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What determines transitions to sick leave?

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What determines transitions to sick leave?

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Abstract

The paper discusses some of the possible determinants of sick leave. The underlying medical health of workers is of course important, but other factors also determine if they manage to function at work. For example the degree to which workers are willing to endure discomfort at work and the demands for efficiency at work can be important. Also of importance is the ease with which workers can change jobs and whether increases in employment bring in marginal, less healthy, workers. Finally, one must take into consideration the ability of firms to accommodate workers with health problems, the age of the work force and the situation workers face at home. As an illustration, we discuss how these factors have influenced married women in ages 35 to 44 using a multinomial model. The main finding is that changes in wages has had a very strong effect on transitions to sick leave in the 90's. In our estimation they explain almost all the change in the group.

Keywords: sick leave, wages, work pressure

Introduction

There are many indications that the health of the Norwegian population has steadily improved during the last twenty to thirty years. Life expectancy for women at birth has increased from 79.8 years in 1990 to 82.9 years in 2006, income levels have increased, and working conditions have improved. Despite this, this period has seen a substantial increase in the number of individuals on sick leave.

In Norway sick leave lasting up to 16 days is paid for by employers, while longer term sick leave is covered by the Social Security System. According to The Norwegian Labour and Welfare Administration (NAV), the number of individuals on long term sick leave per worker increased by over 50 percent in the period from 1992 to 2003 and was still almost 30 percent higher in 2007. For women the increase was even greater, with an increase of around 60 percent in the period to 2003 and an increase of just below 40 percent to 2007. Many workers on sick leave do not return to work, but instead go on to disability or rehabilitation. The number of disability insurance recipients per adult (ages 25-64) went from 8.2 percent in 1980 to 12.4 percent in 2004.

While increases in sick leave and disability are a concern in many OECD countries, there are large differences in how the social security systems work in different countries. Even within the Scandinavian countries, which have a common general approach to welfare, there seem to be different approaches. Brage (2007) concludes that while the Danish model is more market oriented, the Swedish has a strong element of government control. The Norwegian model

distinguishes itself by a formalized system of cooperation between government, unions, employers and the health sector. According to Brage (2007), the rate of sick leave has since the 1990s been significantly lower in Denmark than in Norway and Sweden.

Number of workers on sick leave per worker in the labor force

The number of women and men on sick leave since 1992 are shown in figure above.

In the following we discuss some of the possible determinants of sick leave. As an illustration we look closer at sick leave among married women in the ages between 35 and 44 working full time (more than 30 hours a week). Sick leave among women is generally higher than among men. One important reason is sick leave associated with pregnancy (in our study this type of sick leave is excluded). Another reason might be that many women also have work responsibilities in the home. Studies by Mastekaasa (2000) and Bratberg et. al. (2002) indicate, however, that this type of "double" work is not an important reason for the high level of sick leave among women in Norway. Many women are employed in sectors where there is heavy lifting (the health sector) and little control over ones own work situation (the educational sector); see also Mastekaasa and Dale-Olsen (2000).

While there is no simple answer to why sick leave is steadily increasing or why it has become as high as it is, see Ose et. al. (2006), we believe it is instructive to undertake a closer study of the increase in sick leave in Norway. The following is a preparatory paper for a later, more intensive econometric study of sick leave during the 1990's. In our view, the main determinants of sick leave are considered to be:

- The underlying medical health of workers
- Worker behavior and the degree to which workers are willing to endure discomfort at work
- The demands for efficiency at work
- The ease with which workers can change jobs
- Whether increases in employment bring in marginal, less healthy, workers
- The ability of firms to accommodate workers with health problems

- The age of the work force
- The situation workers face at home

We discuss how the above factors have influenced sick leave in an econometric illustration where we look at the period 1992 to 1999. This because it is a period in which there was much concern in Norway about the high levels of sick leave and disability, so that it is unlikely that the system itself was becoming more lenient in this period, and because there were few changes in the rules governing sick leave and disability during this period (in contrast to the last ten years, where many changes have been implemented).

