The impact of the work resumption program of the disability insurance scheme in the Netherlands

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Abstract

This paper evaluates the work resumption program of the disability insurance scheme introduced in 2006 in the Netherlands, which rewards partially disabled workers if they utilize their remaining earning capacity above a threshold rate. Using administrative data on all partially disabled workers between 2006 and 2013, the results of difference-in-difference regressions suggest a substantial and statistically significant increase in daily earnings of 5 euros corresponding to 8 percent of the average daily earnings during disability. The increase in daily earnings attains 7.7 euros for employees with pre-disability earnings of at least twice the minimum wage, and 8.2 euros for employees younger than 45 years of age. We disentangle between anticipation and response effects, and show that the anticipation effect contributes to the program effect by a much larger amount.

1 Introduction

The Netherlands introduced a new disability benefit scheme in 2006. Under the old scheme, both the number of benefits and the cost of the system have reached unexpected levels, resulting in a yearly inflow into the system of around 1.5 percent of the working population, and a share of beneficiaries of over 10 percent in the working population. The Dutch government implemented a series of successful reforms from 1998 and onwards, aiming in the first place at reducing the inflow into the system by introducing various incentives for both the employers and employees to reintegrate sick employees back to their job. Moreover, the entrance criteria to enter the new scheme became stricter than before, resulting in a yearly inflow of around 0.5 percent, three times as small as before, from 2006 and onwards (van Sonsbeek and Gradus, 2013). In the new scheme, also a strong financial incentive was introduced for partially disabled workers to resume working up to their possibilities. Taken together, the described measures of the new DI scheme are part of a more general DI reform with three main objectives aiming at making the social security system more efficient: stricter assessment criteria for coverage, tighter entitlement rules, and effective reintegration incentives. Whereas the effects of the stricter assessment criteria and the tighter entitlement rules are large and clear, as suggested by the aforementioned figures, the effect of the financial incentives in the system is much less clear. From a policy perspective, it is important to find out if these financial incentives are contributing to their aims, being a lower number of disability beneficiaries and a higher number of workers.

A growing number of studies is analyzing the effects of financial incentives in disability benefit systems. A distinction can be made among the studies in this body of the literature.

A first set of studies analyse the relationship between the generosity of the benefits in a given system and the labour force withdrawal. The second set of studies analyze the relationship between work incentives and labour force participation. The most influential study of the first kind is Gruber (2000) who exploits variation in DI benefit levels in Canada, and finds a large (implied) elasticity of non-participation with respect to benefits of size 1.5. Mullen and Staubli (2016) find a comparable elasticity of 1.2 based upon the Austrian DI reforms. An influential study of the second kind is Kostol and Mogstad (2014) who find elasticity estimates between 0.1 and 0.3 for the work incidence of disabled workers in Norway. Along the same line of research, Koning and van Sonsbeek (2017) find a labour force non-participation elasticity rate of 0.12 for the work incentive that was introduced with the 2006 DI reform in the Netherlands. Apparently, the effect of introducing work incentives on benefit claiming is much smaller than the effect of making the DI benefits less generous. This may be a consequence of the fact that the longer an individual is claiming a benefit, the more difficult it is to resume working. Another finding of the aforementioned studies is that when the assessment criteria are stricter and the entitlement rules are tighter, the effects of the financial incentives are smaller because the target beneficiary population has more limitations. This also explains the comparatively small effects found in the Netherlands.

In the current DI system in the Netherlands, sick employees first stay for two years with their employer before they are allowed to claim a DI benefit. Subsequently, they qualify for a generous disability benefit of 70 percent of their former wage for a period of between 3 and a maximum of 38 months. After this period, however, in case a partially disabled worker does not work a threshold number of hours, his benefit drops to a substantially lower level. Although the financial incentive is strong, it is offered only after a period of sickness of up to 5 years and 2 months, which complicates successful return to the labour market. In particular, it is known from the literature that resuming work from disability is easiest when this happens with the former employer and as soon as possible after falling ill (Koning and Lindeboom, 2015).

From a research design perspective, the interesting variation in benefit levels is due to the sharp drop in the benefit level if the agent does not work a threshold number of hours at the end of the first period of the disability benefit receipt. Within the disability part of the benefit, the incentive only occurs to people earning more than the minimum wage before disability, and gets stronger the more their earnings exceed the minimum wage. Koning and van Sonsbeek (2017) study the effect of this financial incentive on daily earnings during disability. They use a replacement rate measure as a proxy for the financial incentive, and find an increase of 2.68 euros in daily earnings. They also find a significant increase in labour participation of the partially disabled worker that is proportional to the size of the incentive. In our study, we estimate a difference-in-difference model which is the workhorse approach to identify the effects of social security programs in the literature on economic policy evaluation. The model exploits the variation in the pre-disability earnings across beneficiaries which underlies the financial incentive of the work resumption program itself. We find that the incentive increases daily earnings by a large and significant amount of 5.03 euros for the average beneficiary. Our empirical approach also allows to investigate the labor market responses to higher financial incentives offered by the program in more detail, but also to disentangle between anticipation and response effects of the program. The former analysis reveals large and significant effects in line with the intended effect of the program but also shows a non-linear response pattern. The latter analysis shows that the anticipation effect contributes to the program effect much more than the response effect does. Furthermore, we use a dataset covering the period from 2006 to 2016, instead of from 2006 to 2013, adding observations for three more years in which the economy was recovering from the economic crisis. This allows us to obtain a more precise estimate of the program effect, but also to study if the economic crisis had an impact on the

intended effect of the work resumption program. Finally, we explore heterogeneity in outcome measures in more detail, including sectors of industry and types of employment contracts.

This paper proceeds as follows. Section 2 describes the disability insurance (DI) scheme, and the work resumption program of the scheme. Section 3 describes the data. Section 4 presents descriptive statistics and exploratory graphical analysis. Section 5 describes the empirical approach. Section 6 presents the results. Section 7 discusses the robustness of the baseline results to alternative model specifications. Section 8 discusses policy implications and concludes.

