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The effects of flexible working time arrangements on absenteeism – the Dutch case.

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Abstract[*]

Flexible working time arrangements, such as flexi-time, home-based telework, and part-time work, are often credited as being employee-friendly in the sense that they provide time autonomy to workers and improve the fit between paid work and private life in that way. Employers however may profit from employees' working time autonomy as well. Flexible working time arrangements may reduce absenteeism for instance inasmuch as they facilitate the combination of paid work with other activities. In a longer term they may further decrease absenteeism by improving worker's health, through reduced stress and increased job satisfaction, for example. This could be a considerable upshot for employers and present a potential business case for flexible working time arrangements, as absenteeism is costly for both firms and society as a whole.

In this paper we analyse the effect of flexible working time arrangements, namely flexi-time, telework and part-time work, on the frequency and length of sickness absenteeism. We analyse a unique cross-sectional survey dataset collected among more than 20.000 Dutch public sector employees in 2004 with negative binomial regression models. We show that access to flexi-time and telework indeed reduces sickness absence, while working part-time does not have a clear significant effect according to our models. Access to telework only reduces the number of absences but not the total annual length of absences and therefore seems to have an effect on short-term absences only. Flexi-time on the other hand not only decreases the number of absences but has a marked negative effect on the length of absences as well.

Having access to telework and flexi-time seems to lead to behavioural effects – i.e. employees work at other times or at home when a sickness or 'emergency' would prevent the them to show up at work – and therefore reduce the number of absences in a given period. Flexi-time furthermore reduces the total length of absences probably due to a positive indirect effect on health.

Keywords: flexible working time arrangements; flexi-time; telework; part-time work; absenteeism

JEL-codes: J22; J;28; J32; M52; M54

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Introduction

Flexible working time arrangements, such as flexi-time, home-based telework, and part-time work, are often credited as being employee-friendly in the sense that they provide time autonomy to workers and improve the fit between paid work and private life in that way. While these arrangements are primarily viewed as benefiting workers, this does not mean that there are no positive aspects for employers as well. They may reduce absenteeism for instance inasmuch as they facilitate the combination of paid work with other activities. In a longer term they may further decrease absenteeism by improving worker's health, through reduced stress and increased job satisfaction, for example. This would be a considerable upshot for employers and present a business case for flexible working time arrangements, as absenteeism is costly for both firms and society as a whole. Across Europe, average rates of absence are between 3% and 6% of working time with estimated costs amounting to 2.5% of GDP (Edwards and Greasley 2010). In the Netherlands, yearly wage costs of sickness absenteeism are estimated to be 7.5 billion EUR with average absence rates of around 4.3% in recent years (Hartman, Kartopawiro, and Floris Jansen 2010). Various efforts have therefore been made in many countries to reduce absenteeism, e.g. by tightening the rules on sick pay or by promoting well-being and health at work.

In this paper we analyse the effect of flexible working time arrangements on the frequency and length of sickness absenteeism. In particular, we use a cross-section survey of Dutch public sector employees to analyse the effects of flexi-time, telework and part-time work on absenteeism. Against the backdrop of the prevalence of part-time work in the Dutch economy it is particularly interesting to see whether alternative means to provide flexibility to employees, namely flexibility in the scheduling and place of work, provide significant labour market effects.

The paper is customary structured: In the following section we will discuss some theoretical background and previous research. Then we describe the data and the methods used. Next we present and discuss the results of our analysis followed by a conclusion.

Theoretical background and previous research

Flexible working time arrangements can be characterized according to whether they vary the duration, scheduling and place of work (cf. Plantenga 2003; Fagan 2004).[1] Part-time work for example varies the duration, flexi-time the scheduling and telework the place of work in comparison to the 40 hour work weeks and 8 hour work days that constitute the de-facto standard in most industrialized countries (Bosch 1999; Parent-Thirion et al. 2007). It has repeatedly been argued that employee's autonomy and control over working time may have positive consequences for employers as well (e.g. Reilly 2001; Fagan 2004; Anxo et al. 2006; Kerkhofs, Chung, and Ester 2008). Here we attempt to test this claim empirically by analysing the effects of flexi-time, telework and part-time work on the frequency and length of sickness absenteeism.

There are several reasons why autonomy and flexibility in the length, scheduling and place of work may reduce absenteeism. First, emergencies and other non-work responsibilities that appear more or less unplanned may interfere with an employee's duty to show up at work. An employee with access to flexible working time arrangements can fit these activities flexibly into his or her schedule but with fixed working times, only absenteeism permits the worker to undertake these activities. So instead of using sick leave as a shortcut to be able to react to unforeseen emergencies or attend interesting non-work activities during scheduled working time, employees may use flexible working time arrangements for this purpose. In previous research it has accordingly been argued that absenteeism serves as an alternate means of obtaining work schedule flexibility (Allen 1981) and serves as a coping mechanism against bad working conditions (Kristensen 1991), low worktime control being one of them.[2] On a similar note it has been suggested that absenteeism is higher due to a mismatch between preferred and actual working hours (Dunn and Youngblood 1986). The absence rate should therefore be lower if employees can influence their working time and place.

This may in particular be relevant for young working parents struggling to resolve work-family conflict. Especially young children are likely to demand more time from their parents

[1] A variation in the place of work is of course not a working time arrangement per se; but it also provides time autonomy and flexibility to workers, given that it can be performed at home or another place of the worker's choice (Tremblay 2002; Vittersø et al. 2003; Peters, den Dulk, and van der Lippe 2009). It similarly relates to how organizational aspects of paid work, like scheduling, can improve the fit between paid work and other activities.

