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HOSPITAL CAPACITY, WAITING
TIMES AND SICK LEAVE
DURATION— AN EMPIRICAL
ANALYSIS OF A NORWEGIAN
HEALTH POLICY REFORM.



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

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Abstract

A health policy reform aiming to reduce hospital waiting times and sickness absences, the Faster Return to Work (FRW) scheme, is evaluated by creating treatment and control groups to facilitate causal interpretations of the empirical results. We use a unique dataset on individuals where we match hospital data with social security data and socio-economic characteristics. The main idea behind the reform is that long waiting times for hospital treatment lead to unnecessarily long periods of sick leave. We find that the waiting period for treatment or consultation for FRW patients is 12–15 days shorter than for people on sick leave on the regular waiting list. 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.

Keywords: waiting times, length of sick leave, policy reform and econometric evaluation.

JEL Numbers: I12, C21, H51

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. On a given working day, around 6.5% of the work-force (130,000 persons) receive sickness benefits based on a sickness certificate from a general practitioner (GP) (Norwegian Labour and Welfare Administration (NAV), 2012). 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 with 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.² The main idea behind the reform is that long waiting times for hospital treatment lead to unnecessarily long periods of sick leave. It was argued that waiting times and total length of sickness absences should go down as a result of increasing hospital capacity exclusively for people on sick leave. The FRW scheme was introduced at the beginning of 2007 and approximately NOK 1.5 billion (around 200 million euro) was spent on the project over a three-year period (2007–2009).

Many people on sick leave are in need of hospital treatment and the same people may face comparatively long waiting times for treatment (Holmås and Kjerstad, 2010). This indicates that a reduction of waiting times could lead to a reduction in sick leave periods. However, this is not self-evident. If shorter waiting times are to result in shorter sick leave durations, first, the physician must be able to give the right diagnosis. Second, given a correct diagnosis, there must be available treatment that can help. The majority of people on sick leave in Norway are diagnosed with some kind of musculoskeletal system disease.³ It is by no means evident that treatment has the intended effect. For instance, in a systematic review of the effectiveness of multidisciplinary rehabilitation for fibromyalgia and chronic widespread pain, Karjalainen et al. (1999) showed small treatment effects on return to work.

Most Norwegian hospitals were affected by the FRW scheme, but it is important to note that hospitals increased capacity within different medical specialities. Thus, sick-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 unique dataset on individuals where we match hospital data with social security data and socio-economic characteristics. A treatment group and a control group are created based on a quasi-natural experiment. We estimate ordinary least squares (OLS) regressions, matching models and instrumental variable (IV) models, where we use the distance between regular hospitals and FRW hospitals as an instrument. We also estimate switching regressions that allow for heterogeneous effects of FRW (Heckman and Vytlačil, 1999).

² Other measures to reduce sick leave are discussed in Mykletun et al. (2010).

³ In 2008, 40.4% of sickness absences were related to diseases of the *musculoskeletal* system (NAV, 2012).

We find that the waiting period for treatment for patients who received treatment through the FRW scheme in 2007–2008 was 12–15 days shorter, counting from the commencement of the sick leave, compared with sick-listed people on the regular waiting list. This reduction in waiting time is only partially transformed into a reduction in total length of sick leave. On average, the reduction in 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 periods. Patients undergoing surgical treatment have episodes of sick leave that are 15–23 days shorter, on average, compared with surgical patients on the regular waiting list. We find no significant effect of the reform on sick leave periods 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, of course, such subjective effects are harder 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-report illnesses a maximum of four times a year for periods of no more than three days.⁴ Otherwise, a physician, in most cases a GP, must assess 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 work-days (52 weeks). The employer pays the sickness benefits for the first 16 days and the NIS pays the remainder.

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 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 there may be several hospitals grouped into one HE. As in most countries with

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 it was agreed upon by the Government and the labour organizations in 2001. One important goal in 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.

