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Does temporal and locational flexibility of work reduce absenteeism?

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Does temporal and locational flexibility of work reduce absenteeism?

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Abstract

In this study, the effects of temporal and locational flexibility of work on the frequency and length of sickness absenteeism are analysed. Using a Dutch survey of public sector employees, we show that increased temporal and locational flexibility is negatively associated with sickness absenteeism in general. Especially flexi-time, i.e. schedule flexibility which is quickly adjustable, reduces both the frequency and in particular the duration of absences. Telehomework or location flexibility on the other hand seems to mainly affect absence frequency but not absence duration. In contrast, long-term duration flexibility in the form of part-time work does not appear to have a significant impact on absenteeism.

Keywords: absenteeism; flexi-time; locational flexibility; part-time work; telehomework; temporal flexibility

JEL classification: J22; J28; J32; M52; M54

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1 Introduction

Compared to the tremendous amount of literature on the number of hours worked, the timing and setting of work has received relatively little attention among labour economists.¹ Most of the time it is implicitly assumed that employees work together simultaneously and at the same location in order to produce goods and services. This does not always have to be the case, of course. An interesting new development in this respect refers to temporal and locational flexibility (TLF). An increasing number of establishments experiment with a new organisation of work and working time in which employees can determine and modify when, where, and how long they work (Messenger, 2010). This provides them with more flexibility with respect to the duration, schedule, and location of work. The share of establishments in 21 EU countries which offered some type of flexibility regarding the beginning and end of daily working time for example rose from 48% to 57% between 2005 and 2009 alone (Riedmann et al., 2010). In the EU27 the share of employees involved in telework for at least a quarter of their working time expanded from 5% to 8.3% between 2000 and 2005 (Paoli and Merllié, 2001; Parent-Thirion and Paoli, 2003; Parent-Thirion et al., 2007). Facilitated by new management styles and modern information and communication technology (ICT), employees can exert more control over the timing and setting of work.

It may be presumed that increased TLF is beneficial for employees and in line with the preferences of modern knowledge workers. Employees demand more flexibility in order to suit their preferred life styles and to strike a balance between work and personal life. TLF caters this demand by giving employees more control over duration, schedule and location of work (Lewis, 2003; Plantenga, 2003; Rau, 2003). As a result, TLF allows employees to work during times more suited to their personal needs and circadian rhythm. TLF also reduces time spent commuting or sometimes eliminates commuting altogether. Previous research accordingly indicates that TLF improves the fit between working time and private life and increases job satisfaction (Possenriede and Plantenga, 2014).

Employers may also benefit from increased flexibility for employees, however (Reilly, 2001; Anxo et al., 2006; Chung, 2009). TLF can save costs because turnover and travel expenses are reduced and less office space may be needed. Furthermore, employees' attitudes and morale are improved, leading to more dedicated employees (Allen, 2001; Kelliher and Anderson, 2010).

Another potential benefit, which will be the focus of this study, is the reduction of absenteeism rates through increased TLF. TLF may reduce absenteeism because employees can respond more flexibly to minor sickness or private 'emergencies'. Furthermore it

¹ Some of the works of Daniel Hamermesh being notable exceptions (e.g. Hamermesh, 1998, 1999, 2002; Hamermesh and Pfann, 2004).

may improve worker's health through reduced stress and increased job satisfaction. As a result, TLF arrangements may be an effective device to reduce absenteeism.

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, with average absence rates of around 4.3% in recent years, yearly wage costs of sickness absenteeism were estimated to be 7.5 billion Euro in 2009 (Hartman et al., 2010). Further reduction of absenteeism may therefore lead to considerable cost savings for employers and society. In addition, absenteeism has been considered an inverse proxy of effort and productivity, especially in the literature which deals with the link between (financial) incentives and absenteeism (see e.g. Hassink and Koning, 2009).

In order to analyse the effects of TLF on the frequency and duration of sickness absenteeism we use a cross-section survey of Dutch public sector employees. Unfortunately the empirical measurement of TLF is far from perfect yet (CEA, 2010; Plantenga and Remery, 2010). TLF in the strict sense refers to an individualized organisation of work and working time in which at least part of the work can be done outside the premises of the employer and outside regular working hours. In this study we presume that the organisational and agency aspects of TLF are best represented by access to arrangements such as flexi-time, telehomework and part-time work (Plantenga, 2003; Lewis, 2003; Hill et al., 2008). Flexi-time gives employees (some) control over their work schedule and part-time work enables employees to adjust the weekly duration of work. Both are presumed to capture the individualised working times of TLF. Telehomework allows employees (some degree of) individual choice in the location of work and covers the possibility to work at different places. While our cross-sectional data unfortunately does not allow for a causal analysis but can only establish associations between TLF and absenteeism, it is one of the few datasets which contain information on access to flexi-time and telehomework (and not only their utilisation) as well as data on short absences (and not only absences of at least a week for example).

This study is one of the first to analyse potential consequences of this relatively new phenomenon of TLF for employers. It is also one of the few analyses that consider different types of flexibility at the same time. Our results indicate that increased TLF is negatively associated with sickness absenteeism in general and that flexi-time in particular reduces both the frequency and duration of absences.

2 Theoretical framework

In the economic literature on absenteeism, it has been argued that employers have different requirements on workers to be reliably present at the workplace at fixed, predetermined times and therefore have different shadow costs of absenteeism (Weiss, 1985; Coles and Treble, 1993, 1996). Reliability in work attendance is particularly important

in industrial production processes, such as assembly lines, team-work in manufacturing (Heywood and Jirjahn, 2004), or just-in-time production (Coles et al., 2007; Lanfranchi and Treble, 2010). These processes rely on a relatively large endowment of immobile capital and productivity often depends on synchronized activities, because employees need to perform time-critical tasks, interact with clients face-to-face, or complement each other directly in the production process (Kremer, 1993; Coles and Treble, 1996).² Employers' preference for low levels of absenteeism in these industries results in wage premiums for reliability in work attendance and increased monitoring. Employees in turn sort into jobs based on preferences for non-work activities and their abilities to be reliably present at the workplace at employer-determined times. The resulting differences in absenteeism between firms and industries reflect an equilibrium of this sorting process (Coles and Treble, 1996; Coles et al., 2007).

Quite similar reasons, i.e. different requirements for reliability in work attendance and presence at the workplace due to differences in production processes, determine employers' supply of TLF arrangements to a substantial degree. It is therefore not always possible for employers to implement TLF and give employees more control over time and place of work. In fact, the extent to which TLF can be incorporated varies between different jobs and task profiles, since the importance of simultaneity and presence at the workplace differs between production processes (see already Owen, 1977). Compare for example the type of work in an operating room or on an assembly line on the one hand with the type of work of knowledge or web workers on the other. This implies that TLF may not always be available to employees, especially in jobs that require their physical presence.

Yet, an increasing number of establishments and professions do not require constant physical presence at employer-determined times and locations and work can be exercised more flexibly, not least because information is increasingly transferable through ICT. Modern technology reduces the importance of synchrony in timing and location, allowing for new possibilities in the organisation of work and working time. TLF can therefore still be compatible with team-work or any other production process that requires skill-based complementarity and cooperation between workers as long as this process does not require full synchronisation of time and place between workers and tasks.

There are several reasons why increased TLF may have an impact on absenteeism in those production processes where its implementation is generally possible. First, there may be direct effects of increased control over working time and place on absenteeism. It has previously been argued that absenteeism is higher when there is a mismatch between preferred and actual working hours (Dunn and Youngblood, 1986) and that absenteeism serves as a coping mechanism against bad working conditions, such as low work-time

² Reliability and physical presence is also important in some service sector occupations, however, especially if they require face-to-face interaction with colleagues or clients (hospitals, hair dressers, etc.).

control (Kristensen, 1991). It is therefore to be expected that the absence rate is lower if working conditions are more in line with employees' preferences.

Second, TLF arrangements may generate behavioural effects due to an improved timing of and fit between work-related and non-work activities. Emergencies and other non-work responsibilities that appear more or less unplanned may interfere with employee's ability to show up at work. Under a fixed working time regime, absenteeism is the only device that permits an employee to undertake these activities and may therefore be used to obtain work schedule flexibility (Allen, 1981). An employee with TLF on the other hand experiences fewer time restrictions and can thus fit these activities more flexibly into his or her schedule. So instead of using sick leave as a shortcut to be able to react to unforeseen emergencies or attend important non-work activities during scheduled working time – i.e. instead of 'shirking' – employees may make use of TLF arrangements for this purpose (Kim and Campagna, 1981).³ In that sense, TLF is a more 'controlled' form of absence from the workplace, because it ensures that work tasks are still maintained, and, compared to sickness leave, it provides more reliability for employers with respect to the nature and extent of the absence.

