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Abstract

Rising disability insurance rolls are a major concern in many industrialized countries. Many disability benefit systems have until now been based on passive benefit programmes, while the trend now is towards more active labour market programs in order to increase employment among people with partial work capacity. This paper studies early intervention among people with partial work capacity by analysing the effects of reducing the waiting time before participating in vocational rehabilitation programs. The results, using data from a natural field experiment with nearly 5 000 participants, indicate that reducing waiting time by on average 35 days has no effect on employment status or earnings, but leads to earlier transitions into permanent disability benefits.

1. Introduction

It is commonly argued that early identification and intervention among welfare benefit receivers is important (OECD, 2007, Aakvik et al., 2005, Dean et al., 2015, Frölich et al., 2004, Markussen and Røed, 2014). There are several arguments for why early intervention can be beneficiary. First, skills necessary in the labour market and motivation for working can depreciate for people who are outside of the labour market for a long time. Secondly, habits and life style might change over time making it increasingly difficult to re-enter the labour market as time passes by. Third, being out of the labour market might send negative signals to potential employers. Finally, intervening early can change the attraction of benefits in comparison to employment, as interventions that require some sort of active participation reduce the leisure element of passively receiving benefits. There is now vast evidence from several industrialized countries (US, UK, Sweden, Denmark, Austria and Germany) supporting the notion that early intervention reduces dependence on welfare benefits. Earlier, in comparison to later, allocation to

labour market programs have been found to reduce unemployment duration and increase employment in the UK (Dolton and O'Neill, 1996), Sweden (Sianesi, 2004), Germany (Fitzenberger and Völter, 2007) and Austria (Lechner and Wiehler, 2013). Also, several studies find evidence of a threat-effect, that an invitation to participate in a meeting or program itself increases the outflow into employment (in the US (Black et al., 2004) and Denmark (Geerdsen, 2006, Rosholm and Svarer, 2008)). However, Van Landeghem et al. (2017) do not find evidence of a threat-effect.

Rising disability insurance rolls are a major concern in many industrialized countries (Autor and Duggan, 2003, Bratsberg et al., 2013, Burkhauser and Daly, 2011). The disability benefit system has been, and in many countries, still is, quite passive. Most OECD countries spend only 0.1-0.2% of GPD on rehabilitation and employment programs (OECD, 2010). Additionally, the limited employment support that typically does exist is offered at a very late stage in the process, often many years into a health problem. In recent years, however, there has been a shift in focus from passive benefit programs to active labour market programs and vocational rehabilitation programs[1], and from late to early intervention, in order to increase employment among people with partial work capacity..

Most of the existing evidence on early intervention referred to above focuses on unemployed or people on sick leave. An important question is thus whether early intervention also can increase employment among people with more severe or long-term health issues, such as among people with reduced work capacity or disabilities. As the employment rate of disabled people is lower than among the rest of the population in all OECD countries, and rising disability insurance rolls are a growing concern, it is important to know whether the positive results concerning early intervention among unemployed generalize to people with disabilities. If the results indeed generalize to people with disabilities, society could reduce costs substantially by intervening earlier and people with disabilities could benefit (Waddell and Burton, 2006).

The waiting time before participating in vocational rehabilitation programs in Norway is commonly 3-6 months. Long waiting times before starting in such programs raises the question of whether waiting in itself can be detrimental for employment outcomes, and whether reducing waiting time can be beneficiary for labour market outcomes.

[1] For evaluations of vocational rehabilitation programs, see Aakvik et al. (2005), Dean et al. (2015), Frölich et al. (2004) and Markussen and Røed (2014).

In this paper, we study early intervention among people with partial work capacity by means of a large-scale natural field experiment. In particular, we study the effect of reducing the waiting time before participating in vocational rehabilitation programs for a random fraction of the participants. Conceptually, the experiment is meant to mimic a situation where vocational rehabilitation program capacity is increased such that clients waiting time is reduced.

Two previous studies give reason to question the generalizability of positive pre-program effects and effects of early intervention. The first study is a random experiment in Sweden, reported in Hägglund (2011), where a random sample of unemployed received more active placement efforts (for instance job search assistance), while the control group received the regular (and less active) services towards unemployed. The results show a 51 per cent increase in the outflow from unemployment insurance, and this even before participating in the program, in line with a positive pre-program effect. However, Hägglund also found an increase in the transition to sickness insurance. The second study, which is the study most similar to ours, is a randomized field experiment among receivers of sickness benefits (Engström et al., 2015). The social security office in Sweden invited employees on sick leave to attend a meeting with the caseworker and in some cases the employer. In the field experiment reported in Engström et al. (2015), the social security office invited a random fraction of employees on sick leave to attend this meeting earlier than the others. The results show an initial lock-in effect, that is, that in comparison to the control group, more people in the treatment group continued to receive sickness insurance benefits. In the longer term, however, they find an increase in the use of disability benefits. These two studies consider whether a reduction in one type of welfare benefit causes a shift towards other types of welfare benefits, a phenomena often referred to as benefit or program substitution (see also e.g. Inderbitzin et al. (2016), Borghans et al. (2014) and Vestad (2013)).

The randomized natural field experiment took place from September 2013 to December 2014 in four counties in Norway. All applicants for vocational rehabilitation programs within the study area with reduced work capacity, in total 5141 people, participated in the study. A random draw allocated participants between a treatment group and a control group Together with the caseworker, the participants applied for vocational rehabilitation programs. The person administrating the waiting lists in each county put participants from the treatment group on top of the waiting lists, while participants in

the control group waited as usual before starting in vocational rehabilitation programs[2]. This procedure ensured that a random fraction of participants had shorter waiting time than they otherwise would have had.

Our results show that waiting time before starting on a vocational rehabilitation program was significantly lower, on average 35 days, in the treatment group compared to the control group, indicating that the randomization of waiting time was successful. Our results show no effects of reduced waiting time on subsequent earnings or employment. However, reduced waiting time gives a reduction in the fraction receiving temporary disability benefits in the short run, but also a corresponding increase in permanent disability benefits. Hence, it speeds up the transition process from temporary to permanently receiving disability benefits. In the long run, however, reduced waiting time had no effects neither on employment, earnings nor disability benefit receipt.

The remainder of the paper proceeds as follows: Section 2 gives an overview of the social security system in Norway in general, and the vocational rehabilitation programs intending to help people with reduced work capacity find or keep jobs in particular. Section 3 presents the randomized field experiment and the data sources used are presented in Section 4. Section 5 presents the results before we conclude in Section 6.

2. Institutional setting

2.1 The setting

The Norwegian Labour and Welfare Administration (NAV) administer all public welfare programs and benefits in Norway. The benefits include child benefits, parental leave benefits, sickness benefits, unemployment benefits, social security benefits, work assessment benefits, disability insurance and pensions.

This study focuses on people with reduced work capacity, defined as *people who because of sickness, injury or other obstacles need extra help and effort from NAV to get or keep a job*. Here "job" includes income-producing work in the ordinary labour market as well as employment in sheltered businesses (i.e. businesses that produce goods and services, but are strongly subsidized). The two most common diagnoses among people with reduced work capacity are mental illnesses and musculoskeletal diseases.

[2] Participants in the control group on average got slightly longer waiting time than what would have been the case without the field experiment, due to the group with priority.

The procedure of defining people as having reduced work capacity is the following. In a first assessment NAV evaluates whether a client needs help from NAV to keep or find a job, or whether can be expected to find a job on his or her own. If help from NAV is necessary, NAV evaluates whether this is because of situational reasons (for instance changes in the labour market, mismatch between qualifications and demand for qualification in the labour market or language problems) or whether a more thorough evaluation of the client's work capacity is necessary. A work capacity assessment can lead to three possible outcomes: 1) the work capacity is not reduced, 2) the work capacity is reduced but the client is expected to be able to hold a job as the result of extensive effort from NAV, or 3) that the work capacity is reduced, and the client is not expected to be able to hold a job. The target population in this study is people who fall into the second of these three categories; clients with reduced work capacity who are evaluated as having a possibility of holding a job as the result of extensive effort from NAV. Together with the caseworker, these people apply for a vocational rehabilitation program, and then wait for an offer. After participating in the program, some will get a job, some will need further programs, while some will be re-evaluated as category 3 above, and receive permanent disability insurance.

