LEMMA Working Paper

n° 2024-03

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A new empirical model of the determinants of sickness and the choice between presenteeism and absence

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Abstract

This article revisits the association of employment characteristics, working conditions with the annual duration of sickness presenteeism and absence using French representative survey. Our novel estimation method controls for endogenous participation, as working conditions can affect employees' likelihood of illness separately from the decision to stay home or work while ill. We use a copula approach to model the link between illness and the duration of presenteeism and absence. Without correcting for endogenous participation, our estimates would have been underestimated. This work helps identify firm policy instruments that protect workforce health and influence the choice between sickness presenteeism and absence.

Keywords: Sickness absence; presenteeism; working conditions; illness

JEL: I19, J22, J81

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Acknowledgments: We gratefully thank Nicolas Frémeaux, Paul Maarek, Anne-Laure Samson, Ali Skalli and the participants of the Applied Microeconomics Conference (JMA 2021), French Economics Association (AFSE 2021), European Association of Labor Economists Congress (EALE, 2021), Conference on Economics of Personnel (COPE, 2022).

Funding: This work was supported by the Agence Nationale de la Recherche (ANR) [grant number ANR-18-CE26-0014] and by the Labex MME-DII [grant number ANR11- LBX-0023-01].

1 Introduction

Several recent analyses highlight the detrimental influence that employment increasingly tends to have on employees' health and the need to strengthen its rewarding and protective aspects (Hudson et al., 2019; Sorensen et al., 2021). The combination of persistent physical hardship with an increase in time constraints imposed on employees leads to a deterioration in occupational health (Green et al., 2022; Kelly & Moen, 2020), to which the harmful influence of psychosocial work factors (Niedhammer et al., 2013; Havet & Plantier, 2023) as well as disruptive organizational changes (Ben Halima et al., 2023) should also be added.

This accumulation of hardships thus leads to illness and the employee, if he does not withdraw from his job, then has only the choice between sickness absence (SA), or staying at home to take care of himself (Treble & Barmby, 2011), and sickness presenteeism (SP), or going to work despite feeling ill (Johns, 2010; Miraglia & Johns, 2016; Lohaus & Habermann, 2019). The common feature of these two behaviours is that they both generate costs not only for the sick employee, but also for employers and society at large.

Apart from the pain of illness, the main cost of SA for the employee is the loss of part of his or her salary if sick leave pay is less than the salary received. At the company level, the cost of absence is evaluated by losses in terms of productivity, knowing that these are all the more important when the production technology of the company exhibits strong complementarity between labour and capital or between employees (Coles et al., 2007; Heywood et al., 2008; Grinza & Rycx, 2020). Last, the significant increase in the cost of compensation for sick leave is detrimental to the sustainability of the health insurance system; for example, daily sickness benefit payments increased by more than 16% between 2010 and 2017 in France.

While it is relatively straightforward to identify the factors that may impact a firm when an employees is absent, it is much more challenging to do the same for the costs that can be generated by SP. However, several studies have shown that coming to work when feeling ill causes a greater drop in productivity than that caused by SA (Schultz & Edington, 2007). It would therefore be appropriate for sick employees to take time off from work, since when they come to work, they are at least 30% less productive, considering the work done under normal conditions (Hemp, 2004). Evans-Lacko & Knapp (2016) note that in eight countries, the costs associated with SP were five to ten times higher than those associated with SA. In addition, the loss of productivity may extend to the collective level given the risks of contamination in the workplace (Barmby & Larguem, 2009). Further, unlike SA, SP might have broader hidden costs for individuals and firms, such as long-term

effects on physical or mental health leading to future SA (Skagen & Collins, 2016). Taken together, SA and SP may have high economic and social costs (Pauly et al., 2008).

Knowing the job determinants of SA and SP would make it possible to fine-tune firms' practices and policies that promote a reduction in absences and those that protect the organization from excessive attendance of unhealthy employees. Marie & Val Castello (2023) show that the reduction of paid sick leave lowered absences but, at the same time, seems to have extended relapses and accidents at work in the Spanish public sector. In contrast, as shown by Pichler & Ziebarth (2015) and Pichler et al. (2021), the introduction of paid sick leave in some American cities and states resulted in a significant diminution in influenza-like illnesses in the whole population.

The main objective of this paper is therefore to empirically investigate which employment characteristics and working conditions are likely to worsen employees' state of health on the one hand, and to encourage employees to favour SP or SA on the other. From a personnel manager's perspective, it would thus be possible to address the former by means of preventive policies to protect employees' health and, on the other hand, to utilize the latter to design mechanisms that incentivize absence or presence based on their respective costs.

Our article offers two original features. First, using the 2016 survey "Working conditions and psychosocial risks"[1], the determinants of both SA and SP annual duration are identified using two count data models correcting for the endogenous participation related to illness. Employment characteristics may influence the likelihood of ever being sick separately from the intensive margin decision to stay at home for treatment or work sick for any number of days. Second, to do that, we chose to follow a modern methodology proposed by Marra & Wyszynski (2016) based on a flexible copula approach. This enables to experiment various possible copulas representing the joint distribution of the probability of feeling ill and the number of days of SP or SA, and estimate the dependence parameter between these outcomes. This approach is also especially flexible, as at least four different marginal distributions of the count outcomes can be used to model employees' responses.

Despite the extensive research conducted on SA and SP[2], the two bodies of literature rarely overlap. Our article therefore belongs to this limited literature that attempt to explain and estimate the duality of the employee's decision regarding whether to work when feeling ill.

[1] "Conditions de travail et risques psychosociaux" conducted by the French Ministry of Labour

[2] For general overviews of the literature results regarding SA see Beemsterboer, Stewart, Groothoff, & Nijhuis (2009) and for those regarding SP see Miraglia & Johns (2016); Karanika-Murray & Cooper (2018); Lohaus & Habermann (2019).

Two main reasons explain the previous attempts to consider SA and SP simultaneously. Given the high costs of both phenomena for the employee, employer, and society, it seemed relevant to study the determinants of their prevalence. Moreover, the authors have questioned the validity of the substitutability hypothesis between these two behaviours. Strict substitution would occur when a change in a work-related variable implies a variation of opposite sign between SA and SP. If this relationship is imperfect, it suggests the existence of opportunities for firm policies to influence one or another of the two behaviours.

In fact, previous econometric studies seem to invalidate the strong substitution hypothesis. For example, in the "illness flexibility" model proposed by Johansson & Lundberg (2004), the choice made by employees who feel ill between SA and SP would be influenced by the latitude granted in their work pace, as well as by all factors that make absence costly in a broad sense. However, empirically, the ability to adjust one's effort positively affects the frequency of absence for female employees but has no effect on attendance frequency regardless of gender. In recent studies, Arnold & de Pinto (2015) found that a majority of the work-related determinants is either associated to the duration of SA or SP without affecting the other while Gerich (2016) has shown among the determinants that significantly influence both the number of sickness absence and presenteeism days most of them display correlations of the same sign with these two phenomena. These results are in line with the bulk of studies conducted in Northern European countries, which have found a positive correlation between the frequencies of SA and SP (see, for example, Hansen & Andersen (2008) and Leineweber et al. (2012)).

One plausible explanation for these results lies in the need to examine the factors driving the sensation of illness to explain the duration of SA and SP. First of all, individual and employment characteristics may affect the frequency of SA or SP, both directly, by encouraging employees to rest or come to work sick, and indirectly, by influencing the probability of feeling ill. For instance, job insecurity is a stress-inducing factor that can lead to illness and prompt sick employees to show their commitment to their job by attending work. Hansen & Andersen (2008) attempt to determine which of these characteristics act as 'double risk factors' for presenteeism while controlling for employees' self-reported health levels. However, this method does not consider the fact that health levels are not exogenous and that self-reported health is not a measure of the day-to-day feeling of illness.

Furthermore, the perception of being sick is inherently subjective and likely to be influenced by the resources employees have in their work. Thus, Johansson & Lundberg (2004) consider the

possibility that employees who have a high level of autonomy in determining their work pace or the intensity of their effort would be less inclined to self-diagnose as sick and therefore less likely to declare themselves as engaged in sickness presenteeism. Once again, in order to address this issue, it would be necessary to estimate an econometric model that explains the perception of being sick as a prerequisite to estimating the determinants of SA and SP.

This idea was developed theoretically by Arnold & de Pinto (2015), who proposed a model in which the effect of employment characteristics on the prevalence of SA and SP can follow two paths. Firstly, they influence the threshold health level that makes the employee indifferent between absence and attendance, and secondly, they also have an impact on the subjective feeling of being ill. In the latter case, this feeling is influenced by the sources of hardship at work worsened by the illness, but also by the incentives to take time off work or to work while sick, instituted by the employer according to the anticipated productivity of a sick worker. For example, the company could implement incentives encouraging employees to take time off, even in case of a minor illness, if, considering the organization of work, their presence would be detrimental to their productivity or that of their colleagues. Consequently, the model shows that it is then possible for SA and SP to be correlated with employment characteristics in the same direction. These results are confirmed by their empirical analysis of the determinants of SA and SP using seemingly unrelated regression models. However, like in most empirical models to our knowledge, the authors neglect to estimate beforehand whether the employee has experienced illness during the observed period leading to likely biases in the final estimation.

In this paper, unlike previous studies, we explicitly assume that employment characteristics and working conditions may affect differently the extensive margin, i.e. the probability of illness, and the intensive margin of SA and SP, i.e. their duration. Our results underline the fact that without taking into account the endogeneity of illness, the magnitude of the effects of the studied characteristics on both SA and SP would be greatly underestimated. In addition, our results highlight several points to be taken into account when designing the firm's personnel policy. Firstly, the importance of implementing preventive occupational health policies because of the large number of factors that deteriorate health like the causes of intense work pace. Secondly, many of the determinants identified as affecting SA or SP in the literature only predict illness in our models. Finally, our results suggest that influencing workers' decision to engage in SA requires policies based on the employment contract, whereas influencing the decision to engage in SP requires management and prevention policies based primarily on working conditions and employee support. So, depending on

the objectives pursued by a firm, the control of sickness presenteeism and absence would not be achieved using the same human resources management and work organization practices.

The next section presents our data and questions related to sickness and absenteeism or presenteeism and the explanatory variables employed. Section 3 presents our economic intuition and the methodology of our econometric specification. Then, section 4 presents the results of the study, and finally, we discuss our findings and conclude in section 5.

2 Data and measurement

2.1 Study data and sample

To analyse SP and SA together, we use the 2016 "Working conditions and psychosocial risks" survey, a national survey carried out by the French Ministry of Labour every three years. This is the eighth wave of the working conditions survey but the second in which the phenomenon of SP was measured. The survey initially covers a sample of 24,640 respondents representative of the French working population aged 15 years and above, regardless of their occupation, employment forms, business sectors, etc.[3] These data contain information related to employees' sociodemographic traits and employment characteristics. Among the latter, working conditions at large are precisely described.

We consider employees aged from 18 to 65 years old who have either a temporary or permanent contract, working at least 10 hours per week but no more than 70 hours. We exclude self-employed individuals, students and apprentices, individuals with government-subsidized jobs and employees without working contracts. Moreover, to avoid measuring long sickness durations due to long-term illness or chronic diseases, we disregard observations with more than a total of 60 days of sickness a year. Finally, we have a dataset composed of 19,331 observations according to the applied restrictions.

[3]The non-response to the Working conditions and psychosocial risks 2016 survey occurs at two levels: non-response from the household, which was the unit selected for the survey interview (19.5%), and non-response within the household, where among the selected individuals, some did not respond to the questionnaire (5.7%). This non-response was addressed in two steps, at the household level and then at the individual level, both times using the Chi-square Automatic Interaction Detector (CHAID) algorithm, a decision tree technique that classifies households and individuals into homogeneous response groups, dividing the population into homogeneous subpopulations in terms of non-response probability. This method generates weights to correct for total non-response and circumvent representativity bias.

2.2 Measure of sickness absence and presenteeism

Researchers traditionally study SP through self-reported assessments. Our SP measure is the annual duration of the phenomenon, similar to that used by Arnold & de Pinto (2015) and Arnold (2016), which was constructed from the European Working Conditions Survey . Respondents are asked to identify if they have experienced at least one episode of SP over the past twelve months: *Over the past twelve months, have you ever worked (gone to work) when you thought you shouldn't (should have stayed home) because you were sick?*. Then, if individuals had experienced at least one episode of SP, they were asked to evaluate the cumulative number of days over all episodes: *How many times has this happened in the past twelve months?*, with each episode counted in days. This measure has already been used in the literature (Gerich, 2016; Hirsch et al., 2017) in Austria and Germany respectively, allowing comparison of our findings with the previous results found for the European area.