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 the 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 enlisted patients. An employee absent from work because of sickness must obtain a certified 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.

The FRW scheme itself was established based on applications submitted from hospitals to their respective RHEs; not all proposed FRW projects were approved. The decision regarding whether to allow establishment of an FRW was based on an assessment of demand (number of potential patients and, thereby, potential income) and supply (practicality of the FRW in terms of staffing, location and other cost elements) factors. In the period 2007–2009, approximately 60 FRW facilities were established across the country. Treatment at facilities outside of the reform remains available to both people on sick leave and people who are not in the labour market, but priority at these facilities is based only on medical condition and not on labour market status.

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 only 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 FRW treatment (Holmås and Kjerstad, 2010).

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 starting 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.

The data from the 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 compensated 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 residential municipality (of which there are 430).

The NPR 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 registers from 2008 and onward. 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 control groups are constructed in the following way. First, we start by dividing all FRW consultations/treatments in 2008 into ICD10 diagnosis groups (three-digit level). After excluding small diagnosis groups (fewer than 50 treatments), we are left with 84 different FRW diagnosis groups. We then register the hospitals that offer FRW within each diagnostic group. Hospitals with fewer than five FRW treatments within a certain FRW diagnosis are treated as non-FRW institutions for this particular diagnosis, and we drop FRW patients treated at these institutions from the analysis. Second, many 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. Patient-specific information (such as waiting time, diagnosis, surgery/non-surgery, etc.) is based on the information registered at the first admission. Only patients having an FRW admission as their first treatment/consultation in a treatment series are registered as FRW patients. Third, as the FRW scheme aims to reduce waiting times for planned admissions, all emergency admissions are dropped from the analysis. Fourth, all patients not sick listed at the time of treatment are dropped from the analysis, as are patients who were referred to hospital before the start of their sickness episode. Fifth, some sick leave episodes start with a hospital admission. These are dropped from the analysis. Sixth, patients admitted after 31 June 2008 are dropped from the analysis. The NIA only provides 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). Seventh, regular patients treated at an FRW institution are dropped if the hospital offers FRW treatment for this particular diagnosis. We thus avoid general equilibrium effects on waiting times for both groups. Finally, patients receiving FRW treatment are placed in the treatment group, whereas patients with an FRW diagnosis receiving regular treatment are placed in the control group.

The preparation of the data resulted in a sample of 6,144 patients treated under the FRW scheme (the treatment group) and a control group of 7,796 patients with similar diagnoses treated at non-FRW institutions. Our sample includes 52 hospitals treating patients with FRW diagnoses. Out 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) 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 control groups are reported in Table 2. As 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 groups of sick-listed individuals. Therefore, it is expected that, on average, FRW patients would have waited shorter times 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. This difference between FRW and non-FRW patients is larger for surgical patients than for non-surgical patients. Surgical patients receiving FRW treatment 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. 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. As the sick leave period is almost the same for FRW and regular patients, whereas waiting times are shorter for FRW patients, 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 FRW patients and other patients for most of the socio-economic background variables. FRW patients are somewhat younger, have more children and earn less compared with other patients.

As expected, the distance from the nearest hospital to the nearest hospital that offers FRW is much shorter for FRW patients than for other patients. We use distance as an instrument in the empirical analyses and discuss this variable 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, IV regressions, switching regressions and different matching methods. Switching regressions are based on the model of potential outcomes used to define treatment effects (Rubin, 1978; Heckman and Vytlačil, 1999; Lokshin and Sajaia, 2004), and they allow treatment effects to vary both in terms of observed and unobserved factors. FRW treatment is a dummy variable in the regressions, where FRW indicates whether a patient with a given diagnosis is treated at an FRW hospital. Patients on sick leave treated at hospitals not offering FRW for a given diagnosis are in the control group. In addition, we take into account factors such as gender, age, number of children, marital status, previous sick leave history, income, working hours, seniority, whether the firm is an IA firm and the number of employees in the firm. We also include dummy variables for diagnosis, industry and county.