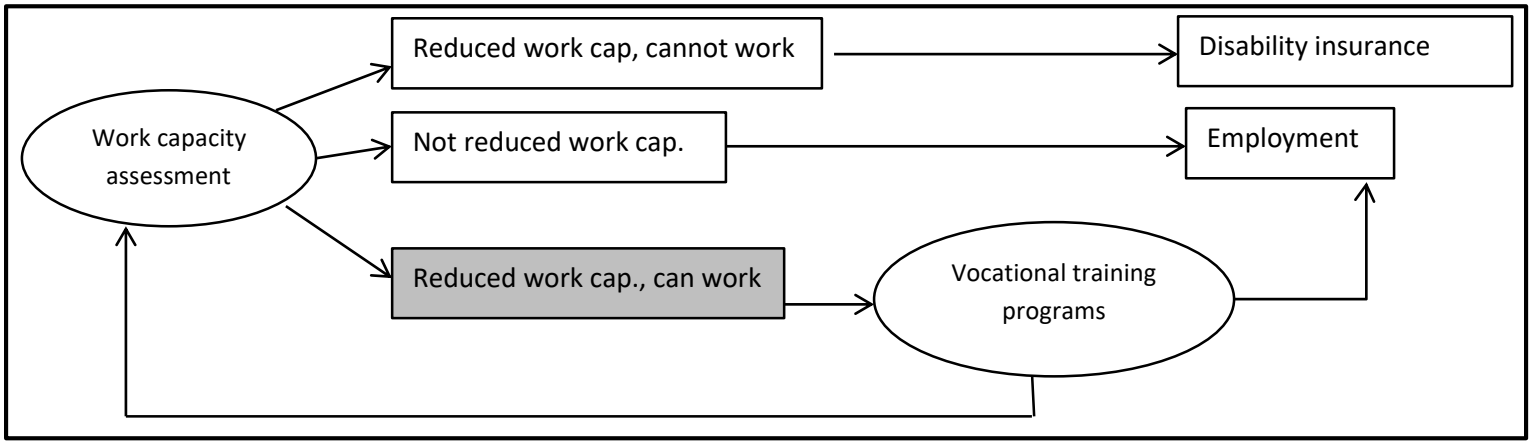

Figure 1: Flow diagram of procedure from defining target population (shaded box) to outcomes

Prior to entering our target population, these people either have been on sick leave for up to 12 months, have had long term health issues and receive temporary disability insurance, have been unemployed for a very long time or have received social assistance benefits. Depending on the history prior to entering the target population, a person with reduced work capacity might receive one of several benefits;

sickness benefits, temporary disability insurance (TDI), unemployment benefits, social assistance or qualification benefits, where temporary disability insurance is by far the most common.

2.2 The programs

Clients defined as having reduced work capacity are eligible to participate in programs intending to help keep or find a job. Below the programs included in the experiment are described.

Work with assistance (In Norwegian "Arbeid med bistand"): Work with assistance is a program helping people with reduced work capacity to find or keep a job in the ordinary job market. An assistant helps make an overview of qualifications, provide supervision and give advice to find a suitable job, assist in necessary adaptions of the job and work place, assist in negotiations regarding employment and salary with an employer, and assist and follow-up in the starting phase of an employment. The maximal duration of the program is three years.

The follow-up program (In Norwegian "Oppfølging"): The program is for people who need extensive help to keep or find a job. The program can provide assistance with applying for jobs, assist in necessary adaptions of the job and work place, and training in work related and social skills. The duration of the program is up to 6 months, but additional 6 months is possible. In cases of special needs the program can last up to 3 years.

Experience in the sheltered sector (In Norwegian "Arbeidspraksis skjermet virksomhet"): This program provides work practice, but not employment, in sheltered businesses. The goal of the program is to improve the chances of employment. The maximum duration of the program is one year, but it is possible to extend the program with a second year.

Work-aimed rehabilitation (In Norwegian "Arbeidsrettet rehabilitering"): The program provides help to overcome or master health related or social problems hindering participation in the labour market. The program provides a daytime service, or a 24-hour service. The 24-hour service is used when the health problems are serious, when the distance to the daytime program is too far, or when the situation requires a change in social environment. The program is open for employed people, in which case the rehabilitation will be in relation to the job, and for people not employed, for whom the rehabilitation will take place in sheltered businesses or in an ordinary job with assistance from a sheltered business. The

24-hour service has a maximum length of 4 weeks, while the daytime-based program has a maximum duration of 12 weeks.

The clarification program (In Norwegian "Avklaring"): This is a program is aimed at identifying what type of work people are able to perform due to serious health problems or to having been out of the labour force for a long period of time. The program is open employed as well as unemployed. The clarification program aims at identifying work capacity, and required adjustments and assistance for holding a job. It is also possible to try out a job at a current or new employer. Before January 1 2015 there were two versions of this program: clarification in the ordinary job market and clarification in the sheltered job market. From January 1 2015 these two programs were merged. The main rule is that the duration of the clarification program is 4 weeks, although and extension of up to eight additional weeks is possible.

In the subsequent analysis, we merge the two first programs (work with assistance and the follow-up program) to a broad category "work first programs".

3. The randomized natural field experiment

3.1 The field experiment

In this study we report on a natural field experiment according to the terminology used by Harrison and List (2004). While a natural experiment is a naturally occurring event, which happens to have some randomness, a natural field experiment is an event where the researcher controls the randomization and where the subjects appear in their natural setting. The natural field experiment took place in four counties in Norway: Akershus, Buskerud, Telemark and Vestfold. These counties were suitable for the experiment because they are populous and situated geographically relatively close to each other.

We conducted the field experiment in cooperation with the Norwegian Labour and Welfare Administration. The randomization took place from August 2013 to March 2015 (19 months). Figure 2 illustrates the frequency of draws by month and year during the time span of the experiment.