The question related to SA asks respondents to report how many times they had taken sick leave over the past twelve months. Then, if they had taken at least one period of sick leave, the respondents were also asked to evaluate their cumulative number of SA days in the past year: *How many days of absence correspond to these sick leaves?* One limitation of these measures is the total lack of information on the type of illness, both in terms of the feeling of being ill and the official cause of sick leave.

While the number of SA days may be easier to remember than the number of SP days, as sick leaves are often justified by a physician prescription, both of these measures may be subject to memory bias. Furthermore, our measure of SP is founded on a retrospective assessment of a subjective feeling of illness. It is indeed possible that such memory biases are present since, as shown in Figure 1 below, peaks in each distribution appear approximately every five to ten days beginning around the fifth day. However, Hillion et al. (2021), who matched the database we use with administrative records[4], does not found significant difference for several characteristics such as SA days between the self-reported information reported in our data and the administrative ones.

In the overall population, as shown in table 1 below, 31.1% of our sample declared to experience at least one day of SA while 44.6% experienced SP at least once. On average, this represents 3.63 days of SA and 2.35 days of SP. For ill individuals, these figures amount to 6.33 days of SA and 4.09 days of SP, meaning that while feeling ill, employees nevertheless spend around 40% of

[4]From the Caisse Nationale d'Assurance Maladie, the French national fund for health insurance.

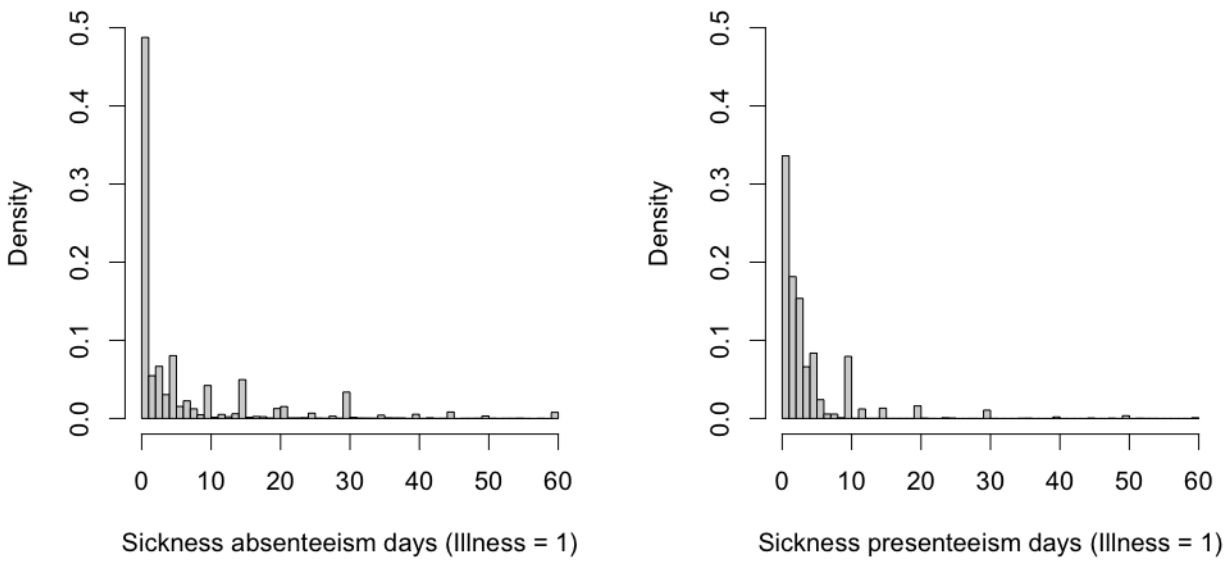


Figure 1: Distribution of sickness absence and presenteeism days of ill individuals

their illness duration working anyway. These observations are consistent with previous research (Lohaus & Habermann, 2019) and confirm the high occurrence of SP relative to SA in terms of both the amount of time employees spend at work while ill and the number of individuals involved in presenteeism.

Hence, regarding illness, more than half of the employees (57.4%) were ill at least one day over the past year. Among them, see table 2, less than a quarter (22.3%) only took sick leave, a large portion (45.7%) only engaged in SP, while 32% engaged in both behaviours. Therefore, when feeling ill, more than three-fourths (77.7%) of the employees go to work on at least one day.

Table 1: Descriptive statistics of dependent variables

Determinants	Mean	St. Dev.	Min	Max
Sickness	0.574	0.495	0	1
Sickness presenteeism	0.446	0.497	0	1
Sickness presenteeism days	2.348	5.164	0	60
Sickness presenteeism days (conditional on illness)	4.093	6.272	0	60
Sickness absenteeism	0.311	0.463	0	1
Sickness absenteeism days	3.634	8.760	0	60
Sickness absenteeism days (conditional on illness)	6.333	10.801	0	60

Table 2: Contingency tables comparing sickness presenteeism and sickness absence

% of total population n = 19,331		Sickness presenteeism 0	Sickness presenteeism 1
Sickness absence	0	42.62%	26.24%
	1	12.80%	18.34%

% of sick population n = 11,092		Sickness presenteeism 0	Sickness presenteeism 1
Sickness absence	0	0.00%	45.73%
	1	22.30%	31.97%

2.3 Explanatory variables

In accordance with our econometric strategy, we select individual and job characteristics that could explain SA and SP duration but that could also be deleterious for illness. We divide these characteristics into three groups of variables: i) individuals' sociodemographic characteristics and health states, ii) employment characteristics and iii) working conditions and individuals' feelings about their jobs. The description of all explanatory variables together with their descriptive statistics can be found in Tables 5 and 6 in the appendix section.

Concerning the individual's sociodemographic traits, we include age and dummies for gender, marital status, the presence of at least one dependent child and education level. In addition to these individual characteristics, we use the reported health status of the employee ranked on a five-point scale from very poor to very good. Furthermore, we control for individuals who declare they suffer from chronic disease, as they represent approximately 28% of our selected sample. We do not include SA days as an explanatory variable in the model explaining SP days, and vice versa, as this would result in a serious endogeneity bias and lead to the estimation of a simultaneous equations model, which is not our objective here.

Regarding the employment characteristics, we include information about the nature of the employment contract and job content: the wage level, working hours, years of seniority, occupational status, work in the public sector, having atypical work schedules and temporary or fixed-term contract, being a supervisor, working alone, and having a quantified performance target. Then, supplementary indicators are used to describe working conditions. Measures of work intensity include a constrained working pace due to the rhythm of a machine, colleagues' work, the extent of demand, norms or short delays of production, and computer or hierarchical control. We introduce further information about workload, such as whether an employee declares a lack of time to be effective and work under pressure. Furthermore, we consider both employee's autonomy and the extent of the helping effort he receives. Hence, two dummies measure first if the employee can choose how to achieve the stated work objective and second if he must take initiative at work. Additionally, two binary variables evaluate whether he receives help from his supervisor or colleagues. Finally,

a dummy variable indicated whether an employee has experienced a significant modification in his work environment, such as a change of function, work organization, redundancy plan, a merger or acquisition of his company, an outsourcing episode, etc.

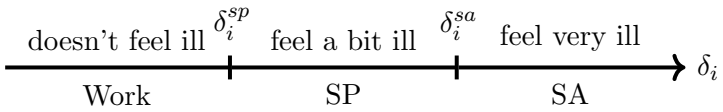
Lastly, we include variables related to how individuals feel about their job. We control for any tension with the public, the firm's hierarchy or with subordinates or colleagues, the degree of conciliation between private and professional life as reported by the employee and perceived job security based on concern individuals may have regarding the future of their job. Industry levels and firm size are included to hopefully control for the differences among sectors and companies in terms of specific collective agreements related to sick pay provisions negotiated between unions and companies.

3 An empirical model of attendance decisions and econometric methodology

Our empirical model rests upon the assumption that an employee i decides to attend work to maximize his utility subject to standard budget constraint and the realization of daily random shock about his feeling of illness. Every day, he experiences a new subjective and specific feeling of illness, δ_i, which modifies the difficulty of his work effort and his work utility. Hence, the outcome of the balance between the benefits of working and the costs of effort daily varies in ways that are unpredictable for employers.

Following previous theoretical models by Brown & Sessions (2004) and latter by Arnold & de Pinto (2015), and assuming that the worse the employee's health, the larger his costs of effort, it is possible to demonstrate the existence of two thresholds for illness status in order to explain the choice between SA, SP and healthy working. So, the higher of these thresholds, δ_i^{sa}, makes the employee indifferent between working and being absent, and therefore depends on the costs associated with productive effort when ill. Hence, the employee will rest at home (SA) if $\delta_i^{sa} \leqslant \delta_i$. Then a second threshold δ_i^{sp} determines whether the employee feels ill or healthy whenever he turns up to work. He will chose to experience sickness presenteeism (working while feeling ill) if $\delta_i^{sp} \leqslant \delta_i < \delta_i^{sa}$ and finally attend work while feeling healthy if $\delta_i < \delta_i^{sp}$. This last self-diagnosed reservation health threshold is certainly impacted by work organisation (decision latitude left to the employee in his or her work, the dependence of the company's productive performance or that of his colleagues on his presence) and the incentives for attendance, whether financial or linked to the

threat of job loss. The central question, of course, is how these thresholds vary with wage earnings and the overall non-monetary benefits and costs of work.



The content of the job in the broad sense will therefore influence the reservation states of health (δ^{sp} and δ^{sa}) by varying the perceived disutility of effort. According to the job demand-resource (JD-R) model (Bakker & Demerouti, 2007), all the resources that enable workers to cope better with their job demands have to be considered. Recently, Böckerman et al. (2020) show the relevance of job design, defined as the combination of job demands and control, for workers' stress and job satisfaction. Hence, a worker's cumulative number of SP days is likely to be higher in a job with extended job demands and high workload. On the other hand, being able to receive help from one's work group (colleagues or supervisors) would reduce the difficulty of managing this workload after a sickness absence. Additionally, if production is organized just in time, employers may deter sickness absenteeism, as the work rhythm of employees would be affected by their colleagues' absence (Coles et al., 2007). Finally, certain features of a job make it more satisfying and motivating, such as interest, autonomy and mission, and can reduce the cost of effort and increase the worker's threshold of illness leading to SA (Jensen et al., 2019; Nikolova & Cnossen, 2020).

3.1 Count-data model with endogenous participation

An empirical model explaining the annual duration of SP and SA must recognise that these phenomena are by nature measured by count data, and be therefore estimated using count data models. A first issue concerns the endogeneity of variables explaining the phenomena. We will assume that the characteristics of the job are determined by the employer and therefore are exogeneously imposed to the employee. Of course, this is a strong assumption, but we miss appropriate instruments for the explanatory characteristics of the job while the choice of inappropriate instrument may severely bias the estimates (Kiviet, 2020). In addition, the question arises of the self-selection of employees in certain forms of jobs. Some of their unobservable characteristics, such as health or their propensity for effort, may lead them to accept more demanding jobs. In order to mitigate estimation bias, Böckerman et al. (2012) proposed to capture these unobservable individual characteristics through employee's health history and labour market experience. We will show in our robustness analysis (section 4.5 below) that the addition of such variables does not alter the association between either

SA or SP duration and job characteristics and working conditions.

Initially, we propose a model in which endogeneity results from endogenous participation in terms of illness. Our theoretical framework implies that the employee's feeling of illness is endogenously related to observable employment characteristics, working conditions and unobservables (such as managerial attendance incentive methods, particular characteristics of the employee such as the severity of his illness episode, his addictive behaviour and lifestyle habits) that could also affect the choice of SA or SP.

First and foremost, we must recognize that although the empirical problem of endogenous participation is inherently different from that of endogenous sample selection, both of these problems involve maximising the same likelihood function when, as in the framework considered here, it is possible to observe non-negative values for SA or SP days when the individual feels ill (for details, see Bratti & Miranda (2011)). Empirical models have been proposed to correct for endogenous selection in count data models (see Greene (1997); Terza (1998); Bratti & Miranda (2011) for example). These methods, share two major drawbacks: the use of fully parametric models based on the assumption of a Poisson distribution for the count outcome and the assumption that the link between the selection and outcome equations follows a bivariate normal distribution. Of course, if one of these assumptions is incorrect, the obtained estimates will not be consistent.

Consequently, this leads us to follow the econometric model detailed in Marra & Wyszynski (2016), using a flexible copula-based endogenous participation approach for count data. Recently, this method has been tested on three health economics applications using the Medical Expenditure Panel Survey by Marra et al. (2024). This method appears to be the most appropriate for our observational data. First, it is flexible in that it allows a choice between several margins for the participation and outcome equations, and also between various copula functions to model the dependence between participation and outcome variables. Second, it allows to estimate the parameter of dependence between these two variables and so testing for endogenous participation.