[2] These two means of obtaining work schedule flexibility come at different (potential) costs to the worker though. Too many absences may for example result in lower wages, a lower likelihood of promotion or even dismissal. Flexible working time arrangements do not have these drawbacks or to a lesser extent.

and cause unexpected emergencies that interfere with work responsibilities (Greenhaus and Beutell 1985). In this case the access to flexible working time arrangements may reduce the need to 'shirk'. Two previous studies find a negative relationship of flexi-time on work-family conflict and subsequent absenteeism. Ralston and Flanagan (1985) for example found that flexitime reduces absenteeism of both men and women by helping to cope with inter-role conflict. Vandenheuvel (1997) shows that family-related absence is reduced if (female) workers can flexibly reschedule their work hours due to family reasons.

Control over working time and place may not only change the way in which employees reconcile emergencies and non-work activities with their work responsibilities, but also how they deal with (minor) sickness and sickness absenteeism. Employees, who are sick and have the opportunity to flexibly re-schedule their work or to work at home, may not report sick or return to work quicker than employees without these opportunities.[3] [4]

Apart from short-term behavioural effects, flexible, employee-oriented working conditions may also have longer term effects by improving the health of the employees and thereby reducing sickness absence.[5] Working time autonomy is associated with positive health outcomes and has been shown to moderate adverse effects on health and sickness absence associated with work-related stress and employer-oriented flexibility, such as overtime and work at irregular hours (Fenwick and Tausig 2001; Costa et al. 2004; Ala-Mursula et al. 2005; Olsen and Dahl 2010). Control over working time and place may further reduce work-life related stress as such, leading to a more relaxed combination of work and private life, and less (perceived) work-life conflict. Good work time control helps employees to integrate their work and private lives more successfully and reduce the adverse effects of long domestic and total working hours on absences and work-family interference (Ala-Mursula et al. 2004, 2006; Geurts et al. 2009). Working time autonomy may also increase job satisfaction (Scandura and Lankau 1997) which again improves health (Sparks, Faragher, and Cooper 2001; Faragher,

[3] We implicitly have to assume that the employee has an incentive to return to work as quickly as (reasonably) possible. This may go against the default in labour economics, but also within the classical labour-leisure framework this may be achieved by increased monitoring or through output- or performance-oriented incentive mechanisms for instance.

[4] If this does not have any negative repercussions on the health of the employee this effect can be considered positive. Inasmuch as these flexible work patterns may lead to intensification of work they may also lead to presenteeism, however, i.e. working on the job while being sick. Presenteeism has in general been shown to affect health negatively (e.g. Kivimäki et al. 2005; Hansen and Andersen 2009) and is therefore negative for productivity, business, and the well-being of the employee.

[5] Short-term and refer to two different dimensions here. First they refer to the length of the absences, second to the time span it takes for the effect to materialize since the introduction of the working time arrangement.

Cass, and Cooper 2005; Notenbomer, Roelen, and Groothoff 2006; Roelen et al. 2008; Fischer and Sousa-Poza 2009).

Control over working time and place may also reduce commuting times substantially and thereby reduce absenteeism (Ala-Mursula et al. 2006). Commuters experience a reduction of time available for domestic work, discretionary leisure activities, sleep and recovery, which again leads to health complaints and therefore higher sickness absence rates (Costal, Pickup, and Martino 1988a, 1988b). Flexible working time arrangements can decrease these absences insofar as they reduce commuting times.

Unravelling flexible working time

Until now we discussed working time autonomy and its potential to reduce absenteeism in rather general terms. Yet there may be a difference in this respect between flexi-time and telework on the one hand and part-time work on the other. This is because most of the obstacles to work attendance, sickness-related or otherwise, come at short notice. Flexi-time and telework make it possible to adjust working schedule and place on a short-term, i.e. daily, basis and we consequently assume that these working time arrangements have a significant impact on absenteeism (cf. Kim and Campagna 1981). Part-time work is different in this respect because adjustments of the length of work are not so quickly made. It seems unlikely then that part-time work will have the same short-term effects on absenteeism. Nevertheless, as we have already mentioned above, some longer-term, indirect effects may exist as well, via health, stress, job satisfaction, etc. Part-time employment may then very well have an effect in this domain.

According to the European Working Conditions Surveys (EWCS), part-time workers report for example to be less exposed to work-related health and safety risks, such as hazards and poor ergonomic conditions, and to experience lower work intensity (Fagan and Burchell 2002; Burchell et al. 2007). This is probably due to the sector and the type of jobs part-timers work in (Isusi and Corral 2004; Burchell et al. 2007). Part-timers also report less work-related health symptoms, such as backache, muscular pain, stress and fatigue (Burchell et al. 2007), which may both be caused by the abovementioned selection into different types of jobs as well as by a shorter exposure to health risks due to shorter work hours.

Part-time work may also improve the combination of paid work and other responsibilities, simply because less time is spent on paid work. Part-time employment also gives more room

for flexible scheduling, because the smaller the number of working hours of an employee, the smaller their fraction relative to a given amount of business hours and therefore the more room to schedule these hours into the roster. According to the EWCS, more part-time than full-time workers indeed report to have at least some control over the scheduling of their working hours (Burchell et al. 2007). Part-time employees accordingly report more often that their work lives are compatible with other commitments (Fagan and Burchell 2002; Burchell et al. 2007).[6] With decreasing marginal utility from work, time not spent in paid work becomes relatively more valuable the more hours one works, and more working hours would therefore lead to an increase in absenteeism (cf. Allen 1981:79).[7]

In summary there are several ways how employee-oriented variations in the length, scheduling, and place of work influence absenteeism. They may change the way employees directly deal with emergencies and (minor) sickness and may improve health by reducing stress and increasing job satisfaction for example. Part-time work is different from flexi-time and telework in that it usually cannot be adapted as quickly to changing circumstances as the latter two. Part-time work may nevertheless have positive longer-term effects on health and work-life fit and may therefore reduce absenteeism as well.