Increased 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 sicknesses and sickness absenteeism. Employees who are sick and have the opportunity to flexibly reschedule their work or to work at home may not report sick or return to work more quickly than employees without these opportunities.⁴

Apart from these behavioural effects, TLF may finally have a positive effect on employees' health via various pathways. Work-time control is associated with positive health outcomes and has been shown to moderate adverse effects on health associated with work-related stress and employer-oriented flexibility, such as overtime and work at irregular hours (Ala-Mursula et al., 2005; Costa et al., 2006; Grzywacz et al., 2008; Olsen and Dahl, 2010). Temporal flexibility furthermore reduces the impact of long domestic and total working hours on absences and work-family interference (Ala-Mursula et al., 2004, 2006; Geurts et al., 2009). Commuters in particular experience a reduction of time available for domestic work, discretionary leisure activities, sleep, and recovery, which again can lead to health complaints and therefore higher sickness absence rates (Costal et al.,

³ Of course, these two means of obtaining work schedule flexibility come at different (potential) costs to employees and employers. Increased absences may for example result in lower wages, a lower likelihood of promotion or even dismissal for the employee. With TLF the risk of these drawbacks should be considerably smaller.

⁴ There may be adverse long-run effects, though. If work pressure is high, more flexibility may lead to presenteeism, i.e. working on the job while being sick. Presenteeism has in general been shown to affect health negatively and is therefore detrimental to productivity and employees' well-being (Kivimäki et al., 2005; Hansen and Andersen, 2009).

1988). Since TLF can reduce commuting times substantially, it may reduce absenteeism via this route as well (Ala-Mursula et al., 2006; van Ommeren and Gutiérrez-i-Puigarnau, 2011). TLF finally increases job satisfaction (Scandura and Lankau, 1997; Possenriede and Plantenga, 2014), which again has been shown to improve health (Faragher et al., 2005; Fischer and Sousa-Poza, 2009).

When we look at the different forms of TLF, there may be differences between arrangements such as flexi-time and telehomework on the one hand and part-time work on the other in their potential to reduce absenteeism. Most of the obstacles to work attendance, sickness-related or otherwise, come at short notice. Flexi-time and telehomework make it possible to adjust working schedule and location rather quickly and we consequently assume that these arrangements have a significant impact on absenteeism. 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 behavioural effects on absenteeism. Nevertheless, some long-term, indirect effects may exist, via health, stress, job satisfaction, etc., as mentioned above. In surveys, 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. They also report fewer work-related health symptoms, such as backache, muscular pain, stress and fatigue (Fagan and Burchell, 2002; Isusi and Corral, 2004; Burchell et al., 2007). Part-time employment may therefore have an effect in this domain.

Shorter work hours also improve the combination of paid work and private life, *ceteris paribus*, simply because more time is available for non-work activities. 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. More part-time than full-time employees therefore report to have at least some control over their work schedule. Part-time employees accordingly report more often that their work lives are compatible with other commitments (Fagan and Burchell, 2002; Burchell et al., 2007). Furthermore, the opportunity costs of work increase under the assumption of decreasing marginal utility from work. More working hours would therefore lead to an increase in absenteeism (Allen, 1981).⁵

TLF may be particularly relevant for workers with care responsibilities, because those may entail unexpected tasks that cannot be delayed, but have to be performed immediately or at specific times of the day (Hassink and Van den Berg, 2011). Especially young children are likely to cause unexpected emergencies that interfere with work responsibilities (Greenhaus and Beutell, 1985). Here again, more control over the timing and location of work may reduce the need to 'shirk'. Two previous studies accordingly point towards a

⁵ Increased hours may theoretically lead to a *decrease* in absences as well, because the cost of a potential job loss increases with working hours (Drago and Wooden, 1992). Empirically, Drago and Wooden (1992) find a positive (composite) effect, however.

negative relationship of flexi-time on work-family conflict and subsequent absenteeism. Ralston and Flanagan (1985) found that flexi-time 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. So, TLF may reduce absenteeism especially for employees with family responsibilities, due to their greater need for flexibility.

In summary there are several ways how TLF influences absenteeism. It may change the way employees directly deal with emergencies and (minor) sickness, and it may improve health, for example by reducing stress and increasing job satisfaction. Part-time work is different from flexi-time and telehomework 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. Employees with family responsibilities, finally, benefit particularly from TLF. These considerations lead to the following hypotheses:

Hypothesis 1: *Increased temporal and locational flexibility through the use of TLF arrangements (flexi-time, telehomework, part-time work) is negatively associated with sickness absenteeism.*

Hypothesis 2: *The association is stronger for flexi-time and telehomework than for part-time work, because the former make it possible to adjust the timing and location of work at short notice.*

Hypothesis 3: *The association between temporal and locational flexibility and sickness absenteeism is stronger for employees with family responsibilities than for those without, due to a higher demand for flexibility by the former group of employees.*

3 Methodology

3.1 Data

The Dutch Public Sector Employee Survey 2004 (*Personeelsonderzoek Overheidspersoneel*, PO 2004) by the Dutch Ministry of the Interior and Kingdom Relations (MinBZK, 2005) is used for the analysis.⁶ This survey is conducted biennially to study the satisfaction, motivation, characteristics and labour market behaviour of public sector employees in the Netherlands. TLF was already a noteworthy phenomenon in 2004 and the institutional framework has not changed significantly since. The PO 2004 edition is unique in that it includes data on the preference for and the availability of TLF arrangements and other working conditions. It contains data on more than 20,000 employees from

⁶ The PO datasets are available for scientific research upon request at the Dutch Ministry of the Interior and Kingdom Relations.

Table 1: Descriptive statistics

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Number of times reported sick	1.168	(0.010)	1.141	(0.011)	0	25
Number of days reported sick	7.518	(0.147)	7.414	(0.160)	0	260
Flexi-time access	0.549	(0.003)	0.568	(0.004)	0	1
Telehomework access	0.503	(0.003)	0.515	(0.004)	0	1
Part-time job						
Small (1–11h)	0.026	(0.001)	0.022	(0.001)	0	1
Medium (12–19h)	0.081	(0.002)	0.075	(0.002)	0	1
Large (20–35h)	0.322	(0.003)	0.313	(0.003)	0	1
Full-time (36+h)	0.571	(0.003)	0.589	(0.004)	0	1
Workdays per week						
1 workday	0.012	(0.001)	0.011	(0.001)	0	1
2 workdays	0.051	(0.001)	0.048	(0.002)	0	1
3 workdays	0.145	(0.002)	0.140	(0.003)	0	1
4 workdays	0.283	(0.003)	0.283	(0.003)	0	1
5 workdays	0.503	(0.003)	0.512	(0.004)	0	1
6 workdays	0.006	(0.001)	0.006	(0.001)	0	1
Female	0.493	(0.003)	0.472	(0.004)	0	1
Child(ren) 0–5 years at home	0.144	(0.002)	0.152	(0.003)	0	1
Child(ren) 6+ years at home	0.432	(0.003)	0.438	(0.004)	0	1
Marital status						
Single	0.162	(0.002)	0.163	(0.003)	0	1
Cohabiting or married	0.818	(0.003)	0.829	(0.003)	0	1
Living at parent's home	0.013	(0.001)	0.004	(0.000)	0	1
Other	0.007	(0.001)	0.004	(0.000)	0	1
Does partner have a job?						
No	0.319	(0.003)	0.313	(0.003)	0	1
Yes, ≤ 20h	0.158	(0.002)	0.163	(0.003)	0	1
Yes, > 20h	0.523	(0.003)	0.524	(0.004)	0	1
Age						
15–24 years	0.035	(0.001)	0.031	(0.001)	0	1
25–34 years	0.177	(0.003)	0.184	(0.003)	0	1
35–44 years	0.259	(0.003)	0.268	(0.003)	0	1
45–54 years	0.366	(0.003)	0.366	(0.004)	0	1
55+ years	0.164	(0.002)	0.151	(0.003)	0	1
Highest educational degree						
Primary	0.007	(0.001)	0.004	(0.000)	0	1
Lower vocational	0.041	(0.001)	0.035	(0.001)	0	1
Lower secondary	0.075	(0.002)	0.073	(0.002)	0	1
Higher secondary	0.059	(0.002)	0.061	(0.002)	0	1
Vocational	0.147	(0.002)	0.150	(0.003)	0	1
Professional	0.452	(0.003)	0.447	(0.004)	0	1
Academic (bachelor)	0.035	(0.001)	0.035	(0.001)	0	1
Academic (master+)	0.184	(0.003)	0.194	(0.003)	0	1