3.2 A copula approach for SA and SP days with endogenous participation

Any non negative number of SP or SA days is observed if an employee i feels sick at least once a year. While we cannot observe his latent daily level of illness δ_i, we observe whether this employee

has ever reported being ill. This variable, S_i, is the binary outcome of the latent daily level of illness such as:

$$S_i = \begin{cases} 1 & \text{if } \delta_i = \mathbf{X}_i'\gamma + \mathbf{Z}_i'\phi + \mathbf{R}_i'\upsilon + \varepsilon_i \geqslant \delta_i^{sp} \ , \quad i = 1, ..., N \\ 0 & \text{otherwise} \end{cases} \tag{1}$$

where the latent daily level of illness is explained by $\mathbf{X}$, the vector of sociodemographic characteristics of employees, $\mathbf{Z}$, the vector of employment characteristics and $\mathbf{R}$ the exclusion restriction used to secure identification of the model. γ, ϕ and υ are the coefficient vectors of all parametric components, while ε_i is an error term containing every individual specific and unobservable characteristics.

In three real-world case studies using copulae as a tool to represent the association between a selection and an outcome equations, Marra et al. (2024) show that in absence of exclusion restriction the estimates are less precise. We choose to introduce employee's history before turning 18 as exclusion restriction. Three indicators measuring respectively if the employee suffered from family conflicts, violence at school or in the neighborhood or physical and psychological mistreatment were used alternatively as exclusion restrictions. Indeed, a large number of studies have regularly identified long-term correlations between the quality of family relationships in childhood and adolescence, and poor emotional and physical health in adulthood (see, e.g., Clark et al. (2010), Landstedt et al. (2015)) and Berg et al. (2017)). Similarly, literature reviews on the link between negative life outcomes in adulthood, on the one hand, and mistreatment received in youth or exposure to violence at school or in the direct environment, on the other, confirm the deleterious impact of these youthful episodes on long-term health (Norman et al. (2012) and Turanovic (2022)). Hence we assume that these variables can be considered as determinants in the past of present health and are supposed to be linked to current SP and SA annual duration solely through their effect on health. All of these exclusion restrictions appear significant in the participation equation. However, we present the main results only with the family conflicts before 18 as restriction since the Wald test returns the higher Chi-square statistics ($\chi^2 = 121.57$) compared to the others[5]. This choice was also made because there is no test to assess the weakness of the instruments in this type of model (Marra et al., 2024).

[5]Wald tests for violence at school or in the neighborhood and physical or psychological abuse as exclusion restrictions provide a χ^2 equal to 24.04, and 41.92 respectively.

Regarding the count outcomes, we assume that $Y_i \sim \mathcal{D}(\mu_i, \sigma, \nu)$, where Y_i is either SA or SP days and follows a discrete distribution $\mathcal{D}$, with:

$$\mu_i = \mathbb{E}(Y_i) = exp\left(\mathbf{X}_i'\alpha + \mathbf{Z}_i'\beta + \mathbf{H}_i'\psi\right) \tag{2}$$

including, in addition to the individual's and job characteristics, **H** the employee's subjective assessment of health. Here, $\mathcal{D}$ can be a Poisson, a negative binomial type I, a negative binomial type II or a Poisson inverse Gaussian distribution. σ and ν are scale and shape parameters according to the chosen distribution, while α, β and ψ are the vectors of parameters associated with each vector of characteristics[6].

Our approach assume that the numbers of SA or SP days are correlated with the process that generates the feeling of illness in the participation equation. This association between participation and outcome equations can be described using a copula function. Given that $F_s(s_i)$ and $F_y(y_i)$ denote the cumulated distribution functions (cdf) of the feeling of illness S_i and count outcome Y_i , we can find a two-place copula function C such that their joint cdf can be represented by $F(s_i, y_i) = C\left(F_s(s_i), F_y(y_i); \theta\right)$ where θ corresponds to the dependence parameter between the equations. For an easier interpretation, this parameter can be converted into Kendall's τ measure of association that ranges into $[-1, 1]$.

The likelihood of the endogenous participation model can be formulated as follows:

$$\begin{aligned} L &= \prod Pr(S_i = 0) \prod Pr(Y_i = y_i, S_i = 1) \\ &= \prod Pr(\delta_i < \delta_i^{sp}) \prod f_{y|s}(y_i | \delta_i \geqslant \delta_i^{sp}) Pr(\delta_i \geqslant \delta_i^{sp}) \end{aligned}$$

The objective is now to find the right model for both SA and SP behaviours. This means that we must find the appropriate margins for the participation and count equations as well as the most appropriate copula linking the distributions. For the participation equation, we consider three possible distributions: logit, probit and cloglog. We have four margins to try for the count distribution: Poisson, negative binomial types I and II and Poisson inverse Gaussian. Furthermore, there are eight copulas to test: Normal, Frank, Ali-Mikhail-Haq (AMH), Farlie-Gumbel-Morgenstern (FGM), Student-t, Clayton, Joe and Gumbel. Additionally, rotated versions of Clayton, Joe and Gumbel

[6]For details about the probability mass function and the parameters of each distribution, see Table 2 of Marra and Wyszynski's paper for example.

exist. These three copulas have a strictly positive dependence parameter θ. Thus, either a 90° or a 270° rotation allows the use of these copulas when the dependence parameter is assumed to be negative. To determine which rotation of the copula we must use, we begin to apply Gaussian, FGM, AMH, Student-t and Frank copulas to determine if there is a positive or negative association between selection and outcome equations. Therefore, in total, we have 11 copulas to test, leading to a total of 132 models to be explored.

4 Results

4.1 Model choice

Following the methodology of Marra & Wyszynski (2016), we use the Akaike and Bayesian Information Criteria (AIC and BIC) to preserve the quantity of information when selecting the distributions of the duration of SP, SA and that of the feeling of illness as well as the copula linking these distributions. With a fixed margin (resp. copula) and the number of parameters to be estimated remaining unchanged, the AIC and BIC are valid selection criteria since they lead to the choice of the model with the highest log-likelihood. Both criteria always conduct to the same model choice. Also, we performed the Vuong test to corroborate if our chosen model is closer to the true data generating process (Hasebe & Vijverberg, 2012). In addition, we propose a graphical exploration of the choice of distributions for the number of days of SP and SA using the Q-Q plots. Although the goodness-of-fit of empirical continuous distributions can be assessed using statistical tests, they cannot be used to check the fit of empirical discrete distributions.

Our results indicate that the logit margin for the participation equation always provides the lowest AIC and BIC values for the whole model compared to the probit and cloglog margins[7]. Hence, table 3 below presents the AIC for each discrete margin and copula for the SA and SP models. For both models, there is a single distribution associated with the lowest AIC values, regardless of the copula selected. This leads to the selection of a negative binomial type II margin for the SA duration and a Poisson inverse Gaussian margin for the SP duration. The Vuong test also leads to this choice comparing the different margins for the same copula[8].

In the figure 2 below, the post-estimation graphical analysis of the randomized and normalized residuals Q-Q plots of the chosen models highlights a very good fit of the empirical distributions

[7] AIC and BIC value tables are available in section A of the supplementary appendices document.

[8] The results of Vuong test are not shown as the R command directly provides the model choice between two models.

of SA and SP with the theoretical quantiles. In other words, these distributions describe the most accurately the generating process of observed values of SA and SP days. For comparison, the figure 4 in the appendix section exhibits how different are the quantiles of the observed and theoretical distribution of the residuals when we assumed the latter to be a Poisson distribution with a Gaussian copula, which clearly does not fit our data[9].

The choice of these two marginal distributions is consistent with the shape of the cumulative days of SA and SP shown in Figure1. The NBII and PIG distributions have in common that they allow adjustment in the case of strong overdispersion in the SA and SP distributions, but in addition, the PIG model can particularly handle count data that present sharp peaks at 0 and small values such as 1 or 2 days, which is the case here of SP and SA (Hilbe, 2014).

Table 3: AIC values for the discrete marginal distributions and copulas

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	172,142	83,413	80,876	80,440	Normal	103,116	78,028	78,674	78,753
Frank	168,526	83,402	80,865	80,424	Frank	102,417	77,996	78,209	78,255
AMH	168,014	83,414	80,872	80,437	AMH	102,817	78,035	78,531	78,572
FGM	167,340	83,398	80,864	80,418	FGM	102,346	78,041	78,523	78,571
Student-t	167,450	83,503	80,878	80,461	Student-t	103,094	**77,958**	78,361	78,458
Clayton	168,810	83,429	80,884	80,453	Clayton 90	101,176	78,013	78,174	78,234
Clayton 180	168,201	83,149	80,825	80,359	Clayton 270	103,319	78,085	78,774	78,808
Joe	168,066	83,095	80,816	**80,348**	Joe 90	103,320	78,067	78,775	78,810
Joe 180	168,681	83,429	80,884	80,453	Joe 270	101,078	78,026	78,156	78,216
Gumbel	168,562	83,297	80,850	80,406	Gumbel 90	103,320	78,019	78,739	78,808
Gumbel 180	168,674	83,429	80,884	80,453	Gumbel 270	102,166	77,991	78,372	78,457

Note: logit in first step

Regarding the copula that link the illness distribution and either the SA or the SP distribution, we also based our choice on the AIC values in table 3. Firstly, after applying Gaussian, FGM, AMH, Student-t and Frank copula to our models, we learned that unobservable characteristics in the SA equation are negatively correlated with those of the illness equation, while by contrast, the unobservables of the SP equation are positively related to those that explain the illness feeling. This led us to add the unrotated and 180° rotated Clayton, Joe and Gumbel copula for the SA equation and the 90° and 270° rotated Clayton, Joe and Gumbel copula for the SP equation.

As in the case of the choice of margins, there exists several goodness-of-fit tests for choosing the right copula when the margins are continuous since the copula is unique. However, this is not true when the two margins are discrete (Cameron et al., 2004) and these tests may not lead to reliable

[9]Before modelling the two durations of SA and SP, the graphical analysis of the Q-Q plot of the unconditional distributions has already provided some insight into the inadequacy of the Poisson distribution.

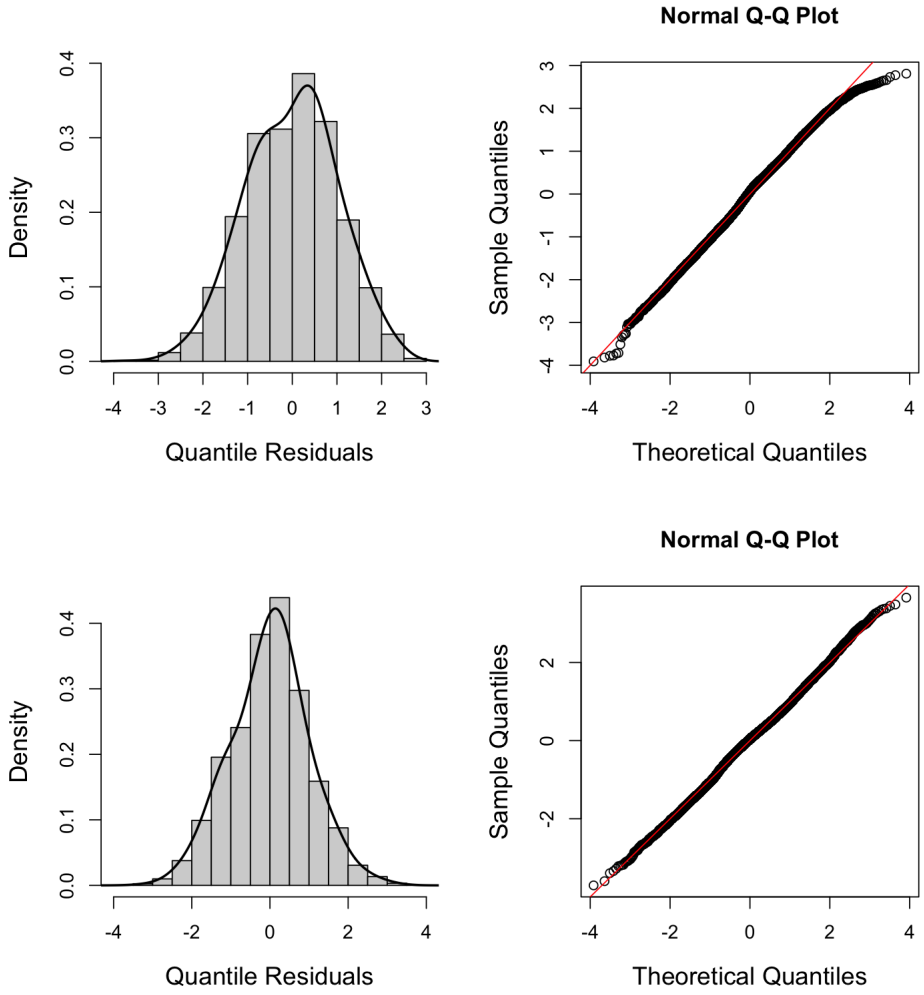


Figure 2: Q-Q plots of the randomized and normalized residuals of the count regressions with endogenous participation. The first row corresponds to the regression of sickness absenteeism days with a negative binomial type II margin, and the second row corresponds to the regression of sickness presenteeism days with a Poisson inverse Gaussian margin.

conclusions. To address this issue, we therefore present in section 4.5 some robustness checks about the choice of the copula. However, Marra et al. (2024) find that the choice of other copula does not impact the estimated effects but rather the efficiency by increasing the confidence intervals. In addition, we calculate the Vuong test by comparing each model with different copulas for a given margin. All those tests lead to choosing the same copula as the AIC. As a result, the best models according to the AIC are the negative binomial of type II with a Joe copula for the SA model and the Poisson inverse Gaussian with a Student-t copula for the SP model.

