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## Does Sick Pay Affect Workplace Absence?

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DISCUSSION PAPER SERIES

IZA DP No. 11222

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# Does Sick Pay Affect Workplace Absence?

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DECEMBER 2017

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## ABSTRACT

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### **Does Sick Pay Affect Workplace Absence?\***

Higher replacement rates often imply higher levels of absenteeism, yet even in generous welfare economies, private sick pay is provided in addition to the public sick pay. Why? Using comparative workplace data for the UK and Norway we show that the higher level of absenteeism in Norway compared to UK is related to the threshold in the Norwegian public sick pay legislation. This threshold's importance is confirmed in a Regression Kinked Design (RKD) analysis on the Norwegian micro-data. Private sick pay is provided as an employer-provided non-wage benefit and when training costs are high.

**JEL Classification:** H31, J22, J28, J32

**Keywords:** absenteeism, public sick pay, private sick pay, comparative

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## 1. Introduction

Absenteeism can be expensive to employers when they must pay for non-productive labour and where it disrupts the production of other workers. Absenteeism is also a concern in redistributive welfare regimes with generous public sick pay. Since public sick pay constitutes insurance against income loss from sickness absence, and moral hazard is a common problem in insurance, the danger of moral hazard is greater under public sick pay than when the cost of sick leave is covered to a larger extent by the individual worker.<sup>1</sup> When the sick pay system is not so generous, as in the U.S. or UK, the cost of presenteeism is often a greater concern (Goetzel et al., 2004; Hemp, 2004).<sup>2</sup>

In this paper, we study how absenteeism relates to employer-provided sick pay and publicly provided sick pay, thus shedding light on how societies deal with the costs associated with absenteeism and presenteeism. The consensus is that economic incentives affect absenteeism. Analyses of reforms of the public sick pay legislation in several countries reveal that absenteeism and replacement rates are positively related (Johansson and Palme, 1996; Johansson and Palme, 2002; Henrekson and Persson, 2004; Ziebarth and Karlsson, 2010; Ziebarth, 2013; Csillag, 2017). Similarly, when public or private incentives increase returns to working absenteeism drops (Barmby et al., 1995; Brown et al., 1999; Dale-Olsen, 2012, 2013b). However, several studies identify heterogeneous effects (Ziebarth, 2013; Ziebarth and Karlsson, 2013), where certain worker groups are unaffected by financial incentives. One hypothesis is that such heterogeneous effects are partially the result of offsetting private pay schemes and sick pay schemes.

Our contribution is two-fold. First, we establish the role played by the public sick pay compensation regime by comparing sickness absence in Britain and Norway, identifying effects using distinctive features in the Norwegian “kink” in compensation that occurs at a point in the earnings distribution. In this sense, our paper is similar in design to the regression kink design of Böckerman et al. (2014) who identify a strong behavioural absence response from a kink in the Finnish sick pay legislation, implying an elasticity of the duration of sickness absence with respect

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<sup>1</sup> In Norway, for example, public sick pay constitutes 1.5% of GDP (The government budget, 2010). See ([http://www.statsbudsjettet.dep.no/upload/Statsbudsjett\\_2010/dokumenter/pdf/summary\\_national%20\\_budget\\_2010.pdf](http://www.statsbudsjettet.dep.no/upload/Statsbudsjett_2010/dokumenter/pdf/summary_national%20_budget_2010.pdf)). Even in the UK where the sick pay system is less generous, the direct cost of sick pay was £11.6 billion in 2003 (Barham and Begum, 2005). The European sickness absence insurance schemes are quite similar to the US temporary disability insurance, and temporary disability insurance benefits amounted in California in 2005 to \$4.2 billion, just slightly less than the amount spent on unemployment insurance (Ziebarth and Karlsson, 2010).

<sup>2</sup> Regardless of system, sick pay can provide sick workers with incentives to take time off to stop the spread of illness (Skatun, 2003). Thus absenteeism and presenteeism are associated with costs, and firms and the society should be concerned about the relative costs and benefits of sick pay. Treble and Barmby (2011) discuss this in detail. The human capital health-model of Grossman (1972) ignores the moral hazard issue in absenteeism, but instead presents health as an investment object such as education. In a recent paper, Pichler and Ziebarth (2016) merge absenteeism and presenteeism modelling to present a unified strategy analysing sick leave behaviour.

to the replacement rate in the order of 1.4.<sup>3</sup> Like Böckerman et al. (2014) we use worker-level data to establish worker responses to the kink. But an important difference is that our study also compares the difference this kink makes to a scenario – Britain – where no such kink exists, using micro workplace data that also nets out heterogeneity across workplaces.

Second, we investigate the factors associated with employer-provided supplementation to the public sick pay compensation system. Barmby et al. (2002) show that in many countries public sick pay legislation is supplemented by additional privately funded sick pay, as might occur if employers use such pay to attract and retain valuable workers. However, with few exceptions (Barmby, 2002; Dale-Olsen, 2013b), there is little empirical evidence regarding the interaction between public and private sick pay.

As discussed by Treble and Barmby (2011), firms provide non-pecuniary goods such as private sick insurance (sick pay) and set wages to maximize profits, and do this while taking into account several different dimensions of labour costs, absence costs being one dimension. Training costs and turnover costs could be other relevant dimensions.<sup>4</sup> Trade unions might also bargain for private sick insurance if this non-pecuniary good is highly valued by union members.

The motivation for comparing sick pay regimes in Norway and Britain is two-fold. First, they are polar opposites in terms of redistribution and welfare regimes, as characterised by typologies such as Esping-Andersen's (1990) (he differentiated between the U.S. and Sweden), creating potentially quite different incentives for firms to offer sick pay compensation, and for workers to take absence. Second, and relatedly, these countries are quite different when it comes to absence levels: Norway has among the highest absence rates in Europe, whereas Britain is among those with the lowest rates (OECD, 2010; Gimeno et al., 2004). Others who have conducted cross-country studies have suggested such differences relate to sick pay systems, rather than differences in employment protection legislation (Frick and Malo, 2008).

The structure of the paper is as follows: In Section 2 we describe the sick pay legislation in the UK and Norway. The econometric strategy is described in Section 3. Data is described in Section 4. Our empirical findings are presented in Section 5, while Section 6 concludes.

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<sup>3</sup> Following a reform of German statutory sick pay Ziebarth and Karlsson (2013) identify (based on SOEP data), that the elasticity of sickness absence w.r.t. the benefit level is around 0.9, a response which is somewhat weaker than that found by Böckerman et al. for Finland.

<sup>4</sup> See appendix for a simple shirking-model incorporating turnover costs. See also note 2.

## 2. The sick pay legislation and privately supplementary sick pay

The British public sick pay legislation (Statutory Sick Pay (SSP)) is relatively simple: each worker receives £81.60 per week for 28 weeks for sickness absence (2011 figures), a figure close to the minimum wage. The first three days of sick leave are “qualifying days” with no pay. Norwegian public sick pay, on the other hand, provides from day 1 for up to one year’s full compensation for annual pay up to what is defined as 6G, where G is the baseline figure in the Social Service benefit system (1G is equivalent to £8685).<sup>5</sup> For pay above this threshold, only 6G is paid in public sick pay. As such the Norwegian sick pay legislation is comparable to the Finnish system: both are kinked (the Finns have more than one kink) (Böckerman et al., 2014).

[ FIGURE 1 AROUND HERE ]

Both in the UK and Norway employers are free to offer top-up publicly provided sick pay compensation. In 2003 40% of the Norwegian private sector workplaces offered additional compensation for those above the threshold (Dale-Olsen, 2012). The employer-provision of top-up sick pay compensation is seen in other countries as well (Barmby et al., 2002). In the UK and Norway a worker usually needs a physician to certify his or her illness after a designated number of sick leave days. In the UK, this occurs after 7 days, in Norway this is usually after 3 consecutive absence days. In Norway employees are limited to four self-declared spells per annum after which all absences (regardless of longevity) have to be physician-certified. A minority of firms allow longer and more periods.

During the period under study UK SSP was paid by the employers, but due to a Percentage Threshold Scheme (PTS) employers could recover SSP costs for their employees’ sick leave if the total SSP paid in a tax month exceeded 13 percent of the employer’s (Class 1) National Insurance contribution in the same month. In 2014 the PTS was replaced with programs aimed at individuals and not employers, including Fit to Work, an occupational health advisory service, which aims to provide advice for managing absence and improve return-to-work rates, but does not provide financial support. In Norway, the first 16 days of the absence spell are covered or paid by the employer. The remaining spell is covered by the public authorities (limited upwards to the 6G-threshold).

## 3. Empirical strategy

We apply three empirical strategies in this paper; two establish how absenteeism is affected by sick pay, and one targets the provision of private sick pay (above the statutory limit).

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<sup>5</sup> All money values in the paper are based on 2011 pounds (PPP-adjusted), where 1£=9.032 Norwegian kroner (NOK).

First, to study how the employer provision of sick pay is related to training costs, other work organization measures, non-wage benefits, work characteristics and unions, we estimate simple Spearman bivariate correlations, but also apply simple linear probability (regressions) models to study how these workplace conditions vary between countries and across the levels of the statutory sick pay. By doing this, we map out the similarities and differences between the UK and Norway in the employer provision of sick pay.

Second, to identify the role played by public sick pay provision we exploit differences in public sick pay provision across Norway and Britain. As described in Section 2 the Norwegian public sick pay system is kinked: full compensation occurs until the earnings threshold of 6G, thereafter no further earnings increase the sick pay. Since no such kink exists in Great Britain, the empirical strategy of directly comparing the relationship between absenteeism and pay between Norway and Great Britain under and above the Norwegian threshold should provide insight into how sick pay affects absenteeism.

