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**Fewer in Number but Harder to Employ:
Incidence and Duration of Unemployment in an
Economic Upswing.**

By
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Fewer in Number but Harder to Employ: Incidence and Duration of Unemployment in an Economic Upswing[•]

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During the upswing in the Norwegian labour market after the peak of unemployment in the post-war period in the early 1990s, the inflow to unemployment fell by one fourth from October 1991 to October 1993. In contrast, the expected unemployment duration remained fairly constant, whether measured by the duration of registered unemployment or by the duration of joblessness. The continued high duration of unemployment was partly due to a decrease in average 'employability' in the unemployment inflow: more immigrants from non-western countries, more without job experience, more with previous unemployment experience, lower average previous earnings, and fewer on recall notice.

1. Introduction

This paper studies the changes in the size and composition of the inflow to unemployment and of the expected duration of unemployment, during the period with highest Norwegian post-war unemployment level. Inflow and duration will influence both the level and the composition of the group of unemployed person. This will have effects on wage formation, since it determines the degree to which the unemployed are potential job seekers, and the degree to which they influence wage formation (Layard *et al., ibid.*). For labour market authorities, the composition of the group of unemployed persons is important for assessing the need for active labour measures, such as training, over the cycle. If a group of persons who are 'hard-to-employ' are left among the unemployed after an economic upswing, the number of unemployed alone is not a sufficient indicator of the need for programmes and other active labour market measures.

From a theoretical point of view, the paper is motivated by the idea of filtering in the labour market. If filtering, caused by the hiring and firing processes in the labour market produces an asymmetry in the movement of the level of unemployment, an increase in unemployment created by an exogenous shock will not easily be reversed. Johansen (1982) developed a model with such a ratchet effect. The key elements of this model were productivity heterogeneity in the labour force, not perfectly matched by wages, and different productivity distributions of the flows into and out of employment, 'filtering'. The productivity distributions of these flows, which reflect hiring and firing decisions of firms and quitting and job searching behaviour of persons, were given alternative, tentative formulations in the paper. In general, the distributions were assumed to reflect the productivity distributions of the stocks of employment and unemployment. It was shown that several equilibria could exist, and that a shock could move the system to equilibrium with a higher level of unemployment. In the high unemployment equilibrium, there is a higher concentration of persons who are 'hard to employ' in the group of unemployed persons.

Empirical testing of the filtering theory requires data on productivity distributions of labour market flows over the business cycle. These are hard to obtain, and the theory has not to my knowledge been tested. The data in the present paper is also incomplete,

but the indications I derive, do not support the theory.

Even apart from a filtering setting, variation in relative unemployment risk over the business cycle has not been addressed in many studies. This contrasts sharply with the large number of studies of cross-section variation in unemployment risk (incidence and duration) with personal characteristics, see e.g. Layard *et al*, 1991 and Wadensjö (ed. 1996). In one of the few papers analysing cycle variation, Imbens and Lynch (1993) find considerable variation over the cycle in the transition probability from non-employment (not distinguishing between unemployment and being out of the labour force) into employment. The study is based on data for young workers in the US and covers the period 1978-1989. Parameterising and allowing flexible duration dependence, they find a positive interaction effect between duration dependence and the local unemployment rate, on the employment probability. This is interpreted as a lower 'scarring' effect of long non-employment in a high unemployment region or period. Rosholm (1996) finds, from Danish data for the period 1981-1990, that durations vary considerably, that most of the variation is explained by the aggregate unemployment rate, and that the composition plays a less important role. Arulampalam and Stewart (1995) find a marked decline in the job hazard from a cohort of unemployment entrants in 1978 (before the trough of the recession) to the 1987 cohort (in the upswing).

Over the past 10 years, unemployment in Norway has fluctuated more than in any other period since World War 2. From a level of two per cent in 1987, the aggregate unemployment peaked in the middle of 1993 at eight percent, and has been falling steadily since, by now to less than half the peak level (Røed and Zhang, 1999). This allows a study of the change in the composition of the unemployment entrants and unemployment duration over the cycle.

In the paper, I use two data sets, covering different stages of the cycle. In the first data set, persons who started a spell of unemployment (unemployment entrants) in October 1991 were followed throughout 1992, which was a period of continuous increase in the number of unemployed. In the second data set, unemployment entrants in October 1993 were followed throughout 1994, which was a period in which the total number of unemployed was falling steadily. Both cohorts of unemployment entrants may, however,

have experienced the first part of the upswing, depending on the timing of the change in incidence and re-employment probabilities.

Both data sets give information on whether the persons entered employment or left the labour force after completion of the spell of unemployment. There is also information on demographic characteristics, on whether the person is on recall, on unemployment benefit and previous labour market history.

Using a number of covariates, the analysis identifies a change in the characteristics of the unemployment entrants, tending to increase the duration of unemployment and joblessness. This reduction in 'employability' among the inflow partly offsets the effect of improved demand conditions. Hence, although most groups face better job prospects from October 1993 compared to a group with similar characteristics starting unemployment in October 1991, the average 1993 entrant faces the same or longer unemployment, implying that the group of unemployed has a larger concentration of 'hard-to-employ'.

In the absence of an empirical measure of productivity, beyond what is reflected in the wages, there is only an indicative rejection of the filtering theory.

2. Data

The basis for the analysis is registers held by Statistics Norway. The registers are all based on a personal identification number, which allows linking of files from different sources, as well as over time. At present, the following main categories of information are included in the linked data set:

- Age, gender, marital status, place of residence, local unemployment rates
- Spells of employment
- Wages in different spells of employment, other income, benefits and taxes
- Spells of unemployment
- Educational qualifications and spells of education

Thus, the data sets give individual histories covering education, employment and unemployment with information on income of various types.