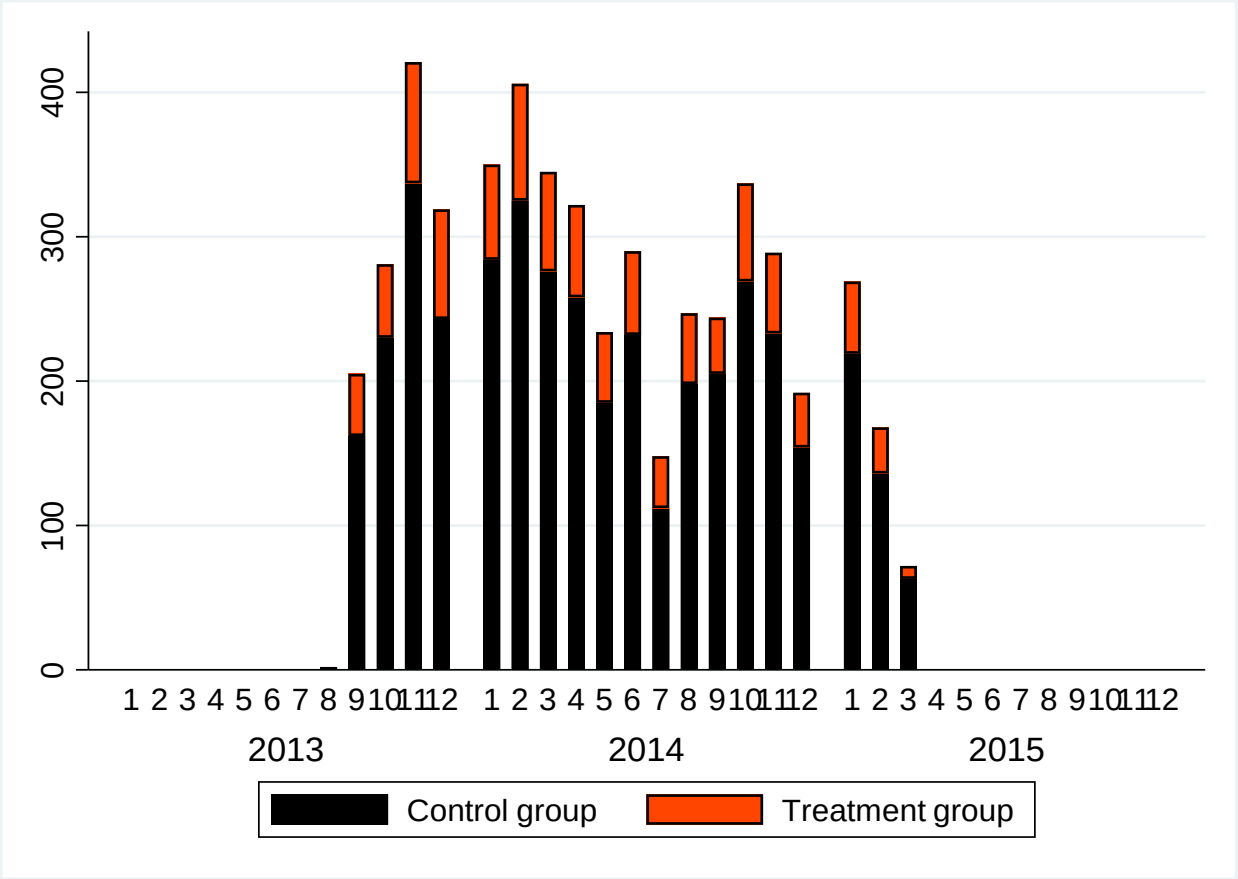

Figure 2: Number of draws into Control and Treatment group over time

In total 5270 participants randomly were allocated to the control or the treatment group. Of these, 129 subjects applied to programs not included in the study, and we therefore dropped them from the sample. The remaining study sample consists of 5141 subjects, 1018 participants in the treatment group and 4123 participants in the control group.

The goal of the field experiment was to create random variation in waiting time before participating in labour market programs, in order to study the causal impact of waiting time on employment after participating in labour market programs. To create random variation in the waiting time, approximately 20 per cent of all participants, the treatment group, got priority to labour market programs. This priority meant that whenever there was a queue or a waiting list for participating in a labour market program, the person administrating the waiting lists in each county put participants from the treatment group on top of the waiting lists. Participants in the control group did not get such priority, but were applied into labour market programs as usual.

The randomization of participants was organized at the office or county level depending on how each county organized applications to labour market programs (that is, at the office or county level). The person responsible for administrating applications to labour market programs performed the random draws on a designated secure web page. After logging in, the administrator filled in the social security number of each applicant, and an algorithm decided treatment. If this was the treatment group, then the administrator put the participant on the top of the waiting list of the respective labour market program. If the outcome of the draw was the control group, the administrator followed the normal routine for applicants into the labour market program. If an administrator drew the same social security number twice, the web page would always give the same outcome. This was to ensure that the administrator could not influence the outcome of the draw.

The Data Protection Officer has reviewed and recommended the project. In addition, the project has been through an ethical and legal assessment at the Norwegian Labour and Welfare Administration. The study is part of a knowledge-based development of the labour market programs in Norway. The waiting time before starting in labour market programs varies already across time and space in Norway, and the effect on labour market outcomes of waiting time, and thus of increasing or decreasing waiting time, was not known prior to this study. The percentage of prioritized clients was therefore set to 20 per cent, high enough to give a significant reduction in waiting time to the treatment group, without increasing the waiting time in the control group by too much. The benefits of learning about the effects of waiting time, to society in general and to people with reduced work capacity specifically, was evaluated as being higher than the possible disadvantage of a small increase in waiting time for the control group.

The field experiment intervened as little as possible in the normal routines at the Norwegian Labour and Welfare Administration. The caseworker was not required to do any extra work or to change procedure, and clients did not know that they were part of an experiment.

The process of the study was the following: clients in need of help to keep or find a job who were assessed to have reduced work capacity and who were expected to be able to hold a job as the result of extensive effort from NAV, were defined to be in the study sample. The caseworker and the client followed the normal process of finding and applying for the relevant labour market program. Next, the administrator performed the random draw and gave the client priority in the waiting list if the draw placed the client in the treatment group. The client waited for an offer to a labour market program, and when he or she received such an offer, participated in the labour market program.

The field experiment collected individual level data on the date and the outcome of the random draw.

3.2 Power calculation

Before starting the analysis, it is instructive to illustrate the statistical power of the experiment. We have done this using Monte Carlo simulations with 5000 repetitions, with two different outcomes, one binary and one continuous (normally distributed with zero mean and standard deviation equal to 1). Figure 3 summarizes the results below. The appendix contains the code used for the simulations.

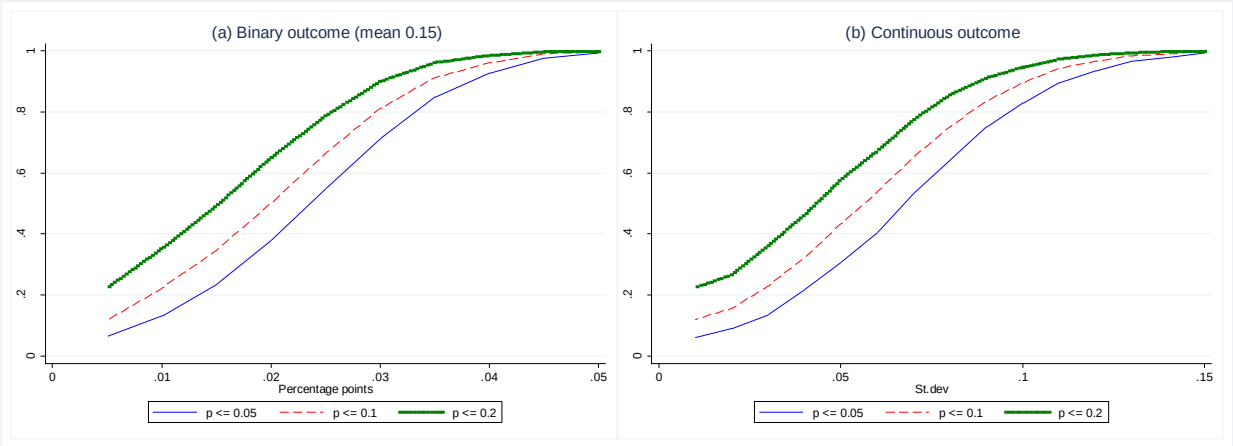

Figure 3: Power analysis using Monte Carlo simulations. The graph shows the detection probability for different effect sizes and three different p-values. The binary outcome has mean 0.15 (approximately similar to employment in the actual analysis) whereas the continuous outcome is standardized normal (mean zero, standard deviation 1). The number of observations (N=5,270) in the simulations equals the actual number of observations in the analysis.

Starting in the upper right corner of panel (a) we can see that an effect of 0.05 percentage points will be detected almost with certainty. Moving to the left along the blue line, which illustrates the probability of detecting effects requiring a p-value of 0.05 or less, we see that we would detect an effect of (approximately) 0.033 in 80 per cent of the cases. An effect of 0.021 would be detected in 40 per cent of the cases. Moving to panel (b) for the continuous case, we see that we would detect an effect of 0.1 standard deviation, requiring a p-value of 0.05 or less, in approx. 80 per cent of the cases. Requiring a p-value of no more than 0.1 we would detect an effect size of 0.05 standard deviations in approximately 40 per cent of the cases.

4. Data and descriptive statistics

The data used to evaluate the experiment all stem from administrative data sources, made available for research by Statistics Norway, and a unique encrypted personal identification number[3] connect the different data sources together. These data cover the full population, including the participants in the experiment, without attrition.