2 Institutional setting

The Netherlands introduced a new disability benefit scheme (Work and Income according to Labour Capacity Act) in 2006. Agents who lose any fraction of their earning capacity due to a health impairment start to receive the 'sickness benefit' from their employer for a period of two years. When the sickness benefit expires, agents become eligible for the 'wage-related benefit'. The benefit is calculated as $0.7 \times PW$, where PW represents the daily wage before the agent has become sick. Agents who lose at least 35 percent of their earning capacity are eligible for the benefit.[2] The benefit is paid for at least 3 months up to a maximum of 38 months, depending on the employment history of the agent. Each year of employment contributes by one month to the duration of the benefit.[3] The benefit has a disability component for a certain grade of disability, and an unemployment component for the remaining part.

When the wage-related benefit expires, the agent is eligible for one of two types of benefits depending on how much he utilises his remaining earning capacity. If the agent utilises more than half of his remaining capacity, he is eligible for the 'wage-supplement' benefit. Otherwise he is eligible for the 'follow-up benefit'.

The wage-supplement benefit is calculated as $0.7 \times D \times PW$, where D represents the disability grade. Compared to the wage-related benefit, the wage-supplement benefit is lower because it does not have an unemployment component. The follow-up benefit is calculated as $0.7 \times D \times \overline{PW}$, where $\overline{PW}$ represents the daily wage before the agent has become sick but is capped by the minimum wage. The difference between the two benefit amounts is $0.7 \times D \times \left(PW - \overline{PW}\right)$, and represents the program incentive of the DI scheme. In particular, the program offers the partially disabled workers with a higher disability grade, or with pre-disability earnings above the minimum wage, an incentive to resume working, or to increase their number of work hours up to their possibilities, if they utilise more than half of their remaining earning capacity.

3 Data

We use administrative data supplied by the Employee Insurance Agency (UWV). The data contains monthly observations for all employees insured under the DI scheme, and have entered the DI scheme from January 2006 until June 2012. We observe people until December 2015. The data contains information on personal, work, and disability characteristics. In particular, we have information on age, gender, marital status, sector, pre-disability wage, post-disability wage (if applicable), grade of disability, type of impairment, and earning capacity, among a number of other benefit related variables.

[2] If the capacity loss is 80 percent or more, and there is no potential for any degree of recovery, the agent is rewarded the 'income provision for fully disabled benefit'. In this study we do not analyse the labor supply response of this group.

[3] The duration also depends on whether the agent was 18 years old on January 1, 1998. This particular rule is due to the fact that until year 1998 employment was not (accurately) recorded in the policy administrations by the executive body.

We impose the following sample restrictions. First, insured agents leave the DI scheme if their insurance expires or is terminated. However, agents can re-enter the scheme. We drop the agents who make multiple entries to the scheme. Second, in the second phase of the DI scheme, the agent who receives the wage-supplement benefit will stop receiving the benefit but start receiving the alternative follow-up benefit if he decides to utilise less than half of his remaining earning capacity. The follow-up benefit can also be replaced by the wage-supplement benefit if the agent decides to utilise more than half of his remaining earning capacity. Furthermore, a second phase benefit can be replaced by the first phase wage-related benefit due to a reassessment of the disability condition of the agent. We drop the agents who switch between different types of benefits during their participation in the scheme. This means that our sample includes only the agents that either start to receive the wage-supplement benefit or the follow-up benefit in the second phase of the scheme after their first phase wage-related benefit expires. The reason for these sample restrictions is that these agents face the program incentive multiple times but the treatment effect analysis using the difference-in-difference approach requires that agents face the program incentive only once during their participation in the scheme. Finally, we drop the agents who never earn wage income during their participation in the scheme. These agents never face the program incentive as they do not utilise any fraction of their remaining earning capacity. These sample restrictions lead to an unbalanced panel of 382,372 observations for 6,920 individuals.

4 Descriptive statistics

Table 1 presents sample statistics by pre-disability wage groups before and after the work incentive. Five wage groups are defined. The first group is the control group, and includes the agents with pre-disability earnings below the minimum wage and hence do not face the program incentive (see Section 2). The other groups are the treatment groups, and include agents who differ by the amounts their pre-disability earnings are above the minimum wage. A first main finding is the following. A large fraction of about 80 percent of the agents in both the control and treatment groups utilise their remaining earning capacity above the threshold rate of 50 percent already during the period before they face the program incentive. This means that the majority of the agents become eligible for the program when their first-stage benefit (wage-related benefit) expires. This shows that the work incentive operates largely among the agents who already utilise more than half of their remaining earning capacity, and offers these agents an incentive to increase their work effort.

Comparing the fractions of agents who utilise their remaining earning capacity above the threshold rate of 50 percent before and after the work incentive, there are notable differences for all pre-disability wage groups. The fractions are larger after the work incentive compared to those before the work incentive for all pre-disability wage groups. This suggests that the agents who work less than the threshold rate during the wage-related period respond to the program incentive and increase their work effort to meet the threshold rate to become eligible for the program incentive when their wage-related benefit expires. For the pre-disability wage groups with earnings above the minimum wage, these are the labour supply effects we would expect. However, the increase in the capacity utilisation rate in the pre-disability wage group with earnings below the minimum wage contradicts our expectation. It might be that this group is aware of the program but does not have complete information of the eligibility criteria of program, and still increases work capacity in anticipation to become eligible for the program.

Table 1 shows that, in all wage groups, daily earnings increase when agents become eligible for the program. The increases are more pronounced for the groups with higher pre-disability earnings. This is what we would expect since the program offers a higher work incentive to the

agents with higher pre-disability earnings. These labor supply effects are in line with the labor supply effects in terms of the remaining capacity utilisation rates discussed above.