The various registers are combined to give status month by month. Given the way they are constructed and the statistical errors, it is possible to be registered both as employed and unemployed in the same month. I have given priority to the unemployment register, since staying in this register requires that one register every two weeks. In contrast, one may misleadingly stay in the employment register if the employer fails to report the end of a spell of employment. There are regular checks of the employment register including a major revision once a year, but there could still be delays in the updating.

The procedures used in collecting and processing data are such that a person may disappear from the unemployment register for a month, without any corresponding change in the labour market situation or the receipt of benefit. I have therefore 'closed' gaps of one-month duration in the unemployment spells.

For the study described here, I have extracted information on two samples. One sample comprises all entrants to the unemployment register in October 1991 and the other sample comprises all entrants in October 1993. The definition of being an unemployment entrant is to be unemployed in October 1991 or October 1993, respectively, and not being unemployed neither in August nor in September of the same year. This definition gives 25 792 unemployment entrants in October 1991 and 19 053 in October 1993. Without closing gaps in the unemployment spells, and hence requiring entrants to have been out of the register in September (1991 and 1993, respectively), the number of entrants would have been about 10 per cent lower, 28 638 in 1991 and 21 726 in 1993.

3. Unemployment and Joblessness

As shown in many studies, see for instance Clark and Summers (1979), Coleman (1989), Feldstein and Ellwood (1982) and Working Party on Measurement of Unemployment in the UK (1995), it is difficult to draw the line between being unemployed and being out of

the labour force. In line with previous work (Hernæs and Strøm, 1996) I use two different measures of duration, suggested by several authors, see Freeman and Wise (1982, eds.). The first measure is the number of months registered as unemployed hereafter called unemployment duration. The combination of inflow to unemployment and duration of unemployment relates to the stock of unemployed. Changes can be illustrated by the corresponding 'pseudo' steady-state stock, (Røed and Zhang, *ibid.*) defined as the number of unemployed persons that would result if inflow and duration were to remain at the level of the current period. The second measure, joblessness, is the number of months from start of the unemployment spell until start of a job. The duration of joblessness provides information on the employment probability, and a comparison of duration of unemployment and duration of joblessness provides information on the propensity to leave the labour force.

The emphasis is on the changes over time, and the measures have been constructed in exactly the same way for the two cohorts in order to make comparisons as valid as possible.

4. Inflow to Unemployment

From October 1991 to October 1993, the total inflow to unemployment fell by one quarter, with equal proportional falls for males and females and across age groups (Table 1). However, the absolute number of unemployment entrants from non-western countries remained constant, increasing the fraction from 5 to 6.8 per cent among males and from 3.9 to 5.2 per cent among females. One possible explanation for the continued high number of immigrant unemployment entrants could be higher propensity to register as unemployed, perhaps as a consequence of a perceived improvement in the chances of getting a job (a 'reversed discouraged worker' effect). Such an increase would most likely consist of persons without unemployment benefit, since those with benefit already have a strong incentive to register. This is supported by the data. The fraction without unemployment benefit increased and cross tabulations not shown here revealed that the

fraction without unemployment benefit increased more among immigrants from non-western countries (from 56 to 68 per cent) than among natives (32 to 37 per cent).

Secondly, there was a change in previous labour market history (reduction in 'employability') of the average unemployment entrant. Among the October 1993 entrants, there were more persons without job experience (observed during the preceding 21 months observation period), more with unemployment experience and fewer on recall. Average income the previous (calendar) year was almost a one-quarter lower. All of these changes tend to impair their average labour market prospects and prolong duration of unemployment and joblessness. On the other hand, the 1993 inflow is better educated, with a decline in the proportion with only compulsory education from one quarter to one fifth. This tends to improve their average labour market prospects.

The reduced size of the inflow and the increased proportion without employment experience and without unemployment benefit (under the rules, few exhausted their unemployment benefit), indicate that fewer were being laid off and that there was a higher share of new entrants. The improved educational composition could indicate both more new entrants and more educated people being laid off. The increased proportion with unemployment experience could be caused by an increased frequency of short-term jobs interspersed by unemployment, so that an increasing proportion also among layoffs will have experienced unemployment before the current spell.

Part of the reduction in average income is caused by a higher share of persons without at job during the preceding 21 months. Among those who had a job at some point during the preceding 21 months, the reduction in average income is about 15 per cent. Since average income is a calendar year measure, even this measure may reflect both the earnings rate, the employment spell length and hours pr day. The reduction in average previous income may reflect a previously difficult labour market, but may also indicate a reduced average productivity among lay-off.

5. Duration of Unemployment and Joblessness

Model

The expected spell duration of an unemployment entrant, both of (registered) unemployment and of joblessness, is analysed in a proportional hazard model with a Weibull specification of the hazard

$$h_t = \alpha t^{\alpha-1} e^{-\alpha x \beta}$$

which gives expected duration

$$E(T) = \Gamma(1 + \frac{1}{\alpha}) e^{x\beta}$$

Although the monotonic form of the Weibull is restrictive, it does provide a convenient parameter for comparing the two periods.

The expected duration depends on both the values of the covariates and the effects of these covariates on the hazard rates. In chapter 6, I decompose the change between 1991 and 1993 in average expected duration of unemployment entrants, into change in the composition with respect to covariates and change in the effects of these covariates. I will look at both duration of unemployment, which in combination with unemployment inflow is related to the total number of unemployed, and on the duration of joblessness, which reflects job probabilities. The combination of the two measures illuminates the propensity to withdraw from the labour force. I start with an overview of the effects of the covariates. The main results are set out in Tables 2 and 3, whereas Table 4 summarises the main changes over the period.