The main finding in our econometric illustration is that changes wages has had a very strong effect on transitions to sick leave in the 90's. In our estimation they explain almost all the change among married women in the age group 35-44.

Changes in the underlying medical health of workers

One of the main problems in research on sick leave and disability is that the meaning of the terms health and sickness are not clear. They are relative terms relating both to the ability of individuals to function and to the individuals' subjective feelings of well-being. We use the term "medical health" to signify how well an individual functions compared to what is accepted as normal functioning as determined by a medical doctor.

How an individual's medical health affects her or his functioning at work will vary among individuals, firms and jobs. How well a worker functions at work will can be termed "functional health". Sick leave and disability are consequences of how medical health translates into functional health at work. How this happens is determined by all the different possible reasons for going on sick leave given in the list above.

Determining which combinations of medical and functional health qualify for sick leave and disability pensions is not necessarily easy. For example, being paralyzed from the waist down is a clear medical illness, but only a functional illness if the work conditions do not allow the worker to comfortably work sitting in a wheel chair. On the other hand, distress from going through a difficult divorce may or may not be considered a medical disease, but regardless of this, might hinder a worker from being able to perform her or his job adequately.

The medical establishment and the social security system are charged with determining who gets sick leave and disability pensions. In Norway there has been a trend toward letting the individuals' own subjective assessment determine both their medical and functional health, especially concerning sick leave.

Sick leave has increased over fairly short periods, for example the period of our analysis, the eight years from 1992 to 1999. This period is so short that it is implausible that it contains large changes in the underlying medical health of Norwegian workers. In addition, many health indicators such as longevity have improved in the period, indicating that if there has been a change in medical health, it should be towards an improvement in health. Thus, we believe most of the observed increase in sick leave in our sample period is related to functional health; to how well workers are adapted to their work environments.

It is, however, a possibility that, while there has been a decrease in life-threatening diseases, there has also been an increase in other types of diseases such as diabetes, asthma, allergies and psychological problems. While these less serious health problems do not have a large

impact on broad measures of health such as mortality, they may play a significant role in the ability of individuals to function in the work place. One could speculate that these diseases occur when certain threshold levels (of pollutants, stress, etc.) are breached and that this is what has happened during the 90s.

We split sick leave into 10 components according to type of disease (muscle/skeleton, psychological or other), whether the diagnosis was subjectively based on the patient's symptoms or objective in the sense that the doctor had found a clear causal factor behind the disease, and whether there was an absence of a good prognosis (a good prognosis means that the doctor expects the patient to fully recover). In the following we will refer to an absence of a good prognosis as a bad prognosis.

If increased sick leave is mainly a result of increases in employment bringing in marginal, less healthy, workers, then one would expect that the number receiving a bad prognosis should increase.

Table 1 gives an overview over how our sample is distributed across different types diagnosis and prognosis. Between 1992 and 1993 there was a strong shift in the number of workers with musculoskeletal disease from symptoms to complaints, leading to a substantial fall in the percentage of workers on sick leave with a disease based on symptoms/complaints.

Table 1. The number of fully employed women on sick leave with different types of diagnosis and prognosis

	Symptoms, complaints	Diagnosis	Psychological problems	Musculo-skeletal	Other	Bad prognosis	Good prognosis
1992	32 %	68 %	16 %	57 %	27 %	19 %	81 %
1993	21 %	79 %	16 %	56 %	28 %	21 %	79 %
1994	22 %	78 %	18 %	53 %	29 %	23 %	77 %
1995	21 %	79 %	19 %	53 %	28 %	23 %	77 %
1996	22 %	78 %	19 %	53 %	28 %	24 %	76 %
1997	23 %	77 %	20 %	51 %	29 %	25 %	75 %
1998	25 %	75 %	21 %	50 %	29 %	23 %	77 %

Increased sick leave due to worker behavior

There are a number of studies of how the arrangements governing sick leave affect the number receiving sick leave benefits. In addition, there has been a discussion about the effects of different ways of splitting the expense of sick leave between the firms and the government.