In the IV and switching regressions, we use distance between the nearest hospital and nearest FRW hospital for each patient as our instrument for FRW. 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 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 the important trade-off that a patient and GP make when choosing between an 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. A patient is more likely to choose an FRW hospital if the extra 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 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.

A valid IV should 1) be uncorrelated with unobserved factors affecting the length of sick leave and 2) affect the potential endogenous variable (FRW). 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 it should not be affected by the distance between hospitals.

In Table 3, Column 4, we report the results from a probit model where we analyse factors that affect the probability of choosing FRW treatment. First, we find that the IV Distance is highly significant, with the expected negative sign. This is also the case if we split 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 FRW treatment compared with treatment at a regular hospital. In particular, age, number of children, marital status and income (see Table 3, Column 4).

/Tables 3–5 about here/

We report three different outcome models in Table 3. 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 period as our dependent variable, i.e., the period from treatment to the end of the sick leave episode. In Columns 5–7, we report the results from the same models but now control for selection using a standard Heckman selection model. Tables 4 and 5 show the results for surgical and non-surgical patients, respectively. The results based on the selection model (IV and switching regressions) indicate that there is no selection on unobservable variables in any of our regressions. None of the selection correction terms (“lambdas”) is statistically significant. Treatment effects from the switching regression model, where we estimate separate outcome regressions for FRW patients and other patients, are imprecisely estimated, and we do not report effects from this model. Results from the switching regressions are available upon request. We report the results from different matching models in Table 6.

The results vary somewhat between the OLS and IV regressions, 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 IV selection 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 selection 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 IV regression (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 on PT 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 the paper.

In Table 6, we report the results from the matching models based on propensity score matching (nearest neighbour, kernel density). Results from other matching specifications are available upon request. Our main conclusions from the OLS and IV regressions are confirmed. For all patients, we find a significant effect (11.7 days) of the FRW scheme on total length of sick leave. The effect is 22.7 days for surgical patients and 6.5 days for non-surgical patients. The effect on waiting time prior to treatment is around 20 days for both groups. The effect on post-treatment period is significant for non-surgical patients, at 11.7 days, but is not significant for surgical patients.

/Table 6 about here/

A potential issue is that FRW treatment 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. 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 reported in Table 7, there is no indication that waiting times were different between FRW institutions and other institutions in the year before the scheme was established. Together with the fact that most hospitals have implemented the reform (but for different patient groups), we consider this test to be clear evidence that the FRW scheme was not established in areas with particularly high existing sick leave rates or long waiting times.

/Table 7 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. The FRW scheme, implemented in 2007, is aimed at achieving the latter goal. We use a unique dataset matching hospital data with social security data and socio-economic characteristics to evaluate the FRW scheme. A treatment group and a control group are created based on a quasi-natural experiment. OLS and IV regressions show that the waiting period for treatment/consultation for FRW patients is 12–15 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. 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 15–23 days shorter than for surgical patients on the regular waiting list. We find no significant effect of the reform 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. 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 treatment-as-usual. 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, reducing 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 good (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 case. Our analysis 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. However, prioritizing 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.