4.2 Participation bias

The estimates of the two models reported in Table 4 hereafter reveal a significant Kendall τ, but of opposite sign, between unobserved determinants of illness and unobserved determinants of both the duration of SP and SA. Thus, unobservable variables that increase the probability of feeling ill are negatively correlated ($\tau = -0.34$) with unobservable variables that increase the number of days of SP but are positively correlated ($\tau = 0.31$) with unobserved determinants of days of SA. Hence, one possible interpretation is that these unobservables are indicators of the seriousness of illness, information that is missing in our database. These results would therefore be compatible with our attendance model, since the more severe the illness experienced, the longer the period of SA and the shorter the period of SP.

These significant correlations between the participation and count equations demonstrate the importance of considering participation bias in our econometric model. Without taking the participation equation into account, the results of the count models would have changed significantly. Table 7 in the appendix section details the results of the univariate count models (ignoring endogenous participation). The results show that the estimates of the effects of the covariates on the two outcomes would have been significantly underestimated. We show that the marginal effects are on average 4 times smaller in the univariate models, and can be up to 8 times smaller than in our models with endogenous participation. More importantly, 10 of the 26 variables among the employment characteristics, working conditions and environment, change in significance between the univariate models and the bivariate models with endogenous participation.

These results are fundamental for firms in assessing the effectiveness of various personnel policies. Indeed, according to the relative costs of one day of sickness absence or presenteeism, firms must determine which employment characteristics should be used as instruments to induce the workforce to favour the right behaviour. Underestimating the association between employment characteristics and the duration of SA and SP would thus lead to inefficient incentive schemes. For instance, according to the estimates of the univariate model, a human resources policy designed to alleviate the pressure exerted by external demand on the pace of work would have been associated with an increase in SA duration of only 0.2 days. In fact, the bivariate model shows that this policy would be associated with a larger increase in SA duration of 0.6 days but combined with a significant decrease in SP duration of 0.34 days. Similarly, the effects of characteristics such as lack of time and working under pressure, which could be targeted to reduce workload, are significantly underestimated in the univariate model of SP duration. The expected reduction in SP duration would not be 0.2 and 0.3

days but 0.6 and 0.9 days.

Table 4: Determinants of sickness presenteeism and absence days with endogenous participation

	Sickness absence			Sickness presenteeism		
Equation	SA days		Illness	SP days		Illness
Distribution	(NB II)		(logit)	(PIG)		(logit)
	Coef.	AME[a]	Coef.	Coef.	AME[a]	Coef.
Constant	**1.407*****	−−	−0.005	**1.167*****	−−	−0.044
	(0.367)		(0.367)	(0.282)		(0.367)
Health (ref: good)						
bad or very bad	**0.587*****	**3.347**	−−	**0.445*****	**3.301**	−−
	(0.057)			(0.049)		
rather good	**0.179*****	**0.814**	−−	**0.286*****	**1.838**	−−
	(0.034)			(0.027)		
very good	**−0.083****	**−0.353**	−−	**−0.150*****	**−0.862**	−−
	(0.042)			(0.033)		
Chronic disease	**0.199*****	**0.895**	−−	**0.063****	**0.385**	−−
	(0.032)			(0.025)		
Occupation (ref: employee)						
labourer	0.055	0.245	0.059	−0.025	−0.153	0.076
	(0.053)		(0.056)	(0.043)		(0.056)
intermediate	0.069	0.309	−0.003	−0.005	−0.032	−0.005
	(0.044)		(0.047)	(0.034)		(0.047)
executive	−0.029	−0.128	−0.080	0.002	0.012	−0.064
	(0.064)		(0.064)	(0.048)		(0.064)
Seniority	0.004	−0.003	**0.022*****	−0.006	−0.008	**0.024*****
	(0.006)		(0.006)	(0.005)		(0.006)
Seniority^2	−0.000		**−0.001*****	0.000		**−0.001*****
	(0.000)		(0.000)	(0.000)		(0.000)
Work alone	**−0.067***	**−0.291**	**0.091****	0.020	0.120	**0.100*****
	(0.035)		(0.037)	(0.027)		(0.037)
Supervisor	**−0.194*****	**−0.789**	**−0.227*****	−0.016	−0.094	**−0.207*****
	(0.051)		(0.049)	(0.037)		(0.049)
Public sector	**0.156*****	**0.687**	**0.134*****	−0.002	−0.012	**0.112****
	(0.043)		(0.047)	(0.034)		(0.047)
Temporary contract	**−0.466*****	**−1.671**	**−0.516*****	0.036	0.220	**−0.506*****
	(0.079)		(0.069)	(0.058)		(0.069)
Working time	**0.067*****	**−0.034**	**0.041*****	**−0.014***	**0.019**	**0.040*****
	(0.011)		(0.010)	(0.007)		(0.009)
Working time^2	**−0.001*****		**−0.001*****	**0.000****		**−0.001*****
	(0.000)		(0.000)	(0.000)		(0.000)
Atypical schedules	**−0.101*****	**−0.447**	**−0.075****	**0.056****	**0.341**	**−0.064***
	(0.031)		(0.033)	(0.025)		(0.033)
Wage (ref: 1,800-2,499)						
100-1,199	0.085	0.386	−0.023	−0.002	−0.011	−0.021
	(0.067)		(0.071)	(0.052)		(0.071)
1,200-1,499	0.067	0.299	−0.080	−0.012	−0.070	−0.051
	(0.047)		(0.052)	(0.038)		(0.052)
1,500-1,799	0.066	0.294	−0.072	0.051	0.312	−0.065
	(0.043)		(0.048)	(0.034)		(0.048)
2,500-2,999	0.028	0.124	−0.089	0.076	0.478	−0.089
	(0.062)		(0.062)	(0.047)		(0.062)
3,000-20,000	0.011	0.050	**−0.154****	−0.001	-0.006	**−0.155****
	(0.068)		(0.065)	(0.050)		(0.064)
Quantified target	**0.063***	**0.279**	**0.120*****	**0.086*****	**0.530**	**0.107*****

	SA days		Illness	SP days		Illness
	Coef.	AME	Coef.	Coef.	AME	Coef.
	(0.035)		(0.039)	(0.028)		(0.039)
Work rhythm paced by:						
machine	0.067	0.302	**0.192*****	0.014	0.083	**0.182*****
	(0.047)		(0.057)	(0.038)		(0.057)
external demand	**−0.136*****	**−0.616**	−0.018	**0.056****	**0.337**	−0.009
	(0.035)		(0.036)	(0.028)		(0.036)
norms	0.016	0.070	**0.064***	0.007	0.045	**0.077****
	(0.033)		(0.035)	(0.026)		(0.035)
computing control	0.010	0.043	0.034	0.003	0.019	0.037
	(0.033)		(0.036)	(0.026)		(0.036)
monitoring	0.047	0.206	**0.151*****	0.041	0.250	**0.142*****
	(0.034)		(0.039)	(0.027)		(0.039)
colleagues relation	−0.009	−0.042	**0.104*****	0.015	0.091	**0.100*****
	(0.034)		(0.037)	(0.026)		(0.038)
Help from supervisors	−0.040	−0.175	**−0.268*****	**−0.075*****	**−0.459**	**−0.261*****
	(0.031)		(0.035)	(0.025)		(0.035)
Help from colleagues	**0.089***	**0.380**	**0.090***	**−0.126*****	**−0.800**	**0.095****
	(0.046)		(0.047)	(0.034)		(0.047)
Tensions at work	**0.132*****	**0.567**	**0.473*****	**0.111*****	**0.660**	**0.473*****
	(0.034)		(0.033)	(0.028)		(0.033)
Lack of time	0.006	0.027	**0.270*****	**0.099*****	**0.611**	**0.269*****
	(0.034)		(0.039)	(0.026)		(0.039)
Under pressure	0.013	0.059	**0.324*****	**0.144*****	**0.885**	**0.309*****
	(0.034)		(0.039)	(0.027)		(0.039)
Choice of methods	**−0.095*****	**−0.430**	−0.061	0.023	0.137	−0.046
	(0.037)		(0.041)	(0.030)		(0.042)
Initiative	−0.034	−0.149	0.044	**0.094*****	**0.573**	0.042
	(0.031)		(0.033)	(0.024)		(0.033)
Work-to-life conflict	−0.031	−0.135	**0.317*****	0.036	0.223	**0.321*****
	(0.039)		(0.046)	(0.030)		(0.046)
Fear of job future	**−0.062***	**−0.269**	**0.223*****	**0.092*****	**0.576**	**0.219*****
	(0.038)		(0.042)	(0.029)		(0.042)
Organizational changes	**0.131*****	**0.571**	**0.270*****	0.022	0.132	**0.263*****
	(0.031)		(0.033)	(0.024)		(0.033)
Family conflicts			**0.361*****			**0.405*****
			(0.035)			(0.035)
Controls[b]	Yes		Yes	Yes		Yes
Num. obs.	11,073		19,285	11,073		19,285
τ	0.312			−0.341		
	(0.271, 0.343)			(−0.382, −0.289)		
Log Likelihood	−40032.815			−38838.129		

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

[a] Average marginal effects (AME) are calculated conditional on illness.
AME for seniority (resp. age) is calculated at the mean: 15 years (resp. 36.8 hours)

[b] We control for individual's characteristics (age, gender, marital status, having children and education level), firm sectors and firm size.

4.3 Determinants of the feeling of illness

The estimates of participation equations concerning illness are reported in Columns 3 and 6 in table 4 and show the extent to which job characteristics and working conditions are involved in the feeling of illness. Our results show that some variables only affect the probability of feeling ill, without influencing the choice between SA and SP, while others are dual risk factors that also affect the choice between absence and attendance in the event of illness. The former can thus identify the ways in which the firm can hope to control SA and SP by directly protecting the workforce against the risk of illness.

Four sets of variables are found to be only associated with the likelihood to feeling ill. Firstly, the more senior the employees, the more likely they are to report illness. This relationship can be explained by the rules of the social insurance system in France, which stipulate that the level of sick pay, as well as the duration of the right to this coverage, increases with workers' seniority. The generosity of the sick pay mechanism can also be enhanced by collective agreements at the firm or industry level (see Lanfranchi & Treble (2010) for a presentation). Secondly, employees earning more than 3,000 euros per month are found to be less likely to consider themselves ill. Reasons for such a result may be found in the better opportunities that high wage earners possess to access quality healthcare and improve their material living conditions (Barnay, 2016). Thirdly, when the pace of work is constrained by machines, norms, hierarchical control, and relationships with colleagues, the likelihood of feeling ill is found to increase. This evidence is consistent with the hypothesis that work intensity is detrimental to health and that firms could control SA and SP through the development of preventive policies. For example, when the rhythm imposed by machines is significant, prevention plans detailing how to adopt good postures and avoid repetitive movements, as well as the acquisition of ergonomic equipment that reduces physical stress, are measures that can reduce the risk of illness. Finally, the likelihood of feeling ill is also increased when employees' working hours do not match their family and social commitment, a finding that supports the use of individualised flexible work arrangements. This is consistent with the meta analysis provided by Shifrin & Michel (2022) showing that these arrangements are associated with better health.