In Norway workers are assured full wage compensation (for incomes up to a fairly high level) from the first day they are sick and they can get sick leave benefits for up to 52 weeks. Sweden had a similar arrangement until 1991, when full compensation was abolished and workers no longer received compensation for the first day they were sick. Today wage compensation is generally between 70 and 90 percent, but there is no time limit on how long one can be on sick leave.

According to Henrekson and Persson (2004), when workers had to cover the first day of sick leave in Sweden in 1991, the number of incidences of sick leave decreased, but each period of sick leave became longer on average. Using Norwegian data, Dyrstad and Lysø (1998) come to the same conclusion; that taking away compensation for the first days of sick leave will lead to a decrease in sick leave. Johansson and Palme (2002) studied a sample of Swedish

workers in 1991, and found that a reduction in the compensation received when sick, reduced the time the workers were sick. These studies therefore indicate that both reducing the number of days covered and reducing the compensation will decrease sick leave. On the other hand, it doesn't seem as if the length of the period paid by employers affects sick leave.

One might speculate that if increases in sick leave are mainly motivated by changing norms and worker behavior, then diseases that are difficult for the doctor to control should increase. Thus, symptom/complaints should increase more than those with a clear diagnosis, and psychological diseases should increase more than musculoskeletal. In addition, the relative number receiving a bad prognosis should decrease, since the increase would lead workers with relatively better medical health to seek sick leave.

In recent years, there has been done a considerable amount of work on the spreading of norms, see for example Rege et al. (200?). The norms acknowledged by workers are an important determinant of the willingness to endure discomfort at work, which indicates the degree to which challenges at work and demands at home translate into vulnerability to becoming non-functional at work. For those feeling uncomfortable with the pressure at work, it is a measure of how much physical or psychological discomfort they are willing to endure. In our econometric study we choose to associate this with the variable for non-labor income. Individuals with a high outside income (including spousal income) will be less willing to endure discomfort than those with lower outside income.

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## *Sick leave and the demands for efficiency at work*

Sick leave as a business cycle phenomenon

In a preliminary analysis we did, we found that changes in norms and in worker behavior might not be the most important factor behind the observed increase in sick leave. We therefore chose to look closer at explanations connected with changes in work conditions due to increases in the cost of labor. The approach can be seen as moving towards the types of explanation found in the literature dealing with sick leave as a business cycle phenomenon. This literature focuses on the connection between unemployment and sick leave, focusing on three main hypothesis all pointing to sick leave increasing when unemployment falls (and wages increase), see Askilden et. al. (2004) and Bjørnstad (2006?) for studies based on Norwegian data. The pressure hypothesis says that when the pressure in the economy increases, workers are worked harder and this leads to increased sick leave. Linking wages to sick leave is close to the pressure hypothesis, in that it assumes that as wages increase firms work to increase the efficiency of the labor force (or increased productivity leads to increases in wages), leading to some workers being pressured onto sick leave and disability pensions. The discipline hypothesis explains the negative correlation between sick leave and unemployment as the result of workers fearing for their jobs when unemployment increases and therefore being less willing to go on sick leave. The composition hypothesis says that when unemployment is low, more people with health problems are employed, and this increases sick leave.

On the other hand, it is not difficult to think of reasons for sick leave to be positively correlated with unemployment. In periods of high unemployment firms reduce staffing levels. This may increase the work pressure on the remaining workers, both because of the psychological anxiety about work security and directly through harsher work conditions.

It is possible that in addition to the business cycle, the level of productivity affects sick leave. As Norwegians have become much wealthier and more productive, increases in productivity might have exerted an increasing toll on marginal workers. Work conditions may have become more physically or psychologically challenging for some groups. There might also be less flexibility in some work places, so there is less chance that a job can be adjusted to accommodate workers with impairments.