We measure individual characteristics/background variables, such as age, education, gender, previous labour market history etc. at the time of the draw. Outcome variables, such as labour earnings and benefit take-up are measured monthly. The time-span covered for the different outcome variables vary: Temporary disability is available up to the end of 2015, labour earnings up to September 2016, whereas permanent disability stops in December 2015.

The data sources for earnings are a national employer/employee register, which register all wage payments with dates and amounts. From this, we construct monthly earnings and dummy variables for employment, defined as earnings more than NOK 15.000 (approx. 1785 USD, 2017) during a month. This corresponds (roughly) to working slightly more than half time with the minimum wage[4]. Table 1 displays a few key descriptive statistics for the treatment and control groups. None of the observed differences between the control and treatment group are statistically significant on any conventional level.

The average age in the sample is 42 years old, 56 per cent in the sample are women, 20 per cent are immigrants, 28 per cent have completed high school and 16 per cent have university education. We also see that most participants (80 per cent) received temporary disability benefits at the time of draw. Most of them also did so one year before.

[3]Key held by Statistics Norway

[4]There is no general minimum wage in Norway, but in certain industries, a minimum wage is set in order to avoid so called "social dumping", i.e. lower wages to foreign workers compared to natives. Our calculation is based in the minimum hourly wage in cleaning, NOK 177.63. See www.arbeidstilsynet.no

Table 1: Descriptive Statistics for the Experimental Population (averages)

	All	Control	Treatment
Age	41.9	41.8	42.1
	(11.75)		
Women	0.56	0.57	0.56
	(0.5)		
Immigrant	0.20	0.20	0.21
	(0.4)		
High School	0.28	0.29	0.27
	(0.45)		
University education	0.16	0.16	0.16
	(0.37)		
TDI, 1 month before the draw	0.794	0.791	0.806
	(0.405)		
TDI, 12months before the draw	0.608	0.604	0.624
	(0.488)		
TDI, 48 months before the draw	0.288	0.282	0.312
	(0.453)		
Annual earnings, year before draw	98,834	98,839	98,813
	(170,526)		
Annual earnings, 4 years before draw	203,179	205,028	195,673
	(231,545)		
Sample size, N	5141	4123	1018

Notes: Standard deviations are given in parentheses. t-tests for the mean difference between the control and treatment group. For variables measured a long time before the draw the observation number is slightly lower as some of the participants then are below 18 years and thus do not qualify for the various programs.

To test whether the experiment is successful, in the sense that it is not trouble with any sorting into the control and treatment groups we estimate the following regression model,

$$treated_i = \boldsymbol{x}_i\boldsymbol{\beta} + \alpha_{p,r,t} + \mathrm{u}_i$$

where the treatment indicator is the outcome variable. The X vector contain the individual characteristics shown in Table 1 and $\alpha_{p,r,t}$ is a fixed effect vector containing all unique combinations of county, vocational training program and time (month) of draw, in total 196 combinations as all programs are not present in all months/counties. The rationale behind the latter is that we then isolate identification to the core of the experiment, comparing two (or more) people waiting for the same program, in the same county, at the same time, but with different treatment status. The results are shown in Table 2, with and without the fixed effect $\alpha_{p,r,t}$.

Table 2: Balancing test

	(1)	(2)
Age	0.000	0.000
	(0.001)	(0.001)
Women	-0.006	-0.007
	(0.012)	(0.012)
Immigrant	0.015	0.017
	(0.014)	(0.015)
High School	-0.013	-0.009
	(0.013)	(0.014)
University education	-0.004	0.006
	(0.016)	(0.017)
TDI, 1 month before the draw	0.011	0.010
	(0.017)	(0.019)
TDI, 12months before the draw	0.006	0.007
	(0.016)	(0.017)
TDI, 48 months before the draw	0.019	0.016
	(0.015)	(0.015)
Annual earnings, year before	0.000	0.000
draw (1,000 NOK)	(0.000)	(0.000)
Annual earnings, 4 years before	-0.000	-0.000
draw (1,000 NOK)	(0.000)	(0.000)
N	4,922	4,922
R2	0.0018	0.0322
Fixed effects for county x program x time	No	Yes
F-test for joint significance (p value)	0.562	0.638

Note: The number of observations is slightly lower than full experiment population. The reason is that some of the participants are too young to have meaningful information on the variables measured in the distant past and are thus excluded in this exercise. If we instead impute zero for these observations we get similar results.

As we can see from Table 2, none of the pre-determined covariates are correlated with the treatment. From this, we conclude that the experiment is successful in the sense that it does not seem to be any contamination of the treatment and control group.

Before turning to the analyses it is instructive to describe the participants' history, in terms of labour market status, in the years leading up to the experiment (Figure 4). For each month, we categorize the participants' labour market status based on their benefit take-up and earnings.

The most common activity before participating in the experiment was receiving temporary disability insurance. As the figure illustrates, around 30 per cent of the sample were on temporary disability insurance 4 years before the experiment, and this group increased steadily up to over 70 per cent at the time of the random draw. Only around 20 per cent were employed 4 years before the experiment, and the share of employed falls gradually towards the start of the experiment. The group "Other", are people who are in neither of the other groups, corresponding to what is often referred to as NEET (not in employment, education or training).

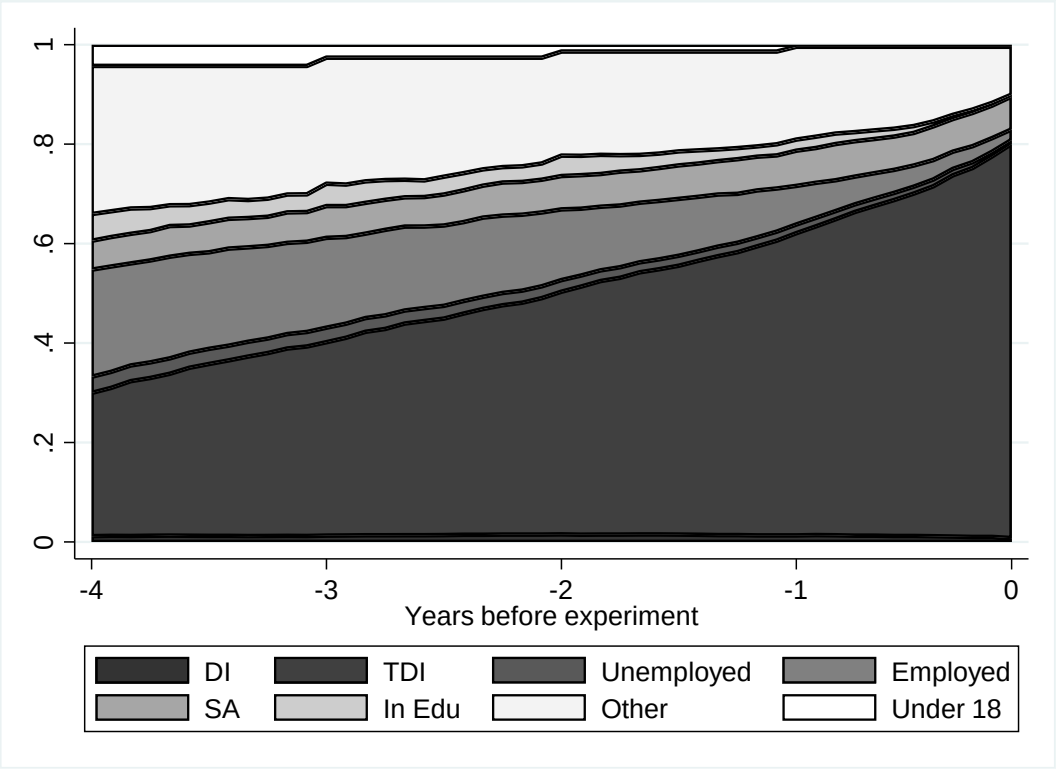

Figure 4: Labour market status up to 4 years before the experiment. DI= Disability insurance. TDI=Temporary disability insurance. SA=Social Assistance. In Edu=In education.

