# Hospital Capacity, Waiting Times and Sick Leave Duration–An Empirical Analysis of a Norwegian Health and Labour Policy Reform*

Arild Aakvik
Department of Economics
University of Bergen

Tor Helge Holmås
UNI Rokkan Centre, Bergen

Egil Kjerstad
UNI Rokkan Centre, Bergen

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## Abstract

A health and labour policy reform aiming to reduce hospital waiting times and sickness absences, the Faster Return to Work (FRW) scheme, is evaluated by creating treatment and comparison groups to facilitate causal interpretations of the empirical results. We use a dataset on individuals where we merge hospital data with social security data and socio-economic characteristics. The main idea behind the FRW scheme is that long waiting times for hospital treatment lead to unnecessarily long periods of sick leave and postponed return to work after illness or injury. Using a program evaluation model allowing for endogeneity we find that the average waiting period for treatment or consultation for FRW patients (treatment group) is 12–15 days shorter than for people on sick leave on the regular waiting list (comparison group). This reduction is only partially transformed into a reduction in the total length of sick leave. On average, the reduction is approximately eight days. There is a significant difference between surgical and non-surgical patients, where surgical patients benefit the most from the reform in terms of significantly faster return to work. We find no effect for non-surgical patients.



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Keywords: program evaluation, waiting times, length of sick leave, policy reform, endogeneity

# 1 Introduction

The National Health and Social Insurance system in Norway, as in many other countries, is under economic stress from an increasing number of disability and sickness benefit claimants (OECD, 2010). On a given working day, around 6.5% of the workforce (130,000 persons) receives sickness benefits based on a sickness certificate from a general practitioner (GP) (Norwegian Labour and Welfare Administration (NAV), 2013). As part of an on-going effort by the Norwegian government to reduce both the incidence and the duration of absences from work, a committee comprised of representatives from central government, labour unions and employer organizations proposed a set of new measures to reduce sickness absences. Among the implemented measures is the Faster Return to Work (FRW) scheme. Other measures to reduce sickness absence are discussed in depth in OECD (2010), and for Norway in Mykletun et al. (2010).

The main idea behind the Faster Return to Work (FRW) scheme is that long waiting times for hospital treatment lead to unnecessarily long periods of sick leave and absence from work. It was argued that waiting times and thus total length of sickness absences should drop as a result of increasing hospital capacity exclusively for people on sick leave. The FRW scheme was introduced at the beginning of 2007 and each year since then approximately NOK 500 million (around EUR 70 million) has been spent on additional treatment capacity for certain patient groups in the labour force.

The FRW scheme consists of two elements. Some patients are put on a FRW *waiting list* based on a recommendation from a GP and governmental guidelines. These patients are given priority for treatment over patients placed on the regular waiting list. Patients on the FRW list are treated at existing facilities that receive extra grants to *increase treatment capacity* exclusively for this group. Thus, waiting times for this group should be reduced without affecting waiting times and treatment availability for persons on the regular waiting list. Both the patients on the FRW scheme (treatment group) and the patients on the regular waiting list (comparison group) are treated with approximately the same technology, but our treatment group experience shorter waiting times for treatment. We analyse if shorter waiting times for treatment at a hospital is transformed into shorter total length of sick leave and faster return to work for persons who are treated at a hospital, as intended by the reform, given that both groups are given approximately the same medical treatment.

Around 40% of persons registered as being on sick leave receive hospital treatment (Holmås and Kjerstad, 2010) during the sick leave episode. The average waiting time for hospital treatment is around 70 days (Norwegian Directorate of Health, 2008).

This indicates that a reduction in waiting times could lead to a reduction in length of sick leave and faster return to work. However, a simple econometric analysis of waiting times for hospital treatment on length of sick leave would probably result in a biased regression coefficient. Waiting times vary both in terms of observed factors (e.g. medical diagnosis) and unobserved factors that also influence the length of sick leave (Askildsen et al., 2010, Askildsen el al., 2011, Carlsen and Kaarbøe, 2013), which creates an endogeneity problem. This problem could be solved if we experimentally could change waiting times for treatment, but no studies have used this design. The FRW scheme we analyse is not a RCT, but it shifts waiting times for certain groups of patients, while holding waiting times for other patients constant, where both groups are given the same type of medical treatment within diagnostic groups. We are thus able to analyse how a shift in waiting times measured with a FRW dummy variable affects length of sick leave using a quasi-experimental design.

It is not self-evident that shorter waiting times will result in shorter periods of sick leave, since this assumes a correct diagnosis and a positive effect of treatment. The majority of people on sick leave in Norway are diagnosed with some form of musculoskeletal disease. In 2008, 40.4% of sickness absences was related to diseases of the musculoskeletal system (NAV, 2013). In a systematic review of the effectiveness of multidisciplinary rehabilitation for fibromyalgia and chronic widespread pain, Karjalainen et al. (1999) showed low treatment effects on return to work. Indahl (2004) concludes that no specific treatment has proven to be highly effective for low back pain patients, and that the multitude of different treatments offered must be regarded as pain-modulating modalities only. Frölich et al. (2004) focus on different types of rehabilitative measures, such as passive, workplace, educational, medical, and social, for long-term sick in Sweden. They conclude that no interventions outperform non-participation with regard to return to work, and find that in many cases the length of sickness increases due to treatment. Engström et al. (2010, 2012) find that early interventions has no or actually negative effects on sickness absence and disability pensions using an experimental evaluation design. Medical research indicates that for common causes of sick leave such as musculoskeletal pain and mild mental disorders, regular activity through work rather than specific medical treatment helps promote recovery and rehabilitation; see Waddell (2004), Waddell and Burton (2006), and OECD (2008). In addition to the lack of clear evidence that treatment reduces length of sick leave, there is also a question of given a correct medical diagnosis as the basis of medical action. Maeland et al. (2012) analyse which diagnosis GPs give patients with subjective health complaints, and what kind of treatments they suggested. They find that GPs give a large variety of diagnosis and treatment to the same type of patient,

indicating how difficult it can be to give proper treatment to people with diseases of the musculoskeletal system.

All costs related to sickness in Norway are covered by the National Insurance Scheme (NIS). Third party financing may create moral hazard problems because no party has a direct financial incentive to reduce the period of sickness absence including waiting times and treatment periods.[2] Following recent reforms, Dutch employers have a strong interest in using effective vocational interventions for sick workers due to strong financial and administrative incentives to reduce long-term sickness (Everhardt and de Jong, 2011). Benefits and rehabilitative health treatment costs related to sickness are not covered by the regular health insurance in the Netherlands, but are paid by the employer, or covered by his/her sick pay insurance (de Jong, 2012).

Most Norwegian hospitals were affected by the Faster Return to Work (FRW) scheme, but it is important to note that the hospitals increased capacity within different medical specialties. Thus, sick-leave-listed patients given a specific diagnosis received hospital treatment through the FRW scheme in some parts of the country, while patients with a similar diagnosis living in other regions received similar treatment through the regular health care system. We use the FRW scheme to analyse whether increased hospital capacity contributes to a reduction in waiting times and length of sick leave for patients in need of hospital treatment. We use a dataset on individuals where we merge hospital data with social security data and socio-economic characteristics. A treatment group and a comparison group are created based on a quasi-natural experiment. We estimate ordinary least squares (OLS) regressions and program evaluation methods allowing for selection into treatment ("treatreg"), where we use the distance between nearest hospitals of different types as the exclusion restriction (identifying variable) for the FRW scheme in the empirical analysis.[3] The distance variable used as the exclusion restriction in the endogenous treatment effect model should affect the decision to enter the FRW scheme, but should not directly affect our outcome variables length of sick leave and return to work.

We find that the waiting period for treatment for patients who received treatment through the FRW scheme in 2007 and 2008 was 12 to 15 days shorter, calculated from the commencement of the sick leave, compared with sick-leave-listed people also being treated but coming from the regular waiting list where patients are not prioritised based on employment status as is the case under the FRW scheme. This reduction in waiting time is only partially transformed into a reduction in total length of sick leave.

[2] Fevang et al. (2013) show how financial incentives affects temporary disability insurance spells.

[3] More precisely, the distance variable used as the exclusion restriction is defined as the distance to the nearest FRW hospital minus the distance to the nearest hospital of any type (FRW or regular hospital) for each patient. For more information about the exclusion restriction see Section 4.