Unemployment and Joblessness

Although more than 90 % of both cohorts have completed their initial spell of unemployment within the 14 months observation period, around 40 % have not started a job during the same period. Other data show that most of those who leave unemployment without starting any job return to unemployment during the observation period (after more than two months without being registered as unemployed). Frequent transitions to

and from unemployment are indicated also by the labour market history. Both in 1991 and in 1993, three quarters of the unemployment entrants in October had experienced unemployment during the previous 19 months (by definition they had not been unemployed neither in August nor in September).

For both males and females, the pseudo steady state stock of unemployment (Table 2) declined approximately in line with the inflow, and duration was fairly constant. This is in line with US results (Blanchard and Diamond, 1990) but not in line with Danish results (Rosholm, *ibid.*). The duration of joblessness was approximately constant for males, but increased for females, indicating that the upswing was more favourable for males. This may reflect a shift towards 'male' sectors, since expected duration for females increases also if I predict duration for a person with constant characteristics, either the reference person (Table 3) or a person with 1991 average covariate values (Table 4).

Education and Demographics

The effects of education are strong: generally speaking the longer the education the shorter the unemployment. More than two years of higher education compared to only compulsory education is estimated to shorten the expected duration of the spell of registered unemployment by around one month, evaluated for the reference person for unemployment entrants (Table 3). The effects on the expected duration of joblessness are even stronger, around four months (Table 4), indicating a stronger tendency for the least educated to leave the labour force.

The exception to the rule of the longer the education the better, is that one-year of post-compulsory education does not shorten duration neither of unemployment nor of joblessness. This is typically only the first, basic year of a multi-year vocational education, and may on its own not be much valued by potential employers. Also the fact that the person has completed only the first year of a supposedly 3 or 4 years education may be regarded an unfortunate signal.

Between 1991 and 1993 the effects of education decreased for males, but increased for females. I have no ready explanation for this, but the main point may be the continued strong effect rather than the change in magnitude.

Higher age increases duration, both of registered unemployment and of joblessness, particularly for males. The variation with age appears to be less for females, but expected duration of joblessness for the average female is longer than for the average male. Being married shortens unemployment duration for males, and having children prolongs duration for females.

Even after controlling for other covariates, immigrants from non-western countries have considerably longer expected duration of unemployment than the majority population. Furthermore, the disadvantage has increased from 1991 to 1993, in particular for females. Why this is so, our data do not tell us. Also, the estimated coefficients indicate that immigrant females have particularly long duration of unemployment and joblessness. The latter may be because we have now no information on child birth during unemployment. This information is available only for the 1991 inflow, and was used in a previous study (Hernæs *et al.*, 1997). The disadvantage of being an immigrant from a non-western country was then estimated at a lower level for females than for males, while now it is the other way round.

Previous Labour Market Experience

Employment experience during the 19 months observation period before the start of the unemployment spell does not to any large degree influence the expected duration of unemployment, but does substantially shorten the expected spell of joblessness. This means that those with previous employment experience more often get a job after leaving the unemployment register, whereas those without employment experience either leave the labour force or re-enter unemployment (after more than 2 months without registering). The effects are weaker in 1993 than in 1991. This indicates that the job probabilities of new labour market entrants (those without previous employment) have improved relatively to the re-employment probabilities of those laid off, after controlling for other

covariates. The effect is strongest for males, but has also been reduced most between 1991 and 1993 for males.

The estimation of the effect of previous job probably suffers from measurement errors, since jobs which are in effect finished but which are not reported as finished by the employer will remain in the employment register. After the spell of unemployment is completed, we will pick up such a job and mistakenly observe transition to a job. As a check of this estimation error, I have estimated the effect of a previous job in a group of unemployed persons who did not have any job in October. This will exclude not only jobs that are erroneously left in the register but also jobs that actually start in October, and may therefore underestimate the effect of job experience. Still, more than half of the effect of remains, indicating that the estimation bias accounts for a minor part of the effect. This result is in line with Rosholm, *ibid.* who found effects of the same magnitude (doubling) on the hazard of re-employment, of the previous state being employment.

The effects of being on recall remain strong, shortening substantially the duration both of registered unemployment and of joblessness. Finally, those not receiving unemployment benefit register as unemployed for a shorter period, most likely because of the lack of incentive to register. For females, the expected duration of a spell of joblessness is shorter among those without unemployment benefit.

Duration Dependence

The probability of leaving unemployment is estimated to increase over time, and more so among 1993 entrants than among 1991 entrants. The probability of entering a job varies a lot less and even falls for females, but changes in the same direction from 1991 to 1993. With heterogeneity bias in the estimates, the 'true' (individual) duration dependence is even more strongly increasing. This result may at first seem puzzling, compared to the results of Hernæs and Strøm, *ibid.* who found that while the probability of leaving unemployment tended to increase, the job probability was falling in a Weibull model. (With gamma heterogeneity the 'true' job probability was increasing). However, the fall in inflow to unemployment between 1991 and 1993 probably reflects an increase in the

demand for labour, which may also have increased job chances over time. The duration parameter I estimate will then reflect also improved demand conditions. By this argument, the upswing would have started by the autumn 1991. Furthermore, since the duration dependence is estimated to be at the same level in the two samples, the upswing would have lasted (at least) throughout 1994. This conclusion is supported by Røed and Zhang, *ibid.*

The increase in the hazards over time may also be a seasonal effect. I take the samples in October, and outflow from unemployment is low during the winter and increases in spring and summer. This may account for the increase or the lack of reduction in the estimated hazards over time.