The figure below shows how hourly compensation relative to the euro area has changed in Norway and Sweden, and how sick leave has changed. It shows that wage compensation relative to the euro area rose in Norway, while it was relatively flat in Sweden. At the same time, sick leave increased in Norway, while it first fell and then rose back to its original level in Sweden.
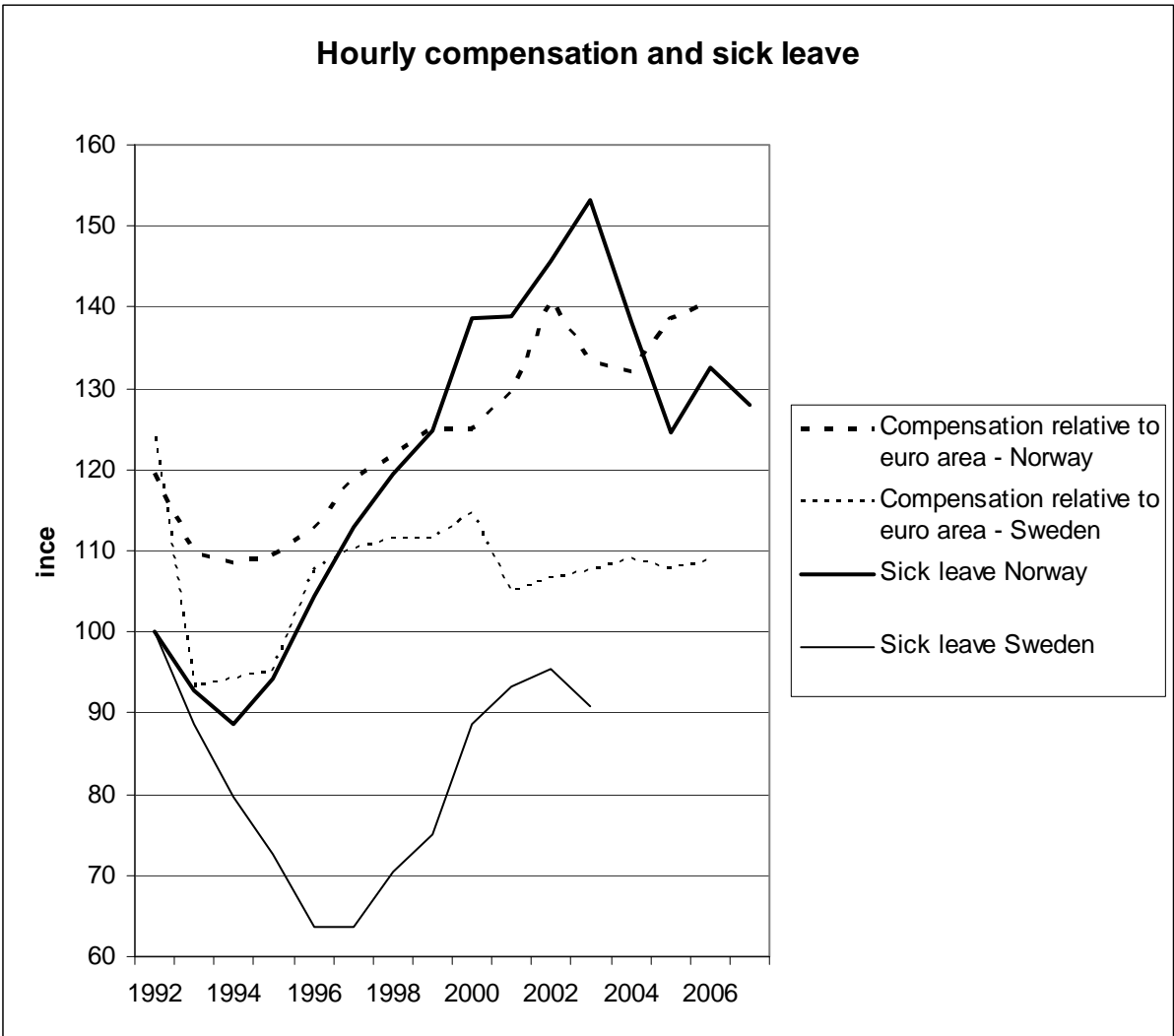
Røed and Fevang (2005) find that reorganization in the private and public sector can lead to increased sick leave. On the other hand, on the basis of surveys carried out by Statistics Norway in 1996, 2000 and 2003, Rønningen (2006) finds that there was no increase from 1996 to 2003 in the pressure individuals experienced at work. It is important to note that the factors leading to increased sick leave are not necessarily experienced by the majority of workers. For example, increased responsibility for and control over one's work may lead the majority of workers to feel more satisfied, while workers already having problems coping with their jobs may feel overwhelmed. This can lead to increased average worker satisfaction combined with an increase in sick leave.