On average, the reduction in total length of sick leave was around eight days. Furthermore, we find a significant difference between surgical and non-surgical patients, whereby patients undergoing surgical treatment benefit the most, both in terms of reduced length of sick leave and shorter waiting times. Patients undergoing surgical treatment through the FRW scheme have episodes of sick leave that are 15 to 23 days shorter, on average, compared with surgical patients on the regular waiting list. We find no significant effect of the FRW scheme on length of sick leave for non-surgical patients and interpret this result as an indication that hospital treatment has limited effect for this group of patients. Treatment may have other positive effects for individual patients but such subjective effects are more difficult to measure.

The paper continues in Section 2 with a description of the institutional settings relevant for this study. Section 3 presents data and descriptive statistics. Section 4 presents the empirical methods and main results. Concluding remarks are provided in Section 5.

# 2 The institutional setting

The Norwegian sickness benefit scheme is organized under the public National Insurance Scheme (NIS). All workers are entitled to sickness benefits if: (1) their occupational activity has lasted for at least 14 days with the same employer, (2) they have an annual income of at least half the basic income, and (3) they are incapable of working because of sickness. Employees may self-certify illnesses a maximum of four times a year for periods of no more than three days each time.[4] Otherwise, a physician, in most cases a GP, assesses all absence caused by sickness. For employees, statutory sickness benefits are 100% of pensionable income and are paid from the first day of sickness for a maximum period of 260 working-days (52 weeks). The employer pays the sickness benefits for the first 16 days and the NIS pays the remainder.[5]

The health care system is tax-based, provides universal access and is predominantly public. Provision of primary health care, including services from GPs, is the responsibility of local authorities, whereas provision of hospital services is the responsibility

[4] Some firms, called IA firms, have a slightly more generous sickness benefit scheme compared with non-IA firms. The IA agreement is a letter of intent regarding a more inclusive working life, and was agreed between the Government and the labour organizations in 2001. One important goal of the agreement is to reduce the number of people on sickness benefits. See `http://www.regjeringen.no/upload/AD/publikasjoner/web-publikasjoner/2010/IA-protokoll_24022010_eng.pdf` for the protocol between the employer and employee.

[5] The Swedish and Dutch sickness schemes are also considered to be generous. Dutch employees are covered for a period of two full years with a replacement rate of maximum 85% (de Jong, 2012). The replacement rate is slightly lower in Sweden. The first sick day is usually not paid. After that day 80% of the income is paid for 364 days and 75% for a further maximum 550 days.

of state-owned hospitals. The hospital sector is organized into four Regional Health Enterprises (RHEs). Each RHE governs one or more Health Enterprises (HEs) and several hospitals may be grouped into one HE. As in most countries with universal access to health care, waiting times are relatively long. In 2008, the average waiting time for specialist health care was around 70 days (Norwegian Directorate of Health, 2008).

The FRW scheme is provided by state-owned hospitals, whereas referral to the scheme is normally the responsibility of GPs. GPs have the so-called gate-keeper function and, in general, an individual patient cannot obtain in-patient or outpatient care without a referral from a GP, with the exception of emergency cases. At the same time, GPs are expected to be advocates and sources of information for their registered patients. An employee absent from work because of sickness must obtain a sick leave certificate from a GP, and the same GP can help the employee to obtain specialist care by providing a referral to a hospital offering the FRW scheme, or to a hospital that is not under the FRW scheme but offers adequate treatment. Thus the GP plays an important role in the allocation of patients to waiting lists and medical treatment.

The FRW scheme consists of two elements: a waiting list and extra treatment capacity. Some patients are put on a FRW waiting list, and these patients are treated at existing facilities that receive extra grants to increase treatment capacity exclusively for this group. These patients are prioritised based on employment and sick listing status, and persons not employed or sick listed cannot be placed on the FRW waiting list. Quite few persons are placed on the FRW waiting list and the decision is mainly made by the patients GP.

The extra treatment capacity at the hospital level for patients on the FRW waiting list was established based on applications submitted by hospitals to their respective RHEs. Not all proposed FRW projects were approved. The FRW scheme is implemented as grants to health and rehabilitation services for persons on sick leave. The purpose is to get people back to work more quickly and to reduce sickness absence. FRW constitutes additional treatment and rehabilitation capacity and should not affect treatment capacity for patients on the regular waiting list. The decision regarding whether to allow establishment of an FRW within the Norwegian specialist health service was based on an assessment of demand (number of potential patients and, thereby, potential income) and supply factors (practicality of the FRW in terms of staffing, location and other cost elements). It was important for the RHEs that grants should only be given if extra treatment capacity did not take resources from existing treatment. In the period from 2007 to 2009, around 60 FRW facilities across the country were given extra grants. Treatment at facilities outside of the FRW scheme remains available to

people on sick leave and to people who are not in the labour market, but priority at these facilities is based only on medical conditions and not on labour market status as is the case under the FRW scheme.

A relatively large proportion (45.5%) of the 3.4 million admissions to public hospitals (in-patient and outpatient care) in 2008 is related to treatment of people on sick leave. FRW admissions constitute 1.4% of all admissions, or 3.1% measured against sick leave admissions. The FRW scheme provides mainly outpatient treatment. In 2008, 46,006 of the 48,042 FRW admissions were directed to outpatient treatments. Non-surgical treatment rather than surgical treatment is the main form of treatment for persons on the FRW waiting list (Holmås and Kjerstad, 2010). Non-surgical facilities usually provide multidisciplinary investigation, treatment and rehabilitation for patients with diseases of the musculoskeletal system (e.g. back/knee/shoulder/neck pain), diseases of the circulatory system (e.g. heart diseases), stress, depression and anxiety, alcohol and drug use, etc. Surgical treatment is typically done at outpatient clinics for patients with diseases of the musculoskeletal system. For an overview of ICD10 diagnoses used in this paper, see Table A1. Most of the extra capacity provided by the FRW was provided by hiring a relatively small number of persons within each facility (4-6 therapists).

# 3 Data and descriptive statistics

In the analysis, we use register data from two different sources. From the National Insurance Administration (NIA), we have information on individuals who started a physician-certified sick leave episode in 2007 or 2008. The data on individual sickness absences are merged with individual patient data from the Norwegian Patient Register (NPR) in 2008. To our knowledge, this is the first time that a large individual dataset on certified sickness absences has been linked to hospital admission data. We focus only on persons who had an episode of sick leave and who were treated because the main goal of the FRW scheme is to reduce the length of sick leave to promote faster return to work via shorter waiting periods for treatment. Thus, we should emphasize that both the treatment group (FRW=1) and comparison group (FRW=0) are treated at a hospital but they have potentially different waiting times for treatment.

The data from the National Insurance Administration (NIA) include information on the date that the sick leave episode started and when it ended, the diagnosis and the degree of sick leave (usually full time). As the first 16 working days of a sickness episode are paid by the employer, sickness absences that are shorter than 17 days are not included in the NIA database. As well as the detailed information on sickness

absence, the data from the NIA include the following information: gender, age, marital status, number and age of children, gross income (before tax), work experience (number of working years), hours of work per week, number of employees and the industry code for the firm at which the person is employed, whether or not the firm is part of the IA agreement and the municipality of residence (of which there are 428).

The Norwegian Patient Register (NPR) data contains patient-level information on all hospital admissions in Norway. As the NPR register does not include social security numbers of patients admitted to hospital before 2008, it is only possible to merge hospital data with data from other population-based register data from 2008 and onward. Thus, it is not possible to include data prior to the reform in a difference-in-differences analysis for sick leave patients. The NPR provides information on age, gender, type of admission (emergency or elective, in-patient or outpatient treatment), main and secondary diagnoses (ICD10), procedural codes, date of referral if elective, waiting time (if elective), date of admission and discharge and municipality of residence. In addition, and of crucial importance for us, we know at which institution a patient was treated and whether he or she participated in the FRW scheme.

The treatment and comparison groups are constructed in the following way. First, we start by dividing all FRW consultations/treatments in 2008 into ICD10 three-digit level diagnosis groups. After excluding small diagnosis groups (fewer than 50 treatments in 2008), we are left with 84 different FRW diagnosis groups. We then register the hospitals that offer FRW within each diagnostic group. Thus, a hospital can for some ICD10 diagnosis groups treat patients both from the FRW and the regular waiting list, while for other diagnosis groups treats only persons from the regular waiting list.