Methodology

Data

For the analysis we will be using a Dutch survey of public sector employees, namely the "Personeelsonderzoek Overheidspersoneel 2004" (PO 2004) (MinBZK 2005).[8] The Dutch Ministry of the Interior and Kingdom Relations is doing this survey is done bi-annually since 2001 to study the satisfaction, motivation, profile and labour market behaviour of the public sector employees in the Netherlands. The raw PO 2004 dataset contains data on 24414 public servants from all public sectors, like state government, municipalities, police, defence, schools, universities, and academic hospitals. All respondents were employed with the same

[6] It would also be conceivable that full-time employees experience less work-life interference, if they have less non-work commitments than part-timers and therefore experience less inter-role conflict.

[7] In theory, increased hours may also lead to a decrease in absences because they also increase the cost of a job loss (Drago and Wooden 1992), but empirically Drago and Wooden (1992) also find a positive (composite) effect.

[8] The PO datasets are available for scientific research upon request at the Dutch Ministry of the Interior and Kingdom Relations.

employer for the whole year 2003 (MinBZK 2005:63).[9] Table 1 in the Appendix presents an overview and summary statistics of the variables used in the analysis.

Dependent variables

The dataset contains three variables relating to absenteeism. A binary variable for whether or not someone reported sick in the previous year, the total number of times someone was absent and the total number of days someone was absent.[10] We use the number of times absent in 2003 and the total number of days absent in 2003 as the dependent variables. In 2003 58.6% of the employees reported sick at least once. On average, employees called in sick 1.16 times and 7.47 days.

Independent variables

Our main independent variables are the opportunity to work at home every now and then (telework) and access to flexi-time[11], which are both dummy variables (0 = no/don't know; 1 = yes), as well as three part-time work categories. The part-time work categories indicate the number of contractual working hours, namely for small, medium, and large part-time jobs (1 = 1-11, 2 = 12-19, and 3 = 20-35 hours/week, respectively). Full-time work (i.e. 35+ hours) without the access to telework and flexi-time is the base category.

Control variables

We use a large number of control variables that measure observables personal and household as well as job characteristics that can be assumed to be correlated with flexible working time arrangements and to affect the frequency and length of absences at the same time. The following control variables are used (See table 1 in the appendix for the respective category values and descriptive statistics.):

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[9] This includes employees who changed jobs or had multiple contracts with the same employer, who stopped working for not more than 3 months and resumed afterwards, or whose number of working hours changed. It does not include employees who entered and left the public sector or changed employers within the public sector (e.g. from one police corps to another) in 2003 (MinBZK 2005:69). This non-random selection certainly has the potential to bias our estimates, though it is *a priori* difficult to say in which way.

[10] The corresponding survey questions are: "*Hoe vaak heeft u zich in 2003 ziek gemeld? (Let op: niet zwangerschapsverlof): Nooit/ongeveer x keer"*and "*Hoeveel werkdagen bent u in 2003 wegens ziekteverzuim niet op uw werk geweest? (Let op, een jaar heeft ongeveer 260 werkdagen, 52 weken van 5 dagen): Ongeveer x werkdagen"*.

[11] I use telework and 'work at home' synonymously here. The survey question here refers to the opportunity to work at home. The corresponding survey questions are: *Kunt u aangeven of u van deze arbeidsvoorwaarden bij uw organisatie gebruik kunt maken?[…] Mogelijkheid om af en toe thuis te werken* (telework)*; Flexibele werktijden* (flexi-time).

Gender: A dummy variable is used to analyse gender differences. In previous studies, female employees have been shown to have more and longer absences (e.g. VandenHeuvel and Wooden 1995). Gender differences are likely to stem from biological (Mastekaasa 2000; Ichino and Moretti 2009), household (women are usually the main care-taker at home) and job (female and male employees sort into different jobs with different likelihoods of workplace induced absence) characteristics.[12]

Age: Age is measured as a categorical variable. Health deteriorates with age, so older employees can be expected to be absent more often. The *healthy worker effect* counterbalances this trend, however, i.e. unhealthy workers drop out of the labour market one way or another (Li and Sung 1999). This effect increases with age and in the aggregate older workers could then have lower absences than younger workers.

Family status and presence of children in the household: As argued above, the household context will influence the likelihood of absences. A categorical variable therefore controls for whether the employee is single (base category), married or living with a partner, or living with his or her parents. Another categorical variable indicates whether the partner holds a job with up to 20 hours per week, more than 20 hours per week or no job at all (base category). An employee who has a partner at home is likely to be faced with less domestic work and fewer problems to combine work and private life. Furthermore, five dummy variables are used to control for the presence of children of different ages in the household, with no child in the household as the base category.

Usual number of workdays per week: Fewer and shorter absences are inherent in part-time work, if working part-time translates into working fewer days, since working less days per year automatically reduces the absolute likelihood of absence days per year. Since our dependent variables are also measuring the *absolute* frequency and length of absences, we use a categorical variable to control for the usual number of days worked per week.

Satisfaction with number of contractual hours: Employees who prefer to work less (more) hours than currently, are expected to have more (less) absences. We use a categorical variable to measure whether or not the employee would like to decrease or increase the number of

[12] The latter two hypotheses are debated however: While Jansen et al. (2006) and Lidwall et al. (2009) find a relation between that gender differences in absenteeism and work-family conflict, Mastekaasa & Olsen (1998) reject this hypothesis and suggest that the "difference in absenteeism is more likely to reflect general health or personality differences between men and women." Ala-Mursula et al. (2002) suggest that the gender diversity in the distribution of occupations is not a probable explanation of the differences in absences.

contractual hours. Satisfaction with the current number of contractual hours is the base category.

Overtime: We use a dummy variable to measure whether an employee works overtime hours on a regular basis.

