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220

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Abstract

Using Finnish data this paper examines to what extent the share of all nurses in unemployment, health care employment and being out of the labour market after the exam of a cohort have affected the long-run outcomes of the cohort. The shares are calculated for all cohorts and years and standardised in each year by dividing the cohort specific rate with the average rate for all nurses. These standardised variables are used as dependent variables. The long-term effects are significant at least for the unemployment and the depression have according to the estimates raised the long-run unemployment by more than 2 percentage points for the nurses graduating then. For the employment in the health care industry the effects may be even larger but the estimates are more uncertain.

1 Introduction

The functioning of specialised human capital on the labour market has been the object of much research in labour economics. Registered nurses form a particular group with highly specialised human capital, and this study will examine the labour market behaviour of them. In addition to the specialisation of human capital the labour market of nurses has been characterised by swings in labour demand, at least in Finland [Alppivuori, 1994]. This gives a possibility to examine different kinds of scarring effects for this group from labour market experiences when entering the labour market. For the labour market to function well it would be important that the nurses in times of scarcity of nursing labour return to the jobs in the health care sector. This study gives an indication of to what extent this condition might hold by examining how the labour market allocates persons with specialised human capital when there temporarily is excess supply of this human capital on the labour market and which implications it has in the long run.

The study concentrates on the experiences around the Finnish depression in 1990s when there was a large rise in unemployment. For a description and analysis of the Finnish depression see [Honkapohja and Koskela, 1999]. Also the registered nurses experienced a sharp rise in unemployment and a decline in the employment in the health care industry [Snellman, 2005]. The rate of unemployment and employment in the health care industry seemed to vary across cohorts and these differences seemed rather persistent. This suggests that early experiences of unemployment and employment outside the health care industry may have had long-term consequences for individuals. This paper will provide an estimate of the size of the effects of changes in the demand for nurses due to the depression.

An innate difficulty in examining the effects of experiences of unemployment is that of separating these effects from differences due to the (unobserved) heterogeneity across individuals. That those who have been unemployed tend to have a low income after the unemployment may either be a consequence of the unemployment or a consequence of the fact that those who became unemployed were different from those who remained employed.

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The problem is that neither all the characteristics of the individuals nor the reasons for that they become unemployed are observed. The depression provide exogenous aggregate changes in the labour demand that under certain assumptions can be used to estimate the long-term effects of unemployment and employment. However, for an analysis using data on individuals the problems to separate the effect of unemployment after graduation from that of unobserved variables would remain, because each nurse graduates only once. By using cohort data and assuming unobserved variables are equally distributed across cohorts I avoid this problem.

If there are effects of unemployment, nonemployment and employment outside the health care industry on the future employment and income of nurses, there are several possible explanations to it. One is that being unemployed and not using the human capital has reduced their human capital making them perform worse in health care jobs. Another explanation is that employers perceive that those who have not been employed as nurses on average are worse employees, for example due to a loss of human capital, and therefore screen employees to avoid appointing those who have not been working as nurses. In addition to these explanations, one could imagine that experiences outside the health care industry divert the nurses' attention from investing in a career in it and make other alternatives seem more appealing.

Nurses are a highly specialised group on the labour market and to a very large extent the nurses work in the health care industry. Of the nurses working in Finland approximately 85 percent worked in health care industry [Snellman, 2005]. The high degree of specialisation and the lack of alternative employers in other industries makes it more likely that the nurses face a choice to either continue to specialise in nursing and work in the health care industry or to choose a career outside it that implies an abandonment of the nursing career. Because the nurse education implies that they have already made a large investment in human capital when graduating, a career in the health care industry seem like a socially optimal alternative. Understanding how the allocation of nurses to different industries and occupations functions can therefore help to improve the allocation of the work force.

Since the information on pay is imperfect and the labour market for nurses in Finland also has been rather regulated, this study will focus on the effects on unemployment, nonemployment, and employment in the health care industry. In the following section earlier studies on the consequences of specialised human capital and the effects of periods of unemployment are summarised. Section three provides a short presentation of the data set. Section four presents the estimation methods and the fifth presents the estimation results. The sixth section concludes the paper.

2 Earlier studies on the effects of unemployment and specialised human capital

Although studies of nurses or other specialised groups are rare, there are many studies of workers in general and of entrants to the labour market. These have examined the effects of unemployment or the effects of losing (or changing) jobs on future earnings and employment. A common feature of these studies is the considerations of how to separate the effects of the job loss and unemployment from those of (unobserved) characteristics of the individuals.

Some studies examine only the effect of becoming unemployed once or several times on the incidence of future unemployment. Already Heckman and Borjas [1980] laid out a theory for separating false and true state dependence for unemployment. Various forms of models to estimate the persistence of unemployment are employed for example by Arulampalam et al. [2000], Gregg [2001] and for the Finnish labour market by Hämäläinen [2003]. These studies usually find a strong tendency to persistence of unemployment but are more or less unable to control appropriately for heterogeneity across individuals. Moreover, in difference to this study none of them addresses any group of employees with highly specialised human capital and all of them employ individual level data sets. In addition these studies have rather short time-perspective, as they often consider effects from one year to the next.