Table 1: Descriptive statistics (*cont.*)

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
Work experience (years)	22.267	(0.071)	22.158	(0.078)	0	55
Wage						
≤ 1.250 EUR	0.092	(0.002)	0.083	(0.002)	0	1
1.251–1.500 EUR	0.077	(0.002)	0.072	(0.002)	0	1
1.501–1.750 EUR	0.073	(0.002)	0.070	(0.002)	0	1
1.751–2.000 EUR	0.087	(0.002)	0.083	(0.002)	0	1
2.001–2.500 EUR	0.182	(0.003)	0.178	(0.003)	0	1
2.501–3.000 EUR	0.135	(0.002)	0.137	(0.003)	0	1
3.001–3.500 EUR	0.141	(0.002)	0.145	(0.003)	0	1
3.501–4.000 EUR	0.093	(0.002)	0.098	(0.002)	0	1
4.001–4.500 EUR	0.056	(0.002)	0.061	(0.002)	0	1
4.501–5.000 EUR	0.032	(0.001)	0.035	(0.001)	0	1
> 5.000 EUR	0.032	(0.001)	0.036	(0.001)	0	1
Regularly doing overtime	0.466	(0.003)	0.472	(0.004)	0	1
Satisfaction with hours						
Satisfied	0.817	(0.003)	0.816	(0.003)	0	1
Prefers more hours	0.059	(0.002)	0.056	(0.002)	0	1
Prefers fewer hours	0.124	(0.002)	0.128	(0.002)	0	1
Multiple jobs	0.063	(0.002)	0.059	(0.002)	0	1
Contract						
Permanent	0.938	(0.002)	0.945	(0.002)	0	1
Temporary	0.049	(0.001)	0.045	(0.002)	0	1
Other	0.012	(0.001)	0.010	(0.001)	0	1
Executive position	0.260	(0.003)	0.274	(0.003)	0	1
Sector						
State government	0.162	(0.002)	0.176	(0.003)	0	1
Municipalities	0.073	(0.002)	0.077	(0.002)	0	1
Primary education	0.190	(0.003)	0.172	(0.003)	0	1
Secondary education	0.180	(0.003)	0.171	(0.003)	0	1
Vocational training	0.141	(0.002)	0.138	(0.003)	0	1
Judiciary	0.012	(0.001)	0.012	(0.001)	0	1
Police	0.077	(0.002)	0.080	(0.002)	0	1
Research institutes	0.014	(0.001)	0.015	(0.001)	0	1
Higher professional education	0.029	(0.001)	0.030	(0.001)	0	1
University	0.039	(0.001)	0.041	(0.001)	0	1
District water board	0.017	(0.001)	0.019	(0.001)	0	1
Provinces	0.024	(0.001)	0.027	(0.001)	0	1
Academic hospitals	0.043	(0.001)	0.042	(0.001)	0	1
Firm size						
1–10 employees	0.009	(0.001)	0.008	(0.001)	0	1
11–20 employees	0.025	(0.001)	0.023	(0.001)	0	1
21–50 employees	0.064	(0.002)	0.059	(0.002)	0	1
51–100 employees	0.078	(0.002)	0.073	(0.002)	0	1

Table 1: Descriptive statistics (*cont.*)

Variables	Gross sample		Net sample		Min	Max
	Mean	S.E.	Mean	S.E.		
101–500 employees	0.313	(0.003)	0.310	(0.003)	0	1
501–1.000 employees	0.128	(0.002)	0.131	(0.002)	0	1
1.001–5.000 employees	0.244	(0.003)	0.252	(0.003)	0	1
> 5.000 employees	0.139	(0.002)	0.145	(0.003)	0	1
Observations	23073		18296			

Note: The gross sample comprises the observations of all employees in the sample, the net sample the observations used for estimation after list-wise deletion due to missing values. S.E. is the standard error of the mean.

all public sectors, like state government, municipalities, police, defence, schools, universities, and academic hospitals and provides detailed information on work organisation, fringe benefits, and other work-related factors, as well as socio-economic and household characteristics of the surveyed employees.

All respondents were employed with the same employer for the whole year 2003 (MinBZK, 2005, p. 63).⁷ Data from individuals working in the defence sector as well as from all individuals with missing information on one of the variables used were excluded from the analysis, resulting in a net sample size of 18,296 employees.⁸ Table 1 presents an overview and descriptive statistics of the variables used in the analysis.

The dataset contains three variables relating to absenteeism; a binary variable for whether or not the respondent reported sick, the total number of times the respondent was absent (frequency) and the total number of days the respondent was absent (duration) in the previous year. The latter two are used as the dependent variables. In 2003 57.0% of the employees reported sick at least once. On average, employees called in sick 1.14 times and 7.41 days.

The main independent variables are the opportunity to work at home every now and then (telehomework) and to have flexible working times (flexi-time), which are both dummy variables (0 = no/don't know; 1 = yes)⁹, as well as three part-time work categories.

A large number of control variables that measure observable personal and household

⁷ This includes employees who changed jobs or had multiple contracts with the same employer, who stopped working for not more than three 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, p. 69). For a description of the sample design see MinBZK (2005, p. 64 et sqq.).

⁸ The gross sample size, i.e. including observations with missing values, is 23,073.

⁹ The 'no' (arrangement not available) and the 'don't know' categories are treated the same. For our analysis it is very unlikely that unknown policies affect absences. If an employee is not aware of whether or not she has access to an arrangement, she probably will not have made use of it.

as well as job and employer characteristics are used (see table 1). Many of these are likely to be correlated with TLF arrangements and to simultaneously affect the frequency and length of absences. Most control variables are measured as dummy or categorical variables.

3.2 Statistical model

Both dependent variables are count outcomes which exhibit significant overdispersion. The data was therefore fitted with a negative binomial regression model (NB).¹⁰ In the NB the counts follow a Poisson regression model to which a variable v_i is added, such that e^{v_i} follows a gamma distribution with mean 1 and variance α . α denotes the overdispersion parameter; the larger α , the greater the overdispersion:

$$y_i \sim \text{Poisson}(\mu_i)$$

where

$$\mu_i = \exp(X_i' \beta + v_i) \cdot \text{exposure}$$

and

$$e^{v_i} \sim \text{Gamma}(1/\alpha, \alpha)$$

The above implies that

$$\mu_i \sim \text{Gamma}(1/\alpha, \alpha \mu_i)$$

and thus

$$\text{Var}(y_i) = \mu_i(1 + \alpha \mu_i)$$

The dispersion for the i^{th} observation is therefore equal to $1 + \alpha(\exp(\beta' X_i) \cdot \text{exposure}_i)$. Specifically we thus employ a negative binomial mean-dispersion model (NB2 in the terminology of Cameron and Trivedi (1998, pp. 70-77)).

The overdispersion parameter α , reported in the tables below, is significantly different from zero in all models. As a robustness check, the models were also estimated by Poisson quasi-MLE (Gourieroux et al., 1984; Cameron and Trivedi, 2010). This alternative specification did not affect the results significantly. Fitting the data with a zero-inflated

¹⁰ See Cameron and Trivedi (1998), Long (1997), Long and Freese (2005) or Winkelmann (2008) for a statistical treatment of count data models.

model was rejected in favour of the NB2, due to the risk of misspecification and overfitting the data (Long, 1997; Staub and Winkelmann, 2013).¹¹

Two models for each of the two dependent variables were estimated. The first model includes all independent and control variables, but no interactions. In the second model we interact flexi-time and telehomework, respectively, with dummy variables indicating the presence of one or more children of two different age categories. This will show us whether these work arrangements have an additional effect for employees with (small) children and reduce absenteeism by helping them to combine paid work with private life. Both models were estimated for the total sample as well as separately for female and male employees in order to determine whether there are structural differences in the effect of TLF arrangements on the absence behaviour of men and women (VandenHeuvel and Wooden, 1995).