Other notable differences across the wage groups are the following. First, the fraction of males is much higher in the groups with higher pre-disability earnings. The large earnings gap between males and females is not surprising since women typically occupy part-time jobs in the Netherlands. Second, the duration of the wage-related benefit is longer for agents with higher pre-disability earnings. This is perhaps because workers with higher earnings are more attached to their work, and spend more years in the labor market, which increases the duration of the wage-related benefit which is a function of the years worked before disability. Finally, the number of agents in the control group is much smaller than in any other treatment group. This limitation of the data results in large standard errors for coefficient estimates in sub-group regression analysis conducted to investigate heterogenous treatment effects.

The work incentive could start to generate labor supply responses before agents face the work incentive, or it could continue to generate responses after agents face the work incentive. Therefore, we investigate the impact of the work incentive over time, around the incentive change. Figure 1 plots univariate nonparametric regressions of the daily wage against the time around the expiry date of the wage-related benefit for agents with pre-disability earnings below and above the minimum wage, allowing for a jump at the expiry date of the wage-related benefit. There is an obvious discontinuity at the cut-off date, and the jump is in the expected direction for partially disabled workers with pre-disability earnings above the minimum wage. The bounds do not cross the curves, suggesting that the jump is statistically significant. The jump shows that the daily wage changes significantly at the expiry date, providing informal evidence that the program is effective. However, the plot is based on univariate regression and does not control for the effect of age or calendar time. We also observe a jump at the cut-off date for the partially disabled workers with pre-disability earnings below the minimum wage. The jump is statistically not significant but this can be due to the small number of observations available for this earnings group (see Table 1). For both pre-disability earnings groups, there is clear evidence of an anticipation effect. Daily earnings increase substantially until workers are eligible for the program incentive but stabilise afterwards. The increase is somewhat more pronounced for the group with higher pre-disability earnings. Furthermore, daily earnings continue to increase, although at a slow rate, after the date of the work incentive for this group.

As discussed above, the work resumption program offers a financial incentive if pre-disability earnings are above the minimum wage, and the incentive is stronger the more the pre-disability earnings exceed the minimum wage. To study the effects of different treatment intensities, Figure 2 plots univariate nonparametric regressions of the daily wage against the time around the date of the work incentive for four different pre-disability earnings groups. In each group the pre-disability earnings is a certain factor of the minimum wage. The factors are 1-1.5, 1.5-2, 2-2.5, and at least 2.5. The plots allow for a jump at the date of the work incentive as in Figure 1. The figure shows substantial anticipation and response effects for those disabled workers who used to earn above a threshold level. That is, until the month of the work incentive, disabled workers who used to earn at least 1.5 times of the minimum wage increase their earnings much more than those with lower pre-disability earnings do, suggesting a strong anticipation effect for this income group. The same group of disabled workers continue to increase their earnings after they become eligible for the work incentive, suggesting that the response effect continues to prevail, and even increases, for a considerable number of months after the date of the work incentive. The figure suggests that the anticipation effect is much larger than the response effect.

The increase in daily earnings around the time of the work incentive could (partly) be

explained by recovery from disability. We could analyse whether disability grades decrease over the course of the work incentive. Such an analysis is not necessarily reliable because a beneficiary is seldom reassessed of his disability grade in practice. However, for a number of reasons, this concern should be small. First, Table 1 shows that the fraction of beneficiaries with a disability grade larger than 50 percent is larger after the work incentive than before the work incentive, suggesting that recovery from disability does not contribute to the program effect. Second, if recovery plays a role, it is difficult to explain why recovery improves in a discontinuous manner at the date of the work incentive in Figure 1. Finally, there is no reason to expect recovery to be stronger for groups with higher pre-disability earnings in Figure 2.

Table 1: Sample statistics by pre-disability wage groups before and after the work incentive

	PW $\leq$ 1.0 $\times$ MW		PW = 1.0–1.5 $\times$ MW		PW = 1.5–2.0 $\times$ MW		PW = 2.0–2.5 $\times$ MW		PW $\geq$ 2.5 $\times$ MW	
	Before	After	Before	After	Before	After	Before	After	Before	After
Age	46.54	48.72	46.64	48.90	48.17	50.48	49.93	52.26	52.15	54.49
Male (%)	0.15	0.15	0.32	0.32	0.50	0.50	0.66	0.66	0.75	0.75
Married (%)	0.56	0.56	0.47	0.46	0.54	0.54	0.60	0.60	0.67	0.67
Pre-disability daily wage	52.26	54.15	81.95	85.03	113.41	117.78	143.42	148.93	180.15	186.98
Daily wage while disabled	25.81	34.79	36.91	45.02	49.20	59.77	61.20	74.22	90.52	104.01
Capacity utilisation > 50% (%)	0.78	0.84	0.80	0.85	0.79	0.86	0.78	0.86	0.82	0.87
Disability grade > 50% (%)	0.31	0.32	0.29	0.32	0.46	0.48	0.40	0.42	0.43	0.45
Dur. of wage-related benefit	25.85		26.21		28.05		30.22		32.21	
Dur. of wage-supplement benefit		37.78		38.87		38.92		36.49		34.62
Dur. of follow-up benefit		38.85		41.75		38.37		34.35		34.88
Social minimum supplement (%)	0.12	0.20	0.03	0.09	0.00	0.05	0.00	0.04	0.00	0.02
Number of observations	17,478		78,167		107,644		87,186		91,762	
Number of individuals	334		1,444		1,948		1,558		1,634	

Notes: 'PW' denotes pre-disability daily wage. 'MW' denotes minimum wage. 'Before' denotes the period from the date the agent starts to receive the wage-related benefit until the date the benefit expires. 'After' denotes the period from the date the agent starts to receive either the wage-supplement or the follow-up benefit. 'Capacity utilisation' denotes the fraction of the remaining earning capacity the agent is working while disabled. Duration of a benefit is the sum of the months the agent receives that benefit. Earnings before and during disability and the minimum wage are adjusted for the average wage increase and inflation.