Second, some patients had more than one admission in 2008. As our interest is in whether reduced waiting times influence the length of sickness absence, we only consider the first admission in a treatment series. Waiting time in our empirical specification is defined as the period from the start of the sick leave period to the first treatment/consultation. Patient-specific information (such as waiting time, diagnosis, surgery/non-surgery, etc.) used in the analysis is based on the information registered at the first hospital admission. Only patients having an FRW admission as their first treatment/consultation in a treatment series are registered as FRW patients in our data.

Third, many persons are treated at a hospital, with potentially long waiting times, but as long as they are not sick-leave-listed, they are not included in our analysis. We focus on the total length of sick leave, and length of sick leave while waiting for a treatment. Also, all patients not sick-leave-listed at the time of treatment are excluded

from the analysis, as are patients who were referred to hospital before the start of their sickness episode. They have zero waiting time since we define the start of the waiting time from the day a patient is sick-leave-listed.

Fourth, as the FRW scheme is intended to reduce waiting times for planned admissions, all emergency admissions are excluded from the analysis. Some sick leave episodes start with a hospital admission. These too are excluded from the analysis, as again they have zero waiting time.

Fifth, patients admitted after 31 June 2008 are excluded from the analysis. We only have access to data on sick leave episodes that ended before 1 July 2009. By only including patients admitted in the first half of 2008, we are able to track all patients for at least one year (the maximum duration of a sick leave episode). Thus, we have no censoring on the sick leave variable.

Sixth, regular patients not under the FRW scheme treated at an FRW institution are excluded if the hospital offers FRW treatment for this particular diagnosis. This is important to avoid general equilibrium effects on waiting times for both groups, since waiting times for patients on the FRW waiting list and patients on the regular waiting list might affect each other within the same facility, even though according to the scheme, they should not do so.

Finally, patients on the FRW waiting list receiving treatment are placed in the treatment group (FRW=1), whereas patients with similar diagnoses receiving regular treatment are placed in the comparison group (FRW=0).

We do not include patients not in the labour market in our analysis since they do not receive paid sick leave from the National Insurance Agency (NIA). The FRW scheme is intended only for persons in the labour market, and the main goal of the FRW scheme is to reduce the length of sick leave for the working population through reduced waiting times for treatment at a hospital. The FRW scheme might potentially affect waiting times for non-working patients although this is not an intended effect. Non-working patients in hospitals are generally much older than FRW patients.

The preparation of the data resulted in a sample of 6,117 patients treated under the FRW scheme (the treatment group) and a comparison group of 7,332 patients with similar diagnoses treated at non-FRW institutions. Our sample includes 52 hospitals treating patients with FRW diagnoses, see Table A1. Of these, 10 hospitals had no registered FRW patients, while 42 hospitals offered FRW treatment for one or more FRW diagnoses. The average number of FRW diagnoses (for the FRW institutions/hospitals) was around 21.

Table 1 gives definitions of the dependent and explanatory variables used in the analysis. In addition to these variables, we use dummy variables to control for patient

diagnosis, industry and county of residence. An overview of the 84 FRW diagnoses is given in Table A1 in the Appendix. The majority of patients (around 55%) have diseases within ICD10 chapter XIII (diseases of the musculoskeletal system and connective tissue (M00–M99)). It is well established that sick leave varies considerably between industries and geographical areas. In our data, employees are stratified according to the NACE (Classification of Economic Activities in the European Community) classification and, based on this, we have constructed 10 different industry dummies (Table A2 in the Appendix). To control for geographical variation in sickness absences, we use dummy variables for county of residence (Table A3 in the Appendix).

Table 1 about here

Descriptive statistics for the treatment and comparison groups are reported in Table 2. Because we distinguish between surgical and non-surgical treatment in the analysis, we make the same distinction here.

Table 2 about here

The FRW scheme resulted in an increase in the treatment capacity for certain groups of sick-leave-listed individuals. Therefore, it is expected that, on average, FRW patients would have waited shorter than people on sick leave placed on the regular waiting list. From Table 2, Columns 2 and 3, we see that the average difference in waiting times is around nine days when we consider all patients, with FRW patients waiting, on average, 105.4 days and regular patients waiting, on average, 114.8 days, for treatment. Waiting time in our setting is defined as the time from the start of the sick leave episode to the first consultation/treatment. The difference in waiting times between FRW and non-FRW patients is larger for surgical patients than for non-surgical patients. Surgical patients receiving treatment on the FRW waiting list have waiting times that are 14 days shorter than surgical patients in the regular system, whereas the difference for non-surgical patients is seven days.

The descriptive statistics give no support to the belief that a reduction in waiting time results in a shorter sick leave episode and thus faster return to work. We can see from Table 2 that the average length of the sickness absence is almost the same for FRW patients (238.7 days) and regular patients (234.8 days). When we distinguish between surgical and non-surgical patients, the same conclusion holds. The difference in length of sick leave between FRW and regular patients is modest. Although the sick leave period is almost the same for FRW and regular patients, the waiting times are shorter for FRW patients. Thus, it follows that, on average, the post-treatment sick leave period must be longer for the FRW patients.

We do not find major differences between patients in the FRW group and other patients for most of the socio-economic background variables, given the selection criteria we have used. Patients in the FRW scheme are somewhat younger, have more children and earn less compared with other patients. There could be differences based on unobserved characteristics, but based on interviews with different GPs we find no clear pattern in the selection process in term of the health status of the patients. However, in the empirical section we use a treatment effect model to correct for biased results due to potential omitted variables that might be correlated with the treatment variable.

The distance variable is defined as the distance to the nearest FRW hospital minus the distance to the nearest hospital of any type (FRW or regular hospital) for each patient. Thus, this variable takes the value zero if the closest hospital is a FRW hospital, and a positive value if the closest hospital is a regular hospital not offering the FRW scheme. We see from Table 2 that the mean extra travel distance to the nearest FRW hospital for regular patients is 320 km, while the mean extra travel distance to the nearest FRW for FRW patients is only 22 km. This pattern is similar when we divide the sample according to surgical and non-surgical patients. We use distance varaible as the exclusion restriction in the empirical analyses and discuss this variable further in Section 4.

# 4 Empirical method and main results

We estimate the effect of the FRW scheme on the length of sick leave and waiting times using OLS regressions and models for estimation treatment effects that allow for unobserved selection into treatment; Heckman (1978), Cerulli (2011). The main model estimates the effect of the endogenous binary treatment variable $\text{FRW}_i$ on the continuous outcome variable $y_i$ conditional on control variables $\mathbf{x}_i$ and $\boldsymbol{\gamma}$ in the following form:

$$y_i = \mathbf{x}_i'\boldsymbol{\beta} + \delta\,\text{FRW}_i + \boldsymbol{\gamma}_D + \boldsymbol{\gamma}_I + \boldsymbol{\gamma}_C + u_i, \tag{1}$$

where $\mathbf{x}_i$ includes background variables such as age, marital status, number of children, sick leave ratio, number of days sick listed in the previous year (2006), labour income, seniority, working hours, number of workers in the firm, and whether the individual work in a company that is part of the IA-agreement. $\boldsymbol{\gamma}_D$ is a set of dummy variables for medical diagnoses, $\boldsymbol{\gamma}_I$ is a set of dummy variables for industry, and $\boldsymbol{\gamma}_C$ is a set of dummy variables for counties. The outcome variable $y_i$ consist of three alternative

variables all reflecting time away from the labour market: total length of sick leave, waiting time before treatment/consultation, and post-treatment sick leave.

$\text{FRW}_i$ is a dummy variable in the regressions, where $\text{FRW}_i$ indicates whether a patient with a given diagnosis is treated at an FRW hospital, i.e. a hospital that has increased capacity and offers treatment for patients on the FRW waiting list. Patients on sick leave treated at hospitals not offering FRW for a given diagnosis are in the comparison group.

We do not include waiting times as a regressor when explaining length of sick leave in our empirical analysis. A simple analysis of waiting times for hospital treatment on length of sick leave would probably result in a biased regression coefficient due to selection issues. The FRW scheme, however, shifts waiting times for certain groups of patients, while holding waiting times for other patients constant, where both groups are given the same type of medical treatment within diagnostic groups. The FRW scheme is evaluated in terms of reduced waiting times and length of sick leave. Our estimation strategy resembles a natural experiment by shifting waiting times for some of the patients. Thus, we do not estimate the relationship between number of days on a waiting list and number of days on sick leave, but the effect of the FRW scheme on number of days on sick leave.

