Profiting from Presenteeism? Effects of an Enforced Activation Policy on Firm Profits *

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Abstract

Activation requirements and graded benefits are strategies for reducing social insurance costs in comprehensive welfare states. In Norway, a policy of issuing graded rather than full time sickness absence certificates, is viewed as a strategy not just to reduce direct costs of sick pay but also to facilitate returns to work and reduce inflows to permanent disability. This paper analyzes effects of graded sick leave on firm profits, on average and across different firm groups. A series of panel data models are formulated to estimate the effects of grading on firm profits. In these models, grading is found to mitigate the negative effects of sickness absence on firm profit. A one percentage point increase in full time sickness absence leads to a 1.7% reduction in return on assets relative to the sample mean; this negative effect is reduced by 70% when absence is graded. Effects are robust to inclusion of firm fixed effects as well as time-varying proxies for labor demand.

Keywords: absenteeism, productivity, activation, work loss

JEL Classification Numbers: I18, I38, J30, J48

1   Introduction

Activation policies have become a feature of various social insurance arrangements. In the case of sick pay, activation requirements in the form of graded absence certificates have been found to reduce the time it takes to find work, as well as reduce inflow to permanent disability benefits. There is limited evidence on the effect these kinds of activation policies have on the firm side. This paper investigates the impact of graded sickness absence on the profitability of firms.

The a priori effects of such activation policies on firm profits are ambiguous. On the one hand, absenteeism is generally perceived to be costly for firms, so reducing absenteeism by having workers come in part time could have positive effects on profits. This is most clearly the case in regimes where the firm continues to pay wages to absent workers on temporary disability. Moreover, the cost of absence is typically thought to be higher than direct wage costs, due to disruption of the firm production process. As a result, firms tend to be concerned with absence rates even when firms do not cover sick pay for temporarily disabled workers, i.e. when sick pay is covered by the government or in systems without sickness benefits. Issuing graded rather than full time sickness certificates could reduce the disruption of the production processes, which would increase firm profits. In this way, activation policies reducing the degree of absence also reduce the cost of absence, improving firm outcomes.

On the other hand, more use of graded sickness absence would mean that the workers who actually show up to work on average have worse health, and thus may be less productive, that is, there may be costs associated with increased presenteeism. Full time absence may be preferable for firms if absent workers are less productive per hour. Graded absence certificates are often implemented by a proportional reduction in working hours - that is a worker who is assigned a 50% absence certificate will work 50% of their contracted hours. Put differently, with graded absence certificates, the employer might end up paying full price for workers who, due to a temporary disability, are less productive than usual. Finally, fulfilling such activation requirements during sickness absence may have direct implementation costs for firms, for instance some medical conditions may require the employer to adjust the physical working environment.

The impact of graded sickness absence on firms' outcomes should be of interest to policymakers for a number of reasons. The policy of issuing graded rather than full time absence certificates has been found to lead to shorter absences and higher re-employment probabilities (Høgelund et al. 2010, Viikari-Juntura et al. 2012, Markussen et al. 2012) reducing the cost of sickness absence to the public. To get a more complete view of the economic consequences of grading, we should also look at costs incurred by the employers. By doing this, we can find out whether grading reduces the costs of health related absences to all involved parties, as opposed to simply shifting the costs of sickness absence from the taxpayers to the individual firms.

If grading impacts firm profitability, the incentives of firms to manage absence might also change. In Norway, as in several European countries, sick pay for long term absence spells is covered by the government. In this kind of

institutional environment, economic theory suggests we should expect a moral hazard problem. As firms are insured against the direct costs of long term sickness absence, they will exert too little effort in keeping absence rates low (OECD 2010). Empirical evidence suggests this is indeed the case: Fevang et al. (2014), using data from a Norwegian reform removing firms' copay for pregnant women's sickness absences, found significant increases in absence rates. If grading sickness certificates increases the costs of absence to firms, this could be one channel explaining the beneficial effects of grading on patients' labor market outcomes. That is, as graded benefits become more common, long term absences become more costly for firms, giving firms stronger incentives to reduce absence rates. Conversely, if graded absences are less costly, moral hazard problems may become more important.

At the same time, if grading has an impact on firm profits, this may also affect firms' hiring strategies. The willingness of firms to hire workers with poor health status could depend on the perceived cost of future absence spells. There is some evidence that reducing firms' direct costs of sickness absence leads to less statistical discrimination of high risk workers. Fevang et al. (2014) illustrates this dillema: the authors found that the reform, mentioned above, which reduced firms' costs of sickness absence of pregnant women significantly increased hiring rates of women of childbearing age. In addition, a worker's absence history may be a factor for firms when deciding whether or not to offer permanent contracts to an individual on a temporary contract.