Let  $a$  denote the workplace sick leave rate. The sick leave rate is highly non-normally distributed, thus we use the logit-transform to normalise our dependent variable (i.e.,  $\ln[a/(1-a)]$ ). Then we apply simple difference-in-difference OLS regressions of this transformed workplace sickness rate on the workplace average of log hourly wage and interactions with a country dummy and a dummy for pay above the threshold and other controls.

$$6) \ln\left[\frac{a}{1-a}\right]_i = \alpha_1 \text{Norway}_i + \alpha_2 \ln w_i + \alpha_3 \ln w(>6G)_i + \alpha_4 \ln w \times \text{Norway}_i + \alpha_5 \ln w(>6G) \times \text{Norway}_i + X_i' b + \varepsilon_i,$$

where  $X_i' b$  is a vector of controls (which we vary in sensitivity tests), and  $\varepsilon$  expresses a standard error term. Note that due to the logit transformation, to derive the average elasticity of absence rate w.r.t. wages in these regressions, one has to multiply the estimated variable by the average  $(1-a)$ .

First, we expect the UK to experience lower sick leave rates than Norway, at least partly because of the less generous sick pay legislation (and thus in accordance with Frick and Malo (2008) and those studies revealing a positive relationship between absence rates and replacement rates). Second, we expect to see less or no impact from wages in Norway under the 6G-threshold relative to the impact observed in the UK, but for workers earning above the 6G-limit behaviour should be similar in the two countries since the replacement rate falls for Norwegian workers above this threshold. In Norway we should see that absenteeism becomes more negatively related to wages compared to those workers earning under the 6G-threshold. Our analyses take into account employer-provided sick pay, other benefits and pay systems.



Finally, since Norwegian sick pay is kinked, we can apply a regression kink design a la Böckerman et al. (2014) where, in contrast to previous studies, we can take into account employer-provided sick pay and self-declared absences. Thus, we can identify a causal impact of sick pay compensation on absenteeism by comparing the sick leave behaviour of workers located below and above the threshold. The regression kink design is established by the work of Card et al. (2015, 2016) and of Cattaneo and co-authors in a series of studies (Cattaneo et al., (2014, 2015, 2016)). The literature referred to in Section 1 and as pointed out in the theoretical model presented in the Appendix means we have good reasons to believe that any negative relationship between sick leave days and earnings is weak below the public sick pay threshold, since for these workers the replacement rate is 100 percent and the monitoring intensity low. In the KRD-approach, one identifies the changes in the slope of the outcome variable, i.e., sick days, below and above the kink, and divides this by changes in the slope of the running variable, i.e., sick pay. To illustrate, let SD and lnE denote sick days and log yearly earnings, let lnG denote the log of the 6G-threshold (in yearly terms), and D expresses a dummy taking the value of 1 if earnings are above the kink. Then one estimates:

$$7) \quad SD_i = \alpha_0 + \alpha_1(\ln E - \ln G)_i + \alpha_2(\ln E - \ln G)_i * D_i + \dots + \mu_i,$$

on a data-determined interval around the kink. The estimate for  $\alpha_2$  then identifies the impact of the slope of sick days. Let B now denote the sick pay. Note that below the kink, B increases with E at a rate of 1. Above the kink, B does not change with W, i.e., this slope changes by -1.

We follow and apply the methods of Cattaneo et al. (2014, 2015, 2016)) in identifying the appropriate bandwidth, and apply local linear regression estimation. Two assumptions are essential for the KRD-analysis to be valid. First, the replacement rate function has to be continuous and differentiable, but non-differentiable at the kink with unequal left and right derivatives. The Norwegian system, with the clearly defined kink at 6G, satisfies this condition. Second, the allocation of observations around the kink should be as good as random, i.e., endogenous bunching of observations around the kink (creating discontinuities in the derivative of the density function) would invalidate the analysis. We test this by running the analyses on other outcome variables and showing that the kink only affects sickness absence, and then by applying the automatic manipulation tests based on density discontinuity, constructed using the results for local polynomial density estimators by Cattaneo et al. (2017). As further robustness tests, we test out different placebo-kinks, by letting the kink-point vary.

## 5. Data

Our data are the British Workplace Employment Relations Survey 2011 (WERS 2011) and the Norwegian Workplace Employment Relations Survey 2012 (NWERS 2012) supplemented by Norwegian population-wide register data (for the period 2000-2012). Although WERS (NWERS) covers workplaces with at least 5(10) employees in all sectors of the British (Norwegian) economy, we confine our analyses to the private sector workplaces with at least 10 employees where the market setting means the profit-maximising assumptions invoked earlier are most likely to hold. Information in WERS was acquired through face-to-face interviews, which were conducted with the manager at the workplace responsible for employment relations. The response rate in 2011 was 46%. Information in NWERS was acquired through computer-assisted telephone interviews, which were conducted with the daily manager at the workplace or the manager responsible for employment relations. The response rate was 54%, but since the main reason for non-response was respondents not being reached by Statistics Norway (36 percentage points) and not by respondents refusing to participate, selection issues are unlikely to be a problem.<sup>6</sup> WERS is documented in van Wanrooy et al. (2013), while NWERS is documented in Holmøy (2013).

The British WERS survey comprises information on absenteeism at the workplace level, while wage information is available at the worker level (and aggregated to workplace). Absenteeism is measured as the total number of days during the last 12 months that workers were absent due to illness, and is measured relative to the number of workers. In addition, WERS contains information on a range of organisational practices, risks, injuries, additional sick pay and pay systems. The Norwegian WERS comprises similar data on organisational issues, pay systems, risk and self-certified absence rates. Absenteeism is measured as the total number of days during the last 12 months that workers were absent due to illness (regardless whether this was self-certified or physician-certified), and is measured relative to the number of worker-days. Note that physician-certified sick spells in Norway might be partial, e.g. 20 or 50 percent on sick leave. We take this into account by creating two measures; one measure based on the observed absence days, and one measure where we weight the absence days by how partial the absence is. For example, 1 day on 100 percent sick leave is equal to 2 days on 50 percent sick leave.

All money values in the comparative analyses are 2011 pounds (PPP-adjusted) (1£=9.032 Norwegian kroner(NOK)). We pool the Norwegian and British workplace level data, and create an absence measure transformed to normality, the logit of the sick leave rate, similarly to what is done previously in the literature on absenteeism (Heywood and Jirjahn, 2004).

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<sup>6</sup> In NWERS 12.7 percent of the issued sample refused to participate. In both NWERS and WERS detectable response biases were corrected using sampling weights.

However, wages and physician-certified sick leave in Norway are collected from the public administrative registers at the worker level (or actually job level), thus allowing analyses of individual behaviour. While the comparative analyses rest on a retrospective absence measure (absence last 12 month), to identify causal impact of pay (and sick pay) on sick leave, the outcome (sick leave days) should be measured after the causing factor (pay/sick pay). The KRD-analyses therefore rest on a sample of workers not absent in 2011, but employed in 2011 and 2012 in a workplace with more than 10 employees, earning between 3G and 10G. A sub-sample of these workers constitutes those employed by the NWERS-workplaces. We measure the running variable as:  $\log(\text{earnings}) - \log(6G)$ , where earnings and 6G express total earnings (including overtime and bonuses) in 2011 and 6G the threshold in the public sick pay legislation. The number of physician-certified sick leave days is then measured from May 1<sup>st</sup>, 2012 to May 1<sup>st</sup>, 2013.

## 6. Results

### 6.1 Descriptive aggregate evidence

We start by looking at aggregate statistics. In Table 1 we present figures for private sector workplaces with more than 10 employees in the Great Britain and Norway. The first and obvious finding is that the sick leave rate is considerably higher in Norway than in Great Britain.

[            TABLE 1 AROUND HERE            ]  
 [            FIGURE 2 AROUND HERE            ]

Employer-provided sick pay is equally prevalent in Norway as in Britain (48% vs. 44%), but distributed quite differently as expected due to the kink in the Norwegian sick pay scheme. High wage workplaces (defined as workplaces with an average wage above 6G (=52110£), comprise 30% and 37% of the workplaces in Norway and Britain, respectively. Close to 45 percent of the Norwegian workplaces providing additional private sick pay have mean earnings above 6G, compared with fewer than 20 percent of the workplaces with mean earnings above 6G. In Britain, the percentage of workplaces offering sick pay above the statutory minimum is similar above and below the 6G threshold (36% vs. 39%), since no kink in public provision exists at this (or, indeed any other) point in the earnings distribution.

Note that employer-provided supplementary sick pay is only relevant for a minority of the Norwegian workers employed by those employers who provide supplementary sick pay (those

earning above 6G)<sup>7</sup>, it is potentially relevant for all British workers employed at similar workplaces since statutory sick pay is so low in Britain. It is also evident that the non-wage benefits such as supplementary sick pay are bundled together with other health-related non-wage benefits such as extended sick leave in the UK and to a certain degree, the provision of private health insurance. This is not the case in Norway. Two other aspects are worth considering. First, both in the UK and Norway, employers are more likely to offer sick pay above the statutory minimum where it takes longer for new workers to be trained in their jobs. This indicates that training costs could be important for the provision of sick pay in excess of the statutory minimum. Second, sick pay in excess of the statutory minimum is positively associated with trade union coverage in Britain but not in Norway. Since sick pay in excess of the statutory minimum is a benefit important for most workers in Britain, but only high wage workers in Norway, this is more important for unions in Britain than Norway (high wage workers are less unionised in both countries).