**Selection on unobservables**

We allow for the fact that patients can choose between the FRW waiting list (FRW hospital) and a regular hospital by estimating an selection model, since free hospital choice applies to all planned investigations and treatment within physical care, and can be affected by many factors. Our selection equation is an function of the same background variables as in equation (1) with an additional exclusion restriction, and we model the selection into FRW as an index function in the following way

$$\text{FRW}_i^* = \mathbf{x}_i'\boldsymbol{\beta} + \alpha\,\text{Distance}_i + \boldsymbol{\gamma}_D + \boldsymbol{\gamma}_I + \boldsymbol{\gamma}_C + v_i, \tag{2}$$

where the observed outcome $\text{FRW}_i = 1$ if $y_i^* > 0$ and $\text{FRW}_i = 0$ otherwise. We allow for correlation between unobserved variables in the outcome equation (1) and selection equation (2) by assuming that the error terms $u_i$ and $v_i$ are bivariate normal with mean zero and covariance matrix

$$\begin{bmatrix} \sigma_u^2 & \rho\sigma_u \\ \rho\sigma_u & 1 \end{bmatrix}.$$

This specification produces a selection correction term ($\lambda = \rho\sigma_u$) for all individuals, which is the covariance between $u_i$ and $v_i$. A positive $\lambda$ indicates that unobserved factors that increases the probability of participating in FRW also affects the outcome variable in a positive way. For instance, if health status is unobserved and those most healthy participate in FRW and also have shorter length of sick leave, then this would create a positive $\lambda$ in the outcome model. If this correlation is not taken into account, an OLS estimation of equation (1) would overestimate the true value of $\delta$. If $\lambda$ is negative, indicating that those most healthy choose not to participate in the FRW scheme, an OLS estimation would underestimate the true value of $\delta$ in equation (1).

Assuming that the error terms are bivariate normal may not be realistic. We have also estimated the model using different specifications involving control functions, matching, IV, 2SLS, switching regressions, and models allowing for heterogenous treatment effects (Cerulli, 2011). None of these models gave significantly different results compared to the Heckman endogenous treatment effect model. All parameters related to heterogenous effects, where in the simplest models this is just interactions between FRW dummy and background variables, have large standard errors and are not significantly different from zero.

Our model in equation (1) can be formulated to capture heterogeneity both in terms of observed and unobserved factors. We include the different $\boldsymbol{\gamma}$s in equation (1) into the matrix $\mathbf{x}_i$ and formulate the model as

$$y_i = \mathbf{x}_i'\boldsymbol{\beta}_0 + \delta\,\mathrm{FRW}_i + \mathrm{FRW}_i[\mathbf{x}_i - \boldsymbol{\mu}_{\mathbf{x}}]\boldsymbol{\beta} + u_{i0} + \mathrm{FRW}_i[u_{i1} - u_{i0}], \tag{3}$$

which is a model where both observed and unobserved factors interact with the treatment variabele FRW. We have estimated this model based on the ivtreatreg command in Stata (Cerulli, 2011). However, the estimated standard errors are very large, and we thus choose to focus on the simpler model where we assume constant treatment effects.

### Exclusion restriction

The Distance variable is defined as the distance to the nearest FRW hospital minus the distance to the nearest hospital of any type (FRW or regular hospital) for each patient and is used as an exclusion restriction in our model. If the distance between the patient's home and the nearest regular hospital is 100 km, and the distance between the patient's home and the nearest FRW hospital is 120 km, then the variable $Distance_i$ will take the value 20. The variable Distance will take a value of zero if the closest hospital is an FRW hospital. We believe that one important trade-off that a patient

and GP make when choosing between a FRW hospital and a regular hospital is not the distance to a regular hospital, but the extra distance a person has to travel to get to an FRW hospital.

We do not have access to the patient's home address, only to the municipality in which they live or to the city districts to which they belong if they live in one of the four largest cities (Oslo, Bergen, Trondheim, Stavanger). Norway has 428 different municipalities of different sizes both in terms of number of inhabitants and geographical size. We use the distance from the centroid of the area in which the patients live as our starting point when we create the distance variable. However, since we use the distance to the nearest FRW hospital minus the distance to the nearest hospital of any type (FRW or regular hospital) for each patient as our exclusion restriction, it is not crucial to have the exact address of each patients, only to know what hospital is the nearest. As we also use city districts in Oslo, Bergen, Trondheim and Stavanger, we are confident that the nearest hospital is correctly defined for the large majority of cases. The distance between hospitals is measured as road distance in kilometres. The road distance to the nearest hospital is short for people living in cities. However, the extra travel distance to the nearest FRW hospital, if this is not the nearest hospital, is not necessarily short even for persons living in a city.

A patient is more likely to choose an FRW hospital if the additional distance is small. Of course, if the nearest hospital is an FRW hospital then there is an increased probability that the patient will choose this hospital. We hypothesize that $\alpha$ in equation (2) is negative, meaning that the distance as we define it has a negative effect on the probability of choosing a hospital offering FRW treatment compared with treatment at a regular hospital.

It is important that our exclusion restriction is valid. Thus it should be uncorrelated with unobserved factors ($u_i$) affecting the length of sick leave, and affect the endogenous dummy variable (FRW). The last assumption could be tested in equation (2) by looking at the significance level of $\alpha$. We believe that distance between hospitals fulfils these two criteria. We observe a strong negative association between distance and the probability of being treated at a hospital offering FRW treatment (Table 2). We find no evidence that the distance variable is correlated with our dependent variables. Length of sick leave may be affected by factors such as health (diagnosis), age, compensation (income), family and work situation and, to some extent, geographical location (municipality, county), etc. (see Alexanderson, 1998; Aakvik et al., 2010; Markussen et al., 2011), but should not be affected by the distance between hospitals as we define it. We provide placebo simulation and alternative regressions to test the validity of our exclusion restriction.

**Empirical results**

In Table 3, Column 4, we report the results from a probit model based on equation (2) where we analyse factors that affect the probability of choosing the FRW scheme. First, we find that the exclusion restriction (Distance) is highly significant, with the expected negative sign. This is also the case if we divide the regression into surgical patients (Table 4, Column 4) and non-surgical patients (Table 5, Column 4). There are also other factors affecting the probability of choosing the FRW scheme compared with treatment at a regular hospital. In particular, age, number of children, marital status and income (see Table 3, Column 4). We will not discuss these factors here, but they have the expected signs.

Tables 3-5 about here

We report three different outcome models in Table 3 based on equation (1). In Column 1, we report an OLS regression where we use length of sick leave as our dependent variable. Column 2 shows waiting times prior to treatment as our dependent variable, and Column 3 shows the results using the post-treatment (PT) period as our dependent variable, i.e., the period from treatment to the end of the sick leave episode and return to work. In Columns 5–7, we report the results from the same models but now control for unobserved selection using a endogenous treatment effect model using Distance as our exclusion restriction (identifying variable). Tables 4 and 5 show the results for surgical and non-surgical patients, respectively. The results based on the treatment effect model indicate that there is no significant selection on unobservable variables in our regressions. None of the selection correction terms ("lambda") are statistically significant in Tables 3-5.[6]

The results vary somewhat between the OLS regressions and the endogenous treatment effect model when it comes to the effect of the FRW scheme on waiting times and length of sick leave, but the main conclusions are the same for all the models that we have estimated. We find that the FRW scheme reduces the length of sick leave by 6.8 days for the OLS regression (Table 3, Column 1) and by 9.3 days in the endogenous treatment effect model (Table 3, Column 5) for all patients. However, there is a significant difference between surgical and non-surgical patients. We find a large and significant effect of the FRW scheme for surgical patients. The effect is 15.4 days in the OLS regression (Table 4, Column 1) and 22.6 days in the treatment effect

[6] Results from other specifications such as the switching regression model, where we estimate separate outcome regressions for FRW patients and other patients, duration analysis, and different matching models show very similar results and are available upon request.

models (Table 4, Column 5). However, for non-surgical patients (Table 5), we find no significant effect of FRW on the length of sick leave.