Identifying the causal effects of graded absences on firms may be complicated, as absence patterns of firms are not random, but likely to depend on observed and unobserved characteristics of the firms. Some firms may have an easier time accommodating graded sickness absence than others, for instance due to differences in the nature of work. The decision of whether a sickness absence spell should be full time or graded is typically made following meetings between the patient, the certifying physician and the employer; the preferences of the employer and the nature of work are both likely to influence the grading decision. To illustrate, some highly productive firms may have a higher requirement for how healthy a worker needs to be in order to be productive. These firms would have low rates of graded absence (as the threshold for returning to work would be high) and high profitability, making it seem as though there is a negative relationship between grading and profits even in the absence of any causal effect.

To account for this, linked longitudinal register data is used to estimate a set of panel data models controlling for a rich set of covariates as well as firm fixed effects. This approach will identify effects of grading on firm profits using variation in absence patterns within firms over time. In these models, sickness absence has a significant negative effect on firm profits: a one percentage increase in firm absence rates is associated with a 1.7% reduction in firm profits. Meanwhile, grading is found to reduce the negative impact of absence on firm profits by 70%, compared to full time absence.

Next, extended models are estimated to examine whether the degree of activation matters. Absence certificates that are not full time can be graded

anywhere between 20 and 80%: This paper asks whether the grading level affects firm profits. This approach allows us to examine patterns of firm profits across different levels of grading. Disaggregating "treatment" in this way provides descriptive evidence on the relationship between workers absence grade and firm outcomes - a relationship which should not a priori be assumed to be linear. The cost of sickness absence appears to be monotonically increasing in absence grade: the models find that absences with certification grades higher than 60% are the most costly, while sickness absence that is graded less than 40% has no significant negative impact on firm profits.

The present paper is related to a literature on the cost of sickness absence to firms. If absence is costly to the firm above and beyond direct wage costs, we might expect part-time absences to reduce some of these costs. Pauly et al. (2002) present a theoretical model of the costs of employee absence. Absence is found to be more costly when there is team production and where substitute workers are difficult to find. In these cases, the firm's cost of absence will be higher than the wage costs. Nicholson et al. (2006) use survey data on perceived costs of absences and job characteristics to empirically evaluate the implications of this model. The authors find that absence costs typically exceed wage costs, with an average figure of 28%. When disaggregating results by profession, excess costs were found to be particularly high for high skill occupations (e.g. engineers), and lower skill jobs working closely with high skill professionals (e.g. paralegals). For low skill jobs (fast food cooks, waiters etc,) there was little excess cost of absence above the wage rate. From their findings, we should expect positive effects of grading, in particular for high skill firms.

There is also a related literature concerned with measuring the impact of various health conditions on firm performance. These studies typically focus on the impact of specific medical conditions, for example depression (Stewart et al. 2003, Simon et al. 2001), back pain (van Tulder et al. 1995). Collins et al. (2005) use survey data from a single US corporation to assess the cost of chronic health conditions to the firm from treatment costs and output loss from absenteeism and on-the-job productivity loss ("presenteeism"). The authors conclude that the cost of presenteeism are large and higher than the costs associated with absences. These studies are focused on a different and somewhat more narrow question than the present paper - attempting to estimate the impact of specific health conditions, taking into account treatment costs - whereas the present paper seeks to identify effects on the firm of overall absence patterns for a given (initial) health status.

The contribution of this paper is twofold. First, it contributes to the scarce literature on costs of sickness absence to firms, by analyzing detailed register data on the full population of firms. Second, it contributes to the literature on activation strategies in social insurance arrangements by explicitly discussing the role of the firm.

The rest of the paper is organized as follows. Section 2 gives a brief overview of the relevant institutional context and presents the data used in the analysis. The panel data models are presented in section 3. Section 4 presents some concluding remarks.

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2   Institutions and data

This section first provides an overview of the institutions that govern sickness absence in Norway during this period. Next, the analysis sample is presented, along with a descriptive analysis of the data, illustrating patterns of grading and absence rates.

2.1   Institutions

In Norway, persons who are unable to work due to illness or injury can receive sickness benefits at 100% replacement ratio for sickness spells lasting up to 12 months. Workers who are absent up to 12 months benefit from additional job protection, meaning they cannot be fired for reasons related to their absence. While very short absences - typically up to three days - can be self certified, absences lasting longer than this need to be certified by a doctor.

The first 16 days of each spell sickness benefits are paid by the employer, after that benefits are paid by the government[1]. In other words, firms incur the largest direct costs of sickness absence for relatively short sickness absence, while the direct costs of long term absences will be considerably lower. After 12 months, the worker is no longer entitled to sick pay, but is eligible for other benefits with significantly lower replacement ratios (typically around 66%). Job protection is also reduced after 12 months absence.