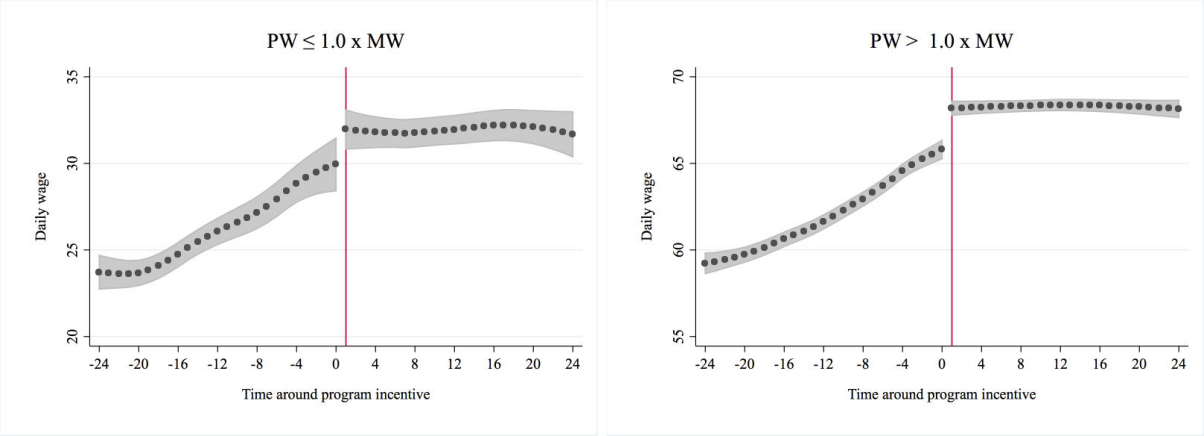

Figure 1: Daily wage against the time around the expiry date of the wage-related benefit for partially disabled workers with pre-disability earnings below and above the minimum wage. Kernel smoothed local polynomials and 95 percent confidence intervals around them.

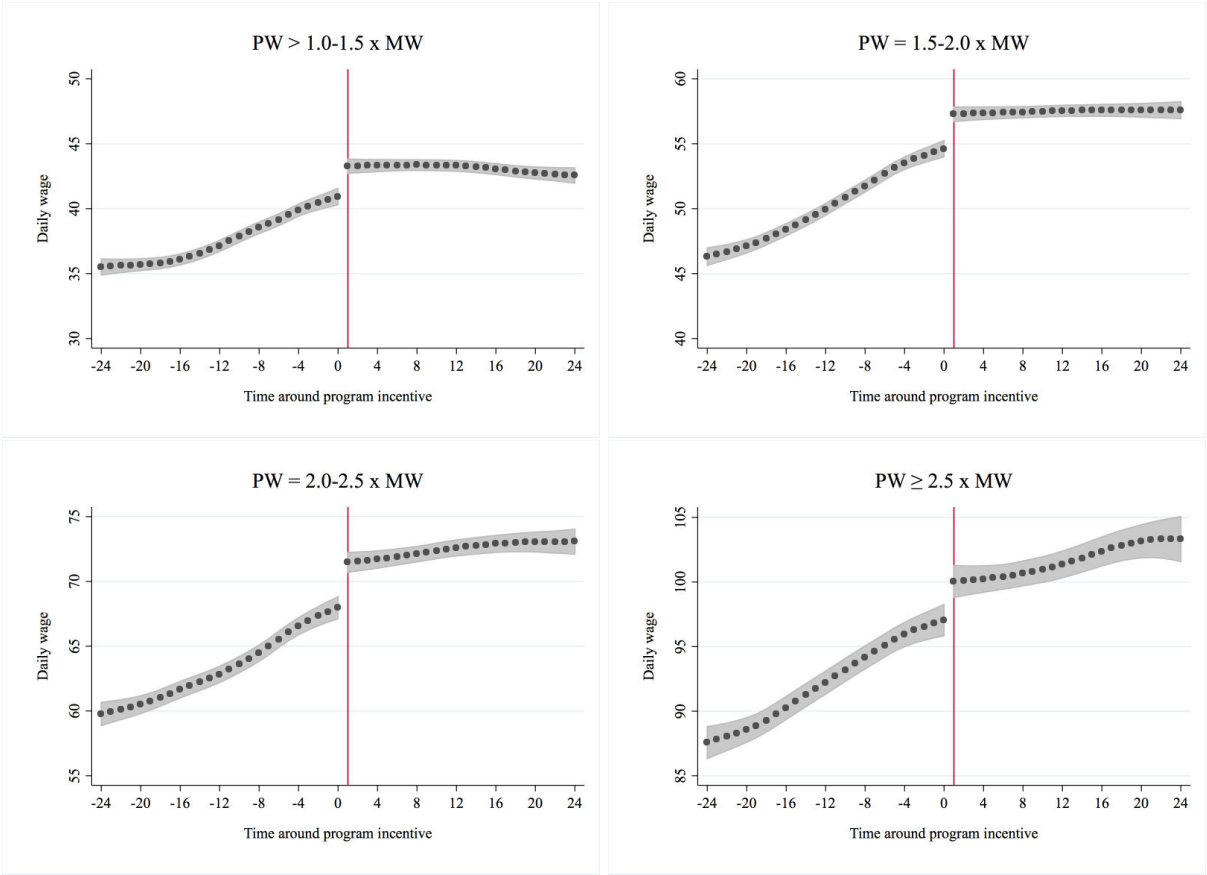

Figure 2: Daily wage against the time around the expiry date of the wage-related benefit by pre-disability earnings groups with pre-disability earnings above the minimum wage. Kernel smoothed local polynomials and 95 percent confidence intervals around them.