We find stronger effects on waiting times prior to treatment compared with the total length of sick leave. The FRW scheme shortens waiting times significantly–more so for surgical patients than for non-surgical patients. The effect of FRW on waiting times for all patients is around 14 days (see Table 3, Columns 2 and 6). For surgical patients, the effect is 19.7 days in the OLS regression (Table 4, Column 2) and 27.5 days in the endogenous treatment effect model (Table 4, Column 6). The corresponding numbers are 10.8 days and 18.2 days for non-surgical patients (Table 5).

The effect of FRW on the period from treatment to the end of the sick leave period (PT) is small and not significant. FRW patients have a post-treatment period that is around four to nine days longer compared with patients in the regular scheme. We find the strongest effect for non-surgical patients, where FRW increases the post-treatment period by 9.5 days (Table 5, Column 7), but this effect is significant only at the 10% level. The effect of FRW on the post-treatment period for surgical patients is not significant.

Many of the background variables significantly affect length of sick leave, waiting times and post-treatment episodes. Gender, age, sick leave ratio, previous sick leave episodes, income, seniority, working hours, firm size and IA membership contribute in the expected way in our regressions. We also find significant effects of diagnoses, type of industry and geographical variables. These variables are considered to be control variables and we do not explicitly discuss them in this paper.

A potential issue is that treatment for patients on the FRW waiting list was established in regions with relatively long waiting times for patients with particular diagnoses. We test this by analysing whether FRW institutions had significantly longer waiting times in 2006 (the year before the FRW scheme was introduced) compared with non-FRW institutions. We do not have individual patient data prior to 2007, and thus have to rely on aggregated waiting time data at the hospital level for different medical diagnoses. In the regression, we use average waiting time calculated based on the NPR records for each FRW diagnosis for each hospital as the dependent variable. As independent variables we use an indicator for FRW institution, number of patients within a given diagnosis at each hospital, mean age of the patients, percentage males, and percentage inpatients.

As reported in Table 6, there is no indication that waiting times were different between FRW institutions and other institutions in the year before the scheme was established. FRW institutions had 2.3 days longer waiting times prior to the reform, with a standard deviation of 3.1. Together with the fact that most hospitals have

implemented the scheme (but for different patient groups), we consider this test to be evidence that the FRW scheme was not established in areas with particularly high existing sick leave rates or long waiting times.

Table 6 about here

# 5 Discussion

Sickness absence is high in Norway compared with other countries (Bonato and Lusinyan, 2004). Several measures have been proposed to reduce the number of disability and sickness benefit claimants and to reduce the length of sickness leave (OECD, 2010) and promote faster return to work after illness or injury. The FRW scheme, implemented in 2007 and still in place with grants of around NOK 500 million per year, is aimed at achieving the latter goal. We use a dataset where we merge hospital data with social security data and socio-economic characteristics to evaluate the FRW scheme. A treatment group and a comparison group are created based on a quasi-natural experiment that changes waiting times for certain sick-listed patients. OLS and treatment models accounting for observed and unobserved selection into the FRW scheme show that the waiting period for treatment/consultation for patients under the FRW scheme is 12 to 15 days shorter than for people on sick leave on the regular waiting list. This reduction in waiting time is only partially transformed into a reduction in total length of sick leave and faster return to work. On average, the total reduction is approximately eight days.

There is a significant difference in the effects of FRW on length of sick leave between surgical and non-surgical patients, but not much difference between the two groups in terms of the effects on waiting times. The duration of sick leave for FRW patients undergoing surgical treatment is 15 to 23 days shorter than for surgical patients on the regular waiting list. We find no significant effect of the scheme on length of sick leave for non-surgical patients. The FRW scheme significantly reduces waiting times for both surgical and non-surgical patients.

The fact that the shorter waiting time translates into a shorter sick leave period for surgical patients, but not for non-surgical patients, can be an indication that hospital treatment has limited effect for non-surgical patients. If two non-surgical patients undergo the same treatment, and the patient on the FRW scheme has a shorter waiting time, yet both patients start and end their sick leave at the same time, then time and not treatment seems to be the relevant healing factor. There are at least two reasons that treatment can have a limited effect for non-surgical patients. Some patients have

diffuse musculoskeletal pain and symptoms, and it can be difficult to give the correct medical diagnosis (Maeland et al. 2012). Treatment is then prone to trial and error without proper medical effect. Even with the correct medical diagnosis, an adequate treatment is not available for all patients. Patients are often given some kind of multidisciplinary treatment. The effects of such treatment on length of sick leave and the return to work are associated ex ante with a large degree of uncertainty for patients with musculoskeletal symptoms. For instance, Haldorsen et al. (2002) found that, for patients with musculoskeletal pain, multidisciplinary treatment is effective concerning return to work only for carefully selected patient groups. Skouen et al. (2006), in a study on the effect of multidisciplinary treatment (light or extensive) on the number of days absent, found that women receiving extensive outpatient treatment have significantly fewer days absent compared with standard treatment. Among men, the light treatment resulted in more days absent because of sickness. A small-scale multidisciplinary programme exclusively for people on sick leave was evaluated by Aakvik et al. (2003), who concluded that there are arguments for expanding multidisciplinary treatment for some groups of back pain patients. However, in general, studies on the employment effects of non-surgical multidisciplinary treatment programmes show mixed results in terms of employment outcomes (Norlund et al., 2009).

Our results are more optimistic for surgical patients, where the necessary procedures are more likely to be aimed at specific conditions with an ex ante higher expected success rate compared with the diagnoses discussed above. Performance of the surgery is based on well-established procedures, patients have clear cut and limited problems, and rehabilitation after surgery is normally fast because of the limited impact that many procedures have on soft tissue and so on. Thus, more surgical capacity leads to shorter waiting times, which transforms into a shorter length of sick leave.

Many countries have dedicated funds to reduce waiting times for hospital treatment (Willcox et al., 2007). We know from UK studies that increased resources at hospitals may reduce waiting times (Martin and Smith, 1999; Dawson et al., 2007). Evidence from 12 OECD countries suggests that increased hospital capacity can play an important role in reducing waiting times (Siciliani and Hurst, 2005). Our results confirm this conclusion as the FRW scheme reduces waiting times for both surgical and non-surgical patients by increasing treatment capacity.

Even though shorter waiting times do not translate into a shorter length of sick leave for non-surgical patients, the reduction of waiting times can be a goal in itself. Patients waiting for treatment generally do not suffer an immediate wage loss because sickness benefits amount to 100% of current wages within the Norwegian social insurance system. The costs of being on a waiting list are connected to entering the list

and receiving the benefit (treatment) later rather than now. Propper (1995) argued that, in the health care context, there is a disutility cost of time spent on a waiting list that is not just the result of a positive decay rate. As individuals on a waiting list for medical care are in poorer health than is normal, they may not be able to carry out normal activities and, thus, they suffer a utility loss. For instance, there might be disutility costs related to anxiety in the waiting period.

There is some evidence that waiting times and length of sick leave are correlated. Andrén and Granlund (2010) analysed the impact of waiting times for health care on the length of sick leave and found that waiting times significantly affect the length of sick leave. The relationship between waiting times and the length of sick leave is less clear in our study.

Engström et al. (2010, 2012) estimate the effects of early interventions in the Swedish sickness insurance system using an experimental design. Early intervention in their analysis means that one group had their work capacity and possibility for vocational rehabilitation (Sassam) evaluated, and meetings between the involved parties (AM) held, during a 6-week period, while the individuals in the control group were offered the same services after 6 weeks. This creates a difference in mean waiting times for work assessment between the two groups. Engström et al. (2010) find no effect of early intervention on the length of the ongoing sick spell. Engström et al. (2012) find the individual in the treatment group are more sick absent and have a higher probability to receive a disability pension compared individuals in the control group. Our analysis also indicates that one should not unconditionally argue that shorter waiting times result in an equal reduction in sick leave periods. Rather, in the case of the FRW scheme, the cost-benefit ratio can probably be improved by targeting surgical patients because they benefit the most from shorter waiting times, given that waiting times for other patients do not increase. However, prioritising patients in need of surgical procedures creates additional equity issues to those already presented by the FRW scheme. The pros and cons of allocating extra hospital resources specifically aimed at people who are active in the labour market raises both equity and ethical issues that are not addressed here.