The experiment consisted of five different vocational training programs described in Section 2.1. Two of the programs, the "Work with assistance" and "Follow-up program" are very similar in nature (and were later merged to a single program), and therefore will be pooled together in the following analyses. This gives us four types of programs in the analyses, which we will call Work, Clarification, Health and Shelter. In Table 3, the distribution of the sample between the four types of programs and between the control and treatment group are illustrated.

Table 3: Distribution of participants between programs.

	N	Percentage, %	Control, N	Treatment, N	Treatment, share
CLARIF	2012	39.1%	1591	421	0.209
HEALTH	151	2.9%	127	24	0.159
SHELTER	1326	25.8%	1081	245	0.196
WORK	1652	32.1%	1324	328	0.199
Sum	5141	100%	4123	1018	0.198

5. Results

5.1 Waiting time

The core of the experiment is to reduce waiting time for the treatment group. Before turning to outcomes, such as employment and benefit take-up, we start with describing the resulting differences in waiting time between the two groups.

Table 4 presents the average number of waiting days, defined as the number of days from the random draw until some new activity began (either participating in a program, starting to work or starting to receive disability benefits.

On average, the control group waited almost 135 days, whereas those in the treatment group waited 103 days (we return to a statistical test of the effects on waiting time below). There is some variation in waiting time between the different programs, reflecting different capacities as well as different demands for the different programs. However, the average waiting time is lower in the treatment group compared to the control group for all programs.

Table 4: Waiting time in days from the day of the random draw to start in vocational rehabilitation program, job or start of permanent disability insurance spell (averages).

	N	Control	Treatment	diff
All programs	5141	134.9	102.7	32.2
CLARIF	2012	138.7	116.8	21.9
HEALTH	151	113.1	58.4	54.7
SHELTER	1326	157.8	107.5	50.3
WORK	1652	113.7	84.1	29.6

To further shed light on how the participants were affected, we plot the share of participants that has started in a program for each week after the draw in Figure 5. The upper panel, showing the results for all participants together, shows that between 5 and 35 weeks after the draw, the fraction of participants who actually start in a program differs substantially between the control and treatment group.

After 1 year, some participants have not started in a program, but the differences between the groups seem very small.

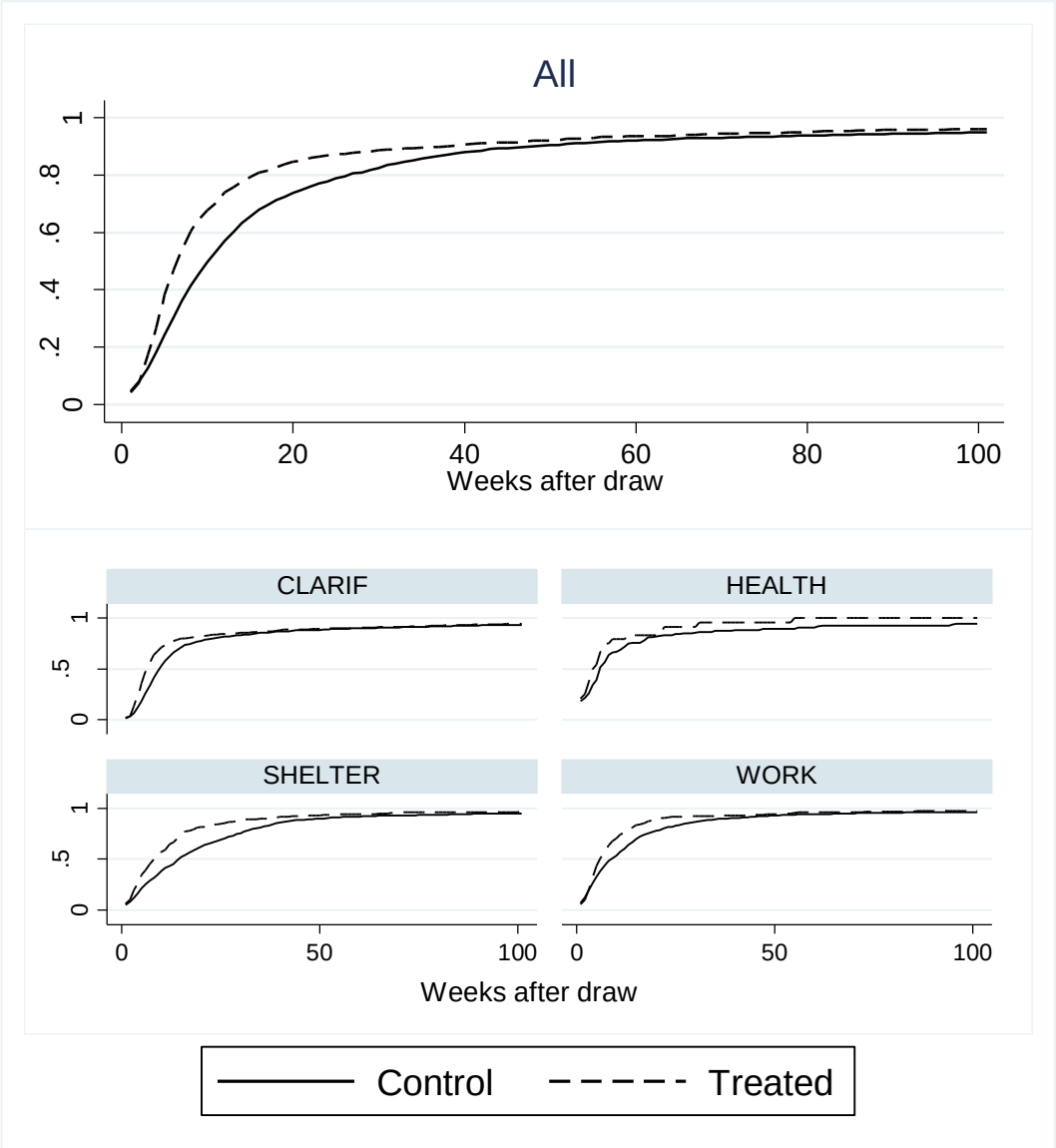

Figure 5: Share of participants in a program by week after draw

Figure 6 shows that that the treatment group does not receive a longer treatment than the control group, and this holds both for the first program after the draw and for all programs attended.