The demand for efficiency at work – The pressure hypothesis

As mentioned above, the pressure hypothesis says that when the pressure in the economy increases, workers are worked harder and this leads to increased sick leave. In our study we choose to associate this increase in work pressure to increases in wages. Usually, increased wages either lead to or are the result of productivity increases. Increases in labor productivity can be due to many things, among them increases in capital and the introduction of more efficient production processes. Increases in productivity do not necessarily imply increased pressure on workers. New capital or production processes may increase productivity and decrease the pressure on workers (for example by introducing machinery that eliminates heavy lifting or other hazardous work practices). Still, we think that at least a part of the increase in productivity is due to increased pressure on some workers (for example through the elimination of slack at work). Some types of productivity increase can be beneficial to a majority of workers, but be difficult for a less "healthy" minority, leading to increases in sick leave.

The link between pressure on workers and wages can be illustrated in a simple cost minimization model with quadratic costs associated with implementing efficiency. Let us assume that the demands that workers face in workplace j can be captured by the efficiency variable $k_j \in [1, \infty)$. For example, if there is little time to rest at work, this implies a higher k_j than if there is ample time for rest. Improved working conditions can alleviate the need for rest and thereby decrease k_j. In addition, let us assume that the proportion of workers of type i in firm j who are functioning in their jobs is given by the function f_{ij}:

$$(1) \qquad f_{ij}(v_{ij}, k_j) = \frac{v_{ij}}{k_j} \in (0,1],$$

where $v_{ij} \in (0,1]$ is a variable that describes the vulnerability of the workers. The smaller v_{ij} is, the more vulnerable the workers are. It depends on the situation at home, the willingness of workers to accept difficulties at work and the extent to which the firms accommodate workers with problems linked to sick leave and disability. As the demands at work and at home increase, the workers become increasingly vulnerable to finding themselves unable to function at work. If the firms' cannot accommodate these workers with difficulties, they may become long term sick.

We wish now to link the efficiency demand k_j to wages w_{ij}. We assume that the cost per worker of implementing efficiency level k is given by the quadratic cost function:

$$(2) \qquad q(k_j) = \gamma_j \cdot k_j^2,$$

where γ_j is a positive parameter indicating how costly an increase in efficiency is. We assume that efficiency costs are due to the costs of surveillance and the implementation of incentive mechanisms.

Assume further that production in firm j, y_j, is given by the Cobb-Douglas production function

$$(3) \qquad y_j = A_j \left(k_j \cdot \sum_i n_i \cdot f_{ij} \right)^{\alpha_j} x_j^{\beta_j},$$

where A_j, α_j, and β_j are firm specific parameters, n_j is the number of workers of type i, and x_j is firm specific capital. Letting w_{ij} be wages and r_j the price of capital firm j's costs are given by

$$(4) \qquad \left(w_{ij} + q\left(k_j \right) \right) \cdot \sum_i n_{ij} \cdot f_{ij} + p_j \cdot x.$$

Cost Minimization of the firm's costs with respect to k_j leads to the following solution for k_j:

$$(5) \qquad k_j = \sqrt{\frac{w_{ij}}{\gamma_j}}.$$

In this simple example we get that there is an inverse relationship between the firms' demand for efficiency and the wages the workers receive.