The costs of sickness absence and medical treatment in Norway are mainly borne by the welfare state and the National Insurance System. The financial costs for employers and employees are thus relatively low. Some types of multidisciplinary treatment for employees with musculoskeletal pain have a limited effect on reducing length of sick leave. Thus reducing waiting times for treatment has limited effects. A recent reform in the Netherlands increases greatly the employer's financial responsibility with regard to long-term sickness. This will probably lead to more searching for medical interventions

that have a positive cost-benefit ratio at least for the employers, since both sickness benefits and treatment costs are paid, directly or indirectly, by the employer.

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Table 1. Variable definitions and descriptive statistics.

| | | Mean | Min | Max |
|---|---|---|---|---|
| Length of sick leave | Number of days with physician certified sick leave | 236.561 (111.970) | 16 | 365 |
| Waiting time | Number of days from start sick leave to first treatment | 110.518 (77.552) | 3 | 361 |
| Post-treatment period | Number of days from first treatment to end of sick leave | 126.044 (94.227) | 0 | 358 |
| Male | 1 if the individual is male, 0 otherwise | 0.490 (0.500) | 0 | 1 |
| Age | Age in 2008 | 45.630 (11.791) | 19 | 67 |
| Married | 1 if the individual is married, 0 otherwise | 0.498 (0.500) | 0 | 1 |
| Divorced | 1 if the individual is divorced, 0 otherwise | 0.166 (0.372) | 0 | 1 |
| Number of children | Number of children below 18 years | 0.815 (1.078) | 0 | 8 |
| Sick leave ratio | Percentage sick listed. If less than 100, the individual combines work and sickness absence. | 84.179 (25.234) | 20 | 100 |
| Sick leave 2006 | Number of days sick listed in 2006 | 33.795 (64.174) | 0 | 359 |
| Income | Labour income in 2008 (in 1000 NOK) | 330.060 (149.519) | 2.8 | 2,680 |
| Seniority | Number of years with labour income | 21.105 (11.423) | 0 | 41 |
| Working hours | Working hours in percentage of full time | 0.824 (0.265) | 0.28 | 1 |
| Distance | The distance to the nearest FRW hospital minus the distance to the nearest hospital of any type (FRW or regular hospital) (in km) | 185.201 (369.238) | 0 | 2,546 |
| Number employees | Number of employees in the firm (in 100) | 2.277 (7.631) | 0.01 | 68.75 |
| IA-firm | 1 if the individual work in a company that is part of the IA-agreement, 0 otherwise | 0.593 (0.491) | 0 | 1 |

Table 2. Descriptive statistics for the different samples.

| | All patients | | Surgical patients | | Non-surgical patients | |
|---|---|---|---|---|---|---|
| | FRW - treatment | Regular treatment | FRW - treatment | Regular treatment | FRW - treatment | Regular treatment |
| Length of sick leave | 238.655 (109.438) | 234.816 (114.017) | 220.755 (108.221) | 221.820 (116.244) | 244.762 (109.193) | 239.271 (112.911) |
| Waiting time | 105.398 (72.448) | 114.790 (81.325) | 91.490 (66.171) | 105.592 (77.691) | 110.143 (73.879) | 117.943 (82.304) |
| Post-treatment period | 133.257 (94.477) | 120.026 (93.599) | 129.264 (91.632) | 116.228 (93.322) | 134.619 (95.400) | 121.328 (93.667) |
| Male | 0.490 (0.500) | 0.490 (0.500) | 0.524 (0.499) | 0.527 (0.499) | 0.478 (0.500) | 0.477 (0.500) |
| Age | 44.169 (11.345) | 46.849 (12.016) | 46.374 (11.218) | 47.311 (12.154) | 43.417 (11.291) | 46.691 (11.965) |
| Married | 0.483 (0.500) | 0.512 (0.500) | 0.518 (0.499) | 0.498 (0.500) | 0.471 (0.499) | 0.516 (0.500) |
| Divorced | 0.171 (0.377) | 0.161 (0.368) | 0.191 (0.393) | 0.163 (0.369) | 0.165 (0.371) | 0.161 (0.367) |
| Number of children | 0.885 (1.110) | 0.757 (1.048) | 0.792 (1.083) | 0.704 (1.026) | 0.916 (1.117) | 0.776 (1.055) |
| Sick leave ratio | 83.665 (25.380) | 84.609 (25.105) | 85.808 (24.281) | 85.598 (24.758) | 82.934 (25.706) | 84.269 (25.216) |
| Sick leave 2006 | 33.765 (63.944) | 33.820 (64.369) | 30.933 (60.052) | 33.017 (64.015) | 34.732 (65.197) | 34.095 (64.493) |
| Income | 322.959 (135.969) | 335.984 (159.716) | 334.768 (140.596) | 335.123 (158.939) | 318.930 (134.132) | 336.280 (159.995) |
| Seniority | 19.797 (11.093) | 22.196 (11.580) | 22.116 (11.012) | 22.834 (11.730) | 19.006 (11.010) | 21.977 (11.521) |
| Working hours | 0.836 (0.262) | 0.830 (0.268) | 0.850 (0.254) | 0.835 (0.267) | 0.831 (0.265) | 0.828 (0.268) |
| Distance | 22.678 (97.538) | 320.792 (449.147) | 16.367 (74.975) | 349.990 (468.129) | 24.832 (104.043) | 310.781 (442.051) |
| Number employees (100) | 2.301 (7.345) | 2.258 (7.863) | 2.332 (7.645) | 2.393 (8.492) | 2.291 (7.240) | 2.211 (7.635) |
| IA-firm | 0.585 (0.493) | 0.600 (0.490) | 0.629 (0.483) | 0.612 (0.487) | 0.571 (0.495) | 0.596 (0.491) |
| Number observations | 6,117 | 7,332 | 1,556 | 1,872 | 4,561 | 5,460 |