The regular number of workdays per week was used as an exposure variable, to account for the fact that the absolute risk of absence is reduced for those who work fewer days. In addition, the workdays variable was included as a control to disentangle the effects of variation in working hours from variation in working days (see Barmby et al. (2001) for a similar strategy).

The usual limitations of cross-sectional data like this also apply to this empirical analysis. The analysis does not imply any statistical causality and despite the large number of control variables there may be potential biases due to unobservable heterogeneity at the individual, job, or firm level. Employees with unobserved private responsibilities or preferences for flexibility may for example self-select into jobs with TLF and exhibit higher absenteeism rates as well. TLF is also not possible in jobs where the task profile requires reliability in work attendance and presence at the workplace and we do not have any information in the data on whether TLF would be generally possible. The literature based on Coles and Treble (1996), however, implies that employers will pay wage premiums and monitor employees more extensively in jobs where reliable attendance is crucial. To the extent that TLF is also not possible in these jobs, we may assume that absenteeism is lower to begin with here. Both aspects, i.e. self-selection and structural differences in TLF availability, would imply a downward bias on our estimates.

Furthermore we have to rely on self-reported data, which means that measurement errors are possible. Employees may not fully recall the frequency and duration of absences in the previous year for example (Dionne and Dostie, 2007).

¹¹ In order to use zero-inflated models one basically has 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. It is hard to imagine 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.

4 Results

Table 2 shows the incidence rate ratios, table 3 the average marginal effects for the model without interactions. Access to flexi-time and access to telehomework have a significant effect on the number of times absent according to the model. Both reduce the absence frequency by about 5% or 0.06 absences per year holding all other variables in the model constant (column Absence Frequency: Total sample). Access to flexi-time furthermore reduces the length of absences significantly by 15.5% or 1.27 days per year (Absence Duration: Total sample). The coefficients on part-time work are not significantly different from the base category (>35h per week) for the total sample on both the absence frequency and duration with one exception. Employees with medium part-time jobs (12–19h per week) are about 9% or 0.10 times less absent than employees working full-time, but the coefficient is only significant at the 10% level. Note, however, that the regular weekly number of workdays was used as an exposure variable, and included as a control (cf. Barmby et al. (2001)). The latter exhibit large coefficients net of exposure, so employees working fewer than five days are *relatively* more often and longer absent than those working five days, holding the number of hours constant (i.e. compressed working week). Employees working only two days a week for example are on average 2.5 times more often and twice as long absent than employees who usually work five days. In *absolute* terms, employees working two to four days a week are as often and as long absent as employees working five days.

As a next step, the model is estimated separately by gender to determine whether there are significant differences in the effect of TLF on the absence behaviour of men and women. The estimation results from the separate regressions are combined by seemingly unrelated estimation (Weesie, 1999; StataCorp, 2013).¹² Subsequent Wald tests for differences in the coefficients do not reject the hypothesis of equal coefficients on flexi-time, telehomework and part-time work for male and female employees, both with respect to frequency and duration of absences (see table 2).¹³ So there are no gender differences in the associations between TLF arrangements and absenteeism.

To analyse whether TLF arrangements have an additional effect for employees with family responsibilities, the flexi-time and telehomework variables are both interacted with dummy variables indicating the presence of one or more children of two different age categories (see table 4). The main effects are similar in size and direction to the specification without interactions above. The interaction effects are not significantly different from zero with respect to absence frequency.

¹² Seemingly unrelated estimation combines the parameter estimates and associated variance-covariance matrices of two or more regression models in order to test cross-model hypotheses.

¹³ Even though two part-time coefficients on the male sample are significantly different from one (the reported coefficients are incidence rate ratios and therefore the reference point is one), these coefficients do not differ from those of female employees at conventional levels of significance.

Table 2: Incidence rate ratios of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.951** (0.0220)	0.937* (0.0331)	0.959 (0.0282)	0.845*** (0.0421)	0.804*** (0.0544)	0.876** (0.0576)
Telehomework access	0.941*** (0.0199)	0.924** (0.0296)	0.956* (0.0262)	0.952 (0.0434)	0.956 (0.0612)	0.944 (0.0563)
Small part-time (1–11h)	0.925 (0.0767)	0.967 (0.137)	0.914 (0.0963)	0.826 (0.151)	1.080 (0.296)	0.739 (0.165)
Medium part-time (12–19h)	0.910* (0.0468)	0.896 (0.0921)	0.920 (0.0573)	0.899 (0.104)	0.659* (0.152)	1.004 (0.129)
Large part-time (20–35h)	1.037 (0.0334)	1.122** (0.0552)	1.016 (0.0424)	1.000 (0.0657)	1.023 (0.0991)	1.003 (0.0822)
Female	1.193*** (0.0288)	–	–	1.360*** (0.0789)	–	–
Children 0–5 years at home	1.085*** (0.0288)	1.178*** (0.0454)	1.028 (0.0382)	1.011 (0.0599)	1.021 (0.0901)	1.067 (0.0828)
Children 6+ years at home	0.944** (0.0211)	0.983 (0.0317)	0.909*** (0.0277)	0.947 (0.0467)	0.924 (0.0630)	0.988 (0.0665)
α	0.459 (0.0225)	0.551 (0.0367)	0.367 (0.0255)	3.639 (0.0591)	4.183 (0.0951)	3.074 (0.0681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios; the reference point is therefore 1. The reference group is employees with full-time jobs (36+ hours) and no access to flexi-time nor telehomework. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses. See table A.1 in the appendix to this chapter for the full-specification.

With respect to absence duration, the main flexi-time incident rate ratio of male employees is 0.734 and the interaction between flexi-time and small children up to 5 years of age is not significant. The incidence rate ratio of the interaction between flexi-time and children of six years and older for male employees is positive and significant. So male employees without children with access to flexi-time report significantly shorter absences on average by about 26% or some 2.2 days per year (and this effect persists for male employees with small children), but male employees with older children seem to benefit from flexi-time less. Finally the incidence rate ratios of the interaction of telehomework and children with respect to absence duration is significantly smaller for male (children 6+) and female (children 0–5) employees. This provides some support for the hypothesis that the association between TLF and absenteeism is stronger for employees with family responsibilities. Apart from this, however, TLF does not seem to have any *additional* effects for employees with children at home.

Table 3: Average marginal effects of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	-0.0578** (0.0266)	-0.0646* (0.0356)	-0.0544 (0.0386)	-1.270*** (0.384)	-1.519*** (0.489)	-1.102** (0.554)
Telehomework access	-0.0687*** (0.0240)	-0.0787** (0.0319)	-0.0590* (0.0357)	-0.368 (0.338)	-0.307 (0.435)	-0.474 (0.489)
Small part-time (1–11h)	-0.0849 (0.0877)	-0.0323 (0.134)	-0.113 (0.128)	-1.310 (1.149)	0.549 (2.025)	-2.167 (1.419)
Medium part-time (12–19h)	-0.103* (0.0544)	-0.101 (0.0907)	-0.105 (0.0776)	-0.758 (0.800)	-2.334** (1.063)	0.0316 (1.070)
Large part-time (20–35h)	0.0420 (0.0374)	0.119** (0.0527)	0.0213 (0.0550)	0.000506 (0.496)	0.158 (0.676)	0.0268 (0.681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Average marginal effects after negative binomial regression. Robust standard errors in parentheses.
See table A.1 for reference groups and control variables.

5 Discussion and conclusion

An increasing number of establishments experiment with a new organisation of work and working time in which employees can determine and modify when, where, and how long they work. Due to differences in production processes which vary in their requirement for reliability in work attendance and presence at the workplace, this temporal and locational flexibility of work is not available in all occupation and task profiles. Nevertheless, this interesting new development represents the increasing individualisation of the labour market and affects a growing share of jobs and establishments.