Earnings provide information on the matches on the labour market and an examination of these can therefore provide additional information on the consequences of labour market experiences. Ruhm [2001] examined the effects on both unemployment and earnings from job displacements. According to his results job displacements four year after the displacement have only small effects on unemployment but large scarring effects on earnings. Other studies have concentrated only on the effects of unemployment and being out of the labour force on earn-

ings. Arulampalam [2001] as well as Gregory and Jukes [2001] found sizeable and lasting effects of unemployment on pay in British data. In a study using Swedish data Albrecht et al. [1999] generally found that the effects of unemployment were more negative than for other types of time out from work. Their conclusion was that human capital depreciation not alone could explain the results since the coefficients varied with gender and the type of time out of work. They suggested that the results to some extent supported signalling as explanation to the effects of being out of work on wages. They also found much weaker evidence of any differences across various reasons for time without job when they used panel data and estimated a fixed effect model. They argue that this supports the hypothesis that much of the effects is due to signalling.

However, there is also compelling evidence of some influence on the human capital. Edin and Gustavsson [2005] examined the effects of unemployment on performance in tests and concluded that one year of unemployment leads to that the person makes a 5-percentile move downwards in the skill distribution. This strongly suggests that unemployment can adversely affect human capital that is relevant for performance in the labour market. In consequence, one has to draw the conclusion that there are evidence both of signalling and human capital effects but that the size of these are still rather uncertain.

The effects of unemployment also seem differ depending on at what stage in the career the unemployment takes place and early unemployment experiences may be especially harmful. According to the study of Nordström Skans [2004] the effect on earnings of unemployment just after graduating from a vocational high school programme in Sweden remained for at least several years. He uses observations on siblings to be able to employ a fixed effect model. As an alternative specification he also controls for family background but the differences between the results with the two methods are rather small. However, unobserved differences between the siblings in the study can probably to some extent explain both initial and later unemployment and thus lead to an overestimation of the effect of initial unemployment, but the results still indicate that initial unemployment may be very harmful for earnings several years after labour market entry.

With a completely different setup, which is similar to the one used in this study, Burgess et al. [2003] found that cohorts with low qualifications that experienced higher unemployment as young also tended to experience higher unemployment later on. The opposite applied to the highly qualified. However, to use cohort effects a number of assumptions have to be made and it remains somewhat unclear whether they were satisfied. Åslund and Rooth [2003] examined the effects on long-term earnings and employment of the experiences of various cohorts of immigrants in Sweden with regard to the unemployment situation. They used both variation in national unemployment over time and local variations in unemployment to disentangle the effects of unemployment in the long run. Also according to their results the employment situation at entry to the labour market is very influential on the outcome in the long run. Support to the importance of experiences at the labour market entry is also given by the study of Gregg [2001]. He examined the effects of experiencing unemployment as young (at 16–23 years of age) on the unemployment several years afterwards (at 28–33 years of age). He found a strong effect of youth unemployment although he in addition to education controlled for a number of variables pertaining to ability and behaviour as young. The conclusions remained even when the author estimated the effects using local unemployment at young age as an instrument. In a careful study in which the authors attempt to control for a range of individual and background characteristics Gregg and Tominey [2005] also found a sizeable wage penalty of at least about 10 percent even at age 42 of experiencing a year of unemployment as young.

It seems to be clear that there are different kinds of specialised human capital. The study of Podgursky and Swaim [1987] indicates that individuals who are highly specialised suffer great losses when they loose their jobs. Gibbons and Katz [1992] provided some evidence of to what extent unmeasured ability explain differences in pay across industries. According to their results much of the inter-industry differences can not be explained by ability but the effect of pre-displacement industry on post-displacement pay points towards some importance of unmeasured ability for pay. Gibbons et al. [2005] also developed a model in which individuals have comparative advantages in different sectors but imperfect information about it and estimate earnings equations. Their estimation results support that earnings differences across sectors largely are due to unmeasured and unobserved skills.

There have been rather few studies of the labour market behaviour of nurses. Of these one can mention Holmås [2002] who found that in Norway the supply of nurses to the public sector has been responsive to the wages but also to the working conditions. Ahlburg and Mahoney [1996] examined both the nurses' choice to work or not to work and their choice to work as a nurse or to work in other occupations. Their conclusion was that a 10 percent increase in wages for nurses relative to the highest pay in alternative occupations raises the

probability for working as a nurse with two percentage points.

Alppivuori [1994] has explored the history of the labour market for nurses in Finland. Characteristic for the Finnish labour market has long been the high participation rate of women but far into the 20th century it was considered impossible for nurses who married to continue to work as a nurse. Later on they were still considered to have the main responsibility for children. This might be visible even during the examined period as the trend for nonparticipation in the labour market still seemed to be somewhat declining. Probably due to the lack of alternative jobs, the labour market of nurses have also been characterised by sharp shifts over time between excess demand and excess supply of nurses. Nurses are a special case of employees with specific human capital, as already their education is highly specialised with few applications outside the care industry. They thus have a large amount of occupation and industry-specific human capital and not much general human capital that is productive in other industries. Any human capital that is useful in other occupations might often have been acquired through experience. The depression in 1990s may have provided nurses with many such occurrences when the best choice was to work and acquire experience in other industries and occupations. This may have long run effects with the acquired human capital during this time making them prefer other occupations and industries to nursing later on even though nursing jobs are available.