Number of jobs: Employees holding more than one job are assumed to run a higher risk of absence due to the relatively higher workload and coordination problems. We use a dummy variable to indicate whether an employee holds 2 or more jobs.

Contract type: Employees with a temporary contract can be expected to have fewer and shorter absences since they have to fear that they will not get a renewed contract if their performance is not satisfactory. We use a categorical variable to indicate the type of contract.

Supervisor: A dummy variable is used to indicate whether the employee holds a job in which he supervises other colleagues. Managers and supervisors are expected to have less absences because they show a greater commitment towards the company and have a high work morale ("my colleagues/clients rely on me", "I am indispensible", etc.), i.e. a relatively higher utility from working and thus higher opportunity costs of not working. Absenteeism rates of managers are also expected to be lower because they work in teams/networks by definition, face increased peer-pressure, and are less easy to replace. Employees that are not easily replaceable also show higher presenteeism rates (Aronsson, Gustafsson, and Dallner 2000; Böckerman and Laukkanen 2010). These workers have to accomplish all tasks that were not done during their absence after they return to work and therefore face higher indirect costs from being absent.

Other job characteristics: Education, wage, sector, and firm size are used to control for some of the heterogeneity in job characteristics that influences absences. Higher educated employees and employees with higher wages are expected to also have better job quality with lower work-related health risks. There is also a strong, positive, bivariate relationship between firm size and absences, probably caused by weaker ties between employer and employee and less social control (Hartman et al. 2010). We use categorical variables to measure all four items, with higher scores corresponding to higher values of education, wage, and firm size.

Statistical model

The distribution of the number of absences and the total length of absences is obviously right-skewed and non-normal (see Figure 1 and Figure 2). Since both dependent variables are count outcomes the use of a count data model is in order.[13] The data was therefore fitted with a negative binomial regression model (NBRM).[14] The NBRM is preferred to the Poisson regression model, since there is significant evidence of overdispersion for both dependent variables. We also considered fitting the data with a zero-inflated Poisson model (ZIP) or a zero-inflated negative binomial regression model (ZINB). The ZINB is preferred to the ZIP (again due to overdispersion), but a comparison of NBRM and ZINB is undetermined based on the fit statistics. We favour the NBRM, however, since it is the more parsimonious one and there is a risk of overfitting the data with a zero-inflated model (cf. Long 1997:249).[15]

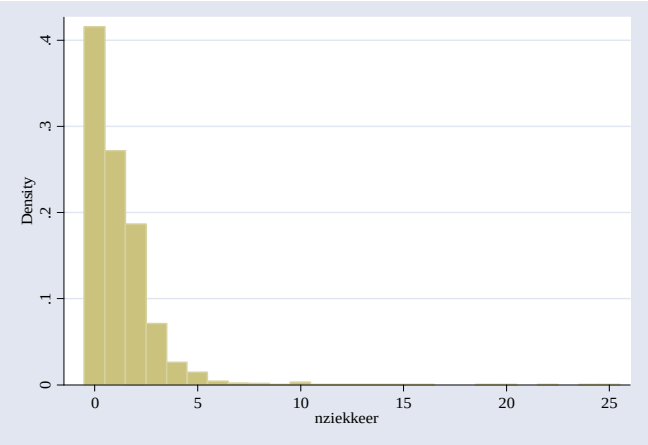

Figure 1: Histogram number of absences in 2003 (Source: PO 2004)

[13] See Long (1997), Long and Freese (2005), Cameron and Trivedi (1998), or Winkelmann (2008) for the statistical theory of count data models.

[14] The statistical analysis was done with Stata 11 (StataCorp 2009), including user-written commands of Long and Freese (2005).

[15] For the use of zero-inflated models one would basically have to assume that there is a two-stage process at work: The first process determines whether or not it is structurally possible for an employee to be absent, the second determines the extent of the absences, given that absences are possible. We cannot think of any reason why the structural probability of an employee to be absent should be zero, however, so the use of zero-inflated models is not justified here.

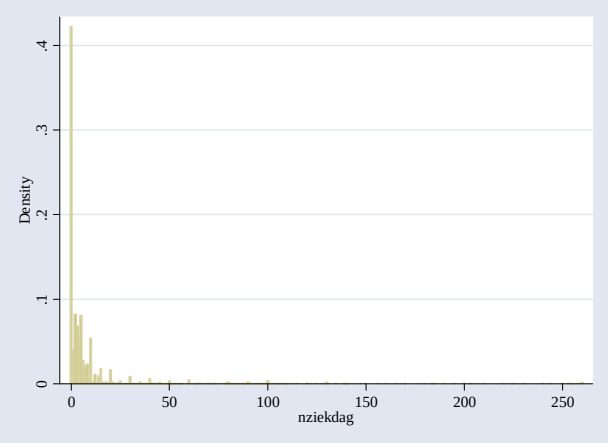

Figure 2: Histogram number of days absent in 2003 (Source: PO 2004)

We estimate three models for each of the two dependent variables. The first model only includes main effects of all predictor variables and the control variables and uses the whole sample.[16] The second model includes the same variables but is estimated for female and male employees separately in order to determine whether there are structural differences in the effect of working time arrangements on the absence behaviour of men and women (cf. VandenHeuvel and Wooden 1995). In the third model we interact flexi-time and telework, respectively, with dummy variables indicating the presence of one or more children of different age categories. This will show us whether these working time arrangements have an additional effect for employees with (small) children and reduce absenteeism by helping to combine paid work with private life.

[16] Observations with missing values are excluded due to listwise deletion.