6. 'Employability' of Unemployment Entrants

The expected duration of unemployment for the average unemployment entrant was fairly constant between 1991 and 1993 (Table 4), apart from a 7.4 % increase in the expected duration of joblessness for females. Since total inflow to unemployment fell by about a quarter it might be the case that hiring had increased, but that the increased demand for labour was not directed toward those registered as unemployed. This may be due to both observed and unobserved characteristics. To analyse changes in the 'employability' I simulated 'how the 1991 entrants would have fared in the 1993 labour market'. To do this, I calculated the expected duration of the average October 1991 unemployment entrant (in terms of observed characteristics), with the coefficients estimated for 1993 representing 'the 1993 labour market'. This includes the local rate of unemployment (which proved not to play any important role).

For males, the expected duration of joblessness for the average 1993 unemployment entrant was 12.6 months, only 0.3 per cent lower than the expected duration for the average 1991 entrants (12.6 months, after rounding off). In contrast, the estimated duration of the average 1991 inflow using the 1993 coefficients (including 1993 unemployment rate), was 11.6 months, 8.1 per cent lower than the expected

duration for the average 1993 entrants. An interpretation of this result is that the employability of the 1993 male inflow was lower than that of the 1991 inflow and that this offsets the improved labour market and results in constant expected duration. The reduction in employability is not reflected in the probability of transition from registered unemployment, which could be to a job or out of the labour force, and which is determined by rules on exhaustion etc, and by the propensity to register.

For females, the predicted duration of joblessness of the average 1991 entrant with 1993 coefficients (including 1993 unemployment rate) was 16 months, 2.6 per cent longer that for the 1991 inflow, whereas the expected duration of the actual average 1993 entrant was 7.4 per cent longer. This points in the same direction as the result for males, to deterioration in the inflow with regard to employability. Furthermore, the 1993 female unemployment inflow also appears to have a composition that leads to longer registered unemployment.

From these results, we are led to conclude that from 1991 to 1993, there has been a change in the inflow to unemployment, towards a group of persons harder to employ. In particular, their labour market history is 'worse'. Hence, the expected duration of the average person has failed to go down in line with the increase in labour demand.

Although females have approximately the same expected duration of register unemployment as males, both in 1991 and in 1993, incidence is lower. This gives a lower proportion of females in the stock of unemployed. A simple multiplication of inflow and expected duration of register unemployment gives a female proportion of about 35 per cent in the corresponding pseudo steady state stock in both years. In the stock of registered unemployed, the actual female proportion in 1995 was 40 (Statistics Norway, 1996).

7. Is there any Filtering?

A prediction from the filtering model in Johansen, *ibid.* is that during a recession, the least productive workers (controlled for wages) will be laid off first. This will gradually increase the average productivity of the remaining labour force and therefore of the flow of persons fired. This is one component of the flow of unemployment entrants. The other

component is the flow of new labour market entrants going into unemployment rather than going directly into employment. If the hiring threshold increases, the average productivity of this flow will also increase.

The results of Røed and Zhang *ibid.* show that inflow to unemployment rose sharply during 1988, and was then fairly stable before going down from 1993. From a filtering model, we would expect a steady increase in average productivity in the inflow to unemployment after the initial jump. This tends to reduce average unemployment duration of new cohorts of persons laid off.

However, if hiring gradually becomes more restrictive, the average duration of unemployment tends to increase. The net result on duration for all unemployment entrants depends on the combined effect. The inflow effect will dominate when the increase in the hiring threshold falls below some limit, and the unemployment duration may therefore start to go down before hiring starts to increase. The larger the filtering effect, the sooner and the steeper the fall in duration.

Hence filtering and changes in hiring will influence unemployment duration in opposite directions from the start of a recession, but unambiguously reduce duration after the point when the increase in the hiring threshold no longer outweighs the productivity increase in the inflow. This may be before the aggregate unemployment has peaked.

In the inflow to the labour market of new entrants, particularly from education, many will go directly to a job, and many of those who do not go directly to a job are not entitled to unemployment benefit and may therefore not register as unemployed. The flow we pick up as unemployment entrants are therefore a select sample. As the hiring threshold falls in the upswing, we may therefore pick up a smaller proportion of less productive, and the average productivity of this component of unemployment entrants may therefore fall during the upswing. One prediction of the filtering model will then be an increase in the average productivity during the upswing in the job probability of those fired, relative to new entrants. Since previous job experience will capture this effect, we would expect an increased effect of job experience on the duration of joblessness. However, this is not supported by the results, as the effect of job experience is stable or falling. Hence I am not able to find any evidence of filtering with the available data.

8. Conclusion

The upswing from 1991 to 1993 reduced the October inflow of unemployment entrants between the two years by approximately one fourth. In contrast, the expected duration of registered unemployment or of joblessness remained more or less at the same level, and even increased for females. Part of the reason for the lack of reduction in duration can be found in the unfavourable change in the composition of the inflow to unemployment. With the average values of observable characteristics of 1991 and coefficients estimated on the 1993 inflow, the expected duration of joblessness would have gone down for males and risen less for females. Still, the reduction in inflow dominates the net impact on stock of unemployed and indicates that incidence preceded outflow during the upswing.

The results indicate that an increasing proportion of the unemployed will have difficulties getting a job. The role for an active labour market policy is probably not reduced in step with the reduction in the unemployment level.

Some caution should be shown in interpreting the results, since I use only two one-month cohorts of unemployment entrants. Similar analysis using several months, preferably spanning more of the cycle, would provide a better basis. Still, the number of observations is large, and the estimates are fairly precise.

I am not able to find indications of filtering. This may be due to lack of data that distinguish between lay-off, quits and new labour market entrants and gives information on productivity. However, the declining effect of job experience may indicate that there is not much filtering taking place.

