	0.001 (0.049)
Teacher	1.593** (0.644)	1.594** (0.064)	0.062 (0.053)	0.044 (0.029)
Hum	0.811 (0.055)	0.979 (0.055)	0.238** (0.056)	0.104** (0.026)
Science	1.057 (0.058)	1.059 (0.058)	-0.678** (0.050)	-0.365** (0.027)
Technology	1.545** (0.102)	1.548** (0.102)	-0.691** (0.082)	0.375** (0.045)
Healthcare	2.245** (0.777)	2.249** (0.078)	-0.551** (0.052)	-0.310** (0.028)
Service	0.965 (0.233)	0.963 (0.234)	0.923 (0.315)	0.379** (0.114)
Educ< 3y	0.921 (0.097)	0.922 (0.097)	0.184** (0.034)	0.100** (0.017)
Educ> 3y	1.132** (0.035)	1.132** (0.035)	-0.269** (0.069)	-0.164** (0.038)

M< high sch	0.991 (0.052)	0.991 (0.052)	-0.026 (0.047)	-0.013 (0.025)
M univ	1.050 (0.043)	1.050 (0.043)	-0.014 (0.042)	-0.004 (0.022)
M unknown	0.911 (0.097)	0.911 (0.097)	0.017 (0.099)	0.007 (0.052)
F< high sch	0.971 (0.052)	0.971 (0.052)	0.074 (0.048)	0.029 (0.026)
F> high sch	1.031 (0.045)	1.032 (0.046)	-0.018 (0.043)	-0.014 (0.023)
F unknown	0.926 (0.096)	0.926 (0.096)	-0.064 (0.092)	-0.034 (0.049)
y91	1.176* (0.076)	1.176* (0.076)	-	-
y92	0.893 (0.064)	0.893 (0.065)	-	-
y93	0.831** (0.067)	0.831** (0.067)	-	-
y94	0.968 (0.063)	0.968 (0.063)	-	-
y96	1.118 (0.065)	1.118 (0.065)	-	-
y97	1.304** (0.067)	1.306** (0.067)	-	-
y98	1.698** (0.072)	1.701** (0.072)	-	-
y99	1.805** (0.075)	1.809** (0.075)	-	-
1991-1993	-	-	0.005 (0.040)	-0.007 (0.020)
1997-1999	-	-	-0.621** (0.037)	-0.334** (0.019)
3 month	6.613** (0.378)	6.621** (0.377)	-	-
6 month	-0.447 (0.254)	-0.440 (0.254)	-	-
12 month	1.309** (0.153)	1.312** (0.152)	-	-
18 month	2.264** (0.181)	2.267** (0.181)	-	-
24 month	0.739* (0.365)	0.749* (0.366)	-	-
Constant	5.267** (0.446)	5.291** (0.448)	-3.319** (0.505)	-1.203** (0.196)
Sigma 1	2.202 (0.078)	-	-	2.208** (0.077)
Sigma 2	-	-	-	2.847** (0.483)
Roh	-	-	-	-0.003 (0.004)
Obs	7285	7285	7285	7285

Notes: Exp (coeff) are presented. Robust SE in parenthesis.\* significant at 5 %, \*\* significant at 1%.  
References are; y95, Nordic and W eu, social science, M high sch, F high sch.