5 Identification strategy

The identification strategy to evaluate the work resumption incentive relies on a difference-in-difference approach. The first difference is over time within groups, as agents have access to the incentive to resume work, or to increase hours worked, when the wage-related benefit expires.

The second difference is across groups; only the agents who used to earn above the minimum wage before they have become disabled have the incentive, or a larger incentive, to resume work. These agents define the treated group. The definition of the comparison group is crucial, as it should capture counterfactual labor market trends in the absence of the incentive to resume work.

As our comparison group we consider the agents who used to earn below the minimum wage, or the minimum wage, before they have become disabled. For both the treatment and comparison groups the disability benefit reduces due to the termination of the component of the benefit due to unemployment when the wage-related benefit expires. However, the treatment group experiences an additional financial incentive if they utilise more than half of the remaining earning capacity. Therefore, we expect that there is either no or a small change in the number of hours worked in the control group after the wage–related benefit expires because there is no or a small financial incentive for this group to utilise more than half of the remaining earning capacity when the wage–related benefit expires.

Another potential comparison group would be people who are officially fully disabled but still have some remaining capacity to work. By law these people are granted the incentivised wage-supplement benefit and therefore do not have the incentive to increase their number of work hours. Still another potential comparison group consists of people who have never been disabled and therefore are not exposed to the rules of the disability benefit scheme. This group is not expected to have changed hours worked during the observation period.

The difference-in-difference comparison is implemented by estimating the following regression:

$$y_{it} = \alpha + \beta\, Treat_i + \gamma\, Post_{it} + \delta\,(Treat_i \times Post_{it}) + \lambda_t + \mu_i + X'_{it}\,\eta + \varepsilon_{it} \tag{1}$$

where i denotes individual, and t time. t starts at the date the agent is reported disabled, and ends when eligibility for disability benefit expires, or at the end of the observation period which is the last month of the year 2016. y_{it} is the monthly labor earnings during disability benefit receipt. *Treat* is the indicator of the treatment group (1 if treatment, 0 if comparison), and it controls for the group-specific trend. *Post* is the indicator of whether the first phase wage-related benefit has expired (1 if the benefit has expired, 0 otherwise) for individual i in the treatment or control group. *Post* is individual specific because the expiration date of the wage-related benefit is individual specific (see Section 2). λ_t is a vector of time fixed effects to control for changes in macro-economic conditions. μ_i is a time-invariant individual specific unobserved error that is potentially correlated with the control variables. The remaining error term ε_{it} is assumed to be uncorrelated with the control variables. The vector X_{it} is a set of individual characteristics to control for any observable differences that might confound the analysis (age, dummies for different disability grades, whether eligible for a supplementary benefit that supplements the DI benefit up to the applicable social minimum). We also control for time-invariant individual-specific observable characteristics when we assume that μ_i is uncorrelated with the explanatory variables in a random effects specification of Equation 1 (gender, number of months receiving the first-stage wage-related benefit). The coefficient of interest is δ which measures the effect of the work resumption program on the treated group relative to the comparison group, using variation over time.

To explore the effect of the work resumption program over time, Equation (1) is generalised

by replacing $Treat_i \times Post_{it}$ with two sets of treatment times month interaction terms:

$$y_{it} = \alpha + \beta Treat_i + \gamma Post_{it} + \sum_{l=1}^{b} \delta_{-l} \left(Treat_i \times d_{-l}\right) + \sum_{l=1}^{a} \delta_l \left(Treat_i \times d_l\right) + \lambda_t + \mu_i + X'_{it}\eta + \varepsilon_{it} \quad (2)$$

where d_l is a dummy that is 1 in month l of the program, and 0 otherwise. The first sum allows for b lags before the last month of the wage-related benefit. These interaction terms capture possible anticipation effects. The second sum allows for a leads after the last month of the wage-related benefit. These interaction terms capture the expected response effects. The interaction term corresponding to the last month of the wage-related benefit ($Treat_i \times d_0$) is considered as the base outcome and excluded from the regression. Therefore, all the interaction terms are interpreted relative to this base outcome. We consider a window of four years around the last month of the wage-related benefit, and therefore a and b take a maximum value of 24. The sample average number of months spent around the last month of the wage-related benefit is 17.9.

As described above, *Post* (the expiry date of the wage-related benefit) is individual specific. This makes our difference-in-difference setup different than that in most other studies where *Post* is typically not individual specific but common to all individuals who face the treatment at a same calendar date. The individual heterogeneity in *Post* makes a difference-in-difference analysis especially competitive. Macro-economic shocks could affect the labor market behaviour of the treatment and control groups differently during the observation period, and make the comparison of the labor supply responses of the two groups difficult. However, since the expiry date of the wage-related benefit is exogenous to when macro-economic shocks could take place, possible macro-economic shocks should not affect the comparison of the labor supply responses of the treatment and control groups to any considerable extent, or not affect it in a systematic manner. This means that the difference-in-difference model we use should tolerate possible violations of the crucial common trends assumption.

A limitation of this study is the following. The most obvious measure of labor supply is the number of hours worked. However, the disability benefit amount does not depend on the number of hours worked, and therefore the number of hour worked is not part of the administrative records. Labor earnings is not the ideal proxy for number of hours worked. For example, earnings may change over time, not because the number of hours worked changes, but because the hourly wage changes. Therefore, we may not be accurately estimating the effect of the work resumption program on labor force participation if earnings depend on factors other than the work resumption program. However, in the sample data the observation period is 4.45 years on average, and there is no particular reason to expect that hourly wages change over this relatively short period of time by amounts large enough to affect the estimated program effect.

6 Results

Table 2 presents results from the OLS estimation of the linear model with fixed effects given by Equation (1). The coefficient of the treatment effect shows a statistically significant increase of 5.03 euros in daily earnings due to the work incentive. The increase corresponds to 7.9 percent of the sample average of the daily earnings and therefore is sizeable. The quadratic age spline is significant suggesting that the effect of age on daily earnings is non-linear. Agents with higher disability grades earn significantly less as we would expect.