The probability of finding new employment – The discipline hypothesis

A firm can choose to sack non-functioning individuals or persuade them to go on sick leave. Sick leave will either result in such individuals becoming functional again or going on to disability. Since there are many laws regulating the dismissal of workers, we assume that it always is better for the firm to get workers into sick leave, where their expenses are covered by the state. Even so, if workers themselves wish to quit their job instead of going on sick leave (if they believe they can function well in another job and that an extended period on sick leave will make them less employable later), the firm is happy for them to do this (maybe even giving them leave for a certain period). In this way a low unemployment rate ought to lead to reduced sick leave.

The composition hypothesis

As mentioned, it is also possible that increases in labor force participation in Norway may have drawn workers with more health problems into the work force. In our study we have devised a variable to try to capture the degree to which increases in employment bring in marginal, "less healthy", workers.

The ability of firms to accommodate workers with problems

The ability (and willingness)of firms to accommodate workers with problems is an important determinant for whether individuals who have problems keeping up the pace at work become sick or not. Demands at home or at work are not necessarily stressful and can be seen as positive challenges by many. We differentiate between the firms' ability to help and the workers willingness to endure to separate between how the work environment interacts with vulnerable workers and how individuals deal with stress. One might, for example, speculate that jobs with flexible hours can better accommodate vulnerable workers than jobs with strict working times. We assume that it is the job that defines the degree to which it is possible for the firm to be accommodating. In our framework, a job is defined as the combination of production sector, region and education.

Work environment and the firm

In any discussion of sick leave, considering the work environment is important. Linking wages and sick leave assumes that wage increases lead to attempts to increase productivity (or increased productivity leads to increases in wages) changing the work environment in ways that may hurt some workers. Research into the effects of work environment on sick leave can be split in there main themes. 1) the effect of the physical work environment, 2) the effect of the psychological and social environment and 3) the effect of organizational changes. Studies concerning the physical work environment have often focused on diseases connected with muscles and the skeleton such as back and shoulder pain, see for example Hakkanen et. al. (2001), Ijzelenberg et. al. (2004), Kuijer etl. al. (2005), and Burdorf and Jansen (2006). Studies of the psychological and social environment often take as a starting point the "demand-control-support" model. According to this model, employees in jobs with high psychological/mental demands but little influence are more vulnerable to becoming sick than others, see Michie and Williams (2003) and Christensen et. al. (2005). Depending on whether organizational change is perceived as positive or negative, such change can both decrease and increase sick leave. A number of studies considering the effect of staff reductions find that such reductions increase sick leave among the remaining workers, see Kivimaki (2001), Ose (2004), and Røed and Fevang (2005).

The age of the work force

Age is the most important determinant of health. We split our data into four separate age categories and include in the regression for each category a age variable that gives the relative age within each group. The relative age variable goes from 1 to 10 indicating one of the ten one-year age groups within each age category. Change in the number of individuals in each age group is of course an important factor behind change in sick leave. An aging work force will be more susceptible to being sick.

The situation at home influences the situation at work

The situation at home influences the situation at work. If there are many demands for one's time and energy at home it can be more difficult for a worker to meet the challenges at work. For example, if we consider workers with young children, they face increased demands at home, though availability of good child care can alleviate this. Other variables we choose to associate with the situation at home are whether a person is married or not and whether a person's spouse is in the labor force (or a student) or not.

An econometric illustration

In our data sick leave only covers time financed by the social security system. During the first 14 days of sick leave, wages are paid by the employer, so this period is not included in our data set. The number of days covered by employers was increased from 14 to 16 days in 1998. This reduced the number of sick days covered by the Social Security System by about 4 percent. Information about sick leave is collected from registers administrated by the Social security administration (Rikstrygdeverket/NAV). They include information on the prognosis given by the medical doctor treating the patient.