*6.2 The provision of supplementary employer-provided sick pay in addition to public sick pay and other benefits and characteristics. Cross-country differences and similarities.*

In this sub-section, we consider the relationship between the provision of sick pay in excess of statutory sick pay and other workplace characteristics. We start by mapping out the country-differences regarding several organisational characteristics and benefits, such as sick pay in excess of statutory sick pay, private health insurance, extended sick leave arrangements, risky work, trade union agreements, quick training<sup>8</sup> and high turnover (above median in sample). We do this by estimating several models related to the provision or existence of these characteristics. We estimate two sets of models (one with 2-digit industry controls), for both countries. Table 2 presents our results.

[ TABLE 2 AROUND HERE ]

Employer-provided benefits such as health insurance, extended sick leave (self-declared) and sick pay in excess of statutory sick pay, and high-powered incentive schemes are more prevalent among high wage workplaces in both countries, but that sick pay in excess of statutory sick pay is particularly common in Norwegian high wage workplaces. Sick pay above the statutory minimum and these other health related benefits are akin to fringe benefits. Employers do not provide sick pay in excess of statutory sick pay when their workers are employed under risky working conditions,

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<sup>7</sup> Based on the Norwegian individual wage data comprising the whole population of workers for 2011, we see that the 6G-threshold in 2011 constitutes roughly the 68<sup>th</sup> percentile in the wage distribution.

<sup>8</sup> Quick training time is defined as when the answer to the question “About how long does it normally take before new recruitments in the main occupational group are able to do their job as well as more experienced employees already working here?” is less than one month, in contrast to longer.

suggesting that employers are sensitive to the potential costs associated with such provision. However, we see that most of the country differences and the differences between high wage and low wage workplaces relate to industry variation, and are thus hard to differentiate from other industry characteristics. Even so, privately provided sick pay in excess of statutory sick pay is more prevalent among Norwegian high wage workplaces within-industry. This is a natural consequence of the 6G-threshold in the Norwegian public sick pay.

At same time, the similarities between the countries along these dimensions are perhaps surprising, as indicated in Table 3. Estimating bivariate Spearman correlations separately for each country, we see health related privately provided benefits are correlated in both countries. Similarly, in both countries easy-to-train workers (quick-training), high turnover and risky work are linked to less extensive employer provision of extended sick leave and sick pay in excess of statutory sick pay.

[ TABLE 3 AROUND HERE ]

### *6.3 The impact of the Norwegian sick pay threshold – comparative analyses*

Next, we turn to the OLS regression analyses of how pay (and thus indirectly sick pay) affect sickness absence. In Table 4 we report the estimated elasticity of sickness absence rate with respect to wages for different models. The elasticities are estimated based on several linear regressions. The results from these are presented in Appendix Table A2.<sup>9</sup>

The sick leave level is much higher in Norway than in Great Britain, in line with our theoretical predictions in the appendix and as seen in Figure 2. Second, when we take into account wages (and thus implicitly sick pay) (Table A2 Models 1-6) then Norway is not different from Great Britain. However, we see that the 6G-threshold matters for sick leave in Norway, but not in Britain.

[ TABLE 4 AROUND HERE ]

In Table 4 we show that the elasticity of sick leave with respect to wages is strongly negative in Britain, but does not differ below and above the Norwegian 6G-threshold, which is as expected since this threshold does not exist in Britain. Overall in the UK we find elasticities around -0.5, but the elasticity of sickness absence w.r.t. pay becomes strongly more negative when focussing on employment relationships in workplaces where the employer does not provide additional sick pay

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<sup>9</sup> In Appendix Table A2 Panel A) we report the parameter estimates associated with our key variables. In Panel B) in Table A2 we report the estimates (and standard errors) of the estimated linear expressions. Note in models 1-6, when we allow the relationship between wages and absenteeism to be kinked (at 6G), we do not allow a jump at the kink (thus following the KRD-approach). Incorporating such a jump, would not have qualitatively have changed our results.

in excess of statutory sick pay. For Norway, however, no significant relationship between sick leave and wages is found below the 6G-threshold for all models with one exception (Model 4)<sup>10</sup>, but a strong negative elasticity appears for the high wage workplaces, and then particularly when focussing on those workplaces where no additional private sick pay is provided. These relationships survive a wide range of controls with respect to industry, pay schemes (performance and merit pay, employee share scheme (ESS) and Company Share Ownership Programs (CSOPs), and work organisation (e.g., teams). These regressions indicate that the replacement rate matters for Norwegian workers' sick leave behaviour. They also reveal that when employers provide sick pay in excess of statutory sick pay, the negative relationship between pay and sick leave becomes less strong.

#### *6.4 The impact of the Norwegian sick pay threshold – micro analyses*

In the previous sub-section we provide evidence based on comparative workplace data that the threshold (and implicitly the replacement rate) matter for sick leave in Norway. However, this approach might be criticised for comparing two economies which differ along a series of institutional dimensions in ways that might make causal inference difficult. To test the impact of public sick pay provision further we focus on the Norwegian job level data only and conduct a regression kinked design (RKD) analysis. We apply the RKD-approach to job-level observations of both the observed number of sick days and the number of sick days adjusted for partial sick leaves for Norwegian workers in 2012 employed by workplaces with more than 10 employees. We conduct the analyses separately for men and women.

In Table 5 we present the result of RKD-analyses for men and women. The table presents 6 models. Model 1 presents the main result, based on the NWERS-sample. Models 2 and 3 focus on those workers employed in workplaces providing extended leave and additional private sick pay in excess of statutory sick pay, respectively.<sup>11</sup> In Model 4 we take into account the occurrence of partial sick leaves, while Model 5 incorporates a control vector, taking into account industry and occupation differentials, education and age and workplace size differences. Finally, in Model 6 we

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<sup>10</sup> In Model 4 exclude all observations from workplaces where the employer provide private sick pay. Since our analyses rest on workplace averages, these averages will be influenced by workers earning more than the 6G-threshold, and this might show up as a negative relationship between absenteeism and wages even for those workplaces with average earnings below the 6G-threshold.

<sup>11</sup> We cannot provide separate analyses of employees in workplaces where employers do not provide additional sick pay, because the number of observations necessary to conduct the KRD-analyses (observations around 6G) is not sufficiently high. The provision of extended sick leave and additional sick pay is correlated at the workplace-level, but not fully. However, they differ in that extended (self-certified) sick leave might affect the measurement of physician-certified sick leave days. Thus by focusing on these two separately, we focus on two different reasons why the relationship between sick leave days and earnings could be weaker.

present a model for all workers based solely on administrative data, as opposed to focusing on the NWERS sample.

[ TABLE 5 AROUND HERE ]

For men, we see in Table 5 that regardless of model, the number of sick leave days drops considerably as pay starts to be uncompensated. The marginal replacement rate changes from 1 to 0 (above the kink an absent worker only receives 6G in sick pay regardless of wages). The estimate of Model 1 implies that if earnings increase by 1 percent above the threshold in the sick pay legislation, the number of days drops by 3.44. The average number of sick days for this sample is 8.175 (as seen in Table A1), although absent workers stay on sick leave 50 days on average (close to 80 percent is not absent at all). Regardless which group (all workers or those at least experiencing one spell of sick leave) you compare with, the drop is considerable. Figure 3 illustrates the kink effect for men

[ FIGURE 3 AROUND HERE ]

If we focus on employees employed in workplaces, which provide extended leave (Model 2) or additional sick pay in excess of statutory sick pay (Model 3), we observe a similar drop. The effect is slightly smaller when we take into account partial sick leave in Model 4, while the inclusion of additional covariates in Model 5 yields no qualitative changes. We also identify a significant negative slope-parameter for men based on the administrative data (Model 6). This impact is clearly weaker, implying that 1 percent increase in uncompensated earnings causes a 0.86 day drop in sick days, or roughly 10 percent.

For women, the picture is starkly different. As is seen in Table 5, no significant impact is found regardless of the model, and Figure 3 does not reveal a clear kink in the relationship between wages and sick leave days. This is not a complete surprise. Dale-Olsen (2013a) did not find any evidence in Norway that financial incentives matter for female absenteeism in 2003. Similarly, Ziebarth and Karlsson (2013) did not find any female response following increased generosity of the statutory sickness insurance system in Germany. This lack of response to financial incentives is thus a characteristic of female sick leave behavior found in other countries as well.<sup>12</sup> In our case, one has to bear in mind that the 6G-threshold affect workers with above-average wages, particularly

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<sup>12</sup> The evidence from the experimental literature is mixed. In this literature a common finding is that, at least in a Western patriarchal society, women have a tendency to avoid strong competition and underperform when the competitive pressure increase (Gneezy et al., 2003; Niederle and Vesterlund; 2007) (this relationship might be different in other cultures, as shown by Gneezy, Leonard and List (2008)). The issue is, however, complicated, as seen in the survey of Niederle (2015) on gender differences in competitiveness, risk aversion and altruism. Currently we cannot conclude that financial incentives in general influence female sick leave behavior less than men.

for women, since women on average earn less than men and more often work part-time. These women in our sample work fulltime, in high-wage occupations and high-wage industries. Thus, they are clearly selected, and might be less oriented towards financial incentives when it comes to sick leave.