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Table 1. Inflow to Unemployment in October 1991 and in October 1993

Variables	Males		Females	
	1991	1993	1991	1993
Average age	32.2	32.6	32.4	32.4
Percentage married	28.0	26.2	43.0	39.2
Percentage with children aged 0-7 December 31st 1991/1993	23.3	19.6	31.8	31.6
Percentage immigrants from Western country	1.8	1.9	1.9	2.1
Percentage immigrants from non-Western country	5.0	6.8	3.9	5.2
Local unemployment rate	4.2	4.0	4.3	4.0
Percentage with:				
- Compulsory education	25.0	21.6	25.3	20.9
- One year of upper secondary education	28.8	27.4	35.0	33.8
- Two or three years of upper secondary general education	6.5	6.5	10.8	11.2
- Two or three years of upper secondary vocational education	29.6	32.0	18.3	21.0
- One or two years of higher education	4.5	4.6	5.6	6.3
- More than two years of higher education	2.6	3.4	2.8	3.5
- Unknown education	3.1	4.3	2.1	3.4
Percentage:				
- with no job Jan 1990-Sept 1991/Jan 1992-Sept 1993	23.7	26.0	26.4	30.1
- without unempln't Jan 1990-Sept 1991/Jan 1992-Sept 1993	26.3	23.4	29.1	30.2
- without unemployment benefit in Oct 1991/Oct1993	29.9	36.5	37.8	45.5
- who are on recall	18.5	15.5	7.3	5.3
Average income preceding calendar year (1990/1992), 1000 NOK/130 USD	114.7	89.0	75.3	58.8
Total number	16566	12070	9226	6983
Relative to 1991	100.0	72.9	100.0	75.7

Table 2. Expected Unemployment Duration in October 1991 and in October 1993

Variables	Males		Females	
	1991	1993	1991	1993
Sample information				
Number of unemployment entrants	16 566	12 070	9 226	6 983
Percentage censored (unemployed until November 1992/1994)	8.70	6.70	8.62	6.95
Averaged observed duration (among completed spells)	3.70	3.96	3.55	3.92
Pseudy steady state of unemployment	77 947	56 094	42 890	32 873
Predicted duration for selected categories				
Predicted duration for average person	4.71	4.65	4.65	4.71
Predicted duration for reference person	6.54	6.17	4.92	5.41
Partial variation for reference person				
- age 42	***1.39***	***1.33***	0.63	***0.96***
- married	***-1.35***	***-1.09***	0.01	*-0.34*
- with children aged 0-7 December 31st Sampling	*0.40*	*0.27*	***1.47***	***1.50***
- immigrants from westen countries	***1.13***	0.08	0.45	0.34
- immigants from non-western countries	***2.21***	***2.80***	*0.67*	***1.30***
- with local unemployment 5.2 per cent	***0.53***	***0.38***	***0.67***	***0.20***
- with one year of upper secondary education	-0.21	*-0.30*	0.01	-0.22
- with two or three years of upper secondary general education	***-0.92***	***-0.75***	-0.32	***-0.52***
- with two or three years of upper secondary vocational education	***-1.15***	***-1.08***	***-0.58***	***-0.67***
- with one or two years of higher education	***-1.45***	***-0.68***	***-0.71***	*-0.52*
- with more than two years of higher education	***-1.66***	***-0.99***	***-0.95***	***-0.90***
- with unknown education	***1.12***	***-0.65***	0.46	***-0.85***
- with no job held during the 21 months prior to sampling-month	*0.40*	0.21	***0.34***	0.04
- with no registered unemployment during the 21 months prior to sampling-month	0.18	*-0.25*	***0.74***	0.06
- with income previous year 150 000 NOK/20 000 USD	-0.03	***-0.11***	***0.21***	*-0.14*
- without unemployment benefit in sampling-month	***-2.23***	***-1.88***	***-1.62***	***-1.70***
- on recall in sampling-month	***-3.26***	***-2.54***	***-2.25***	***-1.58***
Duration dependence (Weibull parameter)	1.16	1.31	1.09	1.25

Reference person: Age 30, not married 1 January 1991, no children, native
4.2 per cent local unemployment, compulsory education,
job at least one month January 1990 - September 1991/January 1992 - September 1993
registered as unemployed at least one month January 1990 - September 1991/January 1992 - September 1993
income in 1990/1992 of 100 000 NOK/13 000 USD, receiving unemp. benefit in samling month, not on recall

Predicted partial effects based on coefficients significant at 5 % level in Bold Italics and effects based on coefficients significant at 1 % levels in Bold

Table 3. Expected Duration of Joblessness Among Unemployment Entrants in October 1991 and in October 1993

Variables	Males		Females	
	1991	1993	1991	1993
Sample information				
Number of unemployment entrants	16566	12070	9226	6983
Proportion censored (no job started by November 1992/1994)	37.5	38.0	41.2	44.6
Averaged observed duration (among completed spells)	4.4	4.7	4.3	4.6
Predicted duration for selected categories	100.0	99.7 %	100	107.4 %
Predicted duration for average person	12.59	12.55	15.56	16.71
Predicted duration for reference person	14.48	12.69	11.32	14.11
Partial variation for reference person				
- age 42	2.23	2.47	***0.23***	***0.65***
- married	***-2.14***	***-2.50***	-0.15	***-1.57***
- with children aged 0-7 December 31st Sampling year	*0.85*	1.15	***5.81***	***6.71***
- immigrants from westen countries	***4.68***	0.62	2.20	2.82
- immigants from non-western countries	***4.00***	***4.85***	***6.00***	***10.55***
- with local unemployment 5.2 per cent	***1.29***	***0.78***	***1.28***	***0.74***
- with one year of upper secondary education	*-0.78*	-0.23	-0.83	*-1.41*
- with two or three years of upper secondary general education	***-1.98***	*-1.22*	-1.14	***-3.36***
- with two or three years of upper secondary vocational	***-3.57***	***-3.15***	***-3.40***	***-4.51***
- with one or two years of higher education	***-2.35***	-1.22	***-3.91***	***-3.56***
- with more than two years of higher education	***-4.78***	***-4.06***	***-3.53***	***-5.39***
- with unknown education	*2.32*	1.00	0.15	-0.59
- with no job held during the 21 months prior to sampling-month	***20.81***	***15.93***	***21.47***	***19.92***
- with no registered unempl'nt during the 21 months prior to sampling-month	-0.53	0.15	***1.91***	*1.15*
- with income previous year of 150 000 NOK/20 000 USD	***-0.96***	***-0.01***	***-0.50***	***-0.01***
- without unemployment benefit in sampling-month	-0.54	-0.15	***-1.77***	***-3.70***
- on recall in sampling-month	***-9.81***	***-7.80***	***-7.70***	***-8.22***
Duration dependence (Weibull parameter)	1.02	1.09	0.91	0.97