The increase of 5.03 euros in daily earnings results from the increase in the earnings of the beneficiaries who were already working in all or some months during the first stage of the DI scheme (wage-related benefit period), and from the work resumption of the beneficiaries who

were not working during the first stage of the scheme. The size of the latter group of beneficiaries is very small in our sample. When we restrict the sample to the beneficiaries who were working in all months during the first stage of the scheme, the increase in daily earnings is 3.31 euros. When we add to this sample of beneficiaries those who were working in some months during the first-stage of the scheme, the increase in daily earnings attains 5.30 euros. This suggests that the overall program effect is driven to a larger extent by the beneficiaries who were working in all months during the first stage of the DI scheme.

Table 2: Impact of the program on daily wage during disability

	Daily wage	
	Coef.	Std. Err.
Post	−0.008	1.039
Treat (PW > 1.0 × MW) × Post	4.933***	1.076
Age	11.688***	1.479
Age squared	−0.071***	0.007
Disability grade 0.46–0.55	−5.166***	1.479
Disability grade 0.56–0.65	−10.664***	1.700
Disability grade 0.66–0.80	−12.424***	1.888
Disability grade 0.81–1.00	−12.412***	1.629
Recipient of the social minimum supplement	−14.796***	1.146
Constant	−345.177***	72.154
Number of observations	382,237	
Number of individuals	6,918	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. Linear model with fixed effects. 3. The regression also controls for month dummies for the observation period from January 2006 until June 2012. 4. Disability grade category 0.35–0.45 is considered as the reference category. 5. Standard errors are clustered at the individual level. 7. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively.

In Table 3 we distinguish between four treatment groups to study the effects of different treatment intensities as in Table 1 and Figure 2. The treatment group earning the lowest pre-disability wage does not have a significant effect. This is not surprising since this group receives only a small incentive to increase earnings. We find large and statistically significant effects for the treatment groups with higher pre-disability earnings. Both the magnitudes and the statistical significance of the effects increase with increasing pre-disability earnings. These are the expected labor supply effects, and confirm the descriptive evidence in Table 1 and Figure 2.

Table 3: Impact of the program on daily wage during disability by pre-disability wage groups

	Daily wage	
	Coef.	Std. Err.
Post	−0.026	1.039
Treat (PW > 1.0–1.5 × MW) × Post	1.112	1.138
Treat (PW = 1.5–2.0 × MW) × Post	3.248***	1.156
Treat (PW = 2.0–2.5 × MW) × Post	6.996***	1.283
Treat (PW ≥ 2.5 × MW) × Post	8.354***	1.447
Age	12.242***	1.481
Age squared	−0.077***	0.007
Disability grade 0.46–0.55	−5.440***	1.482
Disability grade 0.56–0.65	−10.674***	1.703
Disability grade 0.66–0.80	−12.171***	1.888
Disability grade 0.81–1.00	−12.391***	1.623
Recipient of the social minimum supplement	−14.254***	1.152
Constant	−357.389***	71.969
Number of observations	382,237	
Number of individuals	6,918	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. Linear model with fixed effects. 3. The regression also controls for month dummies for the observation period from January 2006 until June 2012. 4. Disability grade category 0.35–0.45 is considered as the reference category. 5. Standard errors are clustered at the individual level. 5. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively.

Figure 1 suggested anticipation and response effects for both the control and treatment groups. To analyse whether these effects are larger and more significant for the treatment group in comparison to the control group, Figure 3 plots the estimated coefficients of the interaction terms in Equation 2 over a period of four years around the work incentive. We also draw 95 percent confidence intervals around the coefficient estimates. Each dot represents the coefficient of the interaction between the treatment and the indicator variable for month. The coefficient estimates marked with black colour are significant at the 0.01 level. The coefficient estimates marked with grey colour are significant at the 0.05 level. Other coefficient estimates marked with light grey colour are not significant at the 0.05 level. The figure suggests a strong anticipation effect. The response effect is positive for a period of 20 months after the program incentive. The anticipation effect clearly dominates the response effect.

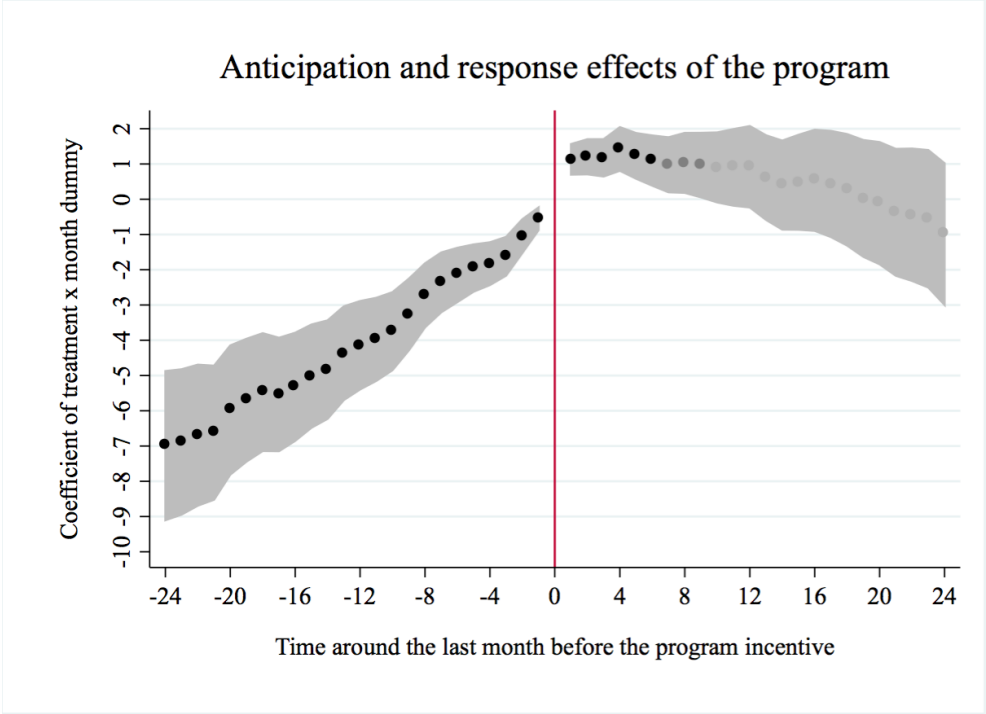

Figure 3: Coefficients of the interaction treatment × month dummy in Equation 2 and 95 percent confidence intervals around them. Coefficients marked with black colour are significant at the 0.01 level.