Absence certificates will state the degree of disability; the minimum absence grade is 20%. A worker who is issued a graded absence certificate -that is, less than 100% disability - can comply in two ways: The first, and most common way, is by working the number of contracted hours multiplied by the assigned grade, at full capacity. For example, a full time worker who is issued a 60% absence certificate could fulfill this requirement by working two full days a week. In this way, one can think of graded absence certificates as prescribing a "graded presence", i.e. a 60% absence certificate indicates the employee should be present 40% of working hours. The second way a graded absence can be implemented is by working a larger number of hours at a reduced work capacity, e.g. a full time worker can be issued a 60% absence certificate, be present at work four full days a week and work at 50% capacity.

Employers are required by law to make necessary accommodations to facilitate return to work. For longer absence spells, the responsibilities of the firm become more involved: Within four weeks, a "follow-up"-plan should be prepared by the employer working together with the employee. This plan can serve as a way for the firm to communicate how motivated they are to have the employee return to work part time[2]. At 8 weeks, the certifying physician and

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[1] In general, the employer pay liability is applicable at the beginning of each new spell, however there is an exception for repeat spells within a short period. Specifically, if an employee returns to work after a 16 day period (maximum employer pay liability period), and works for 16 calendar days or less before starting a new absence spell, the firm does not have to pay - sick pay is covered by the social insurance system from day 1 in this case.

[2] Starting in 2010, the plan was sent directly to the certifying physician.

the Labor and Welfare Administration (NAV, the agency responsible for paying sickness benefits) meet to formally discuss possibilities of returning to work [3]. Occupational health services, required in industries that are characterized by physical or mental strain, can attend these meetings and advise firms on how to accommodate employees with health problems returning to work, graded or full time. However, these occupational health physicians do not issue absence certificates to employees.

Throughout this process, there appears to be some scope for the firm to influence grading outcomes of workers. One way this could happen is through direct contact between the firm and the certifying doctor. While there is limited literature on this matter, one report (Ose et al. 2013) surveying primary care doctors found that 23% of doctors were contacted by employers calling to inform them that their patients could make a graded return-to-work. At the same time, 79% of respondents indicated that employers very rarely made contact. Meanwhile, firms may influence the absence patterns of the employees directly, either by contacting absent workers, or through implicit expectations of when illness or injury justifies full time absence, especially in times when labor demand is high. Crucially, this more indirect influence can happen without any contact between the employer and the certifying physicians. To summarize, it is likely that employers, in some cases, are able to influence employee grading outcomes. This is a reason why we should be careful when it comes to identifying the causal effects of grading on firms outcomes.

2.2 Data and descriptive analysis

In this paper, data on physician certified absences is merged to data on firm performance to shed some light on how these activation requirements affect firm profits. The main sample is a firm-year dataset of annual profits, firm characteristics and sickness absence rates. The starting point of the sample is data from 2004 to 2010 on all limited liability companies where accounting data is available. This accounting data have been used to study, among other topics, entrepeneurship (Berglann et al. 2011) and effects of diversity in board of directors (Dale-Olsen et al. 2013).

Using these data, it is possible to construct various measures of firm profits. I construct the return on assets (ROA) by dividing operating profits by total assets. This measure is typically less volatile than return on equity (ROE), as it is less vulnerable to loss of equity. An alternative would be to use a market-based measure of performance (i.e. Tobin's q), however this would require data on the market value of firms' equity, which is unfortunately not available, as firms in the sample are identified only by encrypted (anonymous) identification numbers.

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[3]It is unclear how much these provisions are enforced. Firms are allowed to make exceptions if follow-up measures are believed to be unnecessary, for instance if the absent employee is expected to make a quick return and for employees with a serious injury or illness that make it unlikely that they will ever return to work.

Next, this firm data is linked to information on the firm's industry classification, firm location and demographic and educational data on the workers. This data includes information about gender, age, education and immigrant status. Finally, data on doctor-certified sickness absence is added to the sample. Absences are classified as full time if the disability rate is 100%, and graded if it is less than 100%.

Firm-years with missing data are excluded from the sample. Accounting data covers 863,236 firms-years. Removing firm-years where the firm is not registered with any employees, or there is other data missing, the sample is reduced to 555,771 firms. Finally, firms with fewer than 5 employees are excluded from the sample. While these very small firms make up a large share of firms in the Norwegian economy (49% of the initial sample), they represent a relatively small fraction of workers (5.9% of the initial sample). The final sample contains 274,356 firm-year observations.

Table 1 shows some summary statistics of this firm level sample. A large majority, 91% of firms experience some sickness absence each year, with the average sickness absence rate being at 4.3%. Meanwhile, 51% of firms experience any part-time sickness absence.