There are no earlier study of the consequences of unemployment or employment in other industries for such a specific group as registered nurses. However, these earlier studies indicate that unemployment may be very bad for future employment possibilities and earnings. Moreover, the studies referred to above have shown that specialised human capital is of great importance for the outcomes on the labour market. This makes it especially interesting to examine the effects of the labour market conditions at labour market entry on the labour market outcomes for registered nurses in the long run.

3 A short presentation of the data

The data set used in the study is a part of a sample from the employment statistics from Statistics Finland. Half of the persons who in some year in the period 1987–2001 were living in Finland and had an educational code whose second number was 7, meaning that they had an education for working with health care or social services, were sampled. This means that also approximately every second registered nurse is included in the sample and that the sample is representative with respect to the characteristics of the nurses except for random variations. In this study we include all nurses from this sample who had a registered nurse educational code in some year during the period 1987–2001. Registered nurses in this study comprise all persons who in some year in the period 1987–2001 had one of the educational codes 571101 or 671101 (Bachelor of Nursing), 571103 or 671103 (Bachelor of Public Health), and 571106 or 671106 (Bachelor of Midwifery), which all enabled them to work as a registered nurse. Some of the nurses got their exam and entered the labour market after the beginning of the period. For them the labour market conditions at labour market entry are observed, approximated as the average value of the relevant variable in the graduation year and the two following years. In the data set there is information only about the highest exam a person had in each year. Some nurses acquired another education during the period after the nursing exam. These are retained as nurses in the analysis also after the other exam. Some of the nurses also retired, emigrated or died before the end of the period. Those who died before the end of the period are excluded from all of the study. In the calculations for each year those 58 years or older are also excluded, since this was a common age for retirement among the nurses employed in the public sector. Those who are abroad in a certain year are treated as missing for that year. In the study employment means that the person has a position. Thus persons taking care of children or being away from the job for other reasons are included as employed and not as being outside the labour market in the study under the condition that they have a position to return to. Table 1 lists the number of nurses of different cohorts.

The data include information on age and sex as well as on education and job characteristics. It is also possible to see in which year the person got the current exam for those graduating 1971 or later. Cohort specific shares, which are used as dependent variables after standardisation, are calculated on the basis of in which year the nursing exam was received. Since the labour market variables at the time of exam are possible to calculate only for those graduating after 1987 and no observations on the outcome are available for those cohorts graduating after 1998, dependent variables are available only for the cohorts 1987–98. However, in the calculation of the average shares of all nurses used for standardisation and as explanatory variable all nurses younger than 58 years

Table 1: The number of nurses in different cohorts in the analysis. Included in the calculations are those nurses who lived in 2001 and was at most 57 years in 1987 meaning that they were included at least in some year. The total number of nurses also includes those for whom the information concerning the year of the exam is missing (almost all of them graduated before 1971).

Grad. year	Number	Grad. year	Number	Grad. year	Number	Grad. year	Number
1971	535	1979	659	1987	1816	1995	2457
1972	595	1980	747	1988	1886	1996	2072
1973	557	1981	803	1989	1854	1997	2195
1974	588	1982	862	1990	1230	1998	2128
1975	596	1983	1046	1991	1865	1999	1990
1976	377	1984	1163	1992	2353	2000	1772
1977	517	1985	1472	1993	2535	2001	1528
1978	595	1986	1638	1994	2981	Total	41835

are included.

For years 1993–2001 the industry classification of year 1995 is used. For these years the health care industry is in this study defined as the industry 85 on the two digit level, which in reality also includes social services. For 1987–1992 the classification system of year 1988 was used and in this the health care industry as defined in this study includes industries 87 (health care) and 88 (social services). Social services are included in the health care industry, because rather many nurses work within the social services in jobs very similar to those in the real health care industry.

To catch the attachment to the working life and the health care industry three variables are used: *Unemployed*, *Outside* and *Health care*. For the cohorts the variable will be standardised with the average for all nurses in respective year. The variable *Unemployed* measures the share of the months on the labour market that the person has been unemployed, that is the variable is calculated as the average 100*(months unemployed) / (months on the labour market) for the nurses on the labour market.[1] The variable *Outside* varies from zero to hundred, depending on the percent of the months of the year the person has been outside the labour market (neither employed nor unemployed). The value zero means that the person has been on the labour market 12 months (including holidays) during the year. The variable *Health care* is calculated as (Percent of months in work)*H, in which H is a dummy taking the value one if the person was working in the health care industry in the end of the year and zero otherwise.

Figure 1 below and Table 2 in Appendix show the unemployment rate across cohorts and years. According to them there has been large variations in unemployment rate from and it is obvious that it has hit different groups of nurses in different ways. Those with little experience and no job from before were worse off, which is indicated by the high unemployment rates in the years nearest after the year of the exam. From the table it is also obvious that there has been considerable variation in the aggregate unemployment and the extent to which recently graduated have been unemployed.

Also the share of nurses being out of the labour market tended to rise during the depression (Table 3 in Appendix). The share being out of the labour market were also generally higher for young recently graduated nurses. The opposite pattern is found for the share employed in the health care industry (in Table 4 in Appendix) with the share employed in it declining during the economic depression of the 1990s.

[1]Note that the division by months on the labour market means that other months in the year are treated like unobserved. For those being outside the labour market all of the year the variable is treated as having a missing value and these observations are not included in the calculations.