In Table 4 we distinguish between age and gender groups. The treatment effects for the younger beneficiaries is especially large. Older beneficiaries respond to the work incentive to a much lesser extent. Earlier studies also find a similar age effect. A potential reason is that working is more onerous for older beneficiaries. Another reason can be that older workers face restrictions that limit their access to the labour market. We find no significant effect for male beneficiaries. This is most likely due to the very small number of observations available for men in the control group, as can be seen in Table 1. In fact, we find that the difference between the average daily earnings before and after the incentive change among men in the control group is large and not significant, which is most likely due to the very small number of observations. This might make the difference-in-difference estimate insignificant for this gender group.

In Table 5 we distinguish between two beneficiary groups with respect to a 50 percent threshold disability grade. In both groups, the treatment effects with different treatment intensities are significant but their magnitudes differ to considerable extents. When we distinguish between two groups with respect to a 50 percent threshold remaining capacity utilisation rate, we do not find significants for all different treatment effects for those working less than 50 percent of their remaining work capacity. This result is at odds with what we would expect since this group might be expected to be more incentivised because eligibility for the work incentive hinges on meeting the 50 percent remaining capacity utilisation rate. However, the small number of observations available for this group might explain the insignificant effects we obtain.

Our data includes information on the type of the disease an agent is diagnosed with: general, blood, cardiovascular, dermatological, endocrinological, pregnancy (or childbirth or maternity leave), hearing, musculoskeletal, neurological, psychiatric, respiratory, digestive, urogenital, and vision. For a number of disease types the number of observations is very limited. Therefore, we present results only for disease types where we have observations for at least 50 agents. Tables 6 and 7 show that agents with blood and urogenital disorders are especially responsive to the program incentive. Besides, there is considerable variation in the program effect across agents diagnosed with different types of diseases.

Table 4: Impact of the program on daily wage during disability by pre-disability wage groups across socio-economic groups

	Age < 45		Age ≥ 45		Male		Female	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Treat (PW $>$ 1.0–1.5 $\times$ MW) $\times$ Post	1.653	2.362	0.447	1.274	-3.187	3.516	1.872	1.218
Treat (PW $=$ 1.5–2.0 $\times$ MW) $\times$ Post	5.225**	2.452	2.126*	1.287	0.006	3.512	3.286**	1.298
Treat (PW $=$ 2.0–2.5 $\times$ MW) $\times$ Post	13.271***	2.874	4.540***	1.419	4.000	3.567	6.286***	1.723
Treat (PW $\geq$ 2.5 $\times$ MW) $\times$ Post	16.083***	4.238	6.366***	1.484	4.963	3.652	8.500***	2.366
Number of observations	98,049		284,188		209,476		172,761	
Number of individuals	2,359		5,401		3,729		3,189	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. The table reports the coefficient estimates of the treatment effect by pre-disability wage groups from a linear model with fixed effects. 3. Standard errors are clustered at the individual level. 4. All regressions control for a quadratic function of age, eligibility for supplementary benefit, dummies for disability grade categories, and month dummies for the observation period from January 2006 until June 2012. 5. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively.

Table 5: Impact of the program on daily wage during disability by pre-disability wage groups across socio-economic groups

	Disability grade $< 50\%$		Disability grade $\geq 50\%$		Cap. uti. $\geq 50\%$		Cap. uti. $< 50\%$	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Treat (PW $>$ 1.0–1.5 $\times$ MW) $\times$ Post	1.080	2.005	0.506	1.372	0.711	1.081	3.708	5.106
Treat (PW $=$ 1.5–2.0 $\times$ MW) $\times$ Post	4.710**	2.200	2.350*	1.352	3.275***	1.135	4.140	4.813
Treat (PW $=$ 2.0–2.5 $\times$ MW) $\times$ Post	8.066***	2.464	5.916***	1.468	6.954***	1.274	8.477	5.175
Treat (PW $\geq$ 2.5 $\times$ MW) $\times$ Post	6.111**	2.690	8.599***	1.706	8.204***	1.437	12.006**	6.075
Number of observations	111,441		270,796		344,436		37,801	
Number of individuals	2,335		5,205		6,241		677	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. The table reports the coefficient estimates of the treatment effect by pre-disability wage groups from a linear model with fixed effects. 3. Standard errors are clustered at the individual level. 4. All regressions control for a quadratic function of age, eligibility for supplementary benefit, dummies for disability grade categories, and month dummies for the observation period from January 2006 until June 2012. 5. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively. 5. 'Cap. uti.' denotes remaining earning capacity utilisation rate during the wage-related benefit receipt.