Table 1: Summary statistics, main sample

	mean	sd
Return on assets	0.0599	0.150
Firm size	33.22	218.9
Frac female	0.368	0.307
Frac immigrant	0.0876	0.155
Avg employee age	38.49	7.392
Share college degree	0.236	0.245
Sickness absence (all)	0.0430	0.0457
Sickness absence (partial)	0.0105	0.0211
Any sick absence	0.905	0.293
Any partial sickness absence	0.509	0.500
Observations	274356	

Note: Figure shows summary statistics of the panel of firms (2004-2010).

These numbers mask substantial variation in absence patterns between firms. Specifically, there appear to be differences in the level of absence rates between high and low skill firms. Figure 1 shows the evolution of the average rate of sickness absence and the average share of absence days that are graded during this period. In this figure, firms are classified according to the education background of their employees. Firms are classified as "high education" if more than 33% of employees have at least a college degree, and low education if less than 10% of workers have a college degree.

The left panel shows the evolution in average absence rates, while the panel

Figure 1: Absence rates, 2004-2010
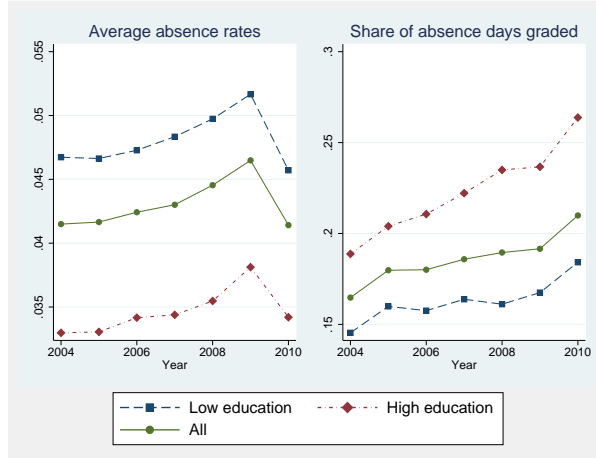
on the right illustrates the average share of absence that is graded. During this period, there has been an upward trend in the use of graded absence certificates. In 2004, 16.5% of the average firm's absence days were associated with spells with graded absence certificates; in 2010, that fraction had grown to 21.0%. Overall absence rates peak in 2009, and drop in 2010, corresponding to a peak in the share of graded absence the same year. These patterns are likely driven in part by changes in the types of illness/injuries: the 2009 swine flu pandemic was associated with a significant increase in sickness absence, moreover, the contagious nature of this would indicate that absence should be full time in these cases. During this period, there were also significant business cycle fluctuations, with profits growing from 2004 to 2007, then falling from 2008 following the financial crisis. To control for these developments, the empirical models will control for calendar time in a flexible way by including a set of dummy variables for calendar year.

The figure also shows significant differences in absence patterns across firm categories. Firms are classified according to the fraction of employees who have completed a tertiary degree. Firms where 10% or less have a college degree are classified as low skill firms, while firms where at least 33% of workers have a college degree are considered high skill firms. High skill firms have on average lower rates of sickness absence than low skill firms; the difference is around 1.3 percentage points and appears to be stable over time. Looking at the panel on the right, graded absence certificates are used more often in high skill firms than in low skill firms. One way of thinking about these differences is that the

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extent to which an illness or injury makes an individual unable to work may depend on the way work is organized. A person may be too sick to show up at the workplace, but have enough residual work capacity to get work done from home. As a result, we would expect firms where it is easier to work from home to have lower rates of registered absence compared to firms that require physical presence. This could help explain the lower absence rates of high education firms (where working from home may be more common).

The link between a medical condition and sickness absence can depend on the nature of work more generally. For example, showing up to work with a minor viral infection may be fine for an office worker, but ill-advised for a person working in a hospital setting. Moreover, the costs of accommodating graded return to work may be lower for high education firms, where there is less physical work. In this way, differences in the nature of work in high and low education firms could be part of the explanation of the difference in overall absence rates and the use of graded absence across firms

Initial costs associated with accommodating the needs of employees returning to work on a graded absence certificate is likely to make doctors less likely to issue graded absence certificates for absences that are expected to last a very short time. After two weeks duration, 19% of absence spells are graded - by 10 weeks, this fraction has more than doubled to 39%. As a result, firms with mainly short term absence are likely to have a smaller fraction of spells be graded, everything else being equal. This could in turn lead to a positive correlation between overall absence rates and the share of graded absence.

Finally, to motivate the formal analysis to follow, figure 2 plots the relationship between the share of absence graded and firm profits. As discussed above, short term absence has a higher direct cost to firms, and short lasting spells are less likely to be graded. The raw correlation between grading and profits therefore would capture in part the relationship between short term absence and profits. To address this, separate figures are constructed for short and long term absence.