Potentially one worry in the RD- and RKD-approach is a bunching of workers on one side of the kind, i.e., workers are able to manipulate the running variable. The standard approach is to estimate how other variables are sensitive to the kink or discontinuity. In Table A3 we present the KRD-estimate associated with several other variables (whereof some have previously been used as controls). Table A3 reveals that with two exceptions, education for men and age for women, these analyses do not reveal any significant bunching around the kink. Next, we look closer at our running variable to see whether this reveals any bunching. As is seen in Figure A1, no strong evidence for bunching around 6G (=0 in the figure's X-axis) is found, neither for men nor women. Finally, we apply the methods of Cattaneo et al. (2017) and formally test the bunching hypothesis. The results of this are presented in Table A4. Once again, we find no evidence of bunching.

Another worry in the RD- and RKD-approach is that factors other than the real incentive difference made by the kink in sick pay replacement rates cause the results. To address this worry, we have estimated the models applying several placebo-kinks, i.e., kinks where in reality there are none. In our case, we have estimated the model for four placebo-kinks; for 4G, 5G, 7G and 8G (two placebo points below and two points above the true threshold 6G). As is seen in Table A5, these do not reveal any significant evidence of other kinks.

## 7. Conclusion

In this paper, we have studied the provision of private sick pay in excess of statutory sick pay in Great Britain and Norway, two very different welfare regimes. In contrast to the majority of Norwegian workers who face a 100 percent replacement rate when absent from work due to illness, UK workers receive statutory sick pay on a par with the minimum wage. However, due to a 6G-threshold for sick pay in Norway, not all Norwegians face a 100 percent replacement rate. We utilize this difference and show that the threshold and pay and thus indirectly sick pay are crucial for explaining the higher sick leave rate in Norway compared to the Great Britain. Conditional on the threshold and pay absenteeism is actually equal in the two countries, but absenteeism is much more sensitive to pay in the Great Britain than in Norway even when we focus on employees in workplaces with no provision of sick pay in excess of statutory sick pay. The important observation is that when pay is no longer fully compensated, the sick leave rate drops. This notion is further



supported when applying a regression kinked design to the Norwegian job level data, at least for male workers. Our estimate of the elasticity of sickness absence w.r.t. the benefit level for men is roughly one third of what Ziebarth and Karlsson (2013) found for Germany, and one fourth of what Böckerman et al. (2014) found in Finland. However, Ziebarth and Karlsson observed that the elasticity dropped when focusing on high paid workers. In our case, our identification rests on the response of rather highly paid workers. Still, although the replacement rate clearly influences absenteeism, employers provide benefits that raise this compared to what is provided by statutory sick pay.

Given the generous Norwegian public sick pay it is no big surprise that private sick pay in excess of statutory sick pay is less prevalent in Norway than Great Britain, and Norwegian employers primarily provide for high-wage workforces. However, in both these countries the provision of excess sick pay is clearly part of health-related benefits package provided by employers, and employers provide this when recruitment costs are high and the working conditions are beneficial to workers. Firms provide non-pecuniary goods such as private sick insurance (sick pay) and set wages to maximize profits, and do this while taking into account several different dimensions of labour costs, absence costs being just one dimension. Training costs and turnover costs could be other relevant dimensions. In addition, trade union agreements raise the probability of sick pay in excess of statutory sick pay.

For policymakers on sick pay our paper provides three important lessons. First, sick pay compensation matters for absenteeism, but the sick leave response to economic incentives is heterogeneous. Second, firms might provide additional benefits to worker groups if by doing so they profit, thus if replacement rates are cut, worker groups with good outside options or strong bargaining position could be less affected by the reduction in replacement rates. Third, when reforming the public sick pay legislation, policymaker should take care so that such reforms do not cause unwanted inequality and unexpectedly affect the level of living of vulnerable worker groups.

## **Appendix**

### **A simple model of shirking**

Workers mainly take sick leave due to illness, but there is a rich literature focussing on the shirking aspect of absenteeism. In this literature, there is a margin at which employees can choose whether to take sick leave or not, depending on the costs and benefits of doing so. At this margin sick leave can be interpreted as a reduction in worker effort.

By choosing a sick leave level,  $a$ , when facing imperfect monitoring,  $N$  identical workers maximise expected utility. Let the monitoring probability be  $0 < m < 1$ . Our focus is privately supplied sick pay, thus we simplify and assume that all firms monitor at the same level and costs. Monitoring intensity is usually treated as a key firm choice variable. Public sick pay is also ignored for simplicity.

$a$  can also be interpreted as the sick leave probability. By staying home on sick leave the worker receives sick pay  $S$ . By showing up to work a worker undertakes the contracted effort. As is common in “shirking”-models, work effort is assumed to be associated with disutility, i.e., one can derive a cost of effort function,  $C$ , expressed as a function of the presence probability  $(1-a)$ . We assume that  $C$  is a convex function, i.e.,  $C'(1-a) > 0$  and  $C''(1-a) > 0$ ). An absent and monitored worker is fired. Each worker then maximises:

$$1) \quad (1-a)U(W) + a(1-m)U(S) + amU(R) - C(1-a),$$

where  $U$  expresses a Von Neumann-Morgenstern utility function,  $U' > 0$ ,  $U'' < 0$ ,  $R$  expresses the workers outside options, and  $C(\cdot)$  expresses a convex cost function of providing effort as a function of  $a$  ( $C' > 0$ ,  $C'' > 0$ ). Workers' first order condition for maximization is given by:

$$2) \quad U(W) - U(S) + m[U(S) - U(R)] = C'(1-a^*),$$

i.e., the marginal cost of providing effort equals the marginal gain from showing up at work plus the added marginal loss if caught shirking.

This simple model then yields different predictions for the UK and Norway on absenteeism. Assume that the cost of providing effort can be represented by a quadric function,  $C(1-a) = c(1-a)^2$ . The sick pay in the UK could be interpreted as being equal to the outside options, i.e.  $S=R$ . For Norway,  $S=W$  for wage levels below  $6G$ , but fixed at  $S=6G$  above. Thus  $(1-a)^{UK} = [U(W) - U(R)]/2c$ , implying that  $\frac{\partial a^{UK}}{\partial W} = -U'(W)/2c < 0$ . For Norway and  $W < 6G$  then  $(1-a)^{Norway} = m[U(W) - U(S)]/2c$ , implying that  $\frac{\partial a^{Norway}}{\partial W} = -mU'(W)/2c < 0$ . If monitoring of workers in Norway is very low or absent, then absence will not diminish with wages for wages less than  $6G$ .<sup>13</sup> Above  $6G$ , this becomes equal to the UK,  $\frac{\partial a^{Norway}}{\partial W} = -U'(W)/2c < 0$ . Thus we should see less or no impact from wages in Norway under the  $6G$ -threshold relative to the impact observed in the UK, but for workers earning above the  $6G$ -limit the behaviour should be similar in the two countries. For the Norwegian workers we should see that absenteeism becomes more negatively related to wages.

The utility set up above could be interpreted as the utility of a staying worker,  $U^{stay} = U$ . Then worker mobility could be modelled as:  $q = q(W, S) = \Pr(U(\text{wage offer competing firm}) > U^{stay})$ .

We easily see that  $\frac{\partial U^{stay}}{\partial W} > 0$  and  $\frac{\partial U^{stay}}{\partial S} > 0$ <sup>14</sup>, i.e., since  $q(w, a)$ , then  $\frac{\partial q}{\partial W} < 0$  and  $\frac{\partial q}{\partial S} < 0$ .

In this modelling framework firms maximize profits by choosing the optimum mix of wages and sick pay (since all firms monitor at the same intensity and cost, monitoring costs can be ignored). Firm profits may be described by Equation 3), where workforce size is normalised to 1:

$$3) \quad \Pi = (1-q)[(1-a)P - (1-a)W - (1-m)aS - Z(m) - T(q)] - qT(q),$$

where  $P$  expresses the value of the final product (product price  $\times$  quantum produced),  $W$  and  $S$  denote the wage and sick pay, respectively,  $a$  and  $m$  express the absence rate and the monitoring-and-found-shirking intensity ( $0 < m < 1$ ), respectively.  $Z$  expresses the cost of monitoring, where  $Z' > 0$  and  $Z'' > 0$ . Finally, we have entered a turnover (training) cost element,  $T$ , where  $T' > 0$  and  $T'' > 0$ , in line with Salop (1979). Firm maximizes  $\Pi$  w.r.t.  $W$  and  $S$ . This yields two first-order conditions (FOCs):

$$4) \quad -\{[(1-a)P - (1-a)W - (1-m)aS - Z(m) - T(q)] + T(q) + T'(q)\} \frac{\partial q}{\partial S} = (1-q)[(1-m)a + (P - W - (1-m)S)] \frac{\partial a}{\partial S},$$

$$5) \quad -\{[(1-a)P - (1-a)W - (1-m)aS - Z(m) - T(q)] + T(q) + T'(q)\} \frac{\partial q}{\partial W} = -(1-q)[(1-a) + (P - W - (1-m)S)] \frac{\partial a}{\partial W}.$$

The first FOC expresses that the marginal turnover costs saved by increasing sick pay should be equal to the marginal shirking costs. This shows that firms might rationally increase (or introduce) private sick pay even if it increases absenteeism, if the gains in turnover costs compensate for this. The second FOC

<sup>13</sup> Note that we focus on physician-certified sick leaves. It might be close to impossible to define such an absence as shirking. In addition, as in the other Scandinavian countries, Norwegian physicians seldom deny sickness certificates (Wahlström and Alexanderson, 2004; Carlsen and Nyborg, 2009).