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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 from the nearest hospital to the nearest FRW institution (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 to FRW institution	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
	(1)	(2)	(3)	(4)	(5)	(6)	(6)
FRW	-6.8521** (3.5344)	-12.5600*** (3.7118)	5.7079** (2.2226)	-	-9.3404* (5.3410)	-15.5711** (3.9475)	6.2307 (4.6529)
Male	-7.3761*** (2.8405)	-7.1229*** (2.1038)	-0.2532 (2.0529)	0.0103 (0.0495)	-7.0568*** (2.3618)	-7.0642*** (1.6581)	0.0074 (2.0576)
Age	4.5103*** (0.7147)	2.2445** (0.4872)	2.2658** (0.5479)	0.0279*** (0.0141)	4.5606*** (0.6692)	2.2286*** (0.4698)	2.3320** (0.5830)
Age squared	-0.0309** (0.0075)	-0.0147*** (0.0049)	-0.0162*** (0.0059)	-0.0005*** (0.0002)	-0.0313*** (0.0073)	-0.0145*** (0.0051)	-0.0168*** (0.0064)
Number of children	-1.3412 (0.9755)	-0.6427 (0.7356)	-0.6985 (0.8736)	0.0346* (0.0213)	-1.2864 (1.0132)	-0.6177 (0.7113)	-0.6687 (0.8827)
Married	-0.6747 (2.9053)	-2.2676 (1.9280)	1.5928 (2.6097)	0.0595 (0.0509)	-0.8935 (2.4105)	-2.3964 (1.6923)	1.5029 (2.1000)
Divorced	2.6244 (3.1261)	1.8016 (3.2117)	1.5928 (2.6097)	0.1831*** (0.0649)	2.8566 (3.0455)	2.0278 (2.1380)	0.8287 (2.6531)
Sick leave ratio	0.5164*** (0.0476)	0.1920*** (0.0275)	0.3245*** (0.0437)	-0.0005 (0.0008)	0.5545*** (0.0374)	0.1872*** (0.0262)	0.3173*** (0.0325)
Sick leave 2006	0.0935*** (0.0134)	0.0465*** (0.0115)	0.0470*** (0.0128)	-0.0003 (0.0003)	0.0854*** (0.0143)	0.0415*** (0.0100)	0.0439*** (0.0124)
Income	-0.0671*** (0.0105)	-0.0269*** (0.0067)	-0.0402*** (0.0075)	-0.0036** (0.0016)	-0.0671*** (0.0073)	-0.0262*** (0.0051)	-0.0409*** (0.0063)
Seniority	-0.7856*** (0.1860)	-0.4877*** (0.1502)	-0.2979*** (0.1550)	0.0057 (0.0036)	-0.7693*** (0.1684)	-0.4732*** (0.1182)	-0.2961*** (0.1467)
Working hours	-9.5973** (5.0235)	-9.5098*** (3.5432)	-0.0875 (3.6161)	0.1042 (0.0823)	-10.4755*** (3.9117)	-9.9725*** (2.7462)	-0.5030 (3.4078)
Distance	-	-	-	-0.0031*** (0.0002)	-	-	-
Number employees	-0.1616 (0.1368)	-0.2994*** (0.0707)	0.1378 (0.1139)	-0.0003 (0.0027)	-0.2183* (0.1261)	-0.3393*** (0.0885)	0.1209 (0.1098)
IA-firm	-13.2872*** (2.5533)	-2.4261 (1.5429)	-10.8611*** (2.0777)	0.0726 (0.0470)	-13.3057*** (2.2476)	-2.2876 (1.5779)	-11.0181*** (1.9581)
Constant	139.6815*** (20.6972)	75.1549*** (14.7875)	64.5266*** (13.3297)	-6.5499*** (1.1854)	196.8510*** (21.0621)	147.5844*** (14.7864)	49.2666*** (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 (3.4355)	1.3879 (2.4118)	-0.7464 (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			Prob. FRW	Selection model		