In this study we focus on one of the potential consequences of TLF that are also of interest for employers, namely how TLF affects on the frequency and length of sickness absenteeism. Our analysis shows that increased temporal and locational flexibility is negatively associated with sickness absenteeism in general. Especially flexi-time, i.e. quickly adjustable schedule flexibility, reduces both the frequency and – in particular – the duration of absences. Telehomework or location flexibility seems to mainly affect absence frequency but not absence duration. So by and large, absence from work via schedule and location flexibility seems to partly substitute sickness absenteeism. This is beneficial and not a zero-sum game for employers, because it ensures that work tasks are still maintained and it provides more reliability for employers with respect to the nature and extent of the absence. Regarding schedule and location flexibility, hypothesis 1, stating that TLF is negatively associated with absenteeism, is therefore not rejected by the data.

Table 4: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.929** (0.0286)	0.921* (0.0388)	0.943 (0.0341)	0.798*** (0.0511)	0.734*** (0.0534)	0.876** (0.0551)
Telehomework access	0.946* (0.0280)	0.938 (0.0383)	0.952 (0.0334)	1.018 (0.0626)	1.037 (0.0715)	0.992 (0.0609)
Children 0–5 years at home	1.083* (0.0462)	1.154** (0.0777)	1.051 (0.0569)	1.071 (0.102)	0.968 (0.117)	1.288*** (0.120)
Children 6+ years at home	0.920** (0.0319)	0.984 (0.0472)	0.871*** (0.0378)	0.936 (0.0701)	0.919 (0.0762)	0.966 (0.0692)
Flexi-time*Children 0–5	0.986 (0.0470)	0.973 (0.0757)	0.982 (0.0615)	0.953 (0.0990)	0.930 (0.132)	0.866 (0.0948)
Flexi-time*Children 6+	1.065 (0.0428)	1.049 (0.0578)	1.059 (0.0539)	1.158* (0.103)	1.236** (0.116)	1.060 (0.0905)
Telehomework*Children 0–5	1.023 (0.0470)	1.082 (0.0817)	0.973 (0.0608)	0.952 (0.0946)	1.218 (0.167)	0.786** (0.0857)
Telehomework*Children 6+	0.980 (0.0390)	0.944 (0.0512)	1.024 (0.0520)	0.872 (0.0782)	0.797** (0.0726)	0.980 (0.0824)
Small part-time (1–11h)	0.923 (0.0764)	0.962 (0.134)	0.912 (0.0847)	0.822 (0.148)	1.073 (0.290)	0.727** (0.114)
Medium part-time (12–19h)	0.909* (0.0468)	0.895 (0.0933)	0.918 (0.0529)	0.894 (0.103)	0.656** (0.113)	1.000 (0.0952)
Large part-time (20–35h)	1.037 (0.0333)	1.121*** (0.0469)	1.015 (0.0377)	0.998 (0.0653)	1.011 (0.0705)	1.003 (0.0621)
Female	1.193*** (0.0288)	–	–	1.366*** (0.0787)	–	–
α	0.458 (0.0225)	0.550 (0.0254)	0.367 (0.0183)	3.637 (0.0590)	4.176 (0.0739)	3.070 (0.0533)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios; the reference point is therefore 1. The reference group is male employees with full-time jobs (36+ hours), no access to flexi-time nor telehomework and without children. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses. See table A.2 in the appendix to this chapter for the full specification.

Long-term duration flexibility in the form of part-time work does not appear to have a significant impact on absenteeism in general, at least not with respect to the number of working hours and holding the number of workdays constant. So even though part-time employees report more often that their work is compatible with other commitments (Burchell et al., 2007; Fagan and Burchell, 2002), this is not reflected in fewer and shorter absences. Controlling for the number of hours, fewer workdays are associated with relatively more frequent and longer spells of absenteeism. So with respect to duration flexibility, hypotheses 1 is rejected by the data. Accordingly, hypothesis 2, stating that the negative association between TLF and absenteeism is stronger for flexi-time and telehomework than for part-time work, is not rejected by the data.

TLF is likely to be particularly relevant for employees with family responsibilities. This should be reflected in lower absenteeism for this group in particular, because TLF offers an alternative to 'emergency-induced' absences, and because it may reduce work-life related stress in general. This reasoning is only very weakly supported by the data, however. There are virtually no gender differences with respect to the effects of flexi-time and telehomework and the interactions of these two variables with the presence of children are mostly not significant. Hypothesis 3 is thus for the most part rejected by the data.

This finding may seem puzzling at first glance. Employees with access to telehomework and especially flexi-time report significantly more often than their colleagues without access to these arrangements that their working times match well with their private life (Possenriede and Plantenga, 2014). This improved fit between work and private life may not translate into fewer and shorter absences, however, because alternative arrangements like short-term care leave are available to react to emergencies (Olsen and Dahl, 2010). It is also possible that voluntary or family-related absences were under-reported in our data, since the dependent variables explicitly measure the frequency and length of *sickness* absence. Employees may thus be reluctant to report family-related absences in this category (Drago and Wooden, 1992; VandenHeuvel, 1997).¹⁴ Employees with children that do not have access to TLF arrangements may therefore still have more absence days altogether (i.e. sickness and family-related) than those with access.

Even though the data does not allow for firm conclusions on whether TLF mainly affects absenteeism because it lifts time-restrictions and changes employees' behaviour or because it improves employees' health, we still attempt an educated guess. The behavioural effects of increased TLF on absenteeism should mainly concern and become apparent in short-term absences, since emergencies and minor indispositions by their very nature come at short notice and often last only a short time. Health-related effects of TLF on the other hand should be reflected in reductions in medium- and long-term absences. If the effect of TLF is larger with respect to the frequency of absences than

¹⁴ On the reliability of self-reported data on sick leave in general, see van Poppel et al. (2002), Ferrie et al. (2005) and Voss et al. (2008).

with respect to their duration, it can be interpreted as a short-term behavioural effect. If the effect is larger with respect to the length than to the frequency, however, it is likely to be a health-related effect. The analysis indicates that telehomework is associated with fewer but not with significantly shorter absences. This suggests that telehomework only reduces short-term absences and thus has an effect on employees' behaviour, but not so much on their health. Flexi-time reduces the frequency of absences similarly, but also has a considerable and highly significant effect on absence duration. Flexi-time therefore not only appears to affect the behaviour of employees but seems to have a positive influence on health as well.

This study does not cover a full cost-benefit analysis of TLF for employers, but focuses only on one potential consequence of TLF. The costs of implementing TLF as well as the costs of absenteeism differ between sectors, firms and even types and groups of employees (Coles and Treble, 1996; Heywood and Jirjahn, 2004; Coles et al., 2007), which is why such an analysis is beyond the scope of this study. Other advantages of TLF, such as potential increases in productivity and organisational commitment, would have to be considered as well. Another limitation of this study is that we cannot control for individual-, job-, or firm-related heterogeneity and that we do not have data on private sector employees. We are therefore only able to establish associations between TLF and sickness absenteeism. Future analyses can improve on both of these issues, once better data becomes available.

The markedly negative association between TLF and absenteeism nevertheless shows a clear benefit of TLF and should increase employers' interest in it further. Apparently TLF is not only valuable for employees and in line with the preferences of modern knowledge workers, but can be quite beneficial for employers as well.