Results

Table 1: Incidence rate ratios of working time arrangements on frequency and length of absences

VARIABLES	Model 1a nziekkeer	Model 1b nziekdag
Telework	0.942**	0.939
	(0.0190)	(0.0411)
Flexi-time	0.949*	0.852***
	(0.0206)	(0.0405)
Small part-time (1-11h)	0.919	0.806
	(0.0702)	(0.137)
Medium part-time (12-19h)	0.917	0.939
	(0.0453)	(0.105)
Large part-time (20-35h)	1.036	0.996
	(0.0319)	(0.0636)
0 workdays	0.666	1.679
	(0.152)	(0.896)
1 workday	0.413***	0.431*
	(0.0676)	(0.148)
2 workdays	0.958	0.886
	(0.0542)	(0.110)
3 workdays	0.951	0.918
	(0.0362)	(0.0708)
4 workdays	1.068*	1.122*
	(0.0273)	(0.0629)
Female	1.216***	1.319***
	(0.0280)	(0.0719)
Child 0-5 years present	1.085**	0.990
	(0.0275)	(0.0566)
Child 6-12 years present	0.958	0.919
	(0.0228)	(0.0514)
Child 13-18 years present	0.976	1.014
	(0.0235)	(0.0572)
Child 19+ years present	0.933*	1.047
	(0.0290)	(0.0727)
lnalpha	0.471***	3.681***
	(0.0214)	(0.0569)
Observations	20,340	20,080

Note: Reported estimates are incidence rate ratios from a negative binomial regression. The coefficients are to be interpreted as follows: If an employee has access to telework for example, number of absences per year would be expected to decrease by a factor of 0.942, while holding all other variables in the model constant. These incidence rate ratios were obtained by exponentiating the coefficients of the negative binomial regression.
Both models control for the preference for more/less contractual hours, age, family status, education, wage, job holding of partner, multiple own job holdings, contract type, working overtime, sector, and firm size.
*** p<0.001, ** p<0.01, * p<0.05

Table 1 shows the coefficients for model 1, which estimates the main effects of all predictor and control variables. The opportunity to work at home every now and then and the access to flexi-time have a significant effect on the number of times being absent. According to the first

model, having the opportunity to work at home every now and then (telework) decreases the number of times absent by 5.8% (coeff. = 0.942, s.e. = 0.0190, p = 0.003) holding all other variables in the model constant (model 1a). Having access to flexi-time reduces the number of times absent by 5.1% (coeff. = 0.949, s.e. = 0.0206, p = 0.017). Access to flexi-time furthermore reduces the length of absences significantly by 14.8% (coeff. = 0.852, s.e. = 0.0405, p = 0.001) (model 1b). Telework does not have a significant effect in this model.

In our theory section we distinguished between short-term behavioural effects and long-term health effects of flexible working time arrangements. It is of course difficult to distinguish between them empirically with a cross-sectional model, since we only observe one snap-shot in time and do not know the exact reason for the absences. If we assume that behavioural effects mostly refers to short absences of only a few days for emergencies and other non-work activities, while health-related (and for example stress-induced) absences may persist for longer periods, however, we can exploit the difference in the size of the effect a working time arrangements has on the frequency or length of absences to get an indication whether the effect is in the short-term or long-term. If the relative effect is larger with respect to the frequency than the length, it can be construed as a short-term behavioural effect. If however the relative effect is larger with respect to the length than to the frequency, we interpret it to be a longer-term, health-related effect.

Consequently, since telework is associated with less but not with significantly shorter absences, our results indicate that telework has a direct effect on the behaviour of employees and reduces (only) short-term absences. Flexi-time on the other hand reduces the number of absences somewhat – the effect on the number of absences is both smaller and also more variable than that of telework – but has a considerable and highly significant effect on the length of absence. This suggests that flexi-time not only affects the behaviour of employees but also improves their health.

Regarding the length of work no single part-time category (arbklas) is individually significant for both the frequency and length of absences, compared to full-time work (35h+) and after controlling for flexi-time and the regular number of days at work (to account for the fact that those who work fewer days also have less of an opportunity to be absent from work). With respect to the number of times absent, all three categories are jointly significantly different from zero (Wald chi2(3) = 10.74, p = 0.0132), however, and significantly different from each other (Wald chi2(2) = 9.94 p = 0.0069). There is some indication that there is a difference between jobs with up to 20 hours per week and jobs with more than 20 hours per week, when

looking at the coefficients of uurklas (model 1a). We do not have evidence against the hypothesis that the coefficients for the two small part-time job categories (1-11h and 12-20 hours) are equal (Wald chi2(1) < 0.01, p = 0.9741). So, with small part-time jobs (<20h) the number of absences is reduced. All three part-time categories are not jointly significantly different from zero with respect to the length of absences (Wald chi2(3) = 1.81, p = 0.6131).

As a next step we estimate our model separately by gender in order to determine whether there are structural differences in the effect of working time arrangements on the absence behaviour of men and women. In general, the coefficients of the working time arrangements are not significantly different between male and female employees, however, for both frequency and length of absences (see Table 2 in the appendix).[17]

Finally we analyse whether flexible working time arrangements have an additional effect for employees with family responsibilities. In model 3 we interact flexi-time and telework, respectively, with dummy variables indicating the presence of one or more children of different age categories (see Table 3 in the appendix). These interaction effects are not significantly different from zero, both with regard to the frequency and the length of absences, while the main effects of flexi-time and telework remain similar to the model without the interaction effects (model 1). As a consequence, the access to flexi-time and to telework do not seem to have any additional effects for employees with children in the household according to our model.