Table 3. Effect of the FRW scheme, all patients

| | OLS | | | | Selection model | | |
|---|---|---|---|---|---|---|---|
| | Sick leave | Waiting time | PT | Prob. FRW | Sick leave | Waiting time | PT |
| FRW | -6.8521** | -12.5600*** | 5.7079** | - | -9.3404* | -15.5711** | 6.2307 |
| | (3.5344) | (3.7118) | (2.2226) | | (5.3410) | (3.9475) | (4.6529) |
| Male | -7.3761*** | -7.1229*** | -0.2532 | 0.0103 | -7.0568*** | -7.0642*** | 0.0074 |
| | (2.8405) | (2.1038) | (2.0529) | (0.0495) | (2.3618) | (1.6581) | (2.0576) |
| Age | 4.5103*** | 2.2445*** | 2.2658*** | 0.0279*** | 4.5606*** | 2.2286*** | 2.3320*** |
| | (0.7147) | (0.4872) | (0.5479) | (0.0141) | (0.6692) | (0.4698) | (0.5830) |
| Age squared | -0.0309*** | -0.0147*** | -0.0162*** | -0.0005*** | -0.0313*** | -0.0145*** | -0.0168*** |
| | (0.0075) | (0.0049) | (0.0059) | (0.0002) | (0.0073) | (0.0051) | (0.0064) |
| Number of children | -1.3412 | -0.6427 | -0.6985 | 0.0346* | -1.2864 | -0.6177 | -0.6687 |
| | (0.9755) | (0.7356) | (0.8736) | (0.0213) | (1.0132) | (0.7113) | (0.8827) |
| Married | -0.6747 | -2.2676 | 1.5928 | 0.0595 | -0.8935 | -2.3964 | 1.5029 |
| | (2.9053) | (1.9280) | (2.6097) | (0.0509) | (2.4105) | (1.6923) | (2.1000) |
| Divorced | 2.6244 | 1.8016 | 1.5928 | 0.1831*** | 2.8566 | 2.0278 | 0.8287 |
| | (3.1261) | (3.2117) | (2.6097) | (0.0649) | (3.0455) | (2.1380) | (2.6531) |
| Sick leave ratio | 0.5164*** | 0.1920*** | 0.3245*** | -0.0005 | 0.5545*** | 0.1872*** | 0.3173*** |
| | (0.0476) | (0.0275) | (0.0437) | (0.0008) | (0.0374) | (0.0262) | (0.0325) |
| Sick leave 2006 | 0.0935*** | 0.0465*** | 0.0470*** | -0.0003 | 0.0854*** | 0.0415*** | 0.0439*** |
| | (0.0134) | (0.0115) | (0.0128) | (0.0003) | (0.0143) | (0.0100) | (0.0124) |
| Income | -0.0671*** | -0.0269*** | -0.0402*** | -0.0036** | -0.0671*** | -0.0262*** | -0.0409*** |
| | (0.0105) | (0.0067) | (0.0075) | (0.0016) | (0.0073) | (0.0051) | (0.0063) |
| Seniority | -0.7856*** | -0.4877*** | -0.2979*** | 0.0057 | -0.7693*** | -0.4732*** | -0.2961*** |
| | (0.1860) | (0.1502) | (0.1550) | (0.0036) | (0.1684) | (0.1182) | (0.1467) |
| Working hours | -9.5973** | -9.5098*** | -0.0875 | 0.1042 | -10.4755*** | -9.9725*** | -0.5030 |
| | (5.0235) | (3.5432) | (3.6161) | (0.0823) | (3.9117) | (2.7462) | (3.4078) |
| Distance | - | - | - | -0.0031*** | - | - | - |
| | | | | (0.0002) | | | |
| Number employees | -0.1616 | -0.2994*** | 0.1378 | -0.0003 | -0.2183* | -0.3393*** | 0.1209 |
| | (0.1368) | (0.0707) | (0.1139) | (0.0027) | (0.1261) | (0.0885) | (0.1098) |
| IA-firm | -13.2872*** | -2.4261 | -10.8611*** | 0.0726 | -13.3057*** | -2.2876 | -11.0181*** |
| | (2.5533) | (1.5429) | (2.0777) | (0.0470) | (2.2476) | (1.5779) | (1.9581) |
| Constant | 139.6815*** | 75.1549*** | 64.5266*** | -6.5499*** | 196.8510*** | 147.5844*** | 49.2666*** |
| | (20.6972) | (14.7875) | (13.3297) | (1.1854) | (21.0621) | (14.7864) | (18.3487) |
| Dummy for diagnoses | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for industry | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for county | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Lamda | | | | | 0.6415 | 1.3879 | -0.7464 |
| | | | | | (3.4355) | (2.4118) | (2.9929) |
| R-squared | 0.116 | 0.088 | 0.058 | | | | |
| Number observations | 13,449 | 13,449 | 13,449 | 13,449 | 13,449 | 13,449 | 13,449 |

Note: * significant at the 10 % level, ** significant at the 5 % level, *** significant at the 1 % level.

Table 4. Effect of the FRW scheme, surgical patients

| | OLS | | | | Selection model | | |
|---|---|---|---|---|---|---|---|
| | Sick leave | WT | PT | Prob. FRW | Sick leave | WT | PT |
| FRW | -15.3706*** | -19.7293*** | 4.3586 | | -22.5873** | -27.5196*** | 4.9323 |
| | (4.8367) | (3.9275) | (4.7329) | | (10.1058) | (6.6118) | (8.5714) |
| Male | -6.1835 | -6.3714* | 0.1879 | -0.0652 | -5.6152 | -5.8786* | 0.2634 |
| | (6.8871) | (3.6506) | (5.4399) | (0.1443) | (4.7831) | (3.1296) | (4.0564) |
| Age | 3.5343** | 2.9748*** | 0.5595 | 0.0155 | 3.8338*** | 3.0412*** | 0.7926 |
| | (1.5634) | (1.0080) | (1.3376) | (0.0384) | (1.3162) | (0.8612) | (1.1162) |
| Age squared | -0.0216 | -0.0266** | 0.0050 | -0.0006 | -0.0244* | -0.0273*** | 0.0029 |
| | (0.0163) | (0.0107) | (0.0141) | (0.0004) | (0.0142) | (0.0093) | (0.0120) |
| Number of children | -1.7108 | -1.1523 | -0.5585 | -0.0113 | -1.7700 | -0.9123 | -0.8577 |
| | (2.1490) | (1.4163) | (2.1407) | (0.0590) | (2.0296) | (1.3280) | (1.7213) |
| Married | -1.3598 | -5.8794* | 4.5196 | 0.3680*** | -1.5680 | -5.7482* | 4.1802 |
| | (4.0851) | (3.6654) | (3.6654) | (0.1392) | (4.8287) | (3.1594) | (4.0951) |
| Divorced | 3.9789 | -3.4837 | 7.4627* | 0.3281* | 5.0235 | -2.4725 | 7.4961 |
| | (4.3742) | (3.3840) | (4.2990) | (0.1777) | (5.9660) | (3.9036) | (5.0596) |
| Sick leave ratio | 0.2074*** | 0.1191*** | 0.0883 | 0.0011 | 0.1957*** | 0.1236*** | 0.0721 |
| | (0.0668) | (0.0481) | (0.0569) | (0.0023) | (0.0754) | (0.0494) | (0.0640) |
| Sick leave 2006 | 0.1000*** | 0.0620*** | 0.0380 | 0.0008 | 0.0951*** | 0.0618*** | 0.0333 |
| | (0.0331) | (0.0205) | (0.0340) | (0.0010) | (0.0292) | (0.0191) | (0.0247) |
| Income | -0.0661*** | -0.0341*** | -0.0320*** | -0.0096** | -0.0638*** | -0.0323*** | -0.0315*** |
| | (0.0135) | (0.0090) | (0.0122) | (0.0046) | (0.0142) | (0.0093) | (0.0121) |
| Seniority | -0.8292** | -0.1549 | -0.6744*** | 0.0320*** | -0.8841*** | -0.1681 | -0.7160*** |
| | (0.4237) | (0.2396) | (0.4084) | (0.0098) | (0.3356) | (0.2196) | (0.2846) |
| Working hours | -10.2219 | -8.2646 | -1.9572 | -0.0214 | -12.9044* | -11.8190** | -1.0854 |
| | (9.3157) | (6.0502) | (6.8416) | (0.2396) | (7.8895) | (5.1622) | (6.6909) |
| Distance | - | - | - | -0.0038*** | - | - | - |
| | | | | (0.0005) | | | |
| Number employees | -0.3425 | -0.4884*** | 0.1459 | -0.0041 | -0.3638 | -0.4829*** | 0.1192 |
| | (0.2546) | (0.1670) | (0.1911) | (0.0065) | (0.2328) | (0.1523) | (0.1975) |
| IA-firm | -8.4211 | 1.0422 | -9.4633** | 0.4404*** | -7.6693* | 1.5184 | -9.1877*** |
| | (5.3890) | (3.1707) | (4.3386) | (0.1326) | (4.3873) | (2.8707) | (3.7208) |
| Constant | 182.1152*** | 65.3297*** | 116.7855*** | -11.5762 | 239.6785*** | 93.0381*** | 146.6404*** |
| | (35.4981) | (23.9622) | (29.4814) | (826.5958) | (48.3407) | (31.6299) | (40.9967) |
| Dummy for diagnoses | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for industry | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for county | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Lamda | | | | | 8.5968 | 7.6555 | 1.1393 |
| | | | | | (7.2310) | (4.6267) | (6.1402) |
| R-squared | 0.171 | 0.147 | 0.120 | | | | |
| Number observations | 3,428 | 3,428 | 3,428 | 3,428 | 3,428 | 3,428 | 3,428 |

Note: * significant at the 10 % level, ** significant at the 5 % level, *** significant at the 1 % level.