The other significant variables influence both the feeling of sickness and the duration of SA and/or SP. Five of these relate to specific job characteristics. Thus, employees on fixed-term contracts and those working atypical work schedules are less likely to declare themselves ill. This subjective assessment can be explained, for the former, by the uncertainty of their contractual sit-

uation (Caroli & Godard, 2016; Pirani & Salvini, 2015) and for the latter, by their entitlement to compensatory payment or rest. On the contrary, public sector employees and those who work alone are found to be significantly more inclined to self-diagnose as ill. This finding is consistent with the fact that employees who self-select into the public sector have a higher preference for low work effort (Ehlert & García-Morán, 2022) and/or low attendance motivation (Mastekaasa, 2020). On their part, employees who work alone are less likely to receive help if they encounter work-related problems, which can create stress, or if they are victims of an accidental risk at work. Finally, when the firm implement specific quantified targets, employees are more likely to report at least one episode of illness confirming that incentives for performance may have a downside effect on mental and physiological health (Andelic et al., 2024).

Regarding working conditions, our results show that excessive workload and high job demands are related to employees reporting illness more often. Specifically, this is the case for employees who experience longer work hours, work under pressure and suffer from a lack of time to perform tasks efficiently and tensions at work. However, these deleterious effects of physical and psychological hardship on employees' perceived health could be mitigated when they receive help from their hierarchy.

Uncertainty in the working environment also plays an important role in the feeling of illness confirming previous empirical evidence about job insecurity (Lepinteur, 2021). Significant past organizational changes are associated with an increased likelihood of feeling ill, possibly due to changes in previous productive routines, physical hazards and/or psychosocial risks (Ben Halima et al., 2023). Once again, this finding illustrates that effective occupational risk prevention is essential to moderate the health impact of future innovations. Furthermore, worrying about the future of one's job appear to increase employees' risk of feeling unwell.

4.4 Determinants of the duration of sickness presenteeism and absence.

Estimates of the associations between employment characteristics, working conditions and the duration of SA or SP are given in columns 1 and 4. The corresponding average marginal effects are reported in columns 2 and 5. While we have previously identified the drivers that can be used for health prevention policies, we now identify the characteristics that can be used by firms to design their policies to encourage or discourage absence and presence in case of illness. Given the daily cost of SA and SP, firms can determine the most effective policy instruments for regulating their duration and minimising the associated costs. In this sense, our results make it possible to use each

tool appropriately by knowing its effects on the duration of SA and SP.

Health

Once we have controlled for the effects of the variables on the probability of feeling ill, our results confirm a well-known fact in the literature, namely that the level of self-reported health is by far the determinant with the strongest effect on both the duration of SA and SP (Miraglia & Johns, 2016). Our results indicate that when the declared level of health deteriorates from good to rather good, individuals tend to extend their duration of SP by just over 1.8 days, compared with an increase of around 0.8 days of SA. However, for a major decrease in declared health from good to bad or very bad, the lengthening in the duration in days of SA and SP tends to equalise, at around 3.3 days for each.

In contrast, improving health to a very good status decreases the duration of SP more than that of SA (-0.86- and -0.35-day, respectively). This indicates that healthier employees more often choose SP over SA when they feel ill. Finally, employees suffering from a chronic disease increase their duration of SA more than their duration of SP (by 0.90- and 0.39-day, respectively) probably indicative of repeated daily episodes of serious illness. Of course, while it is difficult to infer a direction of causality between these variables, these results reinforce our previous recommendations about the importance of preventive health policies.

Employment characteristics

Among the characteristics of employment, it is noteworthy that neither the salary level nor the tasks related to the employees' occupation influence the average duration of sick leave and presenteeism.

However, four of these employment characteristics are dual risk factors for sick leave duration only. First, performing supervisory tasks reduces the duration of SA by 0.79 days per year without significantly affecting that of SP. Being a supervisor likely entails responsibilities in overseeing the production process and assisting subordinates, which motivates supervisors not to take leave. Second, employees who work alone not only have a higher probability of feeling ill during the year but are also significantly less absent on average, by 0.29 days per year. In the absence of a work group that provides help and support, these employees find it more difficult to take time off to recover. Finally, the association of the following two characteristics with the duration of absence seems to confirm the influence of incentive schemes. Thus, public sector employees, who benefit

from greater generosity in terms of payment in case of absence - no waiting days in the French public service at the time of the survey -, are on average 0.69 days more absent than their private sector counterparts. What's more, there is no evidence of a public sector motivation effect inducing workplace attendance during illness. Similarly, employees on temporary contracts, who benefit from less job security but may have the prospect of a permanent contract, have a shorter duration of sick leave, by 1.67 days per year. Our estimates are fairly close to those obtained by Ichino & Riphahn (2005) who, in the context of the probationary period, show that when employees are granted tenure and therefore protected, their weekly absence time decreases by 0.04 days. These results illustrate that attendance incentive systems are potentially effective instruments for employers.

The organization of working time on a daily or weekly basis is a factor that affects both SA and SP. Long workweeks and atypical hours tend to decrease the duration of the former and increase that of the latter. These two findings suggest that when the organization of working time imposes long or irregular hours, employees cannot take time off without disrupting the production schedule or transferring their workload to their colleagues.

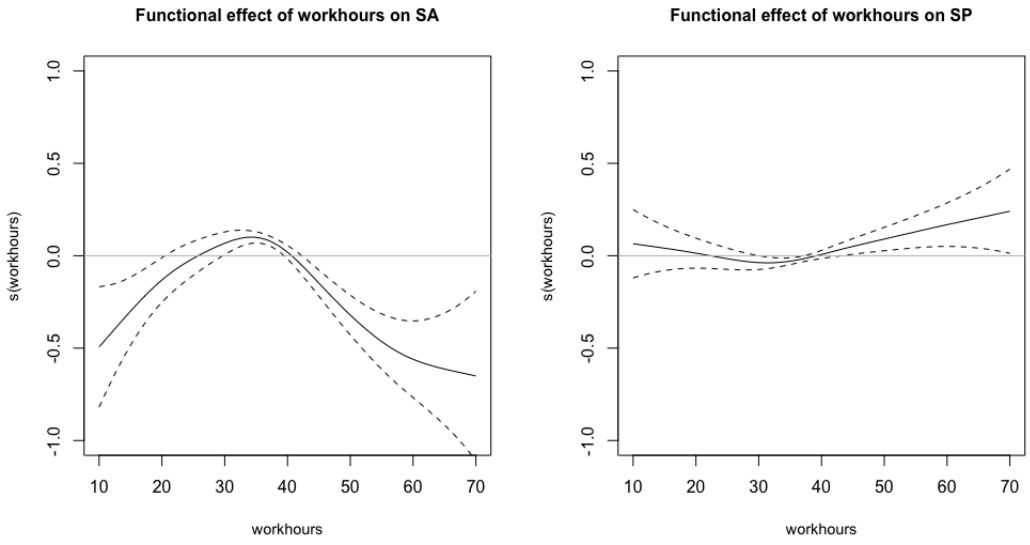


Figure 3: Smooth functional forms of work hours on sickness absence and presenteeism

The relation between working time and duration of SA is concave, while this relation seems convex for SP (only significant at 10%). To better observe the relationship between working time and SA or SP, we model it as a smooth polytomic function to obtain the most accurate functional form. The smooth functions for both outcomes are depicted in figure 3 above, in which we can note that the working time beyond which ill employees will either decrease their SA duration or increase

their SP duration roughly corresponds to the legal weekly working hours in France, i.e. 35 hours.

Finally, the case of the existence of quantifiable targets at work is special. This incentive system not only increases the probability of feeling sick, but also the duration of both SA and SP, by 0.28 and 0.53 days respectively. These positive effects on both absence and attendance at work imply that their relative costs vary over the year. It is thus possible that, as the assessment period of performance draws to a close, employees seeking to achieve the required target may substitute SP for SA.

Working conditions

Our estimates show how working conditions are particularly related to the duration of SP rather that of SA. In particular, a high workload will lead employees to forgo rest to increase the duration of SP days. This is the case when employees must work under pressure in order to complete their tasks and if they lack time to achieve set objectives, that respectively increase the duration of SP by 0.89 and 0.61 days. Also, when employees are prevented from working at their own pace due to external demand, SP duration is lengthened by 0.34 days while the duration of SA decreases by 0.62 days. It should be noted that this pace constraint did not appear to be a significant determinant of the feeling of illness. Here again, the need to meet the demands of customers or suppliers makes it difficult to take time off in case of illness. This can be exacerbated when the employee cannot be replaced by another worker, or if her specific skills require her presence. Nonetheless, when the workload can be shared with the help of coworkers or when employees receive support from their hierarchy, their annual SP duration is respectively shortened by 0.80 and 0.46 days. In addition, help from colleagues is also associated with a 0.38-day longer duration of SA (significant at only 10%). These results are qualitatively in line with those of Arnold & de Pinto (2015). This suggests that, given the costs of SA and SP, a firm policy aimed at shortening the duration of SP could, on the one hand, better organise employees' workload and encourage mutual support, but also invest in manager training.

Furthermore, when employees are allowed to choose their working methods, they experience a 0.43-day decrease in SA duration, but there is no significant association with SP. Conversely, when employees are allowed to take initiative in their jobs, their duration of SP increases by 0.57 days without affecting SA duration. Nevertheless, these two job latitude characteristics are not shown to be protective to health in our estimates. This conclusion appears to be consistent with the results by Arnold (2016) regarding SP duration in Europe.

Taking together, these results seem to highlight that when employees are given the opportunity to organize their work, they can substitute SA to SP when feeling ill. This might underline the fact that job latitude (through different channels) might appear more as a feature of job demand: the pressure associated with workers' empowerment and responsibility, than as a job resource. Another possible explanation for the increase in SP lies in the positive relationship between intrinsic motivation at work and autonomy.

Employee's environment

Episodes of major change in the work environment are associated with an increase of 0.57 days of SA, confirming recent results showing that extensive organisational changes are deleterious to employees' health that lead them to increase their long-term sick leaves (Ben Halima et al., 2023). Also, as already shown in the literature (Miraglia & Johns, 2016), our results highlight that uncertainty about the future of the job would prompt the worker to extend his attendance duration by 0.58 days when ill, but also to reduce his SA duration by 0.27 days (only significant at 10%). Finally, we must notice that the existence of tensions at work with colleagues, supervisors, the public or subordinates is associated with both longer SA and SP days of, respectively 0.57 and 0.66 days. Over the course of the year, employees may feel the need to come to work sick so as not to exacerbate tensions at work, while in due course the accumulation of these tensions may worsen their state of health and the duration of sick leave.

4.5 Additional results

In this section, we present some additional results to check the robustness of our statements. All tables reporting the new evidence discussed in this section are provided in the supplementary appendices document. To evaluate the results reported in these supplementary tables, we have checked whether the new estimated coefficients belong to the confidence interval of the initial estimates[10]. We also investigate for changes in significance in the estimated coefficients. In most cases except those explicitly discussed below, the estimated coefficients associated with the significant variables in each robustness table belongs to the confidence interval of the coefficients of reported in Table 4.

Firstly, we begin by detailing the robustness results associated with the sample restrictions imposed on age, working time and the cumulative days of illness. The results are largely robust to

[10]The confidence intervals of the main results displayed in Table 4 are reported in Table 7 in the supplementary appendices document.

inclusion of all employees whatever their age and working hours (Table 8 and 9). The only noticeable change concerns the influence of working time: while the association between working time and SP duration remains insignificant, that with SA duration is significantly negative. In terms of average marginal effect, an increase of working time leads to a shorter decrease of -0.027 days of SA, instead of -0.034.

When the study samples are modified to include, respectively, employees reporting fewer than 30, more than 120 or up to 365 sick days over the year, we note that the results of the model explaining the duration of SP (table 10) are largely robust. All the estimated coefficients belong to the confidence interval of those in Table 4. However, such variations in the sample selection rules according to the total number of sick days have a greater impact on the results relating to the duration of SA (Table 11). These robustness results are consistent with our expectations. Indeed, if we include in the sample employees with a higher number of sick days per year, this means that the severity of their illness is on average higher. Hence, according to our theoretical intuition, the more severe the perceived illness (i.e. the higher the illness shock δ_i), the more likely the worker is to choose absence rather than presence[11]. Two factors, very poor declared health and working under pressure, saw their coefficients increase so much that they fell outside the confidence interval of the coefficients in Table 4. The effect of being in poor or very poor health, compared with being in good health, on the duration of SA increases from 3.35 days to 12.2 days when the sample restriction in terms of total duration of illness is extended to 365 days. Further, the average marginal effect of working under pressure increases from 0.06 supplementary days of SA to 1 supplementary day. Accordingly, this empirical evidence seems to show that employees who frequently work under pressure are more likely to suffer from a more serious illness.

Finally, a number of determinants become significant as the total duration of days of illness allowed increases to 365 days. This is the case for wage levels below 1,500 euros, when the pace of work is constrained by the rhythm of a machine or by monitoring, or when workers receive help from their superiors or colleagues. So, there is indeed some changes in the results but the overall logic clearly prevailed.