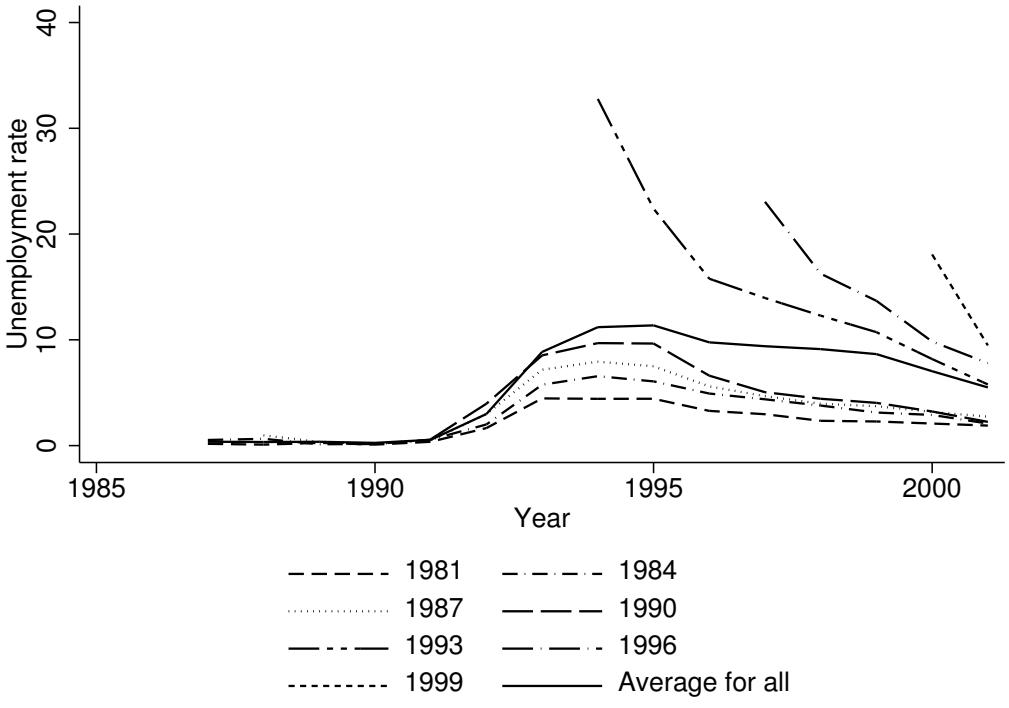

Figure 1: The unemployment rate 1987–2001 for nurses of different cohorts (graduation years) and the average for all nurses.

4 Using the variation in early labour market experiences between cohorts to estimate long-term effects

To estimate the long-term effects of unemployment after the exam I focus on the variation between cohorts in unemployment rates. A cohort is in this study defined as all persons who got their nursing exam in a certain year and they can thus be of different age. In large I follow Burgess et al. [2003] so the effect of the current business cycle conditions are assumed to be separable from the effects of years since graduation (experience) and cohort. This means that nurses with different experience and of different cohorts are hit by the same business cycle factor and the variation in aggregate unemployment among nurses determine the time effect. The distribution of unobservable characteristics is assumed to be similar across cohorts so the variation in cohort averages can be used to estimate the impact of early experiences on the labour market. The early experiences of the cohorts are assumed to differ depending on the state of the labour market after graduation and the effect from these are assumed to affect the standardised dependent variables by the same term for all years they are observed. In order for the methods to give a correct estimate of the effect of unemployment, it is necessary that the future employment decisions does not only depend on the employee's ranking among the employees of the same cohort. Rather the employees of different cohorts should be close substitutes for the employers. This does not necessary apply to when the age difference is very large (for example expectations of child bearing and rearing for young nurses and expectations of illness for old nurses may affect the choices between nurses when the difference in age is large, although discrimination officially is forbidden) but is likely to apply when the age difference is small. The standardised values of the examined variables are calculated as cohort-specific values relative to the values for all persons who have had a nursing exam in some year and were below 58 years. The standardised unemployment u is thus defined as

$$u(e,c) = U(e,c,t)/U(t), \tag{1}$$

in which the unemployment rate for a cohort is measured as in Table 2 in Appendix, $U(t)$ is the average unemployment for all nurses on the labour market, the cohort c denotes the year of the exam, and experience e denotes years after graduation. An examination confirms that unemployment has been highest among those who recently got their exam.

In the corresponding way standardised values for the percentages being outside the labour market and being employed in the health care sector are calculated. These standardised shares may also reflect some kind of scarring since the alternative to employment is sometimes not unemployment and employment in the health care industry may be necessary to retain the human capital acquired in the nursing education.

In the following section the effects of early experiences of different cohorts on later labour market outcomes are tested. The average total unemployment when the nurse graduated averaged over that year and the two following years as an indication of the employment situation in the beginning of the career. When this variable is used as explanatory variable in regressions with the standardised unemployment for the cohorts as dependent variable it should capture any scarring from early labour market experiences of the cohorts. In a similar way the averaged percentages outside the labour market and working in the health care industry at graduation and the two following years are also used to explain standardised shares outside the labour market and employed in the health care industry later.