Figure 2 appears to indicate a positive relationship between grading and profits. On average, firms where a larger share of long term absence is graded have higher return on assets, compared to firms where a higher share of absence is full time. Of course, this relationship could reflect many things and should not be given a causal interpretation. Some of this likely reflects the way grading is used more often in high skill firms (figure 1), which may be more productive. Any analysis of this relationship should then at a minimum control for employees' observable characteristics. The positive relationship between grading and profits could reflect reverse causality: higher profits may lead to lower full time absence rates. Moreover, a higher share of graded absence could reflect favorable firm characteristics such as better health of the workers, better quality of management, less workplace conflicts, as well as the firm's willingness to facilitate graded return-to-work, that are not observed in the available register data.

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Figure 2: Return on assets and share graded
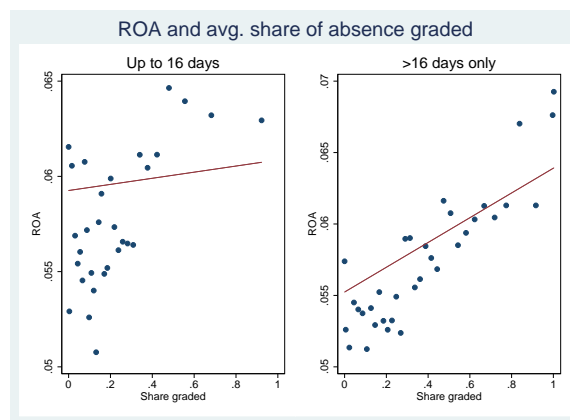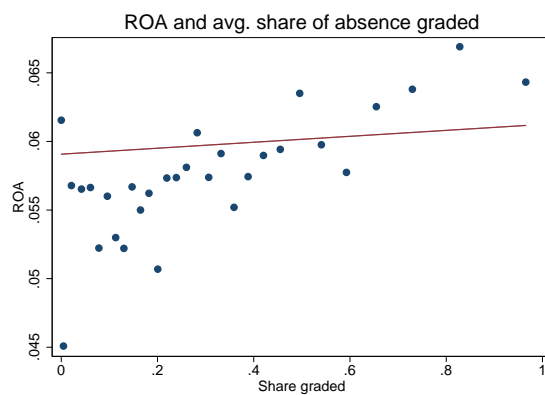
Note: Figure shows binned scatter plots of firms' return on assets (ROA) and the share of absence that is graded.

3 Panel data models

To examine the link between grading and firm profits, the following econometric model is estimated:

$$y_{it} = \alpha_i x_{it} \beta^x + \theta_t + sick_{it} \beta^s + part_{it} \beta^p + \varepsilon_{it} \qquad (1)$$

Here y_{it} is the profits of firm i year t (measured by return on assets). α_i is a firm fixed effect, x_{it} is a vector of firm observable characteristics, which in the baseline specification includes the share of female workers, share of immigrant workers, average age of workers and number of employees. θ_t are year dummies. The main variables of interest, $sick_{it}$ and $part_{it}$ represent the average incidence of sickness absence (total) and partial sickness absence. For each year t, the variable $sick_{it}$ is constructed by dividing the total number of absence days of firm i's employees – whether full time or graded - by the total number of days these workers are employed at the firm. Similarly, $part_{it}$ is obtained by adding together only absence days where the physician's certificate indicated graded absence, divided by the total number of worker-days at firm i each year. That is, β^p captures the differential effect of partial sickness absence on profits: a positive estimate of β^p indicates an that part-time absence is less costly for the firm compared to full time absence.

Table 2 contains estimated parameters from estimation of (1) on the full sample of firms. In a first specification, shown in column (1), the model is estimated without including firm fixed effects (setting $\alpha_i = \alpha, \forall i$), instead including indicators of firm location and industry (68 categories). The estimated effect of the fraction of working days lost to sickness absence is negative, indicating that sickness absence is in general is costly for firms. However, for graded absences, there is an additional positive effect, suggesting that graded absence is less costly for firms compared to full time absence.

If unobserved characteristics of the firm influence both firm profits and sickness absence, as well as the proportion of sickness absence that is full time, the estimates in column (1) will suffer from omitted variable bias. To the extent that these unobserved characteristics are constant over time, the problem can be mitigated by including firm fixed effects. Column (2) shows selected estimates from the preferred specification, which includes firm FE. Including fixed effects reduces the magnitude of the estimated negative effect of sickness absence on firm profits. Meanwhile, the estimated additional effect of graded absence remains positive and significant.