The variables

We have chosen to analyze a fairly homogenous groups of workers: women working full time in age group 35-44. The variables included in our analysis can be seen as reflecting different factors determining sick leave. In table 2 we give summary statistics for our variables and

group them according to how we interpret the variables in connection with the factors determining sick leave discussed above

Table 2. Summary statistics. Average frequency for dummy variables and mean for continuous variables. Women 35-44. Percent

Dummy variables		Continuous variables	
Workers' family situation		*Age*	
Married	69,1	Relative age	4,6
Spouse non-participation	2,7	*Firms' ability to accommodate workers*	
Children 0-5 year	21,2	Education (year)	12,8
Children 6-17 year	49,8	*Workers' willingness to endure discomfort*	
Firms' ability to accommodate workers		Non-labor income	280 786
Education missing	1,5	*The disciplining effect of the unemploy. rate*	
		Unemployment rate	4,3
Region 1	28,1	*The composition hypothesis*	
Region 2	17,2	Employment change	1,012
Region 3	7,1	*The demand for efficiency*	
Region 4	11,2	Avg. wage costs prod. sector other (NOK)	108 441
Region 5	16,4	Avg. wage costs manufacturing (NOK)	114 823
Region 6	8,4	Avg. wage costs retail trade (NOK)	117 773
Region 7	11,6	Avg. wage costs transport (NOK)	109 233
		Avg. wage costs finance NOK)	117 767
Prod. sector other	5,2	Avg. wage costs publ. educ. (NOK)	116 977
Manufacturing	10,5	Avg. wage costs publ. health (NOK)	122 734
Retail trade	13,4	Avg. wage costs publ. other (NOK)	134 851
Transport	6,2		
Finance	10,7	Number Observations	721 456
Public education	11,3		
Public health	16,3		
Public other	26,4		

We see that 69 percent of the women are married and 21 percent of the women have a child aged 0-5 and 50 percent have a child aged 6-17. More of these women live in regions 1 and 2 (around the Oslo fjord) than in the other regions. The public sector employs 54 percent and in the private sector retail employs the most. The women working in the public sector have on average the highest wages.

We have made some preliminary multinomial estimations based on the transitions from work to the 10 different sick leave categories mentioned earlier. Table 3 shows only the estimation results for one group: Those with a musculoskeletal disorder and a bad prognosis. Only parameter estimates which are significant at a 5 percent level are reported
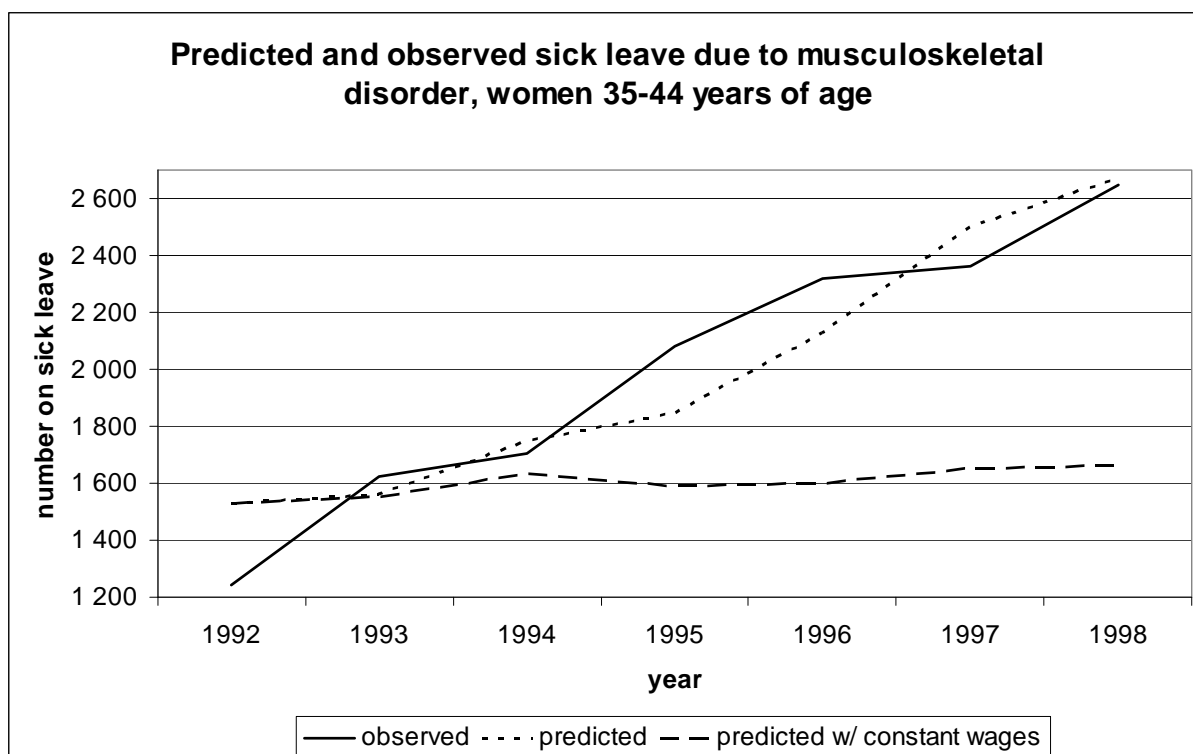
From the table we see that having spouse not participating in the work force increases the transition to sick leave. Other indicators of the workers' family situation are not significant. Increasing age increases the probability of going on sick leave. Jobs requiring low education, in the central regions and in sectors such as transport and manufacturing have lower transitions to sick leave, all else equal. There is no indication that workers with higher outside income go on sick leave more often than others, indicating that it is not worker behavior that