<sup>14</sup> This is easily seen differentiating  $U^{stay}$ :  $\frac{\partial U^{stay}}{\partial W} = (1-a)U'(W) - [U(W) - (1-m)U(S) - mU(R)] \frac{\partial a}{\partial W} > 0$  and  $\frac{\partial U^{stay}}{\partial S} = a(1-m)U'(S) - [U(W) - (1-m)U(S) - mU(R) - C'(1-a)] \frac{\partial a}{\partial S} > 0$  (note that the last term in bracket is 0 since it is the FOC).

expresses that the marginal wage costs (and thus profit) should be equal to the saved marginal turnover and absence costs.

## Tables

[ TABLE A1 AROUND HERE ]  
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[ FIGURE A1 AROUND HERE ]

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Table 1 The private sector sick leave rate and sick pay regimes. UK 2011 and Norway 2012.

	UK			Norway		
	All	Public sick pay only	Additional private sick pay	All	Public sick pay only	Additional private sick pay
Sick leave rate	0.044	0.045	0.042	0.068	0.069	0.066
Sick leave rate-adjusted	-	-	-	0.055	0.057	0.053
Ln hourly wage	2.199	2.053	2.353	3.110	2.957	3.220
Over 6G in earnings	0.369	0.358	0.386	0.299	0.178	0.449
Private sick pay	0.484	0	1	0.477	0	1
Extended leave	0.480	0.256	0.720	0.189	0.182	0.405
Private health insurance/GP	0.156	0.095	0.220	0.190	0.233	0.341
Risky work	0.342	0.382	0.299	0.262	0.337	0.226
Work control index (Design, discretion, pace)	1.751	1.680	1.841	1.585	1.574	1.598
Short time before new recruits perform as well as more experienced workers	0.321	0.385	0.253	0.387	0.456	0.269
Log workforce size	2.683	2.486	2.893	2.948	2.783	3.089
High worker turnover						
Trade union agreement(s)	0.172	0.063	0.289	0.793	0.688	0.711
High powered incentive index	0.671	0.511	0.876	0.739	0.667	0.845

Note: Population: 2680(1858) WERS2011- and 1888 (1107) NWERS2012-workplaces (private sector workplaces in parentheses). All observations are weighted to be representative for the population of workplaces with at least 10 employees.

Table 2 Pay and benefit schemes, working conditions, and statutory pay in UK and Norway.

	Sick pay	Extended leave	Health Insurance	Trade union	Risky work	Quick training	High turnover	Control index	Highpower-incentive-index
<b>A) Basic</b>									
Intercept	0.427** (0.033)	0.439** (0.034)	0.159** (0.022)	0.077** (0.012)	0.334** (0.043)	0.334** (0.033)	0.584** (0.031)	1.785** (0.040)	0.658** (0.061)
Norway	-0.045 (0.042)	-0.231** (0.037)	0.067 (0.034)	0.686** (0.039)	-0.042 (0.037)	0.117 (0.063)	-0.033 (0.060)	-0.262** (0.067)	-0.090 (0.069)
> 6G in earnings	0.151* (0.071)	0.140* (0.070)	0.231* (0.109)	0.041 (0.044)	-0.067 (0.085)	-0.118* (0.055)	0.063 (0.074)	0.081 (0.126)	0.396* (0.185)
NorwayX> 6G in earnings	0.185* (0.074)	0.127 (0.087)	-0.044 (0.074)	-0.260** (0.074)	0.020 (0.082)	-0.166* (0.032)	-0.267* (0.031)	0.156 (0.148)	0.205 (0.062)
R2	0.094	0.072	0.036	0.050	0.002	0.071	0.234	0.210	0.104
<b>B) Within industry</b>									
Intercept	0.453** (0.035)	0.440** (0.034)	0.203** (0.030)	0.109* (0.048)	0.378** (0.030)	0.291** (0.053)	0.554** (0.048)	1.774** (0.083)	0.685** (0.073)
Norway	-0.053 (0.036)	-0.211** (0.041)	0.055 (0.034)	0.614** (0.053)	-0.083* (0.031)	0.115* (0.058)	-0.038 (0.051)	-0.167 (0.086)	0.011 (0.080)
> 6G in earnings	0.118 (0.077)	0.112 (0.078)	0.153 (0.087)	0.191** (0.070)	-0.021 (0.072)	0.001 (0.094)	0.067 (0.131)	0.168 (0.143)	0.080 (0.183)
NorwayX> 6G in earnings	0.157* (0.072)	0.081 (0.106)	-0.077 (0.085)	-0.271** (0.087)	-0.037 (0.030)	-0.127 (0.106)	-0.155 (0.135)	0.116 (0.153)	0.078 (0.073)
R2	0.222	0.187	0.117	0.235	0.258	0.202	0.234	0.210	0.271

Note: Population: WERS 2011- and NWERS 2012-workplaces. 2317 observations. All observations are weighted to be representative for the population of workplaces with at least 10 employees. The industry control vector in Panel B) takes into account 2-digit SIC industry differentials. Industry clustered standard errors presented in parentheses. \* and \*\* denote 5 and 1 percent level of significance, respectively.

Table 3 Coordinated pay and benefit schemes and working conditions. Spearman correlations.

	Sick pay	Extended leave	Health Insurance	Trade union	Risky work	Quick training	High turnover	Control index	Highpower-incentive-index
<b>A) UK</b>									
Ext.leave	0.52**								
Health ins.	0.22**	0.16**							
T. union	0.36**	0.33**	-0.02						
Risky work	-0.07*	-0.05	-0.15**	0.12**					
Quick train.	-0.17**	-0.18**	-0.10**	-0.05	0.06*				
High turn.	-0.05	-0.07*	0.05	-0.12**	-0.05	0.02			
Control in.	0.06*	0.04	0.13**	-0.06*	-0.10**	-0.09**	0.03		
HP.incentives	0.24**	0.30**	0.29**	0.19**	-0.08**	-0.10**	0.04	0.01	
Over 6G	0.14**	0.10**	0.17**	0.07*	-0.06*	-0.05**	0.01	-0.01	0.14**
<b>B) Norway</b>									
Ext.leave	0.30**								
Health ins.	0.15**	0.15**							
T. union	0.02	-0.08**	-0.06						
Risky work	-0.10**	-0.03	0.01	0.13**					
Quick train.	-0.23**	-0.16**	-0.07*	0.10**	0.03				
High turn.	-0.16**	-0.13**	-0.04	-0.03	-0.08*	0.22**			
Control in.	0.04	0.08**	-0.01	-0.20**	-0.11**	-0.16**	-0.03		
HP.incentives	0.20**	0.24**	0.19**	-0.21**	-0.05	-0.20**	-0.06	0.15**	
Over 6G	0.38**	0.30**	0.19**	-0.15**	-0.05	-0.30**	-0.22**	0.12**	0.38**

Note: Population: WERS 2011- and NWERS 2012-workplaces. All observations are weighted to be representative for the population of workplaces with at least 10 employees. The industry control vector in Panel B) takes into account 2-digit SIC industry differentials. Industry clustered standard errors presented in parentheses. \*, \*, and \*\* denote 10, 5, and 1 percent level of significance, respectively.



Table 4 The relationship between pay, sick pay and absenteeism in UK and Norway.  
Estimated elasticities of the sickness absence rate w.r.t. the hourly wage

	Sick leave rate				Sick leave rate adjusted	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
UK:Lnw<G6	-0.574**	-0.609**	-0.548**	-1.409**	-0.653**	-1.331**
	(0.150)	(0.151)	(0.146)	(0.370)	(0.152)	(0.390)
UK:Lnw>G6	-0.413**	-0.471**	-0.548**	-1.195**	-0.503**	-1.152**
	(0.152)	(0.167)	(0.146)	(0.317)	(0.158)	(0.326)
N:Lnw<G6	-0.085	-0.169	-0.169	-0.240*	-0.118	-0.158
	(0.076)	(0.104)	(0.104)	(0.103)	(0.160)	(0.195)
N:Lnw>G6	-0.171**	-0.250**	-0.250**	-0.515**	-0.340**	-0.414*
	(0.065)	(0.091)	(0.150)	(0.148)	(0.171)	(0.210)
Controls:						
Basic		Yes	Yes	Yes		Yes
Industry		Yes	Yes	Yes		Yes
Selection	No	No	No	No private sick pay	No	No private sick pay
R2	0.057	0.075	0.075	0.069	0.070	0.066
Observations	2150	2082	2082	1297	2082	1297

Note: Population: WERS2011- and NWERS2012-workplaces. All observations are weighted to be representative for the population of workplaces with at least 10 employees. OLS regressions. Dependent variable:  $\ln(a/(1-a))$  (= the logit of the sick leave rate). Lnw expresses log hourly wage measured in pounds. Lnw>G6 and Lnw<G6 express log hourly wages for those with earnings above and below G6 (the earnings threshold for public sick pay in Norway). N: and UK: then denote which country for the marginal effect of log hourly wage is calculated. Basic control vector: dummy for trade union agreement, working conditions such as risk (1), pollution (1), and physical (1), pay regimes (4), benefits (3), worker discretion and design (2), team (1) and recruitment costs (1). The industry control vector takes into account 2-digit SIC industry differentials. See Table A2 for parameter estimates and estimates of linear expressions. \* and \*\* denote 5 and 1 percent level of significance, respectively.

Table 5 The impact of public sick pay on the duration of sick leaves. 2012.