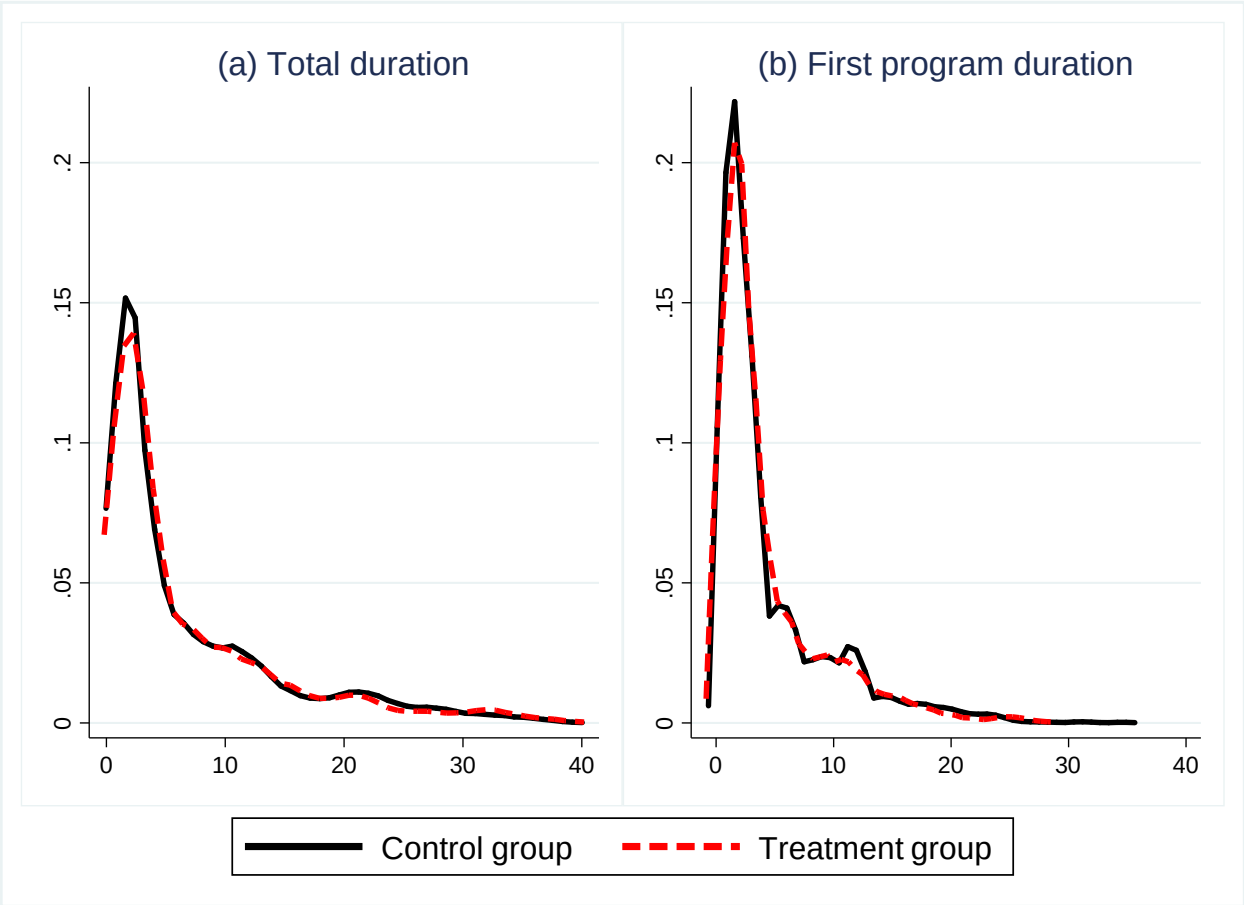

Figure 6: Program duration: Panel (a): total program duration of all programs participated in after the random draw. Panel (b): program duration of the first program after the random draw.

5.2 Effects on labour market outcomes

We start out by studying effects on outcomes measured at the end of the data period. We include all participants (draws), but keep in mind that at the end of the data period, the duration since draw will vary between the participants. We thus control for the calendar time of the draw using flexible dummy variables for all unique combinations of *year* and *month*. A consequence of this estimation strategy is that we assume the treatment effect to be the same, regardless of duration since the draw. We will investigate this below by estimating the model repeatedly for outcomes measured at different durations since the draw.

Throughout we employ the following empirical model,

$$y_i = \boldsymbol{x}_i\boldsymbol{\beta} + \alpha_{p,r,t} + \theta\text{treated} + \text{e}_i$$

where *x* is a set of individual covariates, including; age, age squared, gender, whether or not the person is foreign born, and level of education (9 levels), $\alpha_{p,r,t}$ is a fixed effect vector containing all unique combinations of county, vocational training program and time (month) of draw, in total 196 combinations. The rationale behind the latter is that we then isolate identification to the core of the experiment, comparing two (or more) people who are waiting for the same program, in the same county, at the same time, but who with different priority on the (same) waiting list. As can be seen from the balancing tests above, whether or not we include individual covariates should not affect the results (and it does not). We have chosen to include individual covariates only to reduce to residual variance. The dummy variable *treat* captures whether or not person *i* is in the treatment group and θ is thus the treatment effect of interest. The main results are presented in Table 5.

Table 5: The effect of treatment on waiting time and labour market outcomes

	September 2016			*December 2015*			*Dec. 2016*
	Waiting time (days)	Monthly earnings (NOK)	Employment	TDI	DI	TDI or DI	TDI
Treated	-35.21***	-50.92	0.007	-0.039**	0.026**	-0.011	-0.024
	(6.03)	(395.61)	(0.013)	(0.017)	(0.012)	(0.015)	(0.017)
y mean, C	134.9	5513	0.162	0.619	0.164	0.760	0.417
b/y mean	0.26	-0.009	0.043	-0.063	0.159	-0.014	-0.058
N	5141	5141	5141	5141	5141	5141	5141

Note: Table 5 displays the estimated effect of being given priority on the waiting list for participation in a vocational training program on actual waiting time and subsequent labour market outcomes. The second line, y mean, C displays the sample mean of the dependent variable in the control group. Part from waiting time (days) and monthly earnings (NOK), all outcomes are dichotomous such that the coefficient is the effect in percentage points. * = p < 0.1, ** = p < 0.05, *** p < 0.01

Starting to the left in Table 5 we see the effect of treatment on actual waiting time. Treatment reduces waiting time by 35 days. The mean waiting time in the control group is 135 days such that treatment implies a reduction of 26 per cent, on average.

The next two columns show the effect on earnings and employment. The coefficient for earnings is NOK -51, not nearly statistically significant, and small both in absolute and relative terms (< 1 per cent). The coefficient for employment is also small (0.007) and far from statistically significant. From this, we conclude that we cannot reject the null hypothesis that reduced waiting does not improve participants' labour market prospect. Furthermore, we can be fairly confident that the effect on labour earnings is quite small, e.g. the upper limit of the 95 per cent confidence interval is approx. NOK 720.

The next three columns show the effects on benefit uptake measured in December 2015. Treatment reduces the fraction receiving temporary disability benefits (TDI) by 3.9 percentage points. However, it also increases the fraction receiving permanent disability benefits (DI) by almost the same, 2.6 percentage points. Hence, the effect of treatment on receiving *either* TDI or DI is -0.011 and not statistically significant from zero. In the rightmost column, we see the effect on TDI uptake in the end of December 2016. The effect of treatment is then slightly smaller than one year before, -2.4 percentage points, and not statistically significant from zero.

Our reading of these findings is that treatment speeded up the screening process towards permanent disability for people who, in the absence of treatment, would have got access to permanent disability insurance anyhow. This can at best be interpreted as a partial success in the sense that one of the aims of these programs is exactly to screen participants for DI. However, the results also indicate that these programs have a very limited, or none, effect of transitions to employment.

As mentioned above, the model estimated so far is restrictive in the sense that it estimates one treatment effect (i.e. for a 26 per cent or 35 day reduction in waiting time) for all durations since treatment started when the draw took place. Below we change this by estimating the model separately by month since the draw took place. This way we can estimate the effect of treatment one month after the draw, two months after the draw and so on. The drawback of this strategy is that the sample becomes smaller as we move further away from the draw, since these outcomes are not yet available (or realized). The results are presented in Figure 7 below.

Starting in panel (a) we see monthly earnings for the control group (solid line) and treatment group (dashed line). The vertical line illustrates the month before the draw took place. To the left in the graph we start 48 months before (4 years) and to the right in the graph we are 25 months after the draw. We see that earnings in the control and treatment groups are very similar, both before and after treatment. In panel (b) we plot the regression coefficient for the treatment group estimated separately month by month after treatment. The dotted lines illustrate the 95 per cent confidence interval. We see that the point estimate is very close to zero at all durations.

Panels (c) and (d) show the same for the employment rate. Both groups are very similar both before and after treatment, and the estimated treatment effect is zero at all durations. Hence, we see that the results for earnings and employment at all durations since the draw resembles the effects already presented in Table 5 above.

Panels (e)-(j) displays pre and post outcomes as well as treatment effects for TDI, DI and either TDI or DI. We see no effects of treatment for approximately the first 12 months. Thereafter TDI is decreasing and DI is increasing. The lack of any effects on uptake of either of these programs (panel j) confirms the impression from above; that treatment speeds up screening for DI. At the end of the data window, 25 months after the draw, we see that the effects on DI and TDI goes back to zero, indicating that treatment leads to a temporary program substitution effect, but has no consequences in the long run.