To consider the quantitative implication of these findings, recall that the sample average return on average is 0.069. Using the fixed effects estimates from column (2) of table 2, a one percentage point increase in full time sickness absence leads to a 1.7% reduction in ROA. When absence is graded rather than full time, this negative effect is reduced by 70%: A one percentage point increase in graded absence rate reduces ROA by 0.05% relative to the sample mean.

Making accommodations for sick workers returning to work on a graded absence certificate can be costly. The firm's willingness to incur these costs

Table 2: Effects of Sickness Absence Rates

	(1) OLS	(2) Firm FE	(3) Firm FE
Frac sick	-0.226***	-0.103***	-0.109***
	(-23.73)	(-11.63)	(-12.47)
Frac partial	0.138***	0.0725***	0.0798***
	(7.07)	(4.04)	(4.52)
Unemployment			-0.299***
			(-8.35)
Log revenue			0.0349***
			(32.96)
$\bar{y}$	0.0599	0.0599	0.0599
Observations	274251	274292	274292

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Models include controls for education background of the employees (share of employees in each of 7 education levels), share of women, share of immigrants, average age, number of employees, and calendar year. Model (1) includes additional controls for industry (68 categories) and municipality. Standard error clustered at firm level.

could potentially vary with fluctuations in firm profits. Moreover, there could be a stronger pressure on workers to return to work in a graded capacity during good times, when firms are short of manpower. Such mechanisms could bias the estimated relationship between graded absence rates and firm profits.

To address this, I estimate an alternative model specification that includes additional variables as proxies for the firm's labor demand. This specification includes a measure of local unemployment[4] as well as firms' annual revenue figures (from accounting data). If the positive differential effect of graded absence is driven by unobserved changes in labor demand, introducing these additional control variables should reduce the estimated coefficient β^p. Estimates from this model are shown in column (3) of table (2). Comparing these estimates with the baseline results of column (2), the estimated effects of full and graded absence rates remain virtually unchanged.

Next, the model is estimated separately for low and high skill firms. Results are shown in table 3. Column (1) reproduces the fixed effects estimates for the full population of firms, while columns (2) and (3) show estimated effects for low and high skill firms. The positive differential effect of graded absence appears to be driven mainly by low skill firms. For high skill firms, the estimated differential effect of graded absence is positive, but smaller and not statistically

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[4]Here, local unemployment is defined as the fraction of a municipalities' residents aged between 18 and 67 who receive unemployment insurance at any time during the year.

significant.

This difference may seem puzzling given the higher relative incidence of graded absence in high skill firms. One interpretation could be diminishing marginal gains from increasing graded return to work. If this is the case, the marginal treated patient in low skill firms could be healthier and more productive compared to the marginal patient in high skill firms. The findings in table 3 would imply potential gains to low skill firms from increased use of graded rather than full time absence.

Table 3: Effects of Sickness Absence Rates by Education Category

	(1) All	(2) Low ed	(3) High ed
Frac sick	-0.103***	-0.106***	-0.114***
	(-11.63)	(-7.85)	(-5.31)
Frac partial	0.0725***	0.104***	0.0506
	(4.04)	(3.56)	(1.33)
$\bar{y}$	0.0599	0.0598	0.0659
Observations	274292	99089	80004

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Models include firm fixed effects as well as controls for education background of the employees (share of employees in each of 7 education levels), share of women, share of immigrants, average age, number of employees, and calendar year. Low education firms are firms where 10% or less have a college degree; high education firms are firms where at least 33% of workers have a college degree. Average frac sick in low (high) education firms 4.80% (3.46%). Average frac partial in low(high) education firms 1.04% (1.06%). Standard error clustered at firm level.

So far, grading has been included in the model as a binary treatment, i.e. absence has been categorized as graded if the absence grade is less than 100%, and full time otherwise. In the models presented so far, grading is assumed to have the same impact on firm profits regardless of the absence grade. To examine this more closely, an alternative set of models is estimated, where graded sickness absence at the firm is grouped in four bins according to the absence grade indicated on the doctor's certificate: 20-39%, 40-59%, 60-79% or 80-99%. In the sample, 8% of graded absence is graded between 80 and 99%, 13% is graded between 60 and 79%, 69% is graded between 40 and 59%, and 13 percent is graded between 20 and 39%.

$$y_{it} = \alpha_i + sick_{it}\beta^{sick} + sick20_{it}\beta^{20} + sick40_{it}\beta^{40} + sick60_{it}\beta^{60} + sick80_{it}\beta^{80}$$
$$+ x_{it}\beta^x + \theta_t + \varepsilon_{it}$$

(2)

The variables $sick20_{it} - sick100_{it}$ represent firm average rates of sickness absence, separated by certification degree. For example, the variable $sick20_{it}$

represents the share of working days in the firms where employees have a certified sickness absence with an absence grade set between 20 and 39%; the coefficient β^{20} then captures the differential effect of sickness absence with an absence grade $20 - 39\%$ (relative to full time absence) on profits.