	Sick leave	Waiting time	PT		Sick leave	Waiting time	PT
	(1)	(2)	(3)	(4)	(5)	(6)	(6)
FRW	-15.3706*** (4.8367)	-19.7293*** (3.9275)	4.3586 (4.7329)		-22.5873** (10.1058)	-27.5196*** (6.6118)	4.9323 (8.5714)
Male	-6.1835 (6.8871)	-6.3714* (3.6506)	0.1879 (5.4399)	-0.0652 (0.1443)	-5.6152 (4.7831)	-5.8786* (3.1296)	0.2634 (4.0564)
Age	3.5343** (1.5634)	2.9748*** (1.0080)	0.5595 (1.3376)	0.0155 (0.0384)	3.8338*** (1.3162)	3.0412*** (0.8612)	0.7926 (1.1162)
Age squared	-0.0216 (0.0163)	-0.0266** (0.0107)	0.0050 (0.0141)	-0.0006 (0.0004)	-0.0244* (0.0142)	-0.0273*** (0.0093)	0.0029 (0.0120)
Number of children	-1.7108 (2.1490)	-1.1523 (1.4163)	-0.5585 (2.1407)	-0.0113 (0.0590)	-1.7700 (2.0296)	-0.9123 (1.3280)	-0.8577 (1.7213)
Married	-1.3598 (4.0851)	-5.8794* (3.6654)	4.5196 (3.6654)	0.3680*** (0.1392)	-1.5680 (4.8287)	-5.7482* (3.1594)	4.1802 (4.0951)
Divorced	3.9789 (4.3742)	-3.4837 (3.3840)	7.4627* (4.2990)	0.3281* (0.1777)	5.0235 (5.9660)	-2.4725 (3.9036)	7.4961 (5.0596)
Sick leave ratio	0.2074*** (0.0668)	0.1191*** (0.0481)	0.0883 (0.0569)	0.0011 (0.0023)	0.1957*** (0.0754)	0.1236*** (0.0494)	0.0721 (0.0640)
Sick leave 2006	0.1000*** (0.0331)	0.0620*** (0.0205)	0.0380 (0.0340)	0.0008 (0.0010)	0.0951*** (0.0292)	0.0618*** (0.0191)	0.0333 (0.0247)
Income	-0.0661*** (0.0135)	-0.0341*** (0.0090)	-0.0320*** (0.0122)	-0.0096** (0.0046)	-0.0638*** (0.0142)	-0.0323*** (0.0093)	-0.0315*** (0.0121)
Seniority	-0.8292** (0.4237)	-0.1549 (0.2396)	-0.6744*** (0.4084)	0.0320*** (0.0098)	-0.8841*** (0.3356)	-0.1681 (0.2196)	-0.7160*** (0.2846)
Working hours	-10.2219 (9.3157)	-8.2646 (6.0502)	-1.9572 (6.8416)	-0.0214 (0.2396)	-12.9044* (7.8895)	-11.8190** (5.1622)	-1.0854 (6.6909)
Distance	-	-	-	-0.0038*** (0.0005)	-	-	-
Number employees	-0.3425 (0.2546)	-0.4884*** (0.1670)	0.1459 (0.1911)	-0.0041 (0.0065)	-0.3638 (0.2328)	-0.4829*** (0.1523)	0.1192 (0.1975)
IA-firm	-8.4211 (5.3890)	1.0422 (3.1707)	-9.4633* (4.3386)	0.4404*** (0.1326)	-7.6693* (4.3873)	1.5184 (2.8707)	-9.1877*** (3.7208)
Constant	182.1152*** (35.4981)	65.3297*** (23.9622)	116.7855*** (29.4814)	-11.5762 (826.5958)	239.6785*** (48.3407)	93.0381*** (31.6299)	146.6404*** (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 (7.2310)	7.6555 (4.6267)	1.1393 (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	Waiting time	PT	Prob. FRW	Sick leave	Waiting time	PT
	(1)	(2)	(3)	(4)	(5)	(6)	(6)
FRW	-4.6507 (4.0207)	-10.8448** (4.0949)	6.1940** (2.7187)		-8.7538 (6.1530)	-18.2738*** (4.4042)	9.5200* (5.4113)
Male	-7.4527*** (2.7398)	-7.3339*** (2.6783)	-0.1189 (2.7327)	0.0113 (0.0573)	-7.0866*** (2.7176)	-7.0559*** (1.9453)	-0.0307 (2.3900)