From the results in Table 5 and Figure 7 we can draw three substantive conclusions. First, we see no evidence of any pre-program effect (e.g. “threat effect”). Such an effect should have been visible as a temporary increase (reduction) in employment/earnings (TDI) the first months after the draw. Clearly, we cannot discard that such an effect exists, but there is no evidence of such an effect in our data. Secondly, we see a substantial post-program effect on TDI and DI as treated participants substitute TDI with DI in the window ranging from approx. 12 to 24 months after the draw, which is when treated participants often will have completed their program whereas the control group have not. For employment and labour earnings, we see no such effect. If there was a post-program effect of a substantive (enough) size, we should have seen a temporary increase in employment/earnings approx. between 12-24 months after the draw. The complete lack of such evidence leads us to conclude that these programs in themselves have no positive effects on labour market outcomes. Thirdly, we find no evidence of a long-run effect of reduced waiting time, on any of the outcomes. As time elapses, we find that the difference between treated and non-treated participants disappears. If reduced waiting time indeed had a separate effect beyond the post-programme effect, we should expect to find a difference between the treatment and control group that remained after the control group had been through the same programs. The lack of such an effect in our data makes us conclude that, for these vocational rehabilitation programs, there are no lasting effects of reduced waiting time.

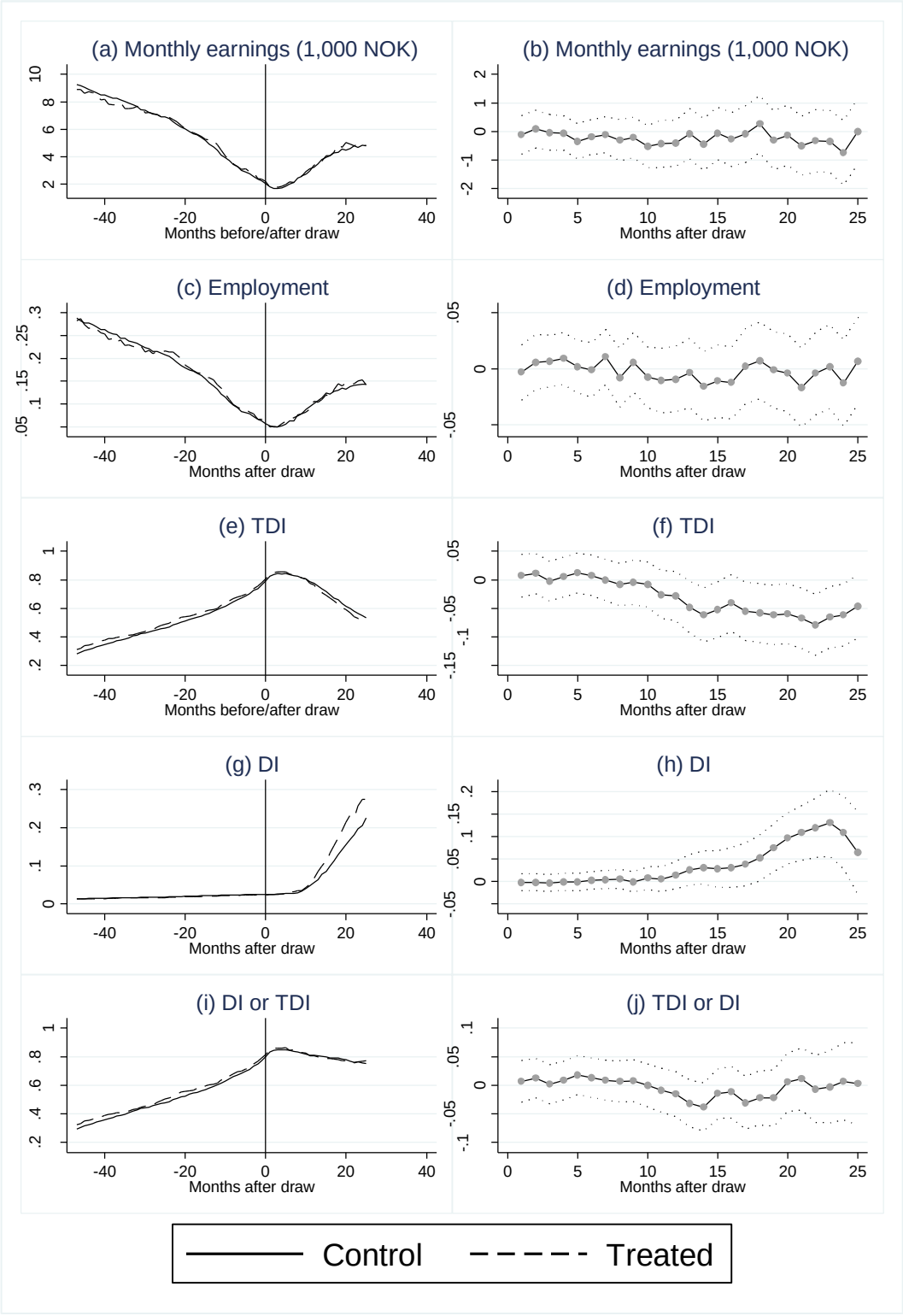

Figure 7: Left panel illustrates outcomes variables in the control and treatment group respectively in the months before and after the random draw. Right panel illustrates coefficients from regressions for the difference between the control and treatment group.

In Table 6 below we move on to study effects of treatment by program. Unfortunately, this makes the samples a lot smaller since we divide into four different programs. In particular, the program we label HEALTH, which is medical rehabilitation, has very few participants in the experiment, such that sample size is merely 151 persons of which 24 are treated. For completeness, we still include this program among the results.

Table 6: The effect of treatment on waiting time and labour market outcomes, by program

	September 2016			*December 2015*			*Dec. 2016*
	Waiting time (days)	Monthly earnings (NOK)	Employment	TDI	DI	TDI or DI	TDI
			WORK: Work first programs, in ordinary firms, N=1652				
Treated	-34.31***	-161.41	0.004	0.005	0.018	0.012	-0.015
	(9.39)	(829.28)	(0,027)	(0.030)	(0.018)	(0.029)	(0.030)
y mean, C	113.7	8213	0.247	0.585	0.092	0.659	0.401
b/y mean	-0.302	-0.020	0.016	0.009	0.196	0.018	-0.037
			HEALTH: Medical rehabilitation, N=151				
Treated	-71.12*	-739.85	-0.009	0.109	-0.018	0.109	0.055
	(40.78)	(3627.02)	(0.106)	(0.123)	(0.063)	(0.117)	(0.118)
y mean, C	113.1	9260	0.276	0.591	0.071	0.653	0.433
b/y mean	-0.629	-0.080	-0.033	0.184	-0.254	0.167	0.127
			SHELTER: Train first programs, in sheltered firms, N=1326				
Treated	-53.11***	204.42	0.005	-0.063*	0.049**	-0.024	-0.047
	(12.18)	(601.42)	(0.021)	(0.033)	(0.025)	(0.027)	(0.035)
y mean, C	157.8	3091	0.090	0.690	0.147	0.818	0.468
b/y mean	-0.337	0.066	0.056	-0.091	0.333	-0.029	-0.100
			CLARIF: Screening program to evaluate work capacity, N=2012				
Treated	-23.91**	-105.09	0.010	-0.065**	0.022	-0.025	-0.020
	(10.27)	(584.89)	(0.019)	(0.027)	(0.022)	(0.021)	(0.026)
y mean, C	138.7	4615	0.131	0.601	0.242	0.813	0.394
b/y mean	-0.172	-0.023	0.076	-0.108	0.091	-0.031	-0.051

Note: Table x displays the estimated effect of being given priority on the waiting list for participation in a vocational training program on actual waiting time and subsequent labour market outcomes. The second line, y mean, C displays the sample mean of the dependent variable in the control group. Part from waiting time (days) and monthly earnings (NOK), all outcomes are dichotomous such that the coefficient is the effect in percentage points. * = p < 0.1, ** = p < 0.05, *** p < 0.01

In all four programs, treatment reduced waiting time substantially, with relative reductions ranging from 17 to 62 per cent. We, however, do not find statistically significant effects on neither wages nor employment for any of the programs. For all programs, except HEALTH (medical rehabilitation) where we only have 23 treated persons, the coefficient for earnings and employment are very small and close to zero. When we turn to TDI and DI, we see that treatment effects differ across programs. For WORK, the coefficients are small, but positive, showing that, if anything, treatment actually increased benefit take-up. The programs CLARIF and SHELTER have negative and sizable coefficients, approximately 6.5 percentage points, and these two programs entirely drive the reduction seen in TDI in the full sample.