Reference person: Age 30, not married 1 January 1991, no children, native
4,2 per cent local unemployment, compulsory education,
job at least one month January 1990 - September 1991/January 1992 - September 1993
registered as unemployed at least one month January 1990 - September 1991/January 1992 - September 1993
income in 1990/1992 of 100 000 NOK/13 000 USD, receiving unemployment benefit in samling month, not on recall

Predicted partial effects based on coefficients significant at 5 % level in Bold Italics and effects based on coefficients significant at 1 % levels in Bold

Table 4. Main Changes Between 1991 and 1993 in Expected Duration of Registered Unemployment and Joblessness

	Duration of unemployment			Duration of joblessness		
	1991	1993	Percentage change from 1991	1991	1993	Percentage change from 1991
Males						
Expected duration with average covariate	4.7	4.7	-1.3 %	12.6	12.6	-0.3 %
Expected duration with covariate values as the average person in 1991, and 1993 local unemployment and coefficients		4.7	0.2 %		11.6	-8.1 %
Expected duration with covariate values as the average person in 1991 and 1991 local unemployment, and 1993 coefficients		4.8	1.5 %		11.7	-7.1 %
Females						
Expected duration with average covariate	4.7	4.7	1.3 %	15.6	16.7	7.4 %
Expected duration with covariate values as the average person in 1991, and 1993 local unemployment and coefficients		5.0	6.7 %		16.0	2.6 %
Expected duration with covariate values as the average person in 1991 and 1991 local unemployment, and 1993 coefficients		5.0	7.7 %		16.2	4.1 %

Source: Tables 2 and 3

Table A1. Effect of Covariates on Unemployment Duration in October 1991 and in October 1993. Males

	1991	1993
Number of observations	16566	12070
Proportion without observed job (censored January 1st 1993 or 1995)	8.7046	6.7026

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	0.0298496	0.0041860	0.0001000	0.0155664	0.0041970	0.0002000
Age squared	-0.0001515	0.0000530	0.0044000	0.0000573	0.0000540	0.2897000
Married	-0.2308398	0.0199550	0.0001000	-0.1942971	0.0206480	0.0001000
Children aged 0-7 December 31st 1991	0.0593516	0.0182660	0.0012000	0.0421056	0.0196380	0.0320000
Immigant from western country	0.1594283	0.0563780	0.0047000	0.0125448	0.0564620	0.8242000
Immigant from non-western country	0.2916149	0.0360490	0.0001000	0.3749509	0.0333840	0.0001000
- One year of upper secondary education	-0.0326718	0.0196040	0.0956000	-0.0501925	0.0211830	0.0178000
- Two or three years of upper secondary general education	-0.1516643	0.0312970	0.0001000	-0.1288154	0.0329070	0.0001000
- Two or three years of upper secondary vocational education	-0.1929613	0.0195570	0.0001000	-0.1933539	0.0207930	0.0001000
- One or two years of higher education	-0.2511699	0.0362210	0.0001000	-0.1160846	0.0375890	0.0020000
- More than two years of higher education	-0.2921798	0.0467640	0.0001000	-0.1743175	0.0426100	0.0001000
Unknown education	0.1575367	0.0463640	0.0007000	-0.1122865	0.0429180	0.0089000
Previous job (January 1990-September 1991)	0.0597107	0.0187140	0.0014000	0.0327210	0.0191070	0.0868000
No previous unemployment (January 1990-September 1991)	0.0278200	0.0166430	0.0946000	-0.0409829	0.0182770	0.0249000
Income 1990	-0.0082642	0.0118140	0.4842000	-0.0367500	0.0100000	0.0002000
Unemployment benefit	-0.4163064	0.0162120	0.0001000	-0.3630721	0.0164120	0.0001000
On recall	-0.6909853	0.0189970	0.0001000	-0.5319537	0.0212640	0.0001000
Duration dependence (1/a)	0.8610083	0.0054170		0.7658885	0.0055330	
Local unemployment rate	0.0785668	0.0082230	0.0001000	0.0604089	0.0077270	0.0001000

Table A2. Effect of Covariates on Unemployment Duration in October 1991 and in October 1993. Females

	1991	1993
Number of observations	9226	6983
Proportion without observed job (censored January 1st 1993 or 1995)	8.6170	6.9454