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Tables

Table A.1: Incidence rate ratios of TLF on absence frequency and duration

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.951** (0.0220)	0.937* (0.0331)	0.959 (0.0282)	0.845*** (0.0421)	0.804*** (0.0544)	0.876** (0.0576)
Telehomework access	0.941*** (0.0199)	0.924** (0.0296)	0.956* (0.0262)	0.952 (0.0434)	0.956 (0.0612)	0.944 (0.0563)
Part-time employment						
Ref: Full-time						
Small (1–11h)	0.925 (0.0767)	0.967 (0.137)	0.914 (0.0963)	0.826 (0.151)	1.080 (0.296)	0.739 (0.165)
Medium (12–19h)	0.910* (0.0468)	0.896 (0.0921)	0.920 (0.0573)	0.899 (0.104)	0.659* (0.152)	1.004 (0.129)
Large (20–35h)	1.037 (0.0334)	1.122** (0.0552)	1.016 (0.0424)	1.000 (0.0657)	1.023 (0.0991)	1.003 (0.0822)
Workdays per week						
Ref: 5 workdays						
1 workday	2.108*** (0.355)	1.379 (0.442)	2.707*** (0.551)	2.009** (0.679)	1.032 (0.495)	2.580** (1.008)
2 workdays	2.408*** (0.142)	2.706*** (0.341)	2.416*** (0.161)	2.119*** (0.266)	2.431*** (0.558)	2.078*** (0.303)
3 workdays	1.608*** (0.0641)	1.850*** (0.165)	1.626*** (0.0746)	1.473*** (0.117)	1.966*** (0.271)	1.407*** (0.133)
4 workdays	1.339*** (0.0363)	1.296*** (0.0481)	1.359*** (0.0524)	1.398*** (0.0813)	1.386*** (0.108)	1.394*** (0.104)
6 workdays	0.663*** (0.104)	0.623*** (0.113)	0.723 (0.210)	0.526** (0.136)	0.356*** (0.0760)	1.018 (0.465)
Female	1.193*** (0.0288)	–	–	1.360*** (0.0789)	–	–
Children 0 – 5 years at home	1.085*** (0.0288)	1.178*** (0.0454)	1.028 (0.0382)	1.011 (0.0599)	1.021 (0.0901)	1.067 (0.0828)
Children 6+ years at home	0.944** (0.0211)	0.983 (0.0317)	0.909*** (0.0277)	0.947 (0.0467)	0.924 (0.0630)	0.988 (0.0665)
Marital status						
Ref: Single						
Cohabiting or married	0.790*** (0.0280)	0.812*** (0.0438)	0.792*** (0.0389)	0.746*** (0.0579)	0.826* (0.0909)	0.662*** (0.0745)
Living at parent's home	0.914 (0.110)	1.258 (0.210)	0.740* (0.124)	0.667* (0.139)	0.833 (0.176)	0.528** (0.161)
Other	0.953 (0.124)	0.932 (0.209)	0.962 (0.150)	0.567*** (0.111)	0.561** (0.159)	0.560** (0.159)
Does partner have a job?						
Ref: No						

Table A.1: Incidence rate ratios of TLF on absence frequency and duration (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Yes, ≤ 20h	1.081** (0.0385)	1.077* (0.0436)	1.102 (0.0881)	1.078 (0.0833)	1.088 (0.0870)	1.305 (0.250)
Yes, > 20h	1.056* (0.0330)	1.122*** (0.0448)	1.002 (0.0467)	0.977 (0.0663)	1.062 (0.0851)	0.997 (0.108)
Age						
Ref: 15–24 years						
25–34 years	0.975 (0.0538)	1.259** (0.120)	0.914 (0.0597)	1.021 (0.103)	1.634*** (0.238)	0.884 (0.103)
35–44 years	0.902* (0.0562)	1.373*** (0.146)	0.789*** (0.0602)	0.889 (0.104)	1.514** (0.266)	0.752** (0.103)
45–54 years	0.857** (0.0606)	1.406*** (0.174)	0.719*** (0.0613)	0.932 (0.130)	1.546** (0.335)	0.816 (0.132)
55+ years	0.805** (0.0697)	1.445** (0.217)	0.608*** (0.0642)	0.729* (0.120)	1.330 (0.346)	0.521*** (0.1000)
Highest educational degree						
Ref: Primary						
Lower vocational	1.178 (0.184)	1.080 (0.214)	1.337 (0.333)	1.457* (0.330)	1.354 (0.376)	1.573 (0.598)
Lower secondary	1.222 (0.184)	1.043 (0.205)	1.538* (0.362)	1.207 (0.259)	1.356 (0.363)	1.054 (0.372)
Higher secondary	1.170 (0.176)	1.100 (0.214)	1.357 (0.320)	1.079 (0.234)	1.350 (0.374)	0.897 (0.316)
Vocational	1.126 (0.166)	0.985 (0.186)	1.379 (0.321)	1.212 (0.254)	1.227 (0.322)	1.229 (0.428)
Professional	1.105 (0.163)	0.995 (0.190)	1.302 (0.302)	1.102 (0.232)	1.128 (0.299)	1.087 (0.377)
Academic (bachelor)	1.118 (0.177)	1.067 (0.217)	1.165 (0.293)	0.872 (0.213)	0.880 (0.261)	0.964 (0.410)
Academic (master+)	1.125 (0.169)	0.993 (0.193)	1.324 (0.311)	0.991 (0.218)	1.036 (0.289)	0.894 (0.316)
Work experience (years)	0.994*** (0.00182)	0.989*** (0.00305)	0.996 (0.00236)	1.020*** (0.00413)	1.018*** (0.00621)	1.021*** (0.00516)
Wage						
Ref: ≤ 1.250 EUR						
1.251–1.500 EUR	1.010 (0.0491)	1.077 (0.148)	1.004 (0.0535)	0.775** (0.0832)	0.668 (0.226)	0.758*** (0.0775)
1.501–1.750 EUR	1.051 (0.0553)	1.231 (0.173)	0.993 (0.0556)	0.796** (0.0858)	0.514** (0.158)	0.853 (0.0975)
1.751–2.000 EUR	1.025 (0.0516)	1.047 (0.135)	1.029 (0.0591)	0.819* (0.0943)	0.559* (0.175)	0.832 (0.101)
2.001–2.500 EUR	1.004 (0.0491)	1.063 (0.133)	0.989 (0.0552)	0.869 (0.0920)	0.537** (0.162)	0.938 (0.106)
2.501–3.000 EUR	0.962	1.029	0.925	0.764**	0.438***	0.915

Table A.1: Incidence rate ratios of TLF on absence frequency and duration (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
	(0.0511)	(0.129)	(0.0603)	(0.0886)	(0.133)	(0.124)
3.001–3.500 EUR	0.971	1.000	0.990	0.687***	0.422***	0.791
	(0.0550)	(0.128)	(0.0728)	(0.0833)	(0.128)	(0.124)
3.501–4.000 EUR	0.975	1.038	0.918	0.739**	0.462**	0.842
	(0.0609)	(0.136)	(0.0779)	(0.0995)	(0.144)	(0.164)
4.001–4.500 EUR	0.936	0.978	0.925	0.731**	0.470**	0.594***
	(0.0664)	(0.134)	(0.0965)	(0.116)	(0.154)	(0.114)
4.501–5.000 EUR	0.842**	0.880	0.888	1.041	0.625	1.278
	(0.0701)	(0.128)	(0.113)	(0.202)	(0.219)	(0.354)
> 5.000 EUR	0.782***	0.818	0.816	0.656**	0.350***	1.304
	(0.0653)	(0.120)	(0.111)	(0.123)	(0.119)	(0.444)
Regularly doing overtime	0.857***	0.843***	0.877***	0.816***	0.776***	0.832***
	(0.0172)	(0.0252)	(0.0236)	(0.0371)	(0.0495)	(0.0495)
Satisfaction with hours						
Ref: Satisfied						
Prefers more hours	0.974	0.929	1.006	0.850*	0.960	0.747***
	(0.0418)	(0.0628)	(0.0544)	(0.0793)	(0.143)	(0.0733)
Prefers fewer hours	1.457***	1.430***	1.466***	1.789***	1.736***	1.920***
	(0.0370)	(0.0512)	(0.0523)	(0.102)	(0.138)	(0.148)
2+ jobs	0.981	0.964	0.953	1.032	1.049	1.008
	(0.0389)	(0.0581)	(0.0508)	(0.0996)	(0.134)	(0.134)
Contract						
Ref: Permanent						
Temporary	0.966	0.984	0.954	0.763***	0.728***	0.754***
	(0.0445)	(0.0662)	(0.0587)	(0.0651)	(0.0896)	(0.0794)
Other	1.013	0.942	1.036	1.242	1.276	1.100
	(0.0808)	(0.115)	(0.107)	(0.202)	(0.309)	(0.212)
Executive position	0.852***	0.822***	0.901***	0.822***	0.845**	0.785***
	(0.0209)	(0.0270)	(0.0331)	(0.0430)	(0.0567)	(0.0592)
Sector						
Ref: State government						
Municipalities	0.968	0.895*	1.051	0.994	1.028	0.922
	(0.0394)	(0.0529)	(0.0554)	(0.0907)	(0.134)	(0.0972)
Primary education	0.713***	0.675***	0.769***	0.707***	0.717**	0.678***
	(0.0303)	(0.0493)	(0.0426)	(0.0675)	(0.113)	(0.0770)
Secondary education	1.044	0.927	1.157***	0.684***	0.603***	0.752***
	(0.0387)	(0.0490)	(0.0599)	(0.0561)	(0.0670)	(0.0816)
Vocational training	0.883***	0.757***	1.017	0.870	0.756**	0.940
	(0.0329)	(0.0417)	(0.0511)	(0.0749)	(0.0892)	(0.103)
Judiciary	0.492***	0.531***	0.465***	0.512***	0.483**	0.638
	(0.0475)	(0.0725)	(0.0654)	(0.113)	(0.145)	(0.230)
Police	1.004	1.015	0.966	1.129	1.073	1.144
	(0.0437)	(0.0561)	(0.0631)	(0.0924)	(0.111)	(0.154)