Discussion

Measurement of family-related absences

Above we hypothesized that flexible working time arrangements moderate the adverse effect of inter-role conflict and family care tasks on absenteeism, both directly, because they offer an alternative to 'emergency-induced' absences, and indirectly, because control over working time and place may reduce work-life related stress as such and consequently health-related absences. We do not find any meaningful significant results, however, neither for differences in effects for flexi-time and telework between genders nor for the interactions of flexi-time and telework with the presence of children. This finding may seem puzzling at first glance because it seems that flexible working time arrangements indeed improve the fit between work and private life. Employees with access to telework and especially flexi-time report

[17] There is one exception: Men working in large part-time jobs are roughly 13% more often sick than their full-time working (male) colleagues, but they are not significantly longer absent.

significantly more often that their working times match well with their private responsibilities than their colleagues without these working time arrangements.[18] But why does this improved fit between work and private life not translate into fewer and shorter absences?

It is possible that this is caused by both attempts to reduce short-term absenteeism in previous years[19] and the availability of alternative means to react to emergencies, like short-term care leave for instance (cf. Olsen and Dahl 2010). It is, however, also possible that especially of voluntary or family-related absences are underreported (VandenHeuvel 1997:280; Drago and Wooden 1992). Our dependent variables explicitly measure the frequency and length of *sickness* absence. Employees thus may be reluctant to report family-related absences that were wrongfully declared as sickness absences.[20]

Access to working time arrangements and efficiency wages

The variables for telework and flexi-time measure the access to these working time conditions, not the actual use. An alternative interpretation of our results could also be that it is not the use of the working time arrangements that reduces absences but that employees see the access to these working time conditions as an additional benefit or gift that they receive from their employers and that they have to reciprocate, in particular being absent less often and/or shorter (cf. Akerlof 1982).

Self-selection

Across all models, we cannot rule out reverse causality and sorting effects in particular, since we only have cross-sectional data. It may for instance be the case that employees with higher (potential) absenteeism due to work-life compatibility issues or weak health demand and sort into jobs that give them more flexibility to compensate for this drawback. They in particular sort into those jobs that offer the opportunity for flexi-time and work at home. Empirically, this sorting effect cannot be fully disentangled from a causal effect of flexi-time and telework on absenteeism with the data at hand. We think that its role is rather limited though.

[18] For telework, Kendall's tau-b is 0.0563 (ASE = 0.006), and for flexi-time, Kendall's tau-b equals 0.1921 (ASE = 0.006). See also Table 4 and Table 5 in the appendix.

[19] For the Netherlands Working Conditions Survey (*Nationale Enquête Arbeidsomstandigheden*) 2008 only 4.6% of all employees (N = 5076) said that they have been reporting themselves sick and absent from work for one day during the last 12 months, and 1.3% have been doing so for more than one day (de Vroome 2010).

[20] On the reliability of self-reported data on sick leave in general, see van Poppel et al. (2002), Ferrie et al. (2005), and Voss, Stark et al. (2008).

In principle the sorting effect comes down to an omitted variable bias. We have heterogeneity in the propensity to be absent and this heterogeneity also influences the likelihood of access to flexible working time arrangements. For the sorting effect to hold we assume that the factors causing a higher propensity of absenteeism are also positively correlated with the likelihood of access to flexi-time. The effects of working time arrangements on absenteeism would then be overestimated. But if so, by how much? There are two arguments that this effect is probably not very large. First, if a low number of absence days are a comparative advantage for employees and flexible working time arrangements a means to reduce absence days, it seems reasonable that all employees would strive to reduce them and therefore all employees would try to get access to these working conditions.[21] Second, job choice and labour relations depend on a complex bundle of conditions, of which the opportunity for flexi-time and telework presumably are only two minor points compared to e.g. the type of job, the wage, and the number of hours. The sorting argument rests on the assumption that (disadvantaged) employees can actually choose these working conditions as part of the working conditions bundle, which seems quite unlikely. Quite the contrary, employers rather seem to offer these conditions to employees with more leverage in the labour market in order to retain those (Golden 2008). So even if the sorting takes place, the correlation between the propensity for absence and flexible working time arrangements is probably not very high.[22]

Relevance for private sector

Finally, can our results, which are based on a survey of public sector employees, be generalised to the private sector? We like to believe that they can since we have a broad sample with employees from diverse sectors (within the public sector) working in very different jobs and firms. The general argument of sorting into public sector jobs should therefore play only a minor role. On average the absence rates are lower in the private than in the public sector (de Vroome 2010), though, so there may be less room for improvement. The question is rather to what extent flexible working time arrangements can be implemented in various jobs. Especially in the industrial and agricultural sectors it is hard to imagine that e.g.

[21] Nevertheless some differences in preferences for and access to flexible working time arrangements may of course still remain since different combinations of working conditions cause different utility levels for different employees. However, the correlation between access to flexible working time arrangements and the likelihood of absence should not be too large.

[22] Empirically, we can reduce this correlation and therefore the size of the supposed bias even further, if we control for the employee's preference for flexi-time and telework, respectively. When the reported importance of the flexible working time conditions ("how important is the following working condition: … " 5-point Likert scale) is added to the first model, the coefficients of the access to flexi-time and telework and the part-time work categories are not significantly affected (table not shown).

telework will be implemented on a large scale, so we are mainly talking about the services sector here.

Conclusion

In this paper we analysed the effect of flexible working time arrangements – flexi-time, telework and part-time work – on the frequency and length of sickness absenteeism. Using a Dutch survey of public sector employees, we show that access to flexi-time and telework indeed reduces sickness absence, while working part-time does not have a clear significant effect according to our model. Access to telework only seems to have an effect on short-term absences since it reduces the number of absences by almost 6% but not the total annual length of absences. Flexi-time on the other hand not only decreases the number of absences by about 5%, but has a marked negative effect – almost 15% – on the length of absences as well. Flexi-time therefore not only seems to lead to short-term behavioural effects like telework – working at other times or at home when a sickness or 'emergency' would prevent the employee to show up at work – but also to reduce absences probably due to a positive indirect effect on health.