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	0.0018402	0.0057580	0.7493000	0.0171218	0.0058660	0.0035000
Age squared	0.0001455	0.0000750	0.0516000	-0.0000121	0.0000760	0.8744000
Married	0.0022311	0.0251460	0.9293000	-0.0651695	0.0254130	0.0103000
Children aged 0-7 December 31st 1991	0.2613230	0.0242050	0.0001000	0.2452471	0.0237070	0.0001000
Immigant from western country	0.0875936	0.0752080	0.2441000	0.0601126	0.0738370	0.4156000
Immigant from non-western country	0.1284898	0.0561230	0.0221000	0.2151366	0.0522930	0.0001000
- One year of upper secondary education	0.0010850	0.0265580	0.9674000	-0.0412652	0.0282000	0.1434000
- Two or three years of upper secondary general education	-0.0672298	0.0368810	0.0683000	-0.1005909	0.0378060	0.0078000
- Two or three years of upper secondary vocational education	-0.1266038	0.0316250	0.0001000	-0.1323614	0.0320570	0.0001000
- One or two years of higher education	-0.1550102	0.0468270	0.0009000	-0.1016508	0.0457420	0.0263000
- More than two years of higher education	-0.2156032	0.0634940	0.0007000	-0.1812154	0.0588390	0.0021000
Unknown education	0.0900815	0.0775190	0.2452000	-0.1717149	0.0657110	0.0090000
Previous job (January 1990-September 1991)	0.0675343	0.0257680	0.0088000	0.0071030	0.0256260	0.7816000
No previous unemployment (January 1990-September 1991)	0.1404740	0.0227450	0.0001000	0.0108940	0.0229760	0.6354000
Income 1990	0.0822975	0.0223520	0.0002000	-0.0514900	0.0205000	0.0121000
Unemployment benefit	-0.3984447	0.0240990	0.0001000	-0.3773405	0.0236490	0.0001000
On recall	-0.6100779	0.0387180	0.0001000	-0.3447020	0.0449910	0.0001000
Duration dependence (1/a)	0.9145134	0.0077070		0.8009662	0.0075630	
Local unemployment rate	0.1269457	0.0120320	0.0001000	0.0361448	0.0107130	0.0007000

Table A3. Effect of Covariates on Unemployment Duration while Registered as Unemployed in October 1991 and in October 1993. Males

	1991	1993
Number of observations	16566	12070
Proportion without observed job (censored January 1st 1993 or 1995 or leaving labour force)	55.4751	56.5949

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	0.0155731	0.0061800	0.0117000	0.0080564	0.0064750	0.2134000
Age squared	0.0000246	0.0000780	0.7507000	0.0001844	0.0000820	0.0249000
Married	-0.2140316	0.0272510	0.0001000	-0.2397530	0.0289960	0.0001000
Children aged 0-7 December 31st 1991	0.0476879	0.0255310	0.0618000	0.0815526	0.0280800	0.0037000
Immigant from western country	0.2288751	0.0821030	0.0053000	0.0015421	0.0825220	0.9851000
Immigant from non-western country	0.2825712	0.0573820	0.0001000	0.4471014	0.0573950	0.0001000
- One year of upper secondary education	-0.0379432	0.0286180	0.1849000	0.0002016	0.0326100	0.9951000
- Two or three years of upper secondary general education	-0.1812452	0.0470970	0.0001000	-0.1343385	0.0516230	0.0093000
- Two or three years of upper secondary vocational education	-0.2582006	0.0277060	0.0001000	-0.2422434	0.0306780	0.0001000
- One or two years of higher education	-0.2719008	0.0521400	0.0001000	-0.1336184	0.0561050	0.0172000
- More than two years of higher education	-0.3574958	0.0689290	0.0001000	-0.3362958	0.0603920	0.0001000
Unknown education	0.1240893	0.0729180	0.0888000	-0.0837326	0.0719660	0.2446000
Previous job (January 1990-September 1991)	0.8719288	0.0394870	0.0001000	0.7650519	0.0398000	0.0001000
No previous unemployment (January 1990-September 1991)	-0.0356825	0.0228400	0.1182000	-0.0272155	0.0263760	0.3021000
Income 1990	-0.0966598	0.0158810	0.0001000	-0.0967800	0.0126000	0.0001000
Unemployment benefit	-0.3077281	0.0246030	0.0001000	-0.3022726	0.0252470	0.0001000
On recall	-1.1448879	0.0233250	0.0001000	-0.9325797	0.0258890	0.0001000
Duration dependence (1/a)	0.8628144	0.0077470		0.7714545	0.0082060	
Local unemployment rate	0.0956458	0.0115400	0.0001000	0.0709182	0.0111190	0.0001000

Table A4. Effect of Covariates on Unemployment Duration while Registered as Unemployed in October 1991 and in October 1993. Females

	1991	1993
Number of observations	9226	6983
Proportion without observed job (censored January 1st 1993 or 1995 or leaving labour force)	58.4435	62.2082

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	-0.0263839	0.0091630	0.0040000	-0.0099090	0.0101320	0.3281000
Age squared	0.0004627	0.0001170	0.0001000	0.0003130	0.0001300	0.0159000
Married	-0.0312867	0.0388740	0.4209000	-0.1135551	0.0421360	0.0070000
Children aged 0-7 December 31st 1991	0.4565929	0.0394520	0.0001000	0.4408197	0.0415540	0.0001000
Immigant from western country	0.0988082	0.1147980	0.3894000	0.1282228	0.1229740	0.2971000
Immigant from non-western country	0.3204399	0.1051760	0.0023000	0.4306912	0.1077100	0.0001000
- One year of upper secondary education	-0.0068954	0.0417570	0.8688000	-0.1261420	0.0488930	0.0099000
- Two or three years of upper secondary general education	-0.0861150	0.0592920	0.1464000	-0.2783078	0.0652050	0.0001000
- Two or three years of upper secondary vocational education	-0.2753661	0.0492100	0.0001000	-0.3469081	0.0547140	0.0001000
- One or two years of higher education	-0.2748165	0.0714030	0.0001000	-0.2045770	0.0780030	0.0087000
- More than two years of higher education	-0.3623547	0.0985350	0.0002000	-0.3963247	0.0945590	0.0001000
Unknown education	0.2132868	0.1370100	0.1195000	-0.2163794	0.1242280	0.0815000
Previous job (January 1990-September 1991)	1.1710598	0.0591390	0.0001000	0.8784109	0.0566810	0.0001000
No previous unemployment (January 1990-September 1991)	0.2031551	0.0360060	0.0001000	0.1011943	0.0394060	0.0102000
Income 1990	0.0264297	0.0329380	0.4223000	-0.1022700	0.0310000	0.0010000
Unemployment benefit	-0.3633898	0.0378630	0.0001000	-0.4371251	0.0389270	0.0001000
On recall	-1.0738430	0.0464070	0.0001000	-0.8040119	0.0568220	0.0001000
Duration dependence (1/a)	0.9654717	0.0122460		0.8577069	0.0129660	
Local unemployment rate	0.1544245	0.0183020	0.0001000	0.0650295	0.0171390	0.0001000