Table A.1: Incidence rate ratios of TLF on absence frequency and duration (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Research institutes	0.940 (0.0748)	0.847 (0.0965)	1.157 (0.126)	0.752* (0.128)	0.744 (0.192)	0.883 (0.181)
Higher professional education	0.868** (0.0522)	0.716*** (0.0588)	1.034 (0.0885)	0.862 (0.118)	0.748 (0.137)	0.952 (0.165)
University	0.830*** (0.0445)	0.799*** (0.0639)	0.879* (0.0623)	0.803* (0.106)	0.845 (0.164)	0.758** (0.104)
District water board	0.773*** (0.0614)	0.773** (0.0790)	0.912 (0.117)	0.675** (0.115)	0.717* (0.143)	0.565** (0.151)
Provinces	0.898* (0.0512)	0.959 (0.0787)	0.892 (0.0698)	0.832 (0.102)	0.754 (0.131)	0.926 (0.156)
Academic hospitals	0.979 (0.0467)	0.955 (0.0827)	1.018 (0.0609)	0.794** (0.0865)	0.926 (0.171)	0.706*** (0.0885)
Firm size						
Ref: 1–10 employees						
11–20 employees	0.878 (0.123)	0.927 (0.234)	0.873 (0.147)	0.994 (0.311)	0.573 (0.302)	1.226 (0.376)
21–50 employees	1.063 (0.137)	1.053 (0.240)	1.065 (0.166)	0.943 (0.258)	0.682 (0.337)	1.110 (0.273)
51–100 employees	1.023 (0.130)	1.109 (0.245)	0.980 (0.151)	1.274 (0.356)	0.906 (0.451)	1.475 (0.373)
101–500 employees	0.964 (0.119)	1.055 (0.228)	0.924 (0.138)	1.167 (0.315)	0.987 (0.475)	1.169 (0.280)
501–1.000 employees	0.984 (0.123)	1.061 (0.233)	0.952 (0.144)	1.062 (0.291)	0.946 (0.459)	1.066 (0.265)
1.001–5.000 employees	1.020 (0.127)	1.093 (0.238)	0.993 (0.149)	1.219 (0.331)	1.056 (0.509)	1.214 (0.296)
5.000+ employees	1.013 (0.127)	1.009 (0.221)	1.062 (0.162)	1.180 (0.324)	0.883 (0.429)	1.440 (0.362)
α	0.459 (0.0225)	0.551 (0.0367)	0.367 (0.0255)	3.639 (0.0591)	4.183 (0.0951)	3.074 (0.0681)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios from negative binomial regression; the reference point is therefore 1. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses.

Table A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Flexi-time access	0.929** (0.0286)	0.921* (0.0388)	0.943 (0.0341)	0.798*** (0.0511)	0.734*** (0.0534)	0.876** (0.0551)
Telehomework access	0.946* (0.0280)	0.938 (0.0383)	0.952 (0.0334)	1.018 (0.0626)	1.037 (0.0715)	0.992 (0.0609)
Children 0 – 5 years at home	1.083* (0.0462)	1.154** (0.0777)	1.051 (0.0569)	1.071 (0.102)	0.968 (0.117)	1.288*** (0.120)
Children 6+ years at home	0.920** (0.0319)	0.984 (0.0472)	0.871*** (0.0378)	0.936 (0.0701)	0.919 (0.0762)	0.966 (0.0692)
Flexi-time*Children 0–5	0.986 (0.0470)	0.973 (0.0757)	0.982 (0.0615)	0.953 (0.0990)	0.930 (0.132)	0.866 (0.0948)
Flexi-time*Children 6+	1.065 (0.0428)	1.049 (0.0578)	1.059 (0.0539)	1.158* (0.103)	1.236** (0.116)	1.060 (0.0905)
Telehomework*Children 0–5	1.023 (0.0470)	1.082 (0.0817)	0.973 (0.0608)	0.952 (0.0946)	1.218 (0.167)	0.786** (0.0857)
Telehomework*Children 6+	0.980 (0.0390)	0.944 (0.0512)	1.024 (0.0520)	0.872 (0.0782)	0.797** (0.0726)	0.980 (0.0824)
Part-time job Ref: Full-time						
Small (1–11h)	0.923 (0.0764)	0.962 (0.134)	0.912 (0.0847)	0.822 (0.148)	1.073 (0.290)	0.727** (0.114)
Medium (12–19h)	0.909* (0.0468)	0.895 (0.0933)	0.918 (0.0529)	0.894 (0.103)	0.656** (0.113)	1.000 (0.0952)
Large (20–35h)	1.037 (0.0333)	1.121*** (0.0469)	1.015 (0.0377)	0.998 (0.0653)	1.011 (0.0705)	1.003 (0.0621)
Workdays per week Ref: 5 workdays						
1 workday	2.112*** (0.356)	1.382 (0.341)	2.708*** (0.417)	2.012** (0.675)	1.062 (0.343)	2.532*** (0.551)
2 workdays	2.410*** (0.142)	2.704*** (0.281)	2.422*** (0.152)	2.117*** (0.263)	2.397*** (0.419)	2.075*** (0.211)
3 workdays	1.608*** (0.0640)	1.849*** (0.126)	1.631*** (0.0698)	1.474*** (0.117)	1.957*** (0.230)	1.415*** (0.101)
4 workdays	1.339*** (0.0362)	1.296*** (0.0430)	1.360*** (0.0468)	1.401*** (0.0809)	1.381*** (0.0752)	1.394*** (0.0830)
6 workdays	0.663*** (0.104)	0.622*** (0.106)	0.723 (0.155)	0.531** (0.140)	0.354*** (0.0892)	1.018 (0.372)
Female	1.193*** (0.0288)	–	–	1.366*** (0.0787)	–	–
Marital status Ref: Single						
Cohabiting or married	0.790*** (0.0280)	0.812*** (0.0388)	0.791*** (0.0388)	0.747*** (0.0579)	0.824** (0.0662)	0.667*** (0.0550)

Table A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Living at parent's home	0.914 (0.111)	1.259 (0.221)	0.737* (0.133)	0.674* (0.139)	0.839 (0.280)	0.531* (0.178)
Other	0.954 (0.124)	0.931 (0.212)	0.962 (0.153)	0.569*** (0.113)	0.550 (0.217)	0.563* (0.167)
Does partner have a job?						
Ref: No						
Yes, ≤ 20h	1.081** (0.0385)	1.077** (0.0398)	1.104 (0.0882)	1.076 (0.0830)	1.082 (0.0655)	1.316** (0.176)
Yes, > 20h	1.057* (0.0330)	1.123*** (0.0399)	1.003 (0.0470)	0.978 (0.0660)	1.062 (0.0619)	0.993 (0.0770)
Age						
Ref: 15–24 years						
25–34 years	0.974 (0.0537)	1.257** (0.133)	0.914 (0.0548)	1.016 (0.103)	1.623*** (0.287)	0.872 (0.0988)
35–44 years	0.901* (0.0561)	1.369*** (0.157)	0.791*** (0.0547)	0.884 (0.103)	1.482** (0.280)	0.752** (0.0960)
45–54 years	0.858** (0.0607)	1.404*** (0.179)	0.723*** (0.0569)	0.933 (0.130)	1.517** (0.314)	0.817 (0.116)
55+ years	0.805** (0.0696)	1.442** (0.208)	0.610*** (0.0564)	0.724** (0.119)	1.288 (0.302)	0.524*** (0.0848)
Highest educational degree						
Ref: Primary						
Lower vocational	1.178 (0.184)	1.078 (0.206)	1.333 (0.310)	1.434 (0.325)	1.312 (0.424)	1.545 (0.553)
Lower secondary	1.220 (0.184)	1.042 (0.196)	1.532* (0.339)	1.181 (0.255)	1.304 (0.415)	1.030 (0.347)
Higher secondary	1.169 (0.176)	1.103 (0.210)	1.352 (0.300)	1.059 (0.231)	1.319 (0.426)	0.882 (0.298)
Vocational	1.127 (0.166)	0.987 (0.184)	1.377 (0.303)	1.195 (0.252)	1.200 (0.377)	1.202 (0.403)
Professional	1.106 (0.164)	0.996 (0.185)	1.299 (0.285)	1.086 (0.230)	1.100 (0.345)	1.064 (0.355)
Academic (bachelor)	1.120 (0.178)	1.069 (0.210)	1.163 (0.273)	0.863 (0.213)	0.864 (0.286)	0.949 (0.340)
Academic (master+)	1.126 (0.170)	0.992 (0.188)	1.323 (0.294)	0.976 (0.215)	1.002 (0.322)	0.882 (0.299)
Work experience (years)	0.994*** (0.00182)	0.989*** (0.00284)	0.996* (0.00221)	1.020*** (0.00410)	1.018*** (0.00463)	1.020*** (0.00387)
Wage						
Ref: ≤ 1.250 EUR						
1.251–1.500 EUR	1.010 (0.0491)	1.075 (0.150)	1.002 (0.0477)	0.775** (0.0825)	0.688 (0.176)	0.753*** (0.0620)