Furthermore we analyse whether flexible working time arrangements have a particular effect on the absences of employees most likely faced with difficulties to combine paid work and family life – female employees and employees with young children. While more public sector employees with access to telework and flexi-time on average report that their working times match well with their private life (compared to those without the access), this effect does not seem to translate into relatively less and/or shorter absences for female employees and employees with young children.

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Appendix

Table 1: Variable Definitions and Summary Statistics

Variable	Definition	N	Mean/Percentage
Outcome variables			
Sick report	Reported sick previous year	24226	58.59%
Absence freq.	Number of absences in previous year	24147	1.16
Absence length	Total length of absences in previous year	23777	7.47
Predictor variables			
Telework	Opportunity to work at home every now an then	23271	49.11%
Flexi-time	Access to flexible working times	23232	55.44%
Part-time	Number of contractual working hours		
	1 1-11 hours per week	24414	4.21%
	2 12-19 hours per week	24414	15.71%
	3 20-35 hours per week	24414	29.81%
	4 36+ hours per week	24414	50.27%
Control variables			
# of workdays	Usual number of workdays per week		
	0 less than 1 day a week	24105	0.17%
	1 1 day per week	24105	1.12%
	2 2 days per week	24105	4.86%
	3 3 days per week	24105	13.85%
	4 4 days per week	24105	27.51%
	5 5 days per week	24105	52.49%
Overtime	Do you work overtime on a regular basis?	24212	46.10%
Preference hours	Are you satisfied with number of contractual hours?		
	1 I am satisfied	24144	81.95%
	2 I would like to work more hours	24144	5.83%
	3 I would like to work less hours	24144	12.21%
Contract type	type of contract		
	1 permanent contract	24323	93.20%
	2 temporary contract with option for permanent contract	24323	2.96%
	3 temporary contract without option for permanent contract	24323	2.55%
	4 contract based on special arrangement	24323	0.68%
	5 Other	24323	0.60%
Supervisor	Are you supervising colleagues?	23701	27.40%
Sector	Sector		
	1 state government	24414	15.36%
	2 municipalities	24414	6.95%
	3 primary school	24414	17.98%
	4 secondary school	24414	17.00%
	5 vocational training and further education	24414	13.35%
	6 *defensie burgerpersoneel*	24414	1.74%
	7 *defensie bot*	24414	2.42%

Variable	Definition	N	Mean/Percentage
	8 *defensie bbt*	24414	1.03%
	9 judiciary	24414	1.14%
	10 police	24414	7.34%
	11 research institutes	24414	1.31%
	12 higher vocational training	24414	2.78%
	13 universities	24414	3.67%
	14 conservancies	24414	1.62%
	15 provinces	24414	2.27%
	16 academic hospitals	24414	4.03%
Firm size	number of employees		
	1 0-10 employees	23194	0.89%
	2 11-20 employees	23194	2.43%
	3 21-50 employees	23194	6.20%
	4 51-100 employees	23194	7.58%
	5 101-500 employees	23194	30.16%
	6 501-1000 employees	23194	12.34%
	7 1001-5000 employees	23194	23.67%
	8 5000+ employees	23194	16.73%
Female	female employee	24365	47.43%
Education	highest educational degree		
	1 primary school	24328	0.69%
	2 lower vocational training (e.g. *lbo*)	24328	4.61%
	3 lower secondary education (e.g. *mavo*)	24328	8.34%
	4 higher secondary education (e.g. *vwo*)	24328	6.00%
	5 medium vocational training (e.g. *mbo*)	24328	15.55%
	6 higher vocational training (e.g. *hbo*)	24328	43.47%
	7 academic (e.g. bachelor *kandidaatsexamen*)	24328	3.35%
	8 academic (e.g. master)	24328	17.99%
Wage	Wage category		
	1 <= 1.250 EUR	24414	8.99%
	2 1.251 - 1.500 EUR	24414	7.91%
	3 1.501 - 1.750 EUR	24414	8.02%
	4 1.751 - 2.000 EUR	24414	9.34%
	5 2.001 - 2.500 EUR	24414	18.13%
	6 2.501 - 3.000 EUR	24414	13.31%
	7 3.001 - 3.500 EUR	24414	13.67%
	8 3.501 - 4.000 EUR	24414	8.95%
	9 4.001 - 4.500 EUR	24414	5.46%
	10 4.501 - 5.000 EUR	24414	3.09%
	11 > 5.000 EUR	24414	3.11%
Partner job	does partner have a job?		
	1 No	24414	17.33%
	2 Yes, <= 20 hours per week	24414	15.65%
	3 Yes, >= 21 hours per week	24414	49.78%
	8 no answer	24414	17.24%

Variable	Definition	N	Mean/Percentage
# of jobs	How many jobs do you work in parallel?		
	1 1 job	24195	93.90%
	2 2 or more jobs	24195	6.10%
Age	Age categories		
	1 15-24 years	24414	3.91%
	2 25-34 years	24414	18.05%
	3 35-44 years	24414	25.97%
	4 45-54 years	24414	36.23%
	5 55+ years	24414	15.85%
Family status	family status		
	1 single (incl. single parent)	24338	16.17%
	2 married or living with partner	24338	81.44%
	3 living with parents	24338	1.62%
	4 other	24338	0.77%
Child present	no children living at home	24414	47.33%
Child 0-5 years present	child(ren) between 0 and 5 years living at home	24414	14.38%
Child 6-12 years present	child(ren) between 6 and 12 years living at home	24414	19.52%
Child 13-18 years present	child(ren) between 13 and 18 years living at home	24414	22.02%
Child 19+ years present	child(ren) 19+ years living at home	24414	14.15%

Table 2: Incidence rate ratios of working time arrangements on frequency and length of absences:

VARIABLES	Model 2a: female Absence freq.	Model 2a: male Absence freq.	Model 2b: female Absence length	Model 2b: male Absence length
Telework	0.954	0.928*	0.946	0.920
	(0.0250)	(0.0285)	(0.0553)	(0.0566)
Flexi-time	0.947	0.946	0.867*	0.839**
	(0.0270)	(0.0307)	(0.0564)	(0.0531)
Small part-time (1-11h)	0.940	0.905	0.759	1.033
	(0.0917)	(0.117)	(0.165)	(0.247)
Medium part-time (12-19h)	0.938	0.902	1.042	0.735
	(0.0561)	(0.0881)	(0.134)	(0.155)
Large part-time (20-35h)	1.017	1.132**	0.987	1.051
	(0.0401)	(0.0539)	(0.0791)	(0.101)
0 workdays	0.591*	0.694	0.756	2.114
	(0.146)	(0.223)	(0.380)	(1.317)
1 workday	0.517**	0.290***	0.525	0.237**
	(0.104)	(0.0852)	(0.215)	(0.118)
2 workdays	0.961	1.081	0.880	0.988
	(0.0621)	(0.131)	(0.125)	(0.232)
3 workdays	0.969	1.067	0.884	1.199
	(0.0427)	(0.0927)	(0.0812)	(0.165)
4 workdays	1.084*	1.040	1.135	1.105
	(0.0396)	(0.0364)	(0.0840)	(0.0828)
Child 0-5 years present	1.023	1.183***	1.041	0.997
	(0.0366)	(0.0432)	(0.0802)	(0.0839)
Child 6-12 years present	0.934*	0.979	0.931	0.930
	(0.0314)	(0.0332)	(0.0729)	(0.0698)
Child 13-18 years present	0.940	1.021	1.033	1.016
	(0.0316)	(0.0344)	(0.0833)	(0.0737)
Child 19+ years present	0.967	0.918*	1.099	1.010
	(0.0439)	(0.0383)	(0.117)	(0.0888)
lnalpha	0.378***	0.565***	3.088***	4.229***
	(0.0246)	(0.0346)	(0.0669)	(0.0900)
Observations	9,316	11,024	9,167	10,913

Note: Reported estimates are incidence rate ratios from a negative binomial regression. The coefficients are to be interpreted as follows: If an employee has access to telework for example, number of absences per year would be expected to decrease by a factor of 0.942, while holding all other variables in the model constant. These incidence rate ratios were obtained by exponentiating the coefficients of the negative binomial regression.
All models control for the preference for more/less contractual hours, age, family status, education, wage, job holding of partner, multiple own job holdings, contract type, working overtime, sector, and firm size. Models 1a & 1b also contain gender as a control variable. 0.workdays means less than 1 regular workday per week. Robust standard errors in parentheses.
*** p<0.001, ** p<0.01, * p<0.05

Table 3: Incidence rate ratios of working time arrangements on frequency and length of absences: Effects for employees with children.

VARIABLES	Model 3a Absence freq.	Model 3b Absence length
Telework	0.930**	0.951
	(0.0252)	(0.0551)
Flexi-time	0.938*	0.823**
	(0.0267)	(0.0497)
Small part-time (1-11h)	0.918	0.797
	(0.0699)	(0.134)
Medium part-time (12-19h)	0.916	0.934
	(0.0453)	(0.104)
Large part-time (20-35h)	1.036	0.994
	(0.0318)	(0.0630)
Child 0-5 years present	1.065	1.042
	(0.0442)	(0.0985)
Child 6-12 years present	0.980	0.957
	(0.0386)	(0.0869)
Child 13-18 years present	0.924	0.880
	(0.0378)	(0.0771)
Child 19+ years present	0.913	1.062
	(0.0461)	(0.116)
Telework*Child 0-5 years	1.052	0.996
	(0.0476)	(0.0997)
Telework*Child 6-12 years	0.957	0.898
	(0.0428)	(0.0932)
Telework*Child 13-18 years	1.065	1.012
	(0.0518)	(0.110)
Telework*Child 19+ years	0.999	1.052
	(0.0608)	(0.144)
Flexi-time*Child 0-5 years	0.994	0.927
	(0.0464)	(0.0967)
Flexi-time*Child 6-12 years	1.000	1.029
	(0.0461)	(0.109)
Flexi-time*Child 13-18 years	1.042	1.267*
	(0.0519)	(0.140)
Flexi-time*Child 19+ years	1.044	0.934
	(0.0642)	(0.128)
lnalpha	0.471***	3.677***
	(0.0214)	(0.0567)
Observations	20,340	20,080

Note: Reported estimates are incidence rate ratios from a negative binomial regression. Both models control for the usual number of workdays per week, preference for more/less contractual hours, gender, age, family status, education, wage, job holding of partner, multiple own job holdings, contract type, working overtime, sector, and firm size. Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05

Table 4: Percentage of employees with and without access to telework reporting on the match between working times and private life

I can match my working times well with my private life	Access to telework		
	no/don't know	yes	Total
completely disagree	3.34	1.58	2.47
disagree	8.43	6.00	7.23
neutral	12.89	10.54	11.73
agree	40.72	44.72	42.68
completely agree	34.63	37.17	35.88
Total	100.00	100.00	100.00

Source: PO 2004 Kendall's tau-b = 0.0563 (ASE = 0.006)

Table 5: Percentage of employees with and without access to telework reporting on the match between working times and private life

I can match my working times well with my private life	Access to flexi-time		
	no/don't know	yes	Total
completely disagree	4.05	1.22	2.48
disagree	10.32	4.73	7.21
neutral	15.29	8.95	11.76
agree	43.34	42.24	42.73
completely agree	27.00	42.86	35.83
Total	100.00	100.00	100.00

Source: PO 2004 Kendall's tau-b = 0.1921 (ASE = 0.006)