The panel data are unbalanced and the number of observations are greater for those graduating earlier since their experiences on the labour market can be followed during a longer time period. Three alternative estimations were made. The first one was pooled OLS-regression in which the observations of the standardised unemployment $u(e,c)$ for every cohort and year since graduation were pooled and regressed on $U_{e_c\in[0,2]}$, the average total unemployment at graduation and two years afterwards, as well as on dummies for the number of years ($e = t - c$) since graduation (experience). The regression was thus

$$u(e,c) = \alpha + \beta_e D_e + \gamma U_{e_c\in[0,2]} + \epsilon_{e,c}. \tag{2}$$

Using the state of the nurses labour market at the time of the exam to explain the later experiences and no other cohort variables implies that all cohort effects were assumed to be captured by these variables. The standardised labour market variables that were used as dependent variables also made it possible to avoid using any time dummies, because the division by the total unemployment rate among nurses is assumed to capture all

of the time effects. In this way any problems with identification in the model due to including both time, cohort and experience as explanatory variables were also avoided.

As an alternative way of estimating a Prais–Winsten regression was used.[2] In it autocorrelation is allowed in the estimation as well as heteroscedasticity and contemporaneous correlation of disturbances across cohorts in the calculation of standard errors. The correlation in the error terms across cohorts was calculated pairwise based on the observations in years for which there are observations for both cohorts. The regression equation was as in (2). However, the error term was assumed to be

$$\epsilon_{e,c} = (1-\rho)\epsilon_{e-1,c} + \eta_{e,c}, \tag{3}$$

in which $\eta \sim (0, \sigma^2)$ but correlation and heteroscedasticity are allowed when standard errors are computed. Since the error term of previous time period was missing for the first observation of each cohort ($e = 3$) the following equation was estimated for them

$$u_{3,c}\sqrt{1-\rho^2} = \alpha\sqrt{1-\rho^2} + \beta_3 D_3\sqrt{1-\rho^2} + \gamma U_{e_c\in[0,2]}\sqrt{1-\rho^2} + \upsilon_{3,c}\sqrt{1-\rho^2}, \tag{4}$$

in which υ is an error term satisfying the usual conditions.

As a third method a two-stage procedure was used. In it the standardised variables were first regressed on experience and cohort dummies. After this the cohort dummies were simply regressed on the variable measuring the state of the labour market at labour market entry of the cohort. Since the estimates were similar the results for this method are not reported.

5 Results of the estimation of the effects of unemployment, nonparticipation and health care work

Below follow the results for the estimations of the long-term effects of the state of the labour market after graduation. The estimation results when using the pooling OLS-regression are listed in Table 5. The unemployment after the exam strongly affects later unemployment. The effect of initial care employment on later employment in the industry is also strong. The more negative effect of dummies for more years of experience for unemployment and being out of the labour market reflect the decline in standardised unemployment rates and shares being out of the labour market. Note that the estimate for the explanatory *Outside* variable in Table 5 is of opposite sign than expected, meaning that a larger proportion outside the labour market right after the exam leads to a smaller share outside market for the cohort in the long run. However, in this case the coefficient is not significantly different from zero.

As an alternative Table 6 lists estimates made using the Prais–Winsten estimating method with an AR(1) error term. In this table contemporaneous correlated and heteroscedastic disturbances across cohorts are also allowed when the standard errors are calculated. The Prais–Winsten regression does not greatly change the conclusions. For the unemployment and employment in the health care industry the effects of initial conditions remain significant and for being out of the labour market the coefficient is still of the opposite sign. Although autocorrelation is prevalent with ρ being over $\frac{1}{2}$, the small changes in the estimates point towards that the autocorrelation has not greatly affected the estimates of the coefficients in the regressions for *Health care* and *Unemployment*.

The standardisation of labour market variables used as dependent variables makes the long-term consequences for a cohort of the initial conditions dependent on the average rates for all nurses at the time when the result is measured. However, the size of the effects of the state of the labour market for nurses at the time of exam can be evaluated by calculating a few examples. During the period the average unemployment of nurses has ranged from almost zero to slightly over 10 percent. A 10 percentage points rise in average unemployment at the time of graduation of a cohort has raised the long-term standardised unemployment for the cohort by slightly more than 0.5 units. With an unemployment rate of 5 percent the cohort that was hit by the rise in unemployment will then have a unemployment rate that is about 2.5 percentage points higher than for a cohort graduating

[2]It is important to test a specification of this kind in this study since yearly data is employed and autocorrelation might be influential. This method was not used by Burgess et al. [2003].

Table 5: The pooled regressions with the standardised variables *Unemployed*, *Outside*, and *Health care* as dependent variables. The unstandardised variable for the labour market situation after the exam is used as explanatory variable. The comparison category for the dummies is 3 years after the exam. To denote significance ***, ** and * follow after the coefficient, if it is significantly different from zero (two-side test) on the 1-, 5- and 10-percent level respectively.