Table A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
1.501–1.750 EUR	1.051 (0.0553)	1.230 (0.163)	0.992 (0.0509)	0.795** (0.0847)	0.531*** (0.130)	0.848* (0.0763)
1.751–2.000 EUR	1.026 (0.0517)	1.045 (0.136)	1.030 (0.0540)	0.826* (0.0944)	0.573** (0.136)	0.837* (0.0762)
2.001–2.500 EUR	1.005 (0.0490)	1.061 (0.133)	0.988 (0.0492)	0.870 (0.0910)	0.550*** (0.125)	0.937 (0.0807)
2.501–3.000 EUR	0.962 (0.0511)	1.024 (0.129)	0.926 (0.0537)	0.767** (0.0882)	0.448*** (0.102)	0.920 (0.0918)
3.001–3.500 EUR	0.971 (0.0549)	0.998 (0.127)	0.990 (0.0643)	0.694*** (0.0833)	0.436*** (0.101)	0.792** (0.0884)
3.501–4.000 EUR	0.975 (0.0610)	1.037 (0.135)	0.920 (0.0730)	0.745** (0.0999)	0.471*** (0.110)	0.846 (0.111)
4.001–4.500 EUR	0.936 (0.0664)	0.976 (0.131)	0.926 (0.0929)	0.735* (0.116)	0.485*** (0.117)	0.592*** (0.0991)
4.501–5.000 EUR	0.842** (0.0701)	0.878 (0.125)	0.888 (0.114)	1.042 (0.201)	0.642* (0.161)	1.290 (0.267)
> 5.000 EUR	0.781*** (0.0653)	0.818 (0.119)	0.815 (0.118)	0.660** (0.123)	0.364*** (0.0934)	1.273 (0.293)
Regularly doing overtime	0.857*** (0.0172)	0.844*** (0.0238)	0.876*** (0.0224)	0.815*** (0.0369)	0.779*** (0.0370)	0.826*** (0.0357)
Satisfaction with hours Ref: Satisfied						
Prefers more hours	0.974 (0.0418)	0.930 (0.0605)	1.005 (0.0496)	0.847* (0.0784)	0.972 (0.104)	0.743*** (0.0616)
Prefers fewer hours	1.458*** (0.0370)	1.432*** (0.0508)	1.468*** (0.0498)	1.791*** (0.103)	1.745*** (0.111)	1.909*** (0.120)
2+ jobs	0.982 (0.0389)	0.964 (0.0554)	0.953 (0.0510)	1.030 (0.0988)	1.046 (0.101)	1.012 (0.0895)
Contract Ref: Permanent						
Temporary	0.968 (0.0446)	0.982 (0.0678)	0.957 (0.0524)	0.768*** (0.0654)	0.727*** (0.0862)	0.764*** (0.0726)
Other	1.013 (0.0808)	0.942 (0.132)	1.039 (0.110)	1.237 (0.199)	1.271 (0.304)	1.100 (0.207)
Executive position	0.851*** (0.0209)	0.822*** (0.0253)	0.900*** (0.0304)	0.821*** (0.0431)	0.845*** (0.0432)	0.788*** (0.0436)
Sector Ref: State government						
Municipalities	0.967 (0.0393)	0.894** (0.0485)	1.051 (0.0561)	0.993 (0.0905)	1.024 (0.0956)	0.936 (0.0878)
Primary education	0.712*** (0.0302)	0.675*** (0.0455)	0.770*** (0.0381)	0.704*** (0.0670)	0.705*** (0.0773)	0.681*** (0.0583)

Table A.2: Incidence rate ratios of TLF on absence frequency and duration: Interactions with children (*cont.*)

	Absence Frequency			Absence Duration		
	Total	Male	Female	Total	Male	Female
Secondary education	1.043 (0.0386)	0.926 (0.0470)	1.157*** (0.0559)	0.683*** (0.0558)	0.601*** (0.0529)	0.758*** (0.0657)
Vocational training	0.882*** (0.0329)	0.758*** (0.0395)	1.016 (0.0475)	0.868 (0.0746)	0.750*** (0.0667)	0.943 (0.0779)
Judiciary	0.491*** (0.0474)	0.531*** (0.0782)	0.466*** (0.0714)	0.510*** (0.113)	0.478*** (0.102)	0.636** (0.138)
Police	1.004 (0.0437)	1.016 (0.0523)	0.966 (0.0588)	1.127 (0.0916)	1.067 (0.0971)	1.156 (0.125)
Research institutes	0.943 (0.0750)	0.848 (0.0958)	1.161 (0.121)	0.758 (0.130)	0.743 (0.137)	0.888 (0.172)
Higher professional education	0.870** (0.0523)	0.718*** (0.0630)	1.033 (0.0791)	0.861 (0.117)	0.765* (0.114)	0.947 (0.126)
University	0.831*** (0.0446)	0.798*** (0.0600)	0.879* (0.0620)	0.805 (0.106)	0.848 (0.107)	0.761** (0.0913)
District water board	0.772*** (0.0612)	0.770*** (0.0745)	0.913 (0.113)	0.674** (0.114)	0.694** (0.111)	0.574** (0.126)
Provinces	0.899* (0.0513)	0.958 (0.0822)	0.893 (0.0754)	0.834 (0.102)	0.748** (0.109)	0.931 (0.139)
Academic hospitals	0.979 (0.0469)	0.957 (0.0797)	1.015 (0.0585)	0.798** (0.0868)	0.946 (0.137)	0.700*** (0.0721)
Firm size						
Ref: 1–10 employees						
11–20 employees	0.878 (0.123)	0.930 (0.212)	0.873 (0.122)	1.015 (0.310)	0.606 (0.211)	1.221 (0.276)
21–50 employees	1.061 (0.137)	1.057 (0.213)	1.064 (0.135)	0.956 (0.251)	0.730 (0.227)	1.102 (0.230)
51–100 employees	1.021 (0.130)	1.114 (0.219)	0.980 (0.125)	1.284 (0.345)	0.957 (0.288)	1.454* (0.306)
101–500 employees	0.963 (0.119)	1.059 (0.203)	0.924 (0.114)	1.178 (0.306)	1.043 (0.304)	1.151 (0.234)
501–1.000 employees	0.982 (0.123)	1.066 (0.207)	0.951 (0.120)	1.073 (0.283)	0.997 (0.295)	1.049 (0.218)
1.001–5.000 employees	1.018 (0.127)	1.095 (0.211)	0.993 (0.124)	1.230 (0.321)	1.102 (0.323)	1.192 (0.246)
5.000+ employees	1.012 (0.127)	1.013 (0.197)	1.064 (0.135)	1.188 (0.314)	0.914 (0.271)	1.433* (0.302)
α	0.458 (0.0225)	0.550 (0.0254)	0.367 (0.0183)	3.637 (0.0590)	4.176 (0.0739)	3.070 (0.0533)
Observations	18296	9652	8644	18296	9652	8644

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

Note: Parameter estimates of TLF arrangements on absence frequency and duration from negative binomial regression. The coefficients are incidence rate ratios from negative binomial regression; the reference point is therefore 1. α denotes the overdispersion parameter. Number of workdays used as an exposure variable. Robust standard errors in parentheses.