Secondly, another methodological issue we must highlight concerns our choice of copula. Indeed, as summarized in Cameron et al. (2004), when the multivariate cumulated distribution function is

[11] This is confirmed by the sharper increase in the average duration of SA (from 6.33 to 15.80 days) compared to the average duration of SP (from 4.09 to 5.55 days) when employees reporting up to 365 days of sickness are included in the sample.

continuous, the copula is unique. This is not true for the joint distribution of discrete variables. This led us to question the reliability of our results and compare them to those obtained when choosing the same margins but different copulas with a certain degree of error according to the information criteria. We found that selecting the copula with the second smallest AIC does not change the results at all. Each coefficient belongs to the confidence interval of the one presented in the paper. Moreover, deviating significantly from our selection criterion, i.e. choosing the copula associated with the highest AIC, does not radically modify the logic of the results either. Few variables change in significance and the value of the coefficients always remain within the confidence interval of those presented in Table 4. These results corroborate those previously identified in the case studies presented in the paper of Marra et al. (2024). The authors actually found that the choice of the copula, on the contrary to the importance of choosing the right margins, did not impact the estimates as long as the link between the margins is sufficiently well captured. Somehow, our evidence is generally consistent with the effective use of information criteria to select copula advocated by simulation and empirical case studies (Marra & Wyszynski, 2016; Marra et al., 2024).

Thirdly, a debate continues on the use of exclusion restrictions, especially when the chosen restriction is misspecified (Kiviet, 2020). A powerful advantage of using copula modelling is that it can normally be dispensed with (Park & Gupta, 2012). However, Marra et al. (2024) continue to use exclusion variables and shows that this leads to an efficiency gain. To assess the relevance of these two claims, we thus estimate our models without exclusion restrictions (results in Table 8 in the Appendix section) as well as with the two other restrictions available in the data that are experience of mistreatment or violence (Tables 14 and 15 in the supplementary appendices document). We find that the coefficients of these models are very close from those of the models with the chosen restriction (family conflicts), confirming all our previous findings. Furthermore, unlike Marra et al. (2024), we find no specific gain in efficiency with the addition of our restriction variable compared to the results in Table 8. This evidence would be more in line with Park & Gupta (2012). Therefore, whether or not we add a restriction does not alter our conclusions in any way. [12].

Finally, the exclusion restrictions used in our econometric model deal with the endogenous participation problem but does not insure the causality between explanatory variables and the choice of SA and SP. Thus, we need to explicitly take into account the problem of self-selection of employees into jobs where they can cope with the job characteristics and working conditions. It is indeed likely that healthier employees would be ready to accept more difficult working conditions,

[12]The models presenting the main results in Table 4 show the best AIC compared to the models including the two other restrictions and that without any restriction.

whether mentally or physically demanding. Hence the association of working conditions on sickness and SA and SP durations would be biased. For that matter, we follow the method proposed by Llena-Nozal (2009) and Böckerman et al. (2012) controlling for serious health episodes in the last three years. We can also observe that the exclusion variables used in the participation equation also allow the estimates to be conditioned on health predictors. It is also plausible that other unobservable employee traits influence both their choice of job and their propensity for absence or presenteeism. For example, individuals who have experienced recent episodes of unemployment may be less demanding in terms of employment conditions, but at the same time more reluctant to take time off to avoid risk of loosing their job. So, we also condition on employees' short and long episodes of unemployment in the last three years. According to the results reported in Table 16, our estimates of the association between employment characteristics and working conditions with SA and SP duration remain unchanged in terms of both significance and value of the estimated coefficients. Thus, the inclusion of these variables measuring past health and unemployment does not seem to further control for the self-selection of employees into certain types of employment. It is possible that the healthy worker effect may have already been accounted for, on the one hand, through our exclusion restriction in the participation equation, and on the other hand, by the inclusion of self-reported health status in the outcome equations.

5 Concluding remarks and discussion

Our goal in this article is to propose an innovative contribution to the understanding of the causes of sickness absence and presenteeism by analyzing which employment characteristics and working conditions are primarily associated with employees' feeling of illness and secondary with the choice between work and take time off to rest in case of illness. Previous literature has reviewed the extended costs for employees, firms and social security systems of sickness absence and presenteeism and studied their determinants but has largely neglected the need to empirically model both phenomena simultaneously and conditionally to the realization of the illness shock.

Our theoretical framework assumes that each employee experiences a random daily health shock which, beyond a certain threshold, forces them to decide whether to take sick leave or come to work while being ill. Over the course of a year, these repeated choices result in a certain duration of SP and SA. The empirical equivalent of this decision involves estimating a model that explains the cumulative durations of SA and SP, conditional on a reservation level of illness. Accounting for this

condition requires estimating a first equation for endogenous participation in the choice between absence or presence, i.e., modeling the probability of exceeding a severity threshold that leads the employee to reporting ill, and a second equation explaining the duration of sickness absence (SA) or presenteeism (SP). Indeed, the problem of endogeneity, which has been neglected in the literature so far, arises from the fact that working conditions can impact the likelihood of becoming ill separately from the intensive margin decision of staying home or working while sick for any particular number of days.

Therefore, using a copula-based econometric method, we investigated the determinants involved in the total duration of SA and SP while accounting for the endogenous participation bias. To this end, we analysed the French Ministry of Labour's 2016 "Working Conditions and Psychosocial Risks" survey representative of the working population. It extends the working conditions surveys carried out since 1978, which provided the framework for the European Working Conditions Survey. In addition, our econometric method offers a great flexibility in the choice of distributions modelling the count outcomes and their link with the endogenous participation process. Unlike traditional models of endogenous participation whose assumptions were not very flexible, it makes it possible to obtain very stable results under different specifications. We have thus identified possible explanations that will enable us to gain a better understanding of sickness absence and attendance and therefore guide personnel policies.

This new method enabled us to propose several areas of application. Firstly, we showed that if we had not taken into account the endogeneity of illness, we would have significantly underestimate the association between employment characteristics, working conditions and SA or SP, by up to 4 times on average. More importantly, this would have led us to misidentify the true determinants of each behaviour and thus bias our conclusions and recommendations in terms of firm policies.

Secondly, we need to stress the importance of implementing company health prevention policies. Indeed, a significant number of employment characteristics and working conditions involved in the duration of SA or SP are primarily associated to illness. More specifically, we were able to identify which of the determinants are single risk factor, only associated with the feeling of illness, but not with the choice between SA and SP. For example, it is the case of constraints on the work pace created by machines, norms, hierarchical control, and relationships with colleagues and conflicts between working hours and family and social time. Using the former to design prevention policies helping employees to deal with these difficult rhythms will ultimately reduce both SA and SP.

Conversely, although it is possible to focus on double risk factors to prevent illness, firm managers must be aware of their effects on both behaviours once the worker is ill.

Finally, depending on the relative costs of SA and SP according to the objectives pursued by the firm, we found that SA and SP cannot be controlled via the same channels. While characteristics of the employment contract and job content can be used to manage absence behaviour, they are often useless to reduce SP. In order to manage SP, firms managers need to focus more on job demands that put pressure on work intensity, but also on employee autonomy and support from supervisors and colleagues, that can only be achieved by modifying the organisational methods of workforce management.

A major limitation of our study is the impossibility of establishing causality between our explanatory variables and the annual duration of SA and SP. Unfortunately, given the information available in the data, it is impossible to deal with the endogeneity of all individual and employer characteristics because of the lack of appropriate instruments. We have tried to cope with the problem of workers who select himself in their jobs according to their ability to perform in high demanding situations or their risk propensity taking into account past episodes of health problems and labour market mobility. Our results do not appear to be affected by these additions. Moreover, in the case of measurement error due to memory bias in the reporting of the duration of SA and SP, the individual's psychological state (pessimistic or optimistic) may lead to an over- or under-estimation of the durations studied. This error due to self-estimation, specific to each individual, will then bias our estimates upwards or downwards. Nonetheless, it is impossible to establish whether one of these effects outweighs the other. Hence, future studies should use longitudinal data to take into account the individuals' unobserved characteristics, such as their illness propensity, state of mind (optimism or pessimism) and their risk preferences.

Finally, to further explore the link between SA and SP and the mechanisms that lead employee to choose one behaviour over the other, future research would have to explore firms' production technologies in more detail. As explained by Coles et al. (2007), when technology requires capital/labour or worker complementarity, absenteeism is more costly for a firm, causing employer to implement incentive mechanisms to reduce absence. Therefore, an employee's choice to increase the duration of SP or decrease the duration of SA, for example, will ultimately depend on the firm's technology and related incentive mechanisms. Hence, to better understand choices between SA and SP, as well as to better control for possible self-selection of employees among firms with different

technologies, future research should also focus on the organizational characteristics of the firms. The use of employer-employee matched data would therefore be perfectly suited to explain SP and SA according to different production methods.

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A Appendix

Table 5: Variables description

Socio-demographics:	
Age	Continuous (from 18 to 65 years old)
Gender	Being a female = 1
Marital status	Being single = 1
Children	Having at least one dependent child = 1
Education	Categories of degree levels: No degree/less than High school diploma/High school diploma/Higher education degree (Ref: High school diploma)
Health state	Health levels: Bad or Very Bad/Rather Good/Good/Very Good (Ref: Good)
Chronic disease	Having a chronic disease = 1
Job characteristics:	
Occupation	Labourer/Employee/ intermediate Profession/ executive (Ref: Employee)
Supervisor	Q: In your main job, do you sometimes supervise the work of other employees? A: Yes, this is my main task/Yes, but it is not my main task/No (Dichotomous: Yes is my main task = 1)
Public sector	Working in the public sector = 1 (State, Territorial Collectivity, etc.)
Seniority	Continuous (from 0 to 49 years)
Temporary contract contract	Dichotomized with fixed-term contracts (CDD and interim) = 1, opposed to permanent contract (CDI)
Atypical hours	Working nights, evenings, Saturdays or Sundays = 1
Work alone	Q: Do you work alone? A: always/often/sometimes/never, dichotomized with always = 1
Working time	Continuous (from 8 to 70 hours/week)
Wage	Categories of wage: 100–1,199/1,200–1,499/1,500–1,799/1,800–2,499/2,500–2,999/3,000–20,000
Quantified targets	Q: Do you have to achieve specific quantified objectives? A: Yes/No (Dichotomous for yes = 1)
Company size	Number of employees From 1 to 9/10-49/50-199/200-499/500+/ NoInfo (Ref = 10-49)
Activity sector	17 groups of sectors + No info (Ref = Public Administration, Education, Health and social activities)
Working conditions	
Rhythm paced by	a machine / external demand / production norms / computerized control / hierarchical monitoring / dependence with colleagues (dichotomous variables)
Lack of time	Q: Do you lack time to do your job properly A: Yes/No
Under pressure	Always or often work under pressure (sometimes not included), dichotomized
Supervisor's help	Q: If you have trouble doing delicate, complicated work, are you helped by your superiors? A: Yes/No
Colleagues' help	Q: If you have trouble doing delicate, complicated work, are you helped by your colleagues? A: Yes/No
Choice of methods	Q: You receive orders, instructions, instructions for use. To do your job correctly, do... A: ...you strictly apply the instructions/...you do otherwise/not applicable (no orders , instructions or instructions), dichotomized for doing otherwise
Initiative	Q: Does your work require you to take Initiatives? A: Always / Often / Sometimes / Never, dichotomized for always and often
Work-to-life conflicts	Q: In general, do your working hours match your social and family commitments outside of your work? A: Very Good/Good/Bad/Very Bad, dichotomized with bad or very bad = 1
Tensions at work	Dichotomous: tensions with the public, the hierarchy, the colleagues or the subordinates = 1 if at least one is true
Fear of job future	Q: For the coming year, do you fear for your job? A: Yes/No
Organizational changes	Having their work environment strongly modified by a change of position or function, technique, restructuring or relocation of the firm, work organization, a layoff plan, a buyout or change of management team or for another reason (= 1 if at least one of the reasons is true)
Exclusion restrictions	
Family conflicts	Q: Have you been strongly affected by family conflicts concerning you or your family? A: Yes/No
Mistreatment	Q: Have you been subjected to physical or psychological mistreatments? A: Yes/No
School violence	Q: Have you experienced conflict or repeated violence at school or in your neighbourhood (racketeering, etc.)? A: Yes/No