Explanatory Variable	Dependent standardised variable					
	Unemployed		*Outside*		*Health care*	
	Coefficient	Stand. error	Coefficient	Stand. error	Coefficient	Stand. error
Unstandardised dependent variable at time of exam	0.0533***	0.0037	-0.0088	0.0064	0.0132***	0.0019
4 years since exam dummy	-0.10*	0.05	-0.01	0.03	0.02	0.02
5 years since exam dummy	-0.18***	0.05	-0.04	0.03	0.04**	0.02
6 years since exam dummy	-0.30***	0.05	-0.08**	0.04	0.07***	0.02
7 years since exam dummy	-0.39***	0.06	-0.15***	0.04	0.10***	0.02
8 years since exam dummy	-0.46***	0.06	-0.18***	0.04	0.11***	0.02
9 years since exam dummy	-0.49***	0.06	-0.24***	0.04	0.12***	0.02
10 years since exam dummy	-0.52***	0.07	-0.30***	0.04	0.13***	0.02
11 years since exam dummy	-0.58***	0.07	-0.35***	0.05	0.14***	0.02
12 years since exam dummy	-0.57***	0.08	-0.40***	0.05	0.14***	0.03
13 years since exam dummy	-0.64***	0.10	-0.42***	0.06	0.15***	0.03
14 years since exam dummy	-0.57***	0.13	-0.46***	0.08	0.14***	0.04
Constant	1.05***	0.04	1.32***	0.14	0.17	0.11
Residual degrees of freedom	65		65		65	
R^2	0.9121		0.7840		0.7746	

Table 6: The pooled Prais–Winsten regressions with the standardised variables *Unemployed*, *Outside*, and *Health care* as dependent variables. The unstandardised variable for the labour market situation after the exam is used as explanatory variable. The comparison category for the dummies is 3 years after the exam. To denote significance ***, ** and * follow after the coefficient, if it is significantly different from zero (two-side test) on the 1-, 5- and 10-percent level respectively.

Explanatory Variable	Dependent standardised variable					
	Unemployed		*Outside*		*Health care*	
	Coefficient	Stand. error	Coefficient	Stand. error	Coefficient	Stand. error
Unstandardised dependent variable at time of exam	0.0550***	0.0041	-0.0133*	0.0071	0.0132***	0.0019
4 years since exam dummy	-0.10***	0.03	-0.01	0.01	0.01**	0.01
5 years since exam dummy	-0.17***	0.04	-0.03	0.02	0.04***	0.01
6 years since exam dummy	-0.30***	0.04	-0.07***	0.02	0.06***	0.01
7 years since exam dummy	-0.39***	0.04	-0.14***	0.02	0.09***	0.01
8 years since exam dummy	-0.46***	0.04	-0.17***	0.03	0.10***	0.01
9 years since exam dummy	-0.50***	0.05	-0.22***	0.03	0.12***	0.01
10 years since exam dummy	-0.52***	0.06	-0.28***	0.03	0.13***	0.01
11 years since exam dummy	-0.56***	0.06	-0.31***	0.04	0.13***	0.02
12 years since exam dummy	-0.58***	0.07	-0.38***	0.04	0.14***	0.01
13 years since exam dummy	-0.64***	0.09	-0.40***	0.04	0.13***	0.02
14 years since exam dummy	-0.58***	0.15	-0.42***	0.06	0.11***	0.02
Constant	1.04***	0.04	1.42***	0.16	0.17***	0.12
ρ	.52751768		.64082184		.65601563	
Residual degrees of freedom	65		65		65	
R^2	0.9121		0.7840		0.7746	

when the unemployment rate was zero. The share being outside the labour market have varied less over time and more with years since exam (probably due to children). The estimates were also more uncertain for this measure of labour market participation. Therefore, no example is calculated for this variable. For the average share of nurses working in the health care industry a 5 percentage points fall has implied that the standardised variable has fallen by approximately 0.066 units. If the average share employed in health care is 60 percent this means that the employment in the health care industry has been 0.066*60%=3.96 percentage points lower in the long run for the cohort with the initial 5 percentage points lower employment in health care. However, the uncertainty in this estimate is somewhat larger.

The third alternative specification for estimating the long-term effects of labour market status in the beginning of the career gave rather similar results as the pooling specifications except for that the standard error for the employment in health care was larger and was hardly significant. The results are thus robust at least for the unemployment. The effect on work in the health care can be large and economically significant, although the estimates are uncertain. There might also be a positive effect on labour market participation in the long run of having been out of the labour market right after the exam.

6 Conclusion

By using the cohort approach which compares the outcomes for whole cohorts that are entering the labour market at times with different states of the labour market I have been able to get estimates of the long-term effects of the state of the labour market at labour market entry for registered nurses. The method enables me to avoid the problem with confusing the effects of unobserved variables and the effects of the labour market situation at graduation. The results indicate that experiencing unemployment at the entry to the labour market strongly increases unemployment several years after the entry. The results also show that for nurses employment in the health care industry at entry may be of great importance for whether they work in the health care industry later on. This latter effect may even be larger than the unemployment-effect in the long term. Scarring effects of different types may thus be considerable. However, there might be a positive long-term effect on labour market participation from being out of the labour market in the years after the exam.

To avoid under-utilisation of the specialised human capital acquired by the nurses in the education system it would thus be important to ensure that there are employment possibilities corresponding to their education for all graduating nurses. It is not always possible to arrange suitable jobs for every nurse and it is also up to the individual nurse to make the choice of career. However, the final consequences of the choices might not always be obvious for the nurses. An employment outside the health care industry is not necessarily a bad alternative but there is a risk that taking such a job closes the door to more attractive and actually more suitable jobs in the health care industry. To evaluate this issue the income in different industries must be examined. More information on this issue and especially on the characteristics of the group of nurses that have performed particularly poorly on the labour market might give more information for the decision makers on which groups of nurses that may require special attention. However, to examine these issues it is necessary to perform an analysis on the individual level.