Table 6: Impact of the program on daily wage during disability by pre-disability wage groups across diagnosis groups

	General		Blood		Cardiovascular		Endocrinological	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Treat (PW $>$ 1.0–1.5 $\times$ MW) $\times$ Post	-1.035	2.589	4.065	4.731	1.210	2.231	-2.698	4.026
Treat (PW $=$ 1.5–2.0 $\times$ MW) $\times$ Post	-2.533	3.391	6.326	4.320	2.417	2.283	2.230	4.449
Treat (PW $=$ 2.0–2.5 $\times$ MW) $\times$ Post	0.080	3.709	12.390***	4.259	4.450*	2.509	0.061	5.040
Treat (PW $\geq$ 2.5 $\times$ MW) $\times$ Post	7.890*	4.428	21.430**	8.763	4.316*	2.612	15.192**	7.370
Number of observations	12,646		7,530		44,478		6,890	
Number of individuals	227		143		758		125	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. The table reports the coefficient estimates of the treatment effect by pre-disability wage groups from a linear model with fixed effects. 3. Standard errors are clustered at the individual level. 4. All regressions control for a quadratic function of age, eligibility for supplementary benefit, dummies for disability grade categories, and month dummies for the observation period from January 2006 until June 2012. 5. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively.

Table 7: Impact of the program on daily wage during disability by pre-disability wage groups across diagnosis groups

	Musculoskeletal		Psychiatric		Respiratory		Urogenital	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Treat (PW $>$ 1.0–1.5 $\times$ MW) $\times$ Post	-0.919	2.958	-1.148	2.835	6.792	5.769	8.565^{***}	2.878
Treat (PW $=$ 1.5–2.0 $\times$ MW) $\times$ Post	2.709	3.053	2.644	2.832	11.548^{**}	5.259	7.150^{**}	3.104
Treat (PW $=$ 2.0–2.5 $\times$ MW) $\times$ Post	5.039	3.142	9.850^{***}	3.370	12.872^{**}	5.510	11.771^{***}	4.463
Treat (PW $\geq$ 2.5 $\times$ MW) $\times$ Post	7.917^{*}	4.141	5.802^{*}	3.507	19.083^{*}	10.470	12.525^{**}	5.198
Number of observations	77,701		71,501		10,495		22,909	
Number of individuals	1,378		1,294		182		413	

Notes: 1. PW: Pre-disability daily wage. MW: Minimum wage. 2. The table reports the coefficient estimates of the treatment effect by pre-disability wage groups from a linear model with fixed effects. 3. Standard errors are clustered at the individual level. 4. All regressions control for a quadratic function of age, eligibility for supplementary benefit, dummies for disability grade categories, and month dummies for the observation period from January 2006 until June 2012. 5. ***, **, * indicate statistical significance at the 0.01, 0.05, 0.10 levels, respectively.

7 Robustness checks

We estimated the difference-in-difference model presented in Section 5 with different specifications for the explanatory variables. First, we considered more conservative and more flexible continuous functions of age which did not have any sizeable effect on the estimated treatment effect.

Second, we omitted the month dummies for the observation period from January 2006 until June 2012 which did not change the estimated treatment effect by any considerable amount. This suggests that possible macro-economic shocks did not have sizeable effects on the labor market behaviour of disabled workers before or after they have faced the program incentive. This provides evidence that the crucial common trends assumption of the difference-in-difference model is not violated.

Third, we test whether the omission of the disability grade variable effects the estimated treatment effect. As explained in Section 2, the work resumption program provides a higher incentive to a worker with a higher disability grade, and with pre-disability earnings above the minimum wage. In our baseline specification we have controlled for the disability grade so that the difference-in-difference estimator reflects the program effect that is only due to the pre-disability earnings level. When we omit the disability grade variable from the baseline specification we find no considerable change in the treatment effect. A potential explanation is that workers with higher disability grades struggle to increase their work effort and therefore are not able to take advantage of the work incentive for workers with higher disability grades.

Our regressions allowed for time-invariant individual specific fixed effects to control for unobserved individual heterogeneity in daily earnings. Therefore, we estimated regressions allowing for random effects but this did not change the results by any considerable amount.

Overall, these results show that the difference-in-difference estimate of the program effect is robust to various deviations from the baseline model specification. Therefore, concerns for identification of the program effect should be small.

8 Conclusion

We have evaluated the work resumption program of the DI scheme in the Netherlands. Relying on a difference-in-difference approach, and using data on all partially disabled workers in the Netherlands, we find that the work resumption program of the DI scheme has a number of statistically significant and economically important effects on the labor supply behaviour of the partially disabled workers. First, the program increases the daily earning of the average partially disabled worker by a significant amount of 5.03 euros.

Second, Koning and van Sonsbeek (2017) found that the effect of the program on employment probability is proportional to the size of the pre-disability earnings although the authors do not quantify the proportional change in employment probability. Similar to these authors, we find that the effect of the program on daily earnings has a gradient: daily earnings increase by larger amounts if pre-disability earnings exceed the minimum wage by larger amounts. This is indeed the intended effect of the program. Furthermore, we find that the gradient of the effect is sizeable and not linear along the pre-disability wage distribution. From a policy perspective, it remains troublesome how to incentivise the large group of disability beneficiaries with relatively low pre-disability wages. Their incentive to resume working or to increase the number of work hours is comparatively small, and lack of skills may put additional limitations on top of their health impairment. Since benefits are already near the social minimum level for a large part of this group, possibilities for increasing the financial incentives are limited. Since the potential effectiveness of the financial incentives is limited because of this reason, we can conclude that the

main gains of the disability reforms in the Netherlands were reached by stricter screening and tighter entrance criteria and that financial incentives within the system add to this significantly, but only for a comparatively small group of beneficiaries.

Third, a main finding is that the program generates both an anticipation and a response effect. The anticipation effect is much larger than the response effect. This provides important new information to the literature analysing the effectiveness of the complex social security incentives like the one investigated in this study. The results suggest that beneficiaries are well aware of the consequences of not fulfilling the program requirement on the use of the remaining earning capacity.

Finally, we find a much larger effect among younger beneficiaries, which brings forward the question why older beneficiaries are responding less to the program incentive. A potential reason is that older beneficiaries find working more onerous. On the other hand, if this is caused by restrictions on their access to the labour market, from a policy perspective this may be a reason for great caution in further increasing the incentives for this potentially vulnerable group of beneficiaries.

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