Note: Q for question and A for answer

Table 6: Descriptive statistics of covariables

	Study sample $N = 19,331$				Overall sample $N = 24,640$			
Determinants	Mean	St. Dev.	Min	Max	Mean	St. Dev.	Min	Max
Age	44.216	10.305	18	65	44.744	10.627	15	129
Female	0.564	0.496	0	1	0.553	0.497	0	1
Single	0.229	0.420	0	1	0.234	0.424	0	1
Child	0.608	0.488	0	1	0.594	0.491	0	1
Education:								
no diploma	0.063	0.243	0	1	0.068	0.252	0	1
< high school degree	0.306	0.461	0	1	0.317	0.465	0	1
high school degree	0.183	0.386	0	1	0.183	0.386	0	1
> high school degree	0.449	0.497	0	1	0.431	0.495	0	1
Health:								
bad or very bad	0.035	0.184	0	1	0.052	0.222	0	1
rather good	0.221	0.415	0	1	0.231	0.421	0	1
good	0.518	0.500	0	1	0.503	0.500	0	1
very good	0.226	0.419	0	1	0.215	0.411	0	1
Chronic disease	0.277	0.447	0	1	0.297	0.457	0	1
Occupation:								
labourer	0.173	0.378	0	1	0.176	0.381	0	1
employee	0.317	0.465	0	1	0.332	0.471	0	1
intermediate	0.314	0.464	0	1	0.306	0.461	0	1
executive	0.188	0.391	0	1	0.179	0.383	0	1
Supervisor	0.135	0.341	0	1	0.131	0.338	0	1
Public sector	0.421	0.494	0	1	0.378	0.485	0	1
Seniority	15.179	10.953	0	49	14.827	10.997	0	54
Temporary contract	0.064	0.245	0	1	0.059	0.236	0	1
Atypical schedules	0.561	0.496	0	1	0.595	0.491	0	1
Work alone	0.282	0.450	0	1	0.320	0.466	0	1
Working time	36.819	8.098	10	70	37.472	10.973	1	168
Wage:								
100–1,199	0.121	0.327	0	1	0.148	0.356	0	1
1,200–1,499	0.190	0.392	0	1	0.190	0.392	0	1
1,500–1,799	0.195	0.397	0	1	0.191	0.393	0	1
1,800–2,499	0.281	0.450	0	1	0.268	0.443	0	1
2,500–2,999	0.082	0.274	0	1	0.077	0.267	0	1
3,000–20,000	0.112	0.316	0	1	0.105	0.307	0	1
Quantified targets	0.272	0.445	0	1	0.273	0.446	0	1
Firm size:								
<10	0.141	0.348	0	1	0.141	0.348	0	1
10-50	0.243	0.429	0	1	0.243	0.429	0	1
50-200	0.226	0.418	0	1	0.221	0.415	0	1
200-500	0.130	0.337	0	1	0.127	0.333	0	1
>500	0.211	0.408	0	1	0.207	0.405	0	1
Work paced by:								
machines	0.106	0.307	0	1	0.108	0.310	0	1
external demand	0.699	0.459	0	1	0.702	0.457	0	1
norms	0.448	0.497	0	1	0.444	0.497	0	1
computing control	0.382	0.486	0	1	0.355	0.478	0	1
monitoring	0.281	0.449	0	1	0.257	0.437	0	1
colleagues relation	0.292	0.455	0	1	0.273	0.445	0	1
Tensions at work	0.568	0.495	0	1	0.550	0.497	0	1
Under pressure	0.301	0.459	0	1	0.302	0.459	0	1
Lack of time	0.275	0.446	0	1	0.268	0.443	0	1
Supervisors' help	0.651	0.477	0	1	0.573	0.495	0	1
Colleagues' help	0.835	0.371	0	1	0.739	0.439	0	1
Choice of methods	0.819	0.385	0	1	0.729	0.445	0	1
Initiative	0.456	0.498	0	1	0.494	0.500	0	1
Work-to-family conflicts	0.169	0.375	0	1	0.184	0.388	0	1
Fear of job future	0.188	0.391	0	1	0.207	0.405	0	1
Occupational changes	0.444	0.497	0	1	0.419	0.493	0	1

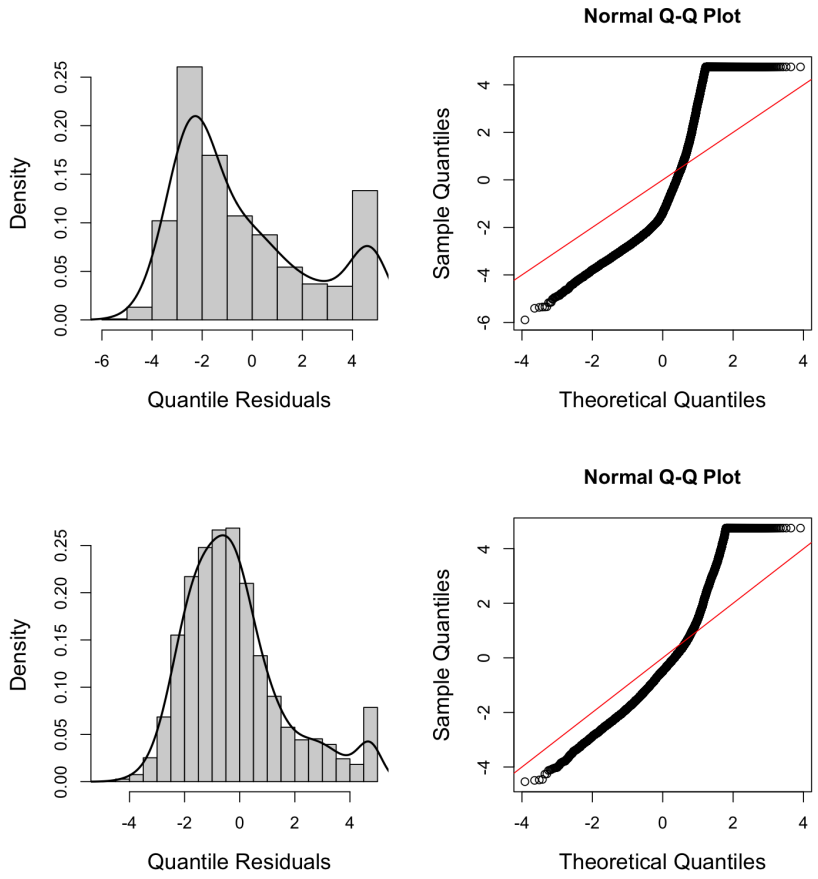

Figure 4: Q-Q plots of the randomized and normalized residuals of the count regressions with endogenous participation. The first row corresponds to the regression of sickness absenteeism days with a Poisson margin and Gaussian copula, and the second row corresponds to the regression on sickness presenteeism days with a Poisson margin and Gaussian copula.

Table 7: Estimations of sickness presenteeism and sickness absence days without endogenous participation (univariate models)

	SA days (NB II)		SP days (PIG)	
	Coef.	AME	Coef.	AME
Constant	1.412***		0.613***	
	(0.175)		(0.139)	
Health (ref: good)				
bad or very bad	**0.349*****	**1.442**	**0.285*****	**0.836**
	(0.034)		(0.027)	
rather good	**0.091*****	**0.429**	**0.161*****	**0.415**
	(0.018)		(0.014)	
very good	**−0.046****	**−0.160**	**−0.066*****	**−0.167**
	(0.021)		(0.016)	
Chronic disease	**0.099*****	**0.355**	**0.035*****	**0.090**
	(0.017)		(0.013)	
Occupation (ref: employee)				
labourer	0.013	0.046	−0.002	−0.006
	(0.027)		(0.021)	
intermediate	0.022	0.077	−0.002	−0.004
	(0.022)		(0.017)	
executive	−0.013	−0.044	−0.014	−0.035
	(0.031)		(0.024)	
Seniority	0.002	−0.001	−0.001	−0.001
	(0.003)		(0.002)	
Seniority^2	−0.0001		0.00004	
	(0.0001)		(0.0001)	
Work alone	−0.025	−0.087	0.017	0.044
	(0.017)		(0.014)	
Supervisor	−0.037	−0.130	−0.028	−0.072
	(0.024)		(0.019)	
Public sector	0.017	0.060	0.012	0.032
	(0.021)		(0.017)	
Temporary contract	**−0.131*****	**−0.435**	−0.029	−0.073
	(0.036)		(0.028)	
Working time	**0.013*****	**−0.009**	−0.004	0.004
	(0.005)		(0.004)	
Working time^2	**−0.0002*****		0.0001	
	(0.0001)		(0.00005)	
Atypical schedules	**−0.029***	**−0.104**	0.017	0.044
	(0.016)		(0.012)	
Wage (ref:1,800-2,499)				
100-1,199	**0.069****	**0.250**	−0.010	−0.026
	(0.033)		(0.026)	
1,200-1,499	**0.064*****	**0.229**	−0.015	0.039
	(0.024)		(0.019)	
1,500-1,799	**0.068*****	**0.246**	0.019	0.048
	(0.022)		(0.017)	
2,500-2,999	0.004	0.015	0.033	0.085
	(0.030)		(0.024)	
3,000-20,000	0.029	0.102	−0.019	−0.050
	(0.032)		(0.025)	
Quantified target	0.012	0.041	**0.058*****	**0.151**
	(0.018)		(0.014)	
Work rhythm paced by:				
machine	0.014	0.049	0.022	0.057
	(0.024)		(0.019)	
external demand	**−0.056*****	**−0.199**	0.020	0.053
	(0.017)		(0.014)	

	SA days		SP days	
	Coef.	AME	Coef.	AME
norms	−0.001	−0.003	0.010	0.026
	(0.016)		(0.013)	
computing control	0.004	0.016	0.008	0.021
	(0.016)		(0.013)	
monitoring	0.018	0.062	**0.036*****	**0.093**
	(0.017)		(0.014)	
colleagues relation	−0.006	−0.022	0.020	0.051
	(0.017)		(0.013)	
Help from supervisors	0.011	0.040	**−0.066*****	**−0.172**
	(0.016)		(0.012)	
Help from colleagues	0.028	0.097	**−0.061*****	**−0.161**
	(0.022)		(0.017)	
Tensions at work	−0.011	−0.039	**0.097*****	**0.246**
	(0.016)		(0.013)	
Lack of time	−0.023	−0.082	**0.075*****	**0.195**
	(0.017)		(0.013)	
Under pressure	**−0.033***	−0.117	**0.110*****	**0.288**
	(0.017)		(0.014)	
Choice of methods	**−0.039****	**−0.141**	0.0004	0.001
	(0.019)		(0.015)	
Initiative	**−0.026***	−0.092	**0.057*****	**0.146**
	(0.015)		(0.012)	
Work-to-life conflicts	**−0.035***	−0.124	**0.049*****	**0.129**
	(0.019)		(0.015)	
Fear of job future	**−0.048*****	**−0.168**	**0.067*****	**0.175**
	(0.019)		(0.015)	
Organizational changes	0.020	0.072	**0.037*****	**0.097**
	(0.015)		(0.012)	
Observations	11,073		11,073	
Adjusted R^2	0.054		0.106	
Log Likelihood	−12,568.920		−10,049.990	

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

We control for individual's characteristics (age, gender, marital status, having children and education), firm sectors and firm size.