	1	2	3	4	5	6
	Sick days	Sick days	Sick days	Sick days adjusted	Sick days	Sick days
<b>A) Men</b>						
Kinked RD-robust	-3.440**	-3.334**	-4.608**	-2.152*	-2.914**	-0.857**
	(1.124)	(1.662)	(1.831)	(0.864)	(1.025)	(0.319)
Total observations	45103	15616	21995	45103	44805	333118
Obs. left cutoff	6524	3673	3192	6286	6894	58667
Obs. right cutoff	7552	3539	3788	7252	8072	60562
<b>B) Women</b>						
Kinked RD-robust	-0.800	-2.668	-1.686	-0.800	-0.735	-0.098
	(0.858)	(2.282)	(2.153)	(0.584)	(0.806)	(0.460)
Total observations	31347	6486	7693	31347	31170	260820
Obs. left cutoff	8435	1429	1932	8048	8840	52325
Obs. right cutoff	6268	1384	1690	6099	6414	38631
<b>C) Elasticity of sick days w.r.t. benefits</b>						
Men	0.295**	0.448**	0.442**	0.236*	0.249**	0.095**
Women	0.083	0.160	0.136	0.038	0.026	0.008
<b>Population, selection and covariates</b>						
Population	Nwers	Nwers	Nwers	Nwers	Nwers	All
Selection		Extended leave	Private sick pay			
Covariates	No	No	No	No	Yes	No

Note: Population: Nwers: workers employed 2011 and 2012 in private sector NWERS-workplaces, not absent in 2011; All: workers employed 2011 and 2012 in private sector workplaces with more than 10 employees, not absent in 2011. Selection: Private sick pay: Only employees in workplaces where employer provides private sick pay above public statutory sick pay; Extended leave: Only employees in workplaces where employer allow longer self-declared sick leaves than what is required by the public sick pay legislation. The table reports the estimate of the kink in the regression line (below and above the cutoff) based on the kinked regressions design approach of Cattaneo et al. (2014, 2015, 2016). The table reports robust estimates based on Cattaneo et al. (2014). Panel A) and B) report the results for men and women, respectively. Dependent variable is sick leave days, except for Model 4 where the measure of sick leave days takes into account the occurrence of partial sick leaves. Cutoff (=threshold for public sick pay) is defined at 6 times the baseline Social Service figure G for 2011 (6G=475296 NOK=63589.9€=52210.6£). The running variable is measured in 100\*log kroners (100\*(lnearnings-ln(6G))). Pay is measured by the yearly total earnings 2011 (i.e., including bonuses and overtime compensation). Covariates: log workforce size, years of education, log worker age, occupation (8 dummies) and industry (8 dummies). \* and \*\* denote 5 and 1 percent level of significance, respectively.

Table A1 Descriptive statistics on earnings, wages and sick leaves

	Establishment-level analysis		Individual-level analysis					
	UK	Norway	All	Men		Women		
				<6G	>6G	All	<6G	>6G
<b>A) Private sector WERS/NWERS-establishments</b>								
Sick leave rate(sr)	0.051	0.067	-	-	-	-	-	-
	(0.089)	(0.050)	-	-	-	-	-	-
Logit (sr)	-3.715	-2.837	-	-	-	-	-	-
	(1.450)	(0.733)	-	-	-	-	-	-
Ln hourly wage	2.182	3.081	-	-	-	-	-	-
	(0.470)	(0.442)	-	-	-	-	-	-
N	1062	1095	-	-	-	-	-	-
<b>B) KR D-sample, Workers employed by private sector NWERS-establishments</b>								
Certified sick days	-	-	8.175	8.522	7.861	13.018	13.728	12.166
	-	-	(31.057)	(32.079)	(30.102)	(40.479)	(40.950)	(39.866)
Certified sick days (absent workers)								
Ln earnings 2011	-	-	13.074	13.019	13.124	13.064	13.017	13.121
	-	-	(0.061)	(0.032)	(0.029)	(0.060)	(0.032)	(0.030)
Age	-	-	44.858	44.219	45.436	46.502	46.004	47.100
	-	-	(11.186)	(11.420)	(10.937)	(9.965)	(10.251)	(9.577)
Education(years)	-	-	4.210	3.905	4.487	5.642	5.352	5.989
	-	-	(2.851)	(2.700)	(2.956)	(2.646)	(2.572)	(2.692)
N	-	-	13937	6624	7313	8906	4857	4049
<b>C) KR D-sample, All private sector workers</b>								
Certified sick days	-	-	8.509	9.033	8.002	13.763	14.406	12.943
	-	-	(31.990)	(33.052)	(30.917)	(41.598)	(42.486)	(40.424)
Certified sick days (absent workers)								
Ln earnings 2011	-	-	13.072	13.013	13.130	13.062	13.011	13.126
	-	-	(0.068)	(0.034)	(0.034)	(0.067)	(0.035)	(0.034)
Age	-	-	44.430	43.665	45.171	47.119	46.468	47.952
	-	-	(11.183)	(11.338)	(10.978)	(9.823)	(10.058)	(9.449)
Education(years)	-	-	3.998	3.727	4.242	5.598	5.347	5.919
	-	-	(2.675)	(2.584)	(2.737)	(2.436)	(2.421)	(2.416)
N	-	-	116374	57295	59080	78436	43997	34441

Note: Populations: Workplace level analyses: private sector WERS2011(UK) - and NWERS2012(Norway)-workplaces. Individual-level analyses: KR D-NWERS=workers employed 2011 and 2012 in private sector NWERS-workplaces earning between 3G and 10G in 2011 and not absent in 2011. KR D-All=all workers employed 2011 and 2012 in private sector workplaces earning between 3G and 10G in, and not absent in 2011. Log hourly pay for UK and Norway is based on 2011 pounds (PPP-adjusted), where 1£=9.032 Norwegian kroner (NOK)). The workplace sick leave rate is measured as the absence rate (for both self-declared and physician-certified sickness absence) the last year (prior to interview). logit (sr) denotes  $\ln(sr/(1-sr))$ . Ln earnings is measured in Norwegian kroner. The 6G-threshold in 2011 is 475296 NOK=63589.9€=52210.6£. Certified sick days denotes physician certified sick days measured from May 1<sup>st</sup>, 2012 and until April 31<sup>st</sup>, 2013.

Table A2 The relationship between pay, sick pay and absenteeism in UK and Norway.

	Observed sick leave rate				Sick leave rate adjusted	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
<b>A) Parameter estimates</b>						
Norway(N)	-0.046 (0.477)	0.090 (0.554)	0.211 (0.546)	-1.468 (1.013)	-0.425 (0.657)	-1.874 (1.201)
Lnw	-0.605** (0.158)	-0.642** (0.159)	-0.577** (0.154)	-1.485** (0.390)	-0.668** (0.160)	-1.403** (0.411)
Lnw>G6	0.170 (0.106)	0.146 (0.122)		0.225 (0.180)	0.138 (0.118)	0.189 (0.172)
NorXLnw	0.514** (0.199)	0.461* (0.227)	0.396 <sup>x</sup> (0.219)	1.228** (0.445)	0.542* (0.256)	1.234* (0.522)
NorXLnw>G6	-0.263** (0.113)	-0.233 <sup>x</sup> (0.129)	-0.087** (0.029)	-0.295 (0.181)	-0.238 <sup>x</sup> (0.124)	-0.275 (0.177)
<b>B) Estimated linear expressions</b>						
UK:Lnw<G6	-0.605** (0.158)	-0.642** (0.159)	-0.577** (0.154)	-1.485** (0.390)	-0.668** (0.160)	-1.403** (0.411)
UK:Lnw>G6	-0.435** (0.160)	-0.496** (0.176)	-0.577** (0.154)	-1.259** (0.334)	-0.530** (0.167)	-1.214** (0.343)
N:Lnw<G6	-0.091 (0.082)	-0.181 (0.112)	-0.181 (0.112)	-0.257* (0.111)	-0.127 (0.172)	-0.169 (0.209)
N:Lnw>G6	-0.184** (0.070)	-0.268** (0.098)	-0.268** (0.098)	-0.552** (0.189)	-0.364* (0.184)	-0.444* (0.225)
Controls:						
Basic		Yes	Yes	Yes		Yes
Industry		Yes	Yes	Yes		Yes
Selection	No	No	No	No private sick pay	No	No private sick pay
R2	0.057	0.075	0.075	0.117	0.070	0.110
Observations	2150	2082	2082	785	2082	785

Note: Population: WERS2011- and NWERS2012-workplaces. All observations are weighted to be representative for the population of workplaces with at least 10 employees. OLS regressions. Dependent variable:  $\ln(a/(1-a))$  (= the logit of the sick leave rate). Lnw expresses log hourly wage measured in pounds. Lnw>G6 expresses  $\lnw * I(\text{earnings} > 6G)$ , i.e., the interaction between log hourly wage and the dummy for whether earnings are above 6G (the earnings threshold for public sick pay in Norway). "NorX" then expresses the interaction with the Norway dummy. Basic control vector: dummy for trade union agreement, working conditions such as risk (1), pollution (1), and physical (1), pay regimes (4), benefits (3), worker discretion and design (2), team (1) and recruitment costs (1). The industry control vector takes into account 2-digit SIC industry differentials. <sup>x</sup>, \*, and \*\* denote 10, 5, and 1 percent level of significance, respectively.

Table A3 Robustness checks. Kinked Regression Design-estimates on other variables.