is driving the increases in sick leave. An increase in the unemployment rate increases transitions to sick leave, indicating that there is a business cycle component, but not supporting the discipline hypothesis, while firms with higher employment than average also have more workers going on sick leave, indicating that the composition hypothesis might be right.

Table 3. Estimation results for the transition from work to sick leave with a musculoskeletal disorder and a bad prognosis (one out 10 groups in the estimation). Married woman aged 35-44. Only parameter estimates significant at a 5% level are reported.

Dummy variables		Continuous variables	
Workers' family situation		*Age*	
Married	-	Relative age	0,03
Spouse non-participation	0,34	*Firms' ability to accommodate workers*	
Children 0-5 year	-	Logarithm of education	-2,85
Children 6-17 year	-		
Firms' ability to accommodate workers		*Workers' willingness to endure discomfort*	
Education missing	-6,68	Non-labor income	-
		The disciplining effect of the unemploy. rate	
Region 1 (reference region)		Unemployment rate	0,06
Region 2	0,18	*The composition hypothesis*	
Region 3	0,19	Employment change	0,90
Region 4		*The demand for efficiency*	
Region 5	0,16	Avg. wage costs prod. sector other	
Region 6		Avg. wage costs manufacturing	9,81
Region 7	0,51	Avg. wage costs retail trade	9,09
		Avg. wage costs transport	12,30
Prod. sector other (reference sector)		Avg. wage costs finance	6,06
Manufacturing	-9,23	Avg. wage costs publ. educ.	8,62
Retail trade	-8,63	Avg. wage costs publ. health	5,40
Transport	-12,23	Avg. wage costs publ. other	10,58
Finance	-7,26		
Public education	-8,62	Constant	
Public health	-5,05		
Public other	-9,98	LR chi2(310) = 7777.84	
		Prob > chi2 = 0.0000	
		Log likelihood = -163042	
		Pseudo R2 = 0.0233	

The most striking result is the large effects of wages. They are especially strong in the transport sector, but also in manufacturing, retail, public education and public other. In the above figure we see how much changes in wages have affected the number on sick leave. According to this, if wages had stayed constant during the period there would only have been a slight increase in the number of transitions to sick leave, instead of an increase from less then 1600 in the group we are looking at in 1992 to more than 2600 in 1998.

Predicted and observed sick leave due to musculoskeletal disorder, women 35-44 years of age

Conclusions

We have discussed some of the possible determinants of transitions to sick leave. On the basis of some illustrative estimation results, it seems that the family situation influences such transitions, that high education jobs find it more difficult to accommodate workers than those requiring a lower education and that increased unemployment increases transitions. Over time it seems that increased demands for efficiency, due to increasing wages, is the most important factor behind the increasing number of transitions to sick leave.

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