For SHELTER, the 4.9 percentage point increase in (permanent) DI almost offsets this reduction. Nevertheless, for both SHELTER and CLARIF, the treatment group has around 2.5 percentage points fewer benefit recipients (TDI or DI) by the end of 2015, and by the end of 2016 they have fewer recipients of TDI. The standard errors are however large, such that except from the benefit substitution from TDI to DI we cannot draw any firm conclusions.

In table A1, displayed in the Appendix, we present results for various subgroups, i.e. by gender, age, education and whether or not one received TDI at the time of draw. The main conclusions are however unaltered.

6. Conclusion

In this paper, we have tested the importance of reducing waiting time for vocational rehabilitation programs using a large-scale field experiment. The experiment affected social security clients with reduced work capacity due to health problems. Most of the participants are receiving temporary disability benefits, and they have been doing so for quite a long time. Together with their caseworker they apply for specific vocational rehabilitation programs, either because the want to or because they have to. After applying, they usually have to wait for 3-4 months. The purpose of the field experiment is to reduce this waiting period for a random fraction of the participants to see whether their outcomes improve. Conceptually, the experiment is meant to mimic a situation where vocational rehabilitation program capacity is increased such that clients waiting time is reduced.

As the study population consists of relatively young people, 42 years old on average, who are on the verge of becoming disability benefit receivers potentially for the rest of their lives, increasing employment in this group, can potentially save society for large costs. On the other side, spending money on policies that do not work would imply unnecessary costs to society. Therefore, knowledge about which policies work and which do not work is equally valuable.

On average, the field experiment reduced waiting time by 35 days, or roughly 25 percent. Prior to evaluating, we expected three possible types of effects to emerge. First, we could expect a pre-program effect, sometimes referred to as a “threat effect” that should speed up the return to employment among clients who did not prefer to participate in the programs. In our data, this should be seen as increased employment/labour earnings in the first 1-4 months after the draw. We see no evidence for such an effect. Second, we could expect a temporary post-program program. In the data, this should be seen as a

temporary divergence between outcomes for the treatment and control groups. We do see this for whether or not clients received temporary or permanent DI. To be precise, we see that treated participants, in the interval 12-24 months after the draw, more often substitute temporary DI for permanent DI. For employment and labour income, we find no such change. Finally, we could expect that reduced waiting time would affect client outcomes also in the long run. This should be seen as a divergence in outcomes between the control and treatment groups that remains stable also long after the draw. We do not see any such differences. Hence, we conclude that reduced waiting time for the vocational rehabilitation programs included in this experiment did not improve labour market outcomes. Instead, it resulted in a swifter transfer from temporary to permanent DI. A part from this we find no effect of the treatment.

Our reading of the perhaps disappointing results is the following. The lack of pre-program effects is probably because these clients at the time of draw already are quite detached from the labour market. Contrary to clients on sickness benefits or job seekers, these participants do generally not have a job to which they can return, and due to their health problems, they will often have a hard time finding a new job. Neither is the lack of long-term effects surprising. After all, the reduction in waiting time was merely around 35 days. Hence, the perhaps clearest finding is the complete lack of post- program effects, apart from the increase in permanent DI. Our reading of this is that the vocational rehabilitation programs in question have very limited effects on labour market return.

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Appendix

Table A1: Additional results, separate estimations for subgroups.

	September 2016			*December 2015*			*Dec. 2016*
	Waiting time (days)	Monthly earnings (NOK)	Employment	TDI	DI	TDI or DI	TDI
			MEN: N=2,235				
Treated	-23.80**	-960.73	-0.023	-0.069**	0.061***	-0.013	-0.005
	(9.23)	(631.99)	(0.019)	(0.026)	(0.018)	(0.023)	(0.026)
			WOMEN: N=2,906				
Treated	-39.89***	431.05	0.025	-0.008	0.001	0.001	-0.029
	(7.89)	(495.67)	(0.017)	(0.022)	(0.017)	(0.018)	(0.022)
			AGE 18-40: N=2,127				
Treated	-28.19***	279.21	0.024	-0.035	0.022	-0.017	-0.039
	(8.90)	(622.61)	(0.020)	(0.026)	(0.014)	(0.024)	(0.027)
			AGE 40+: N=3,014				
Treated	-37.62***	-449.58	-0.009	-0.037*	0.029	-0.001	-0.003
	(8.09)	(505.74)	(0.016)	(0.022)	(0.018)	(0.018)	(0.022)
			COMPULSORY EDUCATION ONLY: N=2,861				
Treated	-41.56***	-273.74	0.000	-0.046**	0.049***	0.007	-0.027
	(8.10)	(471.79)	(0.016)	(0.022)	(0.016)	(0.020)	(0.022)
			MORE THAN COMPULSORY EDUCATION: N=2,280				
Treated	-22.16**	-65.70	0.008	-0.024	-0.002	-0.026	-0.008
	(8.90)	(658.64)	(0.021)	(0.025)	(0.019)	(0.021)	(0.026)
			NOT RECEIVING TDI AT DRAW: N=1060				
Treated	-34.93**	-1743.2	0.015	-0.045**	0.022	-0.016	0.005
	(16.34)	(1059.3)	(0.015)	(0.021)	(0.017)	(0.016)	(0.022)
			RECEIVING TDI AT DRAW: N=4081				
Treated	-32.68***	253.3	0.016	-0.051***	0.028**	-0.012	-0.024
	(6.31)	(408.6)	(0.013)	(0.018)	(0.014)	(0.014)	(0.189)

Note: Table x displays the estimated effect of being given priority on the waiting list for participation in a vocational training program on actual waiting time and subsequent labour market outcomes. The second line, y mean, C displays the sample mean of the dependent variable in the control group. Part from waiting time (days) and monthly earnings (NOK), all outcomes are dichotomous such that the coefficient is the effect in percentage points. * = p < 0.1, ** = p < 0.05, *** p < 0.01

A2: Simulation code, power calculation

simulation code, power calculation:

```
* Binary case:
clear
set obs 5270
gen i = 1
replace i = sum(i)
```

```
gen sig95 = .
gen sig90 = .
gen sig80 = .
gen b = 0.045
forvalues k = 1/5000 {
gen treat = uniform() < 0.2
gen y = (uniform()+treat*b) < 0.15
quietly reg y treat
replace sig95 = abs(_b[treat])-1.96*_se[treat] > 0 if `k' == i
replace sig90 = abs(_b[treat])-1.645*_se[treat] > 0 if `k' == i
replace sig80 = abs(_b[treat])-1.282*_se[treat] > 0 if `k' == i
drop treat y
}
summ sig*

* Continuous case
clear
set obs 5270
gen i = 1
replace i = sum(i)
gen sig95 = .
gen sig90 = .
gen sig80 = .
gen b = 0.14
forvalues k = 1/5270 {
gen treat = uniform() < 0.2
gen y = rnormal(0,1)+b*treat
quietly reg y treat
replace sig95 = abs(_b[treat])-1.96*_se[treat] > 0 if `k' == i
replace sig90 = abs(_b[treat])-1.645*_se[treat] > 0 if `k' == i
replace sig80 = abs(_b[treat])-1.282*_se[treat] > 0 if `k' == i
drop treat y
}
summ sig*
```

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