Age	4.7565*** (0.7323)	1.8875*** (0.5071)	2.8690*** (0.6652)	0.0233 (0.0167)	4.7875*** (0.7785)	1.8511*** (0.5573)	2.9364*** (0.6847)
Age squared	-0.0337*** (0.0078)	-0.0100* (0.0054)	-0.0237*** (0.0072)	-0.0004* (0.0002)	-0.0338*** (0.0086)	-0.0094 (0.0061)	-0.0243*** (0.0075)
Number of children	-1.3879 (1.0848)	-0.6991 (0.8642)	-0.6988 (0.8468)	0.0466* (0.0248)	-1.3318 (1.1659)	-0.6486 (0.8346)	-0.6832 (1.0253)
Married	-0.3225 (3.3533)	-1.2567 (2.3064)	0.9342 (3.1244)	0.0243 (0.0594)	-0.7197 (2.7739)	-1.6393 (1.9857)	0.9196 (2.4396)
Divorced	2.4557 (3.7854)	3.1840 (3.8463)	-0.7282 (3.8474)	0.1972*** (0.0756)	2.0754 (3.5316)	3.0795 (2.5280)	-1.0040 (3.1059)
Sick leave ratio	0.6096*** (0.0527)	0.2139*** (0.0334)	0.3957*** (0.0461)	-0.0010 (0.0009)	0.5943*** (0.0429)	0.2056*** (0.0307)	0.3887*** (0.0377)
Sick leave 2006	0.0906*** (0.0178)	0.0399*** (0.0147)	0.0507*** (0.0170)	-0.0001 (0.0004)	0.0816*** (0.0164)	0.0347*** (0.0117)	0.0469*** (0.0144)
Income	-0.0651*** (0.0130)	-0.0229*** (0.0074)	-0.0422*** (0.0088)	-0.0030* (0.0019)	-0.0651*** (0.0085)	-0.0221*** (0.0061)	-0.0429*** (0.0074)
Seniority	-0.7443*** (0.1920)	-0.5512*** (0.1655)	-0.1932 (0.1563)	-0.0017 (0.0042)	-0.7236*** (0.1949)	-0.5387*** (0.1395)	-0.1849 (0.1714)
Working hours	-10.8757*** (5.8961)	-10.8148*** (3.6101)	-0.0609 (4.9131)	0.1354 (0.0959)	-12.1529*** (4.5060)	-11.4850*** (3.2256)	-0.6680 (3.9629)
Distance	-	-	-	-0.0030*** (0.0002)	-	-	-
Number employees	-0.0955 (0.1692)	-0.2348** (0.1174)	0.1392 (0.1259)	0.0016 (0.0033)	-0.1652 (0.1493)	-0.2907*** (0.1069)	0.1255 (0.1313)
IA-firm	-14.6524*** (2.6124)	-3.4333** (1.6282)	-11.2190*** (2.3371)	0.0239 (0.0556)	-14.7035*** (2.6186)	-3.3070* (1.8745)	-11.3965*** (2.3030)
Constant	130.8724*** (22.6207)	82.4210*** (14.6511)	48.4515 (17.2689)	-6.0467*** (1.2262)	186.1639*** (23.7448)	166.0377*** (16.9973)	20.1262 (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 (3.9763)	3.9868 (2.8453)	-2.5824 (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. Average treatment effects of the FRW scheme. Propensity score matching (nearest neighbour, kernel density)¹.

	All treatments	Surgical treatments	Non-surgical treatments
Length of sick leave	-11.7450 ^{***} (4.3112)	-22.7476 ^{**} (10.6083)	-6.5016 ^{**} (2.9300)
Waiting time	-20.3356 ^{***} (3.0043)	-22.9131 ^{***} (7.2804)	-18.7637 ^{***} (3.9994)
Post-treatment period	8.5906 ^{**} (3.8387)	0.1657 (8.8388)	11.7349 ^{***} (4.2718)
Observations	13,449	3,133	8,747

Table 7. 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 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	

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