To begin, a version of the model is estimated where $\alpha_i = \alpha, \forall i$. These OLS estimates of equation (2) are shown in column 1 of table 4. As discussed in the introduction, these estimates should be interpreted with caution, as grading patterns are unlikely to be exogenous even when controlling for firm observable characteristics. Overall, higher rates of sickness absence is associated with reduced firm profitability. The estimated negative impact of sickness absence absence on firm profits appears to be monotonically increasing in absence grade. Graded absence with high certification grades (60% or higher) does not have a statistically different effect on firm profits compared to full time absence. Perhaps surprisingly, the estimated differential effect of absence in the lowest grading bin - graded between 20 and 39% - is positive and larger than the main effect of sickness absence rates, indicating that this category of absence is associated with increased firm profits. There are at least two possible stories behind this. The first mechanism is related to how graded absence certificates in some situations can function as wage subsidies. This is more likely to be the case for workers who are relatively healthy, retaining a larger fraction of their work capacity. Another explanation is related to selection - graded absence certificates with low certification grades may simply be more common in highly profitable firms.

Next, the model is estimated with firm fixed effects. Estimates from this exercise are shown in column 2 of table 4. Adding fixed effects reduces the magnitude of the estimated coefficients, but the pattern remains unchanged. Fixed effects estimates on the full population of firms indicate that full time absences and absences with certification grades of 60% and higher are particularly costly for firms. Sickness absence with a certification grade between 40 and 60% is also associated with reduced firm profits, but the effect is smaller than for full time absence. According to these models, sickness absence that is graded less than 40% has no negative effects on firm profits.

The model specified in equation (2) allows the effect of grading to vary according to the absence grade. The effect of grading could also vary according to diagnosis groups. Specifically, it may be more straightforward to make adjustments for graded return-to-work for employees who are absent due to somatic illness, rather than psychiatric diagnoses. To investigate this, a set of models relating ROA to absence by diagnosis category, allowing for differential effects for absences that are due to "psychological disorders". The models are estimated with a full set of controls, with and without including firm fixed effects. Results from this exercise are shown in columns 3 and 4 of table 4.

Absence due to psychological disorders is associated with a larger negative impact on firm profits than absence due to other diagnoses. This difference remains significant when including firm fixed effects, for both full time and graded absence. One possible explanation for this difference could be that employees who are absent due to psychological disorders have lower productivity some time

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Table 4: Effects of Sickness Absence Rates

	(1) OLS	(2) Firm FE	(3) OLS	(4) Firm FE
Frac sick	-0.224***	-0.102***	-0.187***	-0.0855***
	(-23.53)	(-11.44)	(-17.64)	(-8.66)
Sick 80	0.00533	0.0319		
	(0.09)	(0.56)		
Sick 60	0.0628	0.0251		
	(1.23)	(0.51)		
Sick 40	0.124***	0.0663***		
	(5.16)	(3.06)		
Sick 20	0.387***	0.155***		
	(7.37)	(3.42)		
Frac sick psych.			-0.188***	-0.0831***
			(-7.63)	(-3.71)
Frac partial			0.130***	0.0717***
			(6.03)	(3.63)
Frac partial psych			0.00998	-0.0254
			(0.19)	(-0.53)
Observations	274251	274251	274251	274251

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Note: Table shows selected estimated coefficients from estimation of equation (1). The dependent variable is return on assets (ROA). "Sick 80" is sickness absence graded 80-99% (sample average 0.09%), Sick 60 is sickness absence graded 60-79% (sample average 0.14%), Sick 40 is sickness absence graded 40-59% (sample average (0.69%). Sick 20 is sickness absence graded 20-39% (sample average 0.14%). Models include controls for education background of the employees (share of employees in each of 7 education levels), share of women, share of immigrants, average age, number of employees, industry (68 categories), municipality and calendar year. Standard error clustered at firm level.

before and after the absence spell. Moreover, absence patterns may be endogenous to firm performance. For instance, poor management could lead to both reduced profits and increased absenteeism, in particular for psychological disorders. Meanwhile, the difference between the point estimates associated with full time and graded absence appears to be roughly similar for the two diagnosis groups. To summarize, while absence due to psychological disorders appears to be more costly for firms, the effect of grading on the cost of absence is found to be roughly constant across diagnosis groups.

4   Conclusions

This paper asks the question of how firm profits are affected by activation requirements for workers on sickness absence. Descriptive statistics show a positive relationship between the share of long term absence that is graded and the profits of the firm, as measured by the return on assets (ROA). This could indicate that graded absence may be less costly for firms when the alternative is full time absence. Meanwhile, the use of graded rather than full time absence certificates is likely to vary with observed and unobserved characteristics of firms. Data on use of graded sickness absence certificates indicate that patients who are employed at high skill firms, defined as firms where a large share of workers have a college education, are more likely to be issued a graded absence certificate compared to people working at low skill firms.