Table A5. Effect of Covariates on Duration of Joblessness in October 1991 and in October 1993. Males

	1991	1993
Number of observations	16566	12070
Proportion without observed job (censored January 1st 1993 or 1995)	37.5468	37.9702

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	-0.0019980	0.0059130	0.7354000	-0.0078728	0.0064120	0.2195000
Age squared	0.0002335	0.0000760	0.0020000	0.0003666	0.0000830	0.0001000
Married	-0.1600936	0.0268520	0.0001000	-0.2196742	0.0297640	0.0001000
Children aged 0-7 December 31st 1991	0.0570615	0.0248780	0.0218000	0.0864055	0.0284190	0.0024000
Immigant from western country	0.2803864	0.0815050	0.0006000	0.0478315	0.0864530	0.5801000
Immigant from non-western country	0.2439880	0.0557990	0.0001000	0.3238425	0.0556750	0.0001000
- One year of upper secondary education	-0.0556588	0.0275260	0.0432000	-0.0186807	0.0321910	0.5617000
- Two or three years of upper secondary general education	-0.1469813	0.0447010	0.0010000	-0.1013206	0.0504350	0.0445000
- Two or three years of upper secondary vocational education	-0.2835092	0.0268280	0.0001000	-0.2854848	0.0306220	0.0001000
- One or two years of higher education	-0.1772631	0.0505170	0.0004000	-0.1011484	0.0566810	0.0743000
- More than two years of higher education	-0.4009717	0.0639570	0.0001000	-0.3858950	0.0607750	0.0001000
Unknown education	0.1489190	0.0722210	0.0392000	0.0756990	0.0727510	0.2981000
Previous job (January 1990-September 1991)	0.8909515	0.0315920	0.0001000	0.8134422	0.0336760	0.0001000
No previous unemployment (January 1990-September 1991)	-0.0370641	0.0224680	0.0990000	0.0119049	0.0265870	0.6543000
Income 1990	-0.1374367	0.0154900	0.0001000	-0.1267300	0.0125000	0.0001000
Unemployment benefit	-0.0381629	0.0239190	0.1106000	-0.0119507	0.0253170	0.6369000
On recall	-1.1315935	0.0236580	0.0001000	-0.9546358	0.0274500	0.0001000
Duration dependence (1/a)	0.9802082	0.0081000		0.9167156	0.0089400	
Local unemployment rate	0.0854280	0.0109460	0.0001000	0.0596220	0.0110360	0.0001000

Table A6. Effect of Covariates on Duration of Joblessness in October 1991 and in October 1993. Females

	1991	1993
Number of observations	9226	6983
Proportion without observed job (censored January 1st 1993 or 1995)	41.1771	44.5511

Variables	1991			1993		
	Coefficient estimate	Standard error	Significance level	Coefficient estimate	Standard error	Significance level
Age	-0.0521382	0.0089870	0.0001000	-0.0410116	0.0101530	0.0001000
Age squared	0.0007732	0.0001170	0.0001000	0.0006503	0.0001330	0.0001000
Married	-0.0134381	0.0378080	0.7223000	-0.1183126	0.0420030	0.0049000
Children aged 0-7 December 31st 1991	0.4140277	0.0371800	0.0001000	0.3890385	0.0406170	0.0001000
Immigant from western country	0.1776164	0.1134120	0.1173000	0.1820576	0.1280230	0.1550000
Immigant from non-western country	0.4253370	0.0998650	0.0001000	0.5581387	0.1049190	0.0001000
- One year of upper secondary education	-0.0763197	0.0408040	0.0614000	-0.1054127	0.0485810	0.0300000
- Two or three years of upper secondary general education	-0.1061253	0.0571580	0.0634000	-0.2718308	0.0638930	0.0001000
- Two or three years of upper secondary vocational education	-0.3576917	0.0477310	0.0001000	-0.3854604	0.0538240	0.0001000
- One or two years of higher education	-0.4238766	0.0675250	0.0001000	-0.2903938	0.0754930	0.0001000
- More than two years of higher education	-0.3739544	0.0932550	0.0001000	-0.4809667	0.0932490	0.0001000
Unknown education	0.0130939	0.1270140	0.9179000	-0.0428693	0.1260540	0.7338000
Previous job (January 1990-September 1991)	1.0635905	0.0469490	0.0001000	0.8802560	0.0486240	0.0001000
No previous unemployment (January 1990-September 1991)	0.1555299	0.0346180	0.0001000	0.0782852	0.0384700	0.0419000
Income 1990	-0.0911244	0.0317280	0.0041000	-0.0015728	0.0003180	0.0001000
Unemployment benefit	-0.1703059	0.0371590	0.0001000	-0.3037575	0.0397820	0.0001000
On recall	-1.1399519	0.0496420	0.0001000	-0.8727287	0.0640000	0.0001000
Duration dependence (1/a)	1.1036057	0.0129110		1.0327590	0.0144400	
Local unemployment rate	0.1068697	0.0174170	0.0001000	0.0513605	0.0172260	0.0029000