	Men		Women	
	Estimate	Robust S.E	Estimate	Robust S.E.
Log workforce size	0.002	(0.024)	-0.013	(0.052)
Extended leave	-0.003	(0.009)	0.017	(0.009)
Additional sick pay	-0.002	(0.013)	-0.019	(0.024)
Private health insurance/GP	-0.003	(0.010)	0.002	(0.010)
Risky work	-0.008	(0.013)	0.011	(0.021)
Short training time	0.001	(0.008)	0.005	(0.014)
Team work	0.001	(0.005)	-0.001	(0.009)
Trade union agreements	-0.001	(0.006)	0.009	(0.010)
Performance pay	-0.015	(0.016)	-0.021	(0.026)
High-powered incentive index	-0.007	(0.013)	0.044	(0.026)
Control index	0.008	(0.017)	0.002	(0.027)
Log worker age	-0.027**	(0.009)	0.019	(0.011)
Years of education	0.022	(0.076)	-0.276*	(0.133)

Note: Population: Nwers: workers employed 2011 and 2012 in private sector NWERS-workplaces, not absent in 2011. The table reports the estimate of the kink in the regression line (below and above the cutoff) based on the kinked regressions design approach of Cattaneo et al. (2014, 2015, 2016). The table reports robust estimates based on Cattaneo et al. (2014). Dependent variable denoted by left-column. Cutoff (=threshold for public sick pay) is defined at 6 times the baseline Social Service figure G for 2011 ( $6G=475296$  NOK= $63589.9\text{€}=52210.6\text{£}$ ). The running variable is measured in  $100 \cdot \log$  kroner ( $100 \cdot (\ln \text{earnings} - \ln(6G))$ ). Pay is measured by the yearly total earnings 2011 (i.e., including bonuses and overtime compensation). \* and \*\* denote 5 and 1 percent level of significance, respectively.

Table A4 The bouncing of observations of earnings around the kink-point.

	Men				Women			
Test-value	0.172	-0.910	-1.066	-0.567	0.078	0.874	0.779	-1.271
	(0.864)	(0.363)	(0.287)	(0.571)	(0.938)	(0.382)	(0.436)	(0.204)
Population	Nwers	Nwers	Nwers	All	Nwers	Nwers	Nwers	All
Selection		Extended leave	Private sick pay			Extended leave	Private sick pay	

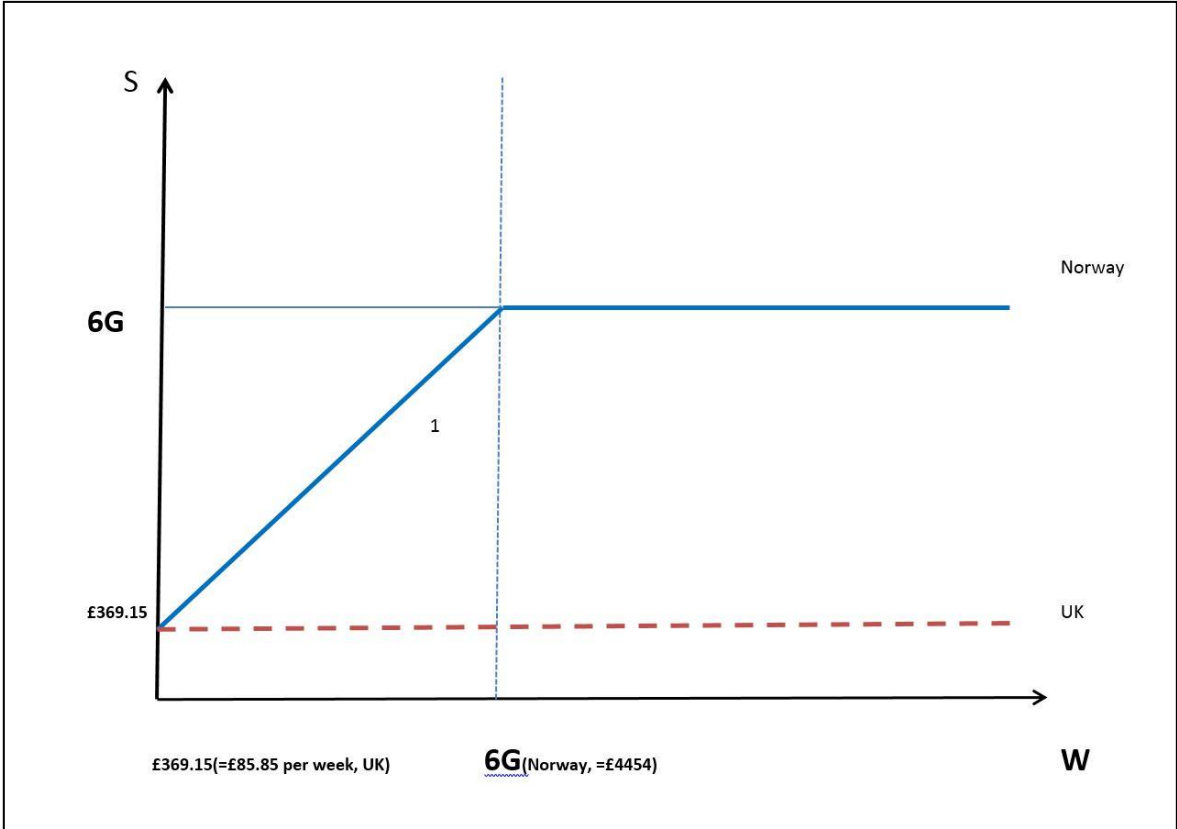
Note: Population: Nwers: workers employed 2011 and 2012 in private sector NWERS-workplaces, not absent in 2011; All: workers employed 2011 and 2012 in private sector workplaces with more than 10 employees, not absent in 2011. Selection: Private sick pay: Only employees in workplaces where employer provides private sick pay above public statutory sick pay; Extended leave: Only employees in workplaces where employer allow longer self-declared sick leaves than what is required by the public sick pay legislation. The table reports a test of the bouncing in the density distribution of earnings (below and above the cutoff) based on the approach of Cattaneo et al. (2017). The table reports robust and bias-corrected test-estimates and the corresponding p-values (in parentheses). \* and \*\* denote 5 and 1 percent level of significance, respectively.

Table A5 The impact of public sick pay on the duration of sick leaves. 2012. Placebo-analyses

	4G	5G	7G	8G
<b>A) MEN</b>				
Kinked RD-robust	1.579	0.184	-0.173	1.023
	(3.008)	(0.985)	(0.532)	(1.905)
Total observations	31483	39362	46767	41325
Obs. left cutoff	1185	5157	11626	4435
Obs. right cutoff	2428	7912	10184	3972
<b>B) WOMEN</b>				
Kinked RD-robust	0.111	0.023	2.047	2.972
	(2.463)	(0.873)	(2.240)	(3.207)
Total observations	27571	29998	28374	20748
Obs. left cutoff	2248	7212	3017	1454
Obs. right cutoff	3687	8459	2050	1062

Note: Population: workers employed 2011 and 2012 in private sector NWERS-workplaces, not absent in 2011. Table elements express the parameter estimate of the kinked regression line (above the cutoff) based on the kinked regressions design approach of Cattaneo et al. (2014, 2015, 2016). Dependent variable is sick leave days. Column head denote Cutoff (=pseudo thresholds for public sick pay) is defined at X times the baseline Social Service figure G for 2011 (the real threshold is  $6G=475296 \text{ NOK}=63589.9\text{€}=51550.6\text{£}$ ). The running variable is measured in  $100*\log$  kroner ( $100*(\ln\text{earnings}-\ln(XG))$ ). The table reports robust estimates based on Cattaneo et al. (2014). Pay is measured by the yearly total earnings 2011 (i.e., including bonuses and overtime compensation). \* and \*\* denote 5 and 1 percent level of significance, respectively.

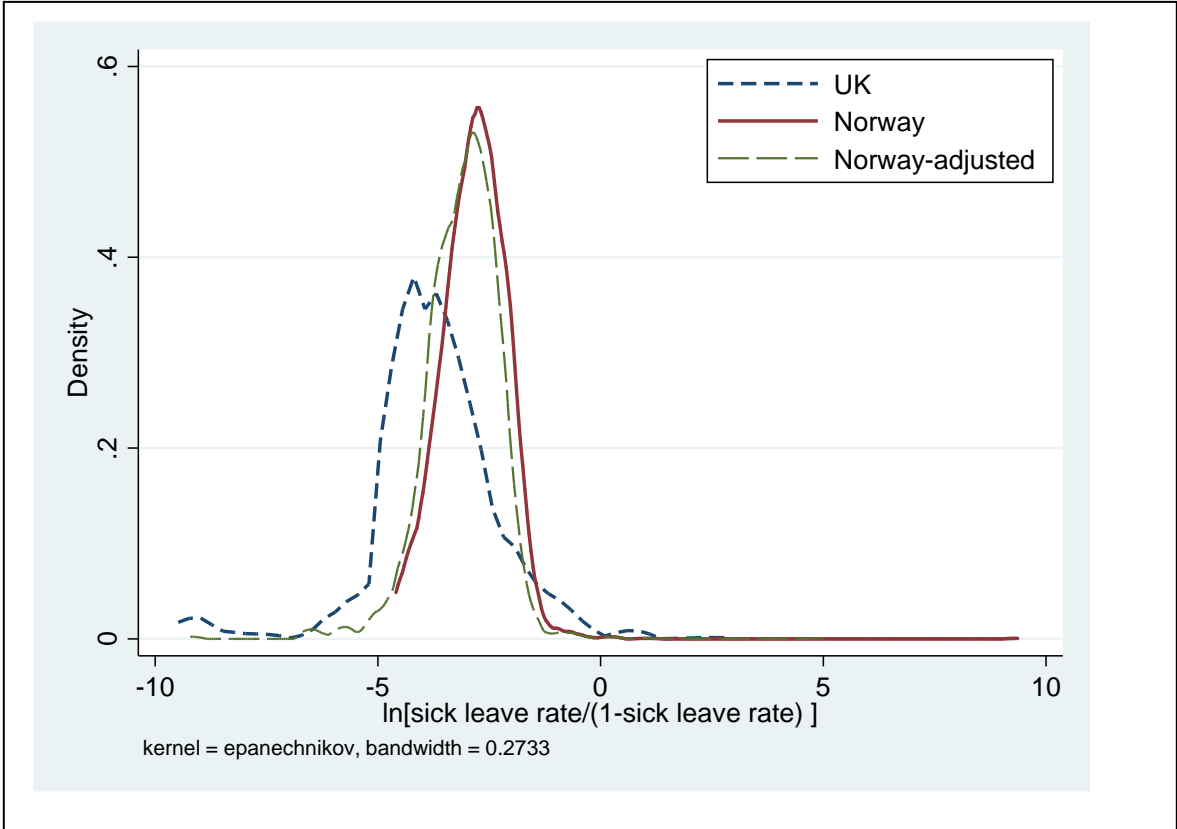
Figure 1 The public sick pay in UK and Norway