Table 5. Effect of the FRW scheme, non-surgical patients

| | OLS | | | | Selection model | | |
|---|---|---|---|---|---|---|---|
| | Sick leave | WT | PT | Prob. FRW | Sick leave | WT | PT |
| FRW | -4.6507 | -10.8448** | 6.1940** | | -8.7538 | -18.2738*** | 9.5200* |
| | (4.0207) | (4.0949) | (2.7187) | | (6.1530) | (4.4042) | (5.4113) |
| Male | -7.4527*** | -7.3339*** | -0.1189 | 0.0113 | -7.0866*** | -7.0559*** | -0.0307 |
| | (2.7398) | (2.6783) | (2.7327) | (0.0573) | (2.7176) | (1.9453) | (2.3900) |
| Age | 4.7565*** | 1.8875*** | 2.8690*** | 0.0233 | 4.7875*** | 1.8511*** | 2.9364*** |
| | (0.7323) | (0.5071) | (0.6652) | (0.0167) | (0.7785) | (0.5573) | (0.6847) |
| Age squared | -0.0337*** | -0.0100* | -0.0237*** | -0.0004* | -0.0338*** | -0.0094 | -0.0243*** |
| | (0.0078) | (0.0054) | (0.0072) | (0.0002) | (0.0086) | (0.0061) | (0.0075) |
| Number of | -1.3879 | -0.6991 | -0.6988 | 0.0466* | -1.3318 | -0.6486 | -0.6832 |
| children | (1.0848) | (0.8642) | (0.8468) | (0.0248) | (1.1659) | (0.8346) | (1.0253) |
| Married | -0.3225 | -1.2567 | 0.9342 | 0.0243 | -0.7197 | -1.6393 | 0.9196 |
| | (3.3533) | (2.3064) | (3.1244) | (0.0594) | (2.7739) | (1.9857) | (2.4396) |
| Divorced | 2.4557 | 3.1840 | -0.7282 | 0.1972*** | 2.0754 | 3.0795 | -1.0040 |
| | (3.7854) | (3.8463) | (3.8474) | (0.0756) | (3.5316) | (2.5280) | (3.1059) |
| Sick leave | 0.6096*** | 0.2139*** | 0.3957*** | -0.0010 | 0.5943*** | 0.2056*** | 0.3887*** |
| ratio | (0.0527) | (0.0334) | (0.0461) | (0.0009) | (0.0429) | (0.0307) | (0.0377) |
| Sick leave | 0.0906*** | 0.0399*** | 0.0507*** | -0.0001 | 0.0816*** | 0.0347*** | 0.0469*** |
| 2006 | (0.0178) | (0.0147) | (0.0170) | (0.0004) | (0.0164) | (0.0117) | (0.0144) |
| Income | -0.0651*** | -0.0229*** | -0.0422*** | -0.0030* | -0.0651*** | -0.0221*** | -0.0429*** |
| | (0.0130) | (0.0074) | (0.0088) | (0.0019) | (0.0085) | (0.0061) | (0.0074) |
| Seniority | -0.7443*** | -0.5512*** | -0.1932 | -0.0017 | -0.7236*** | -0.5387*** | -0.1849 |
| | (0.1920) | (0.1655) | (0.1563) | (0.0042) | (0.1949) | (0.1395) | (0.1714) |
| Working | -10.8757*** | -10.8148*** | -0.0609 | 0.1354 | -12.1529*** | -11.4850*** | -0.6680 |
| hours | (5.8961) | (3.6101) | (4.9131) | (0.0959) | (4.5060) | (3.2256) | (3.9629) |
| Distance | - | - | - | -0.0030*** | - | - | - |
| | | | | (0.0002) | | | |
| Number | -0.0955 | -0.2348** | 0.1392 | 0.0016 | -0.1652 | -0.2907*** | 0.1255 |
| employees | (0.1692) | (0.1174) | (0.1259) | (0.0033) | (0.1493) | (0.1069) | (0.1313) |
| IA-firm | -14.6524*** | -3.4333** | -11.2190*** | 0.0239 | -14.7035*** | -3.3070* | -11.3965*** |
| | (2.6124) | (1.6282) | (2.3371) | (0.0556) | (2.6186) | (1.8745) | (2.3030) |
| Constant | 130.8724*** | 82.4210*** | 48.4515 | -6.0467*** | 186.1639*** | 166.0377*** | 20.1262 |
| | (22.6207) | (14.6511) | (17.2689) | (1.2262) | (23.7448) | (16.9973) | (20.8829) |
| Dummy for diagnoses | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for industry | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Dummy for county | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Lamda | | | | | 1.4043 | 3.9868 | -2.5824 |
| | | | | | (3.9763) | (2.8453) | (3.4968) |
| R-squared | 0.106 | 0.081 | 0.054 | | | | |
| Number observations | 10,021 | 10,021 | 10,021 | 10,021 | 10,021 | 10,021 | 10,021 |

Note: * significant at the 10 % level, ** significant at the 5 % level, *** significant at the 1 % level.

Table 6. Testing for differences in pre-reform waiting times.

| | |
|---|---|
| FRW institution | 2.3538 (3.1177) |
| Number of patients | -0.0054** (0.0026) |
| Mean age of patients | -0.3331 (0.5345) |
| Percentage males | -0.1374 (0.1320) |
| Percentage inpatients | -0.5392*** (0.1975) |
| Constant | 286.1985*** (33.2801) |
| Fixed effect for diagnoses | Yes |
| Fixed effect for hospital | Yes |
| $R^2$ | 0.498 |
| Number of observations | 2,051 |

Table 7. The effect of FRW for patients treated at their nearest hospital.

| | OLS | | | Selection model | | |
|---|---|---|---|---|---|---|
| | All treatments | Surgical treatments | Non-surgical treatments | All treatments | Surgical treatments | Non-surgical treatments |
| Length of sick leave | -7.5459* (4.3059) | -15.6121* (9.5792) | -5.3011 (5.1242) | -13.2564** (6.5997) | -30.9934*** (11.6811) | -10.8654 (7.4268) |
| Waiting time | -8.7660*** (2.9798) | -19.3799*** (6.1961) | -8.1004** (3.6078) | -9.5516** (4.5668) | -28.3888*** (7.5552) | -10.9463** (5.2289) |
| Post-treatment period | 1.2201 (3.6881) | 3.7679 (7.9633) | 2.7993 (4.4395) | -3.7048 (5.6528) | -2.6046 (9.7080) | 0.0809 (6.4341) |
| Number observations | 7,080 | 1,928 | 5,152 | 7,080 | 1,928 | 5,152 |

Table A1. ICD10 diagnoses and number of patients.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| E66: 95 | G93: 51 | J34: 60 | M15: 57 | M43: 41 | M72: 66 | R42: 88 | Z00: 135 |
| F32: 23 | H93: 78 | J44: 93 | M16: 139 | M45: 30 | M75: 1,243 | R51: 66 | Z03: 556 |
| F41: 11 | I10: 240 | J45: 124 | M17: 185 | M47: 45 | M76: 76 | R52: 26 | Z09: 176 |
| F43: 21 | I20: 351 | K21: 305 | M18: 40 | M48: 87 | M77: 289 | R55: 79 | Z46: 53 |
| F48: 18 | I21: 42 | K40: 89 | M19: 105 | M50: 199 | M79: 643 | S06: 33 | Z47: 91 |
| G43: 56 | I25: 223 | K43: 58 | M20: 53 | M51: 967 | M93: 18 | S13: 19 | Z50: 172 |
| G44: 71 | I48: 135 | K80: 85 | M22: 63 | M53: 90 | R06: 119 | S46: 34 | Z71: 209 |
| G47: 91 | I49: 243 | L40: 166 | M23: 698 | M54: 1,230 | R07: 246 | S83: 88 | |
| G56: 220 | I69: 57 | M05: 38 | M24: 91 | M65: 87 | R10: 298 | T84: 36 | |
| G57: 48 | I83: 86 | M06: 19 | M25: 384 | M67: 65 | R20: 54 | T92: 154 | |
| G62: 20 | J32: 50 | M13: 121 | M35: 67 | M70: 76 | R29: 65 | T93: 130 | |

Table A2. Industries and number of patients

| | |
|---|---|
| Agriculture | 154 |
| Mining | 191 |
| Manufacturing | 1,808 |
| Construction | 1,276 |
| Wholesale and retail | 2,283 |
| Transport | 1,170 |
| Financial | 1,230 |
| Public administration | 742 |
| Education | 904 |
| Health | 3,691 |
| Total | 13,449 |

Table A3: Counties and number of patients

| | |
|---|---|
| Østfold: 830 | Rogaland: 796 |
| Akershus: 983 | Hordaland: 1,127 |
| Oslo: 1,137 | Sogn og Fjordande: 365 |
| Hedmark: 520 | Møre og Romsdal: 1,096 |
| Oppland: 422 | Sør-Trøndelag: 493 |
| Buskerud: 833 | Nord-Trøndelag: 423 |
| Vestfold: 692 | Nordland: 1,439 |
| Telemark: 557 | Troms: 735 |
| Aust-Agder: 258 | Finnmark: 406 |
| Vest-Agder: 319 | |