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7 Appendix

Table 2: The values of the unstandardised variable *Unemployed*, the unemployment rate, for different cohorts and years. The unemployment rate is calculated as 100*(average months unemployed for the cohort during the year)/(average months unemployed and employed during the year). The averages are calculated for everyone with a nursing exam below 58 years in the year when the unemployment variable is measured.

Cohort	*Unemployed*									
(Graduation year)	1987	1990	1991	1992	1993	1994	1995	1996	1998	2001
1971	0.26	0.23	0.41	1.62	3.15	4.02	4.03	3.25	2.62	1.64
1972	0.10	0.05	0.27	0.86	2.21	2.87	2.56	1.98	1.75	1.83
1973	0.18	0.07	0.33	1.63	3.82	3.97	4.09	2.98	2.90	1.17
1974	0.15	0.17	0.18	1.16	3.15	3.57	3.38	3.01	3.07	2.16
1975	0.02	0.31	0.23	1.06	2.71	3.33	3.14	2.30	2.58	1.39
1976	0.32	0.25	0.59	2.20	3.76	4.71	5.87	4.68	4.61	2.92
1977	0.46	0.18	0.51	2.40	4.93	6.02	4.84	3.78	3.82	2.63
1978	0.15	0.31	0.70	2.36	6.25	6.95	6.20	5.01	4.18	2.23
1979	0.19	0.50	0.78	2.32	4.98	5.70	5.31	3.79	3.02	2.31
1980	0.21	0.19	0.22	0.89	3.18	4.39	5.05	3.85	3.23	1.92
1981	0.17	0.10	0.36	1.66	4.46	4.42	4.43	3.28	2.34	1.89
1982	0.28	0.28	0.67	2.71	4.44	5.15	5.32	4.36	2.82	1.90
1983	0.36	0.14	0.26	2.03	5.49	5.62	5.97	4.28	2.67	1.70
1984	0.54	0.15	0.56	2.00	5.76	6.56	6.07	4.92	3.79	2.09
1985	0.71	0.29	0.34	2.12	5.83	6.62	5.83	4.57	3.53	1.72
1986	1.17	0.43	0.54	2.75	6.43	7.10	6.58	5.01	3.77	2.00
1987	0.77	0.15	0.49	2.98	7.18	7.93	7.50	5.60	3.96	2.74
1988	.	0.43	0.57	2.81	7.90	9.19	8.20	6.51	5.28	2.16
1989	.	0.37	0.69	3.65	9.18	10.46	8.25	6.66	5.25	2.83
1990	.	0.32	0.60	3.96	8.53	9.69	9.65	6.61	4.43	2.25
1991	.	.	2.74	7.17	14.79	16.93	15.85	11.72	9.95	4.85
1992	.	.	.	11.34	27.40	22.64	19.28	14.65	10.91	5.55
1993	.	.	.	.	26.00	32.78	22.40	15.78	12.29	5.78
1994	.	.	.	.	.	25.32	28.03	17.49	12.65	6.32
1995	.	.	.	.	.	.	24.17	25.05	15.51	7.08
1996	.	.	.	.	.	.	.	18.04	16.25	7.80
1997	.	.	.	.	.	.	.	.	23.53	8.44
1998	.	.	.	.	.	.	.	.	16.31	7.70
1999	.	.	.	.	.	.	.	.	.	9.47
2000	.	.	.	.	.	.	.	.	.	13.77
2001	.	.	.	.	.	.	.	.	.	8.30
Average	0.37	0.26	0.55	2.99	8.86	11.20	11.37	9.76	9.12	5.50

Table 3: The variable *outside* for different cohorts and years. The percentage is calculated as 100*(average months outside the labour market for the cohort during the year)/12. The averages are calculated for everyone with a nursing exam below 58 years in the year when the unemployment variable is measured.