Note: The figure is based on 2012-legislation and a currency exchange rate of 1£=9.22Nok.

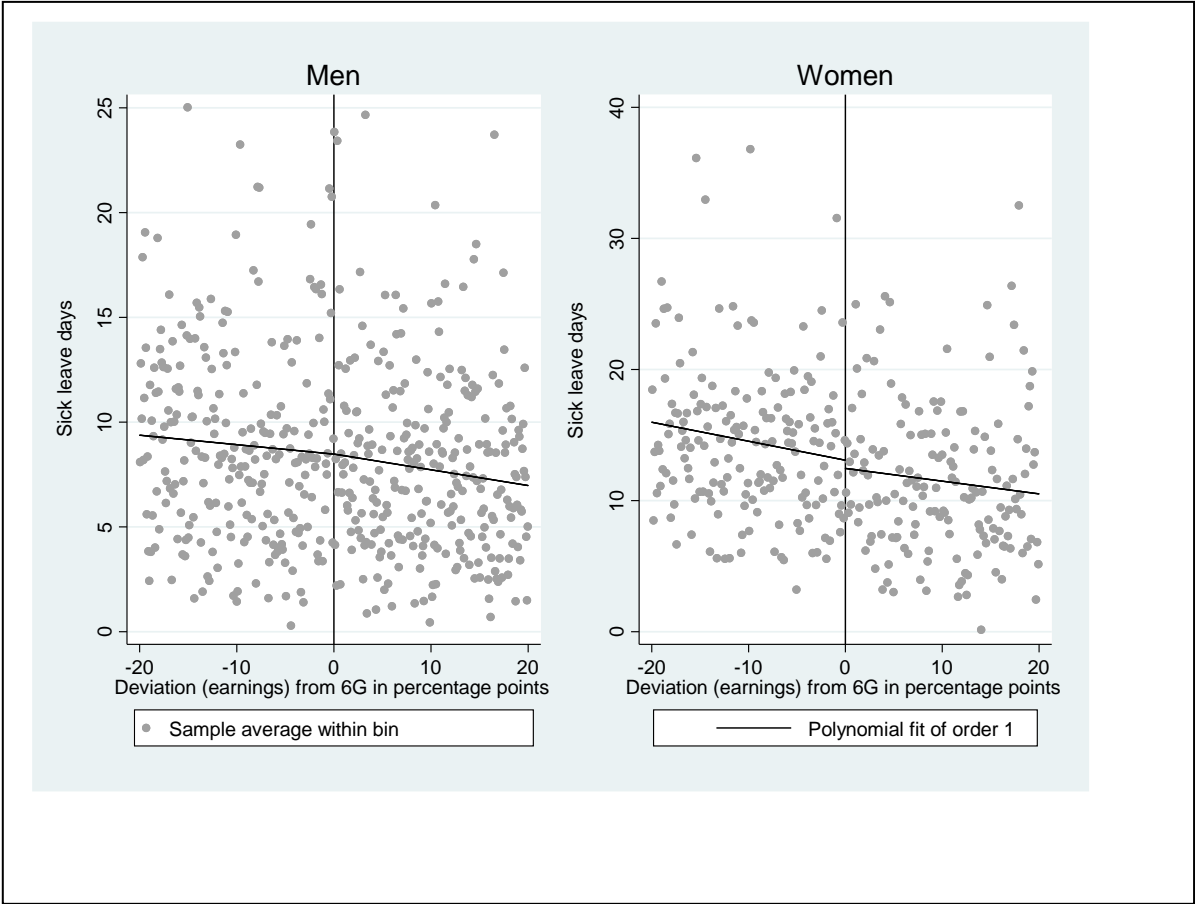


Figure 2 Distribution of the sick leave rate. 2011/2012. Kernel densities. Uk and Norway



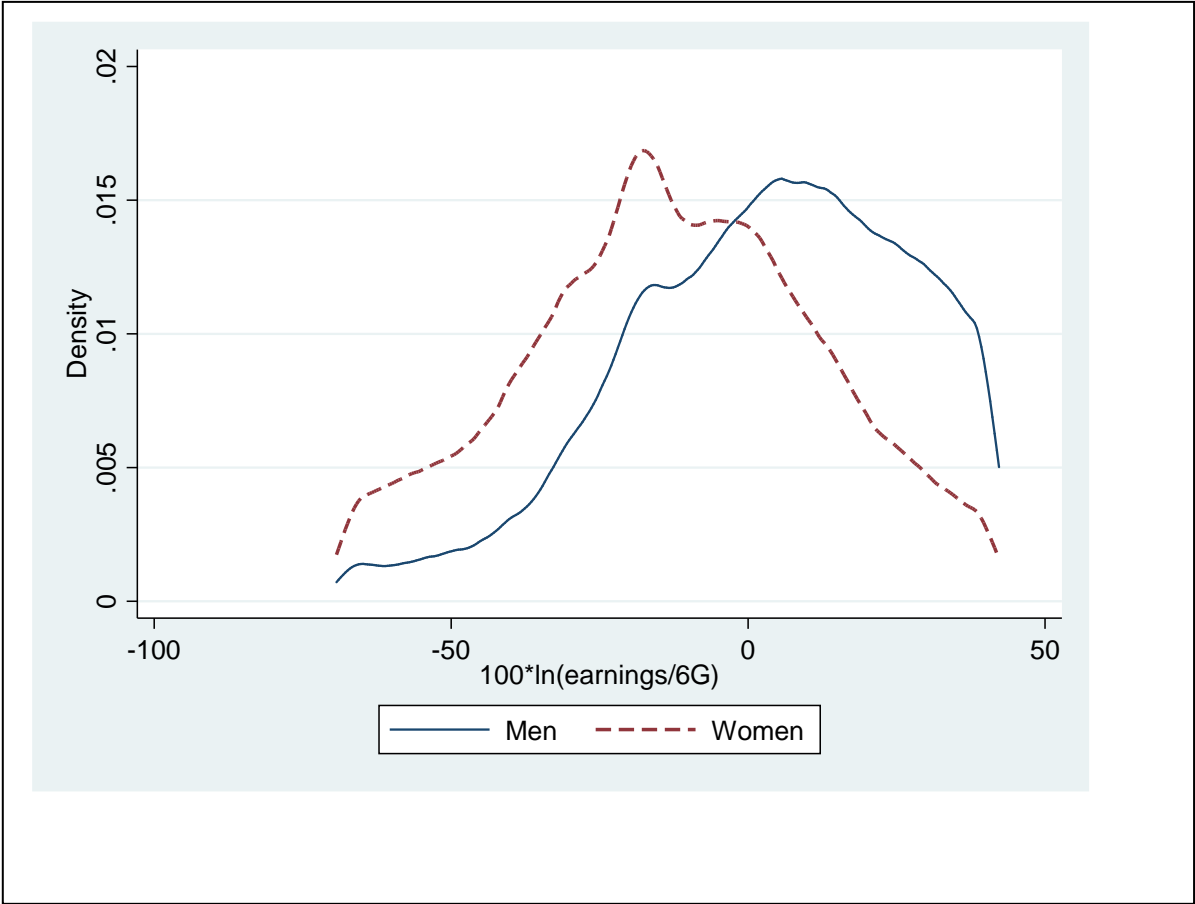
Note: The sick leave rate is measured by:  $\ln(sr/(1-sr))$  (= the logit of the sick leave rate). The adjusted sick leave rate take into account graded sick leaves, i.e., when workers are partly on sick leave (for example, 50%).

Figure 3 The kink at 6G in the Norwegian sick pay legislation. 2012.



Note: Note: Population: workers employed 2011 and 2012 in private sector NWERS-workplaces. Table elements express the parameter estimate of the kinked regression line (above the cutoff) based on the kinked regressions design approach of Cattaneo et al. (2014, 2015, 2016). Dependent variable is sick leave days.

Figure A1 Bunching at the kink at 6G in the Norwegian sick pay legislation.



Note: Population: workers employed 2011 and 2012 in private sector NWERS-workplaces. Kernel densities of the running variable in the KRD-analyses (separately for men and women).