A series of panel data models are formulated to estimate the effects of grading on firm profits. Higher sickness absence is associated with lower firm profits. However, this effect less pronounced for graded absence. Effects appear to be primarily driven by absence with low certification degrees, specifically absences graded 60% or lower. These findings are robust to inclusion of firm fixed effects as well as time-varying proxies for labor demand.

Policymakers in comprehensive welfare states frequently face two potentially contradictory policy goals: on the one hand, providing a generous welfare state while on the other hand maintaining incentives for people to be economically self-sufficient. The policy of encouraging physicians to issue graded rather than full time absence certificates can be thought of as an attempt to reconcile these goals (Markussen et al. 2012). Ideally, grading should reduce the costs to the public of sickness absence, while still providing a high level of insurance to workers with poor health.

This policy may be less desirable if grading simply shifts costs from taxpayers to firms. Grading could be costly to firms, through increased costs of presenteeism (if workers are less productive than usual) or through direct costs of accommodating partially disabled workers. Overall, the findings in this paper indicate that such concerns are unwarranted. It would seem that the gains from reduced interruptions of the production process generally outweigh the costs of accommodating workers returning part time.

References

Berglann, H., Moen, E. R., Røed, K. & Skogstrøm, J. F. (2011), 'Entrepreneurship: Origins and returns', *Labour Economics* **18**(2), 180–193.

Collins, J. J., Baase, C. M., Sharda, C. E., Ozminkowski, R. J., Nicholson, S., Billotti, G. M., Turpin, R. S., Olson, M. & Berger, M. L. (2005), 'The assessment of chronic health conditions on work performance, absence, and total economic impact for employers', *Journal of Occupational and Environmental Medicine* **47**(6), 547–557.

Dale-Olsen, H., Schøne, P. & Verner, M. (2013), 'Diversity among Norwegian boards of directors: Does a quota for women improve firm performance?', *Feminist Economics* **19**(4), 110–135.

Fevang, E., Markussen, S. & Røed, K. (2014), 'The sick pay trap', *Journal of Labor Economics* **32**(2), 305–336.

Høgelund, J., Holm, A. & McIntosh, J. (2010), 'Does graded return-to-work improve sick-listed workers' chance of returning to regular working hours?', *Journal of health economics* **29**(1), 158–169.

Markussen, S., Mykletun, A. & Røed, K. (2012), 'The case for presenteeism—evidence from Norway's sickness insurance program', *Journal of Public Economics* **96**(11), 959–972.

Nicholson, S., Pauly, M. V., Polsky, D., Sharda, C., Szrek, H. & Berger, M. L. (2006), 'Measuring the effects of work loss on productivity with team production', *Health Economics* **15**(2), 111–123.

OECD (2010), *Sickness, Disability and Work: Breaking the Barriers; A Synthesis of Findings Across OECD Countries*, OECD.

Ose, S. O., Dyrstad, K., Brattlid, I., Slettebak, R., Jensberg, H., Mandal, R., Lippestad, J. & Pettersen, I. (2013), Oppfølging av sykmeldte – fungerer dagens regime?, Rapport, SINTEF.

Pauly, M. V., Nicholson, S., Xu, J., Polsky, D., Danzon, P. M., Murray, J. F. & Berger, M. L. (2002), 'A general model of the impact of absenteeism on employers and employees', *Health Economics* **11**(3), 221–231.

Simon, G. E., Barber, C., Birnbaum, H. G., Frank, R. G., Greenberg, P. E., Rose, R. M., Wang, P. S. & Kessler, R. C. (2001), 'Depression and work productivity: the comparative costs of treatment versus nontreatment', *Journal of Occupational and Environmental Medicine* **43**(1), 2–9.

Stewart, W. F., Ricci, J. A., Chee, E., Hahn, S. R. & Morganstein, D. (2003), 'Cost of lost productive work time among us workers with depression', *Jama* **289**(23), 3135–3144.

van Tulder, M. W., Koes, B. W. & Bouter, L. M. (1995), 'A cost-of-illness study of back pain in The Netherlands', *Pain* **62**(2), 233–240.

Viikari-Juntura, E., Kausto, J., Shiri, R., Kaila-Kangas, L., Takala, E.-P., Karppinen, J., Miranda, H., Luukkonen, R. & Martimo, K.-P. (2012), 'Return to work after early part-time sick leave due to musculoskeletal disorders: a randomized controlled trial', *Scandinavian Journal of Work Environment and Health* **38**(2), 134.