Cohort	*Outside*									
(Graduation year)	1987	1990	1991	1992	1993	1994	1995	1996	1998	2001
1971	14.98	10.01	10.94	8.65	9.50	11.06	14.19	8.00	7.80	12.17
1972	13.59	7.95	8.88	7.81	7.57	9.91	11.80	5.35	4.92	5.95
1973	17.25	11.99	12.06	10.46	9.98	10.68	12.48	7.08	5.52	7.30
1974	16.54	14.75	12.59	10.70	10.24	11.79	13.97	7.38	6.39	7.63
1975	19.75	14.87	14.07	12.40	11.08	11.94	15.68	7.82	6.53	8.65
1976	22.85	20.92	18.10	18.59	15.76	16.46	18.20	9.93	9.88	10.67
1977	25.08	19.50	17.80	14.44	12.99	11.76	14.66	7.94	6.35	6.84
1978	22.34	20.14	18.67	15.11	13.15	13.22	15.88	9.13	8.41	8.59
1979	24.01	21.86	18.76	17.00	15.98	15.55	16.42	10.17	7.72	8.29
1980	23.14	20.02	18.05	17.75	15.12	14.93	14.67	8.62	8.07	7.70
1981	24.50	25.61	22.77	17.24	15.74	15.56	18.46	10.00	8.50	8.62
1982	26.05	24.54	22.15	19.63	16.88	18.19	18.03	11.11	8.35	8.96
1983	25.09	24.92	23.33	19.67	18.33	17.28	19.17	10.44	8.67	7.91
1984	23.87	25.93	24.28	22.24	19.73	17.07	20.17	10.81	8.75	8.57
1985	24.55	27.51	25.71	23.14	21.29	22.13	22.51	12.50	11.42	9.52
1986	23.04	29.38	26.03	24.57	22.95	22.38	22.94	14.70	12.52	11.29
1987	54.39	27.41	26.28	24.56	24.89	24.83	25.78	15.40	13.20	10.88
1988	.	25.19	26.30	24.29	26.01	26.00	26.20	15.78	14.77	12.26
1989	.	24.38	23.24	23.15	25.39	24.98	26.01	15.81	13.86	12.46
1990	.	56.00	21.49	20.22	19.72	22.14	25.55	16.19	13.99	12.27
1991	.	.	59.12	21.61	22.77	27.86	30.64	19.34	18.26	15.79
1992	.	.	.	57.68	22.99	27.15	31.48	20.31	17.60	16.25
1993	.	.	.	.	60.60	25.89	29.55	19.06	18.60	16.25
1994	.	.	.	.	.	56.69	29.78	19.22	18.71	16.84
1995	.	.	.	.	.	.	58.89	19.02	19.71	17.82
1996	.	.	.	.	.	.	.	54.88	18.12	17.84
1997	.	.	.	.	.	.	.	.	18.72	19.78
1998	.	.	.	.	.	.	.	.	50.33	21.55
1999	.	.	.	.	.	.	.	.	.	20.69
2000	.	.	.	.	.	.	.	.	.	16.91
2001	.	.	.	.	.	.	.	.	.	48.16
Average	23.38	21.95	22.51	22.07	22.31	23.93	26.37	17.88	17.03	16.51

Table 4: The variable *Health care* for different cohorts and years. The percentage is calculated as the average of (months employed for those whose job in the end of the year is in the health care sector)/12 and zero for nonemployed and those who in the end of the year are employed outside the health care sector. The averages are calculated for everyone with a nursing exam below 58 years in the year when the unemployment variable is measured.

Cohort	*Health care*									
(Graduation year)	1987	1990	1991	1992	1993	1994	1995	1996	1998	2001
1971	66.22	72.85	69.73	72.56	72.54	69.87	67.59	74.80	75.41	72.68
1972	69.15	73.24	72.39	73.71	73.10	71.08	69.82	75.51	77.36	75.17
1973	65.84	72.04	71.25	72.50	72.53	71.58	69.20	74.87	76.66	75.54
1974	64.55	66.99	68.70	69.50	70.07	68.24	67.13	74.92	73.83	74.17
1975	63.96	67.90	67.50	69.27	68.97	66.72	63.76	71.95	73.64	72.07
1976	62.39	64.24	66.49	65.86	67.33	67.27	64.93	74.18	73.21	74.12
1977	59.98	63.05	63.79	64.63	65.26	66.02	64.10	70.93	74.24	75.29
1978	61.74	62.53	63.07	66.18	64.75	64.55	63.38	69.69	72.23	72.64
1979	61.37	61.64	62.92	63.64	62.27	62.68	62.78	68.79	71.90	72.61
1980	63.64	62.97	64.34	64.45	65.24	63.38	63.73	70.05	70.76	73.47
1981	64.24	60.55	61.78	64.93	65.04	65.19	63.40	70.92	72.96	72.77
1982	62.07	60.74	62.00	62.54	64.64	61.67	62.75	69.43	73.97	73.19
1983	66.63	61.79	61.54	64.73	64.63	64.62	61.71	70.96	74.19	76.54
1984	65.87	60.16	60.99	61.80	61.77	61.93	60.69	70.32	73.40	74.42
1985	67.38	60.38	60.15	61.58	61.18	58.66	58.83	69.07	71.60	73.53
1986	69.75	60.25	61.79	61.70	61.17	60.67	60.69	68.36	71.98	73.36
1987	37.97	63.10	62.70	62.92	59.68	58.84	58.34	69.46	71.92	73.82
1988	.	65.45	62.81	64.13	58.96	57.39	58.05	68.02	69.71	73.29
1989	.	68.68	67.89	65.97	59.90	58.34	58.65	68.77	70.25	72.39
1990	.	31.49	71.18	69.07	65.84	61.62	58.80	69.30	71.82	73.73
1991	.	.	28.61	67.52	60.46	53.12	50.86	62.73	64.46	69.38
1992	.	.	.	27.62	48.23	47.88	46.97	58.47	63.29	67.10
1993	.	.	.	.	19.41	40.09	44.96	57.76	60.85	66.23
1994	.	.	.	.	.	20.24	40.30	56.08	59.57	63.99
1995	.	.	.	.	.	.	17.88	49.43	56.85	61.95
1996	.	.	.	.	.	.	.	22.19	57.51	62.74
1997	.	.	.	.	.	.	.	.	50.60	60.57
1998	.	.	.	.	.	.	.	.	23.85	59.49
1999	.	.	.	.	.	.	.	.	.	59.82
2000	.	.	.	.	.	.	.	.	.	62.88
2001	.	.	.	.	.	.	.	.	.	31.09
Average	63.49	63.85	62.82	62.25	58.35	54.54	52.47	60.78	62.03	64.76