Table 8: Determinants of sickness presenteeism and absence days with endogenous participation, without exclusion restriction in the first stage

	Sickness absence			Sickness presenteeism		
Equation	SA days		Illness	SP days		Illness
Distribution	(NB II)		(logit)	(PIG)		(logit)
	Coef.	AME[a]	Coef.	Coef.	AME[a]	Coef.
Constant	**1.374*****		−0.025	**1.170*****		−0.046
	(0.368)		(0.365)	(0.283)		(0.365)
Health (ref: good)						
bad or very bad	**0.580*****	**3.258**	−−	**0.453*****	**3.351**	−−
	(0.058)			(0.049)		
rather good	**0.175*****	**0.789**	−−	**0.290*****	**1.853**	−−
	(0.034)			(0.027)		
very good	**−0.081***	**−0.341**	−−	**−0.152*****	**−0.866**	−−
	(0.041)			(0.033)		
Chronic disease	**0.195*****	**0.865**	−−	**0.066*****	**0.403**	−−
	(0.032)			(0.025)		
Occupation (ref: employee)						
labourer	0.057	0.251	0.053	−0.025	−0.152	0.070
	(0.053)		(0.056)	(0.043)		(0.056)
intermediate	0.070	0.307	−0.002	−0.006	−0.037	−0.004
	(0.044)		(0.047)	(0.034)		(0.047)
executive	−0.032	−0.136	−0.081	0.000	0.002	−0.064
	(0.064)		(0.064)	(0.048)		(0.064)
Seniority	0.004	−0.002	**0.021*****	−0.006	−0.008	**0.023*****
	(0.006)		(0.006)	(0.005)		(0.006)
Seniority^2	−0.000		**−0.001*****	0.000		**−0.001*****
	(0.000)		(0.000)	(0.000)		(0.000)
Work alone	**−0.063***	**−0.272**	**0.100*****	0.020	0.118	**0.108*****
	(0.035)		(0.037)	(0.027)		(0.037)
Supervisor	**−0.197*****	**−0.790**	**−0.229*****	−0.015	−0.092	**−0.210*****
	(0.051)		(0.049)	(0.037)		(0.049)
Public sector	**0.156*****	**0.679**	**0.138*****	−0.001	−0.006	**0.118****
	(0.043)		(0.047)	(0.034)		(0.047)
Temporary contract	**−0.475*****	**−1.675**	**−0.507*****	0.032	0.196	**−0.498*****
	(0.079)		(0.069)	(0.058)		(0.069)
Working time	**0.067*****	**−0.035**	**0.041*****	**−0.014****	**0.018**	**0.039*****
	(0.011)		(0.009)	(0.007)		(0.009)
Working time^2	**−0.001*****		**−0.001*****	**0.000****		**−0.001*****
	(0.000)		(0.000)	(0.000)		(0.000)
Atypical schedules	**−0.101*****	**−0.442**	**−0.075****	**0.055****	**0.333**	**−0.064***
	(0.031)		(0.033)	(0.025)		(0.033)
Wage (ref:1,800-2,499)						
100-1,199	0.085	0.382	−0.017	−0.004	−0.022	−0.016
	(0.067)		(0.070)	(0.052)		(0.071)
1,200-1,499	0.067	0.294	−0.074	−0.013	−0.080	−0.046
	(0.047)		(0.052)	(0.038)		(0.052)
1,500-1,799	0.065	0.288	−0.073	0.049	0.301	−0.066
	(0.043)		(0.047)	(0.034)		(0.047)
2,500-2,999	0.027	0.120	−0.091	0.075	0.470	−0.086
	(0.062)		(0.062)	(0.047)		(0.062)
3,000-20,000	0.008	0.035	**−0.163****	−0.011	−0.011	**−0.166*****
	(0.068)		(0.065)	(0.050)		(0.064)
Quantified target	**0.063***	**0.278**	**0.126*****	**0.087*****	**0.531**	**0.117*****
	(0.035)		(0.038)	(0.028)		(0.039)
Work rhythm paced by:						

	SA days		Illness	SP days		Illness
	Coef.	AME	Coef.	Coef.	AME	Coef.
machine	0.070	0.311	**0.202*****	0.015	0.091	**0.191*****
	(0.047)		(0.057)	(0.038)		(0.057)
external demand	**−0.136*****	**−0.607**	−0.013	**0.055****	**0.330**	−0.004
	(0.035)		(0.036)	(0.028)		(0.036)
norms	0.016	0.068	**0.070****	0.009	0.051	**0.084****
	(0.033)		(0.035)	(0.026)		(0.035)
computing control	0.012	0.051	0.031	0.002	0.013	0.035
	(0.033)		(0.035)	(0.026)		(0.035)
monitoring	0.050	0.219	**0.157*****	0.040	0.246	**0.149*****
	(0.034)		(0.039)	(0.027)		(0.038)
colleagues relation	−0.009	−0.040	**0.109*****	0.017	0.102	**0.104*****
	(0.034)		(0.037)	(0.026)		(0.037)
Help from supervisors	−0.042	−0.185	**−0.269*****	**−0.076*****	**−0.461**	**−0.262*****
	(0.031)		(0.034)	(0.025)		(0.034)
Help from colleagues	**0.092****	**0.387**	0.090*	**−0.127*****	**−0.797**	**0.093****
	(0.046)		(0.047)	(0.034)		(0.046)
Tensions at work	**0.139*****	**0.589**	**0.491*****	**0.113*****	**0.668**	**0.492*****
	(0.034)		(0.033)	(0.028)		(0.033)
Lack of time	0.011	0.047	**0.268*****	**0.100*****	**0.609**	**0.269*****
	(0.034)		(0.039)	(0.026)		(0.039)
Under pressure	0.019	0.081	**0.350*****	**0.146*****	**0.890**	**0.339*****
	(0.034)		(0.039)	(0.027)		(0.039)
Choice of methods	**−0.097*****	**−0.434**	−0.051	0.023	0.139	−0.033
	(0.037)		(0.041)	(0.030)		(0.042)
Initiative	−0.033	−0.145	0.047	**0.094*****	**0.568**	0.044
	(0.031)		(0.033)	(0.024)		(0.033)
Work-to-life conflict	−0.026	−0.113	**0.326*****	0.037	0.226	**0.333*****
	(0.039)		(0.046)	(0.030)		(0.045)
Fear of job future	−0.058	−0.247	**0.231*****	**0.092*****	**0.571**	**0.230*****
	(0.038)		(0.042)	(0.029)		(0.042)
Organizational changes	**0.134*****	**0.580**	**0.284*****	0.022	0.134	**0.280*****
	(0.031)		(0.033)	(0.024)		(0.033)
Num. obs.	11,073		19,285	11,073		19,285
τ			0.329			−0.335
			(0.292, 0.37)			(−0.384, −0.29)
AIC			80454.396			78094.637
Log Likelihood			−40087.198			−38907.319

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

[a] Average marginal effects (AME) are calculated conditional on illness.
We control for individual's characteristics (age, gender, marital status, having children and education level), firm sectors and firm size.

Online Appendix - Not for Print Publication

This document includes all appendices necessary for evaluating the empirical claims in our article. Section A provides tables of AIC and BIC values for the three possible distributions of illness feeling: logit, probit, or cloglog. Section B contains regression estimates when restrictions from our initial study sample are removed, with the first table showing the original results with confidence intervals. Section C presents model estimates with exact margins but varying copulas to study the robustness of results to the choice of the dependency between the outcomes and the participation equation. Section D shows regression results with alternative exclusion restrictions discussed in the paper. Finally, section E provides model results with added control variables for individuals' health characteristics and employment history to consider potential self-selection of workers in their jobs.

Contents

Contents 1

List of Tables 1

A AIC and BIC value tables for every SA and SP duration models 2

B Estimates of models with various restrictions of the sample of study 5

C Models with different choice of copula 14

D Models with alternative exclusion restrictions 18

E Additional controls for past health and employment history 22

List of Tables

1 AIC values for the discrete marginal distributions and copulas with a logit in first step 3

2 BIC values for the discrete marginal distributions and copulas with a logit in first step 3

3 AIC values for the discrete marginal distributions and copulas with a probit in first step . . . 3
4 BIC values for the discrete marginal distributions and copulas with a probit in first step . . . 4
5 AIC values for the discrete marginal distributions and copulas with a cloglog in first step . . . 4
6 BIC values for the discrete marginal distributions and copulas with a cloglog in first step . . . 4
7 SA and SP models presented in the original paper with confidence intervals in square brackets . . . 5
8 SA and SP models without restriction on age . . . 7
9 SA and SP models without restriction on working time . . . 9
10 SP days with different restrictions on the illness duration . . . 11
11 SA days with different restrictions on the illness duration . . . 13
12 SA and SP models with the second best choice of copula . . . 15
13 SA and SP models with the worst choice of copula . . . 17
14 SA and SP models with violence at school as exclusion . . . 19
15 SA and SP models with mistreatment as exclusion . . . 21
16 SA and SP models with additional controls about past health and employment history 23

A AIC and BIC value tables for every SA and SP duration models

In this first section, we present all the value tables for the AIC and BIC information criteria when we consider different distributions for the feeling of illness, i.e. logit, probit or cloglog. The three discrete distributions give very similar results. Moreover, for each of the models, the logit distribution appears to be the best distribution associated with the probability of feeling ill.

Table 1: AIC values for the discrete marginal distributions and copulas with a logit in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	172,142	83,413	80,876	80,440	Normal	103,116	78,028	78,674	78,753
Frank	168,526	83,402	80,865	80,424	Frank	102,417	77,996	78,209	78,255
AMH	168,014	83,414	80,872	80,437	AMH	102,817	78,035	78,531	78,572
FGM	167,340	83,398	80,864	80,418	FGM	102,346	78,041	78,523	78,571
Student-t	167,450	83,503	80,878	80,461	Student-t	103,094	**77,958**	78,361	78,458
Clayton	168,810	83,429	80,884	80,453	Clayton 90	101,176	78,013	78,174	78,234
Clayton 180	168,201	83,149	80,825	80,359	Clayton 270	103,319	78,085	78,774	78,808
Joe	168,066	83,095	80,816	**80,348**	Joe 90	103,320	78,067	78,775	78,810
Joe 180	168,681	83,429	80,884	80,453	Joe 270	101,078	78,026	78,156	78,216
Gumbel	168,562	83,297	80,850	80,406	Gumbel 90	103,320	78,019	78,739	78,808
Gumbel 180	168,674	83,429	80,884	80,453	Gumbel 270	102,166	77,991	78,372	78,457

Note: logit in first step

Table 2: BIC values for the discrete marginal distributions and copulas with a logit in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	173,244	84,522	81,985	81,549	Normal	104,217	79,137	79,783	79,862
Frank	169,627	84,512	81,974	81,533	Frank	103,519	79,106	79,318	79,365
AMH	169,116	84,524	81,981	81,546	AMH	103,918	79,145	79,640	79,681
FGM	168,442	84,507	81,973	81,528	FGM	103,448	79,151	79,632	79,681
Student-t	168,552	84,613	81,987	81,570	Student-t	104,196	**79,068**	79,470	79,567
Clayton	169,911	84,538	81,994	81,562	Clayton 90	102,277	79,123	79,283	79,343
Clayton 180	169,302	84,258	81,935	81,468	Clayton 270	104,421	79,194	79,883	79,917
Joe	169,167	84,204	81,925	**81,457**	Joe 90	104,421	79,177	79,884	79,919
Joe 180	169,782	84,538	81,994	81,562	Joe 270	102,179	79,135	79,265	79,325
Gumbel	169,664	84,406	81,959	81,515	Gumbel 90	104,422	79,128	79,849	79,917
Gumbel 180	169,776	84,538	81,994	81,562	Gumbel 270	103,267	79,100	79,482	79,566

Note: logit in first step

Table 3: AIC values for the discrete marginal distributions and copulas with a probit in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	168,270	83,415	80,878	80,442	Normal	111,338	78,030	79,907	81,938
Frank	169,024	83,404	80,867	80,426	Frank	102,418	77,998	78,210	78,256
AMH	168,027	83,416	80,874	80,439	AMH	102,818	78,037	78,533	78,574
FGM	167,387	83,400	80,866	80,421	FGM	102,352	78,043	78,524	78,573
Student-t	167,456	83,505	80,880	80,463	Student-t	103,093	**77,960**	78,361	78,458
Clayton	168,829	83,431	80,886	80,455	Clayton 90	101,179	78,015	78,172	78,232
Clayton 180	168,191	83,151	80,827	80,361	Clayton 270	114,942	78,088	78,776	78,809
Joe	168,067	83,097	80,817	**80,350**	Joe 90	103,322	78,071	78,776	78,811
Joe 180	168,709	83,431	80,886	80,455	Joe 270	101,078	78,027	78,154	78,214
Gumbel	168,569	83,300	80,852	80,408	Gumbel 90	103,323	78,022	78,742	78,810
Gumbel 180	168,677	83,431	80,886	80,455	Gumbel 270	102,166	77,992	78,372	78,456

Note: probit in first step

Table 4: BIC values for the discrete marginal distributions and copulas with a probit in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	169,372	84,524	81,987	81,551	Normal	112,439	79,139	81,016	83,047
Frank	170,125	84,514	81,976	81,535	Frank	103,519	79,108	79,319	79,366
AMH	169,128	84,526	81,983	81,548	AMH	103,919	79,147	79,642	79,683
FGM	168,488	84,509	81,975	81,530	FGM	103,453	79,153	79,634	79,682
Student-t	168,558	84,614	81,989	81,572	Student-t	104,195	**79,069**	79,470	79,567
Clayton	169,931	84,540	81,995	81,564	Clayton 90	102,280	79,124	79,281	79,342
Clayton 180	169,292	84,261	81,937	81,470	Clayton 270	116,043	79,197	79,885	79,918
Joe	169,169	84,206	81,927	**81,459**	Joe 90	104,423	79,180	79,886	79,920
Joe 180	169,811	84,540	81,995	81,564	Joe 270	102,180	79,136	79,263	79,323
Gumbel	169,670	84,409	81,961	81,518	Gumbel 90	104,424	79,131	79,851	79,919
Gumbel 180	169,779	84,540	81,995	81,564	Gumbel 270	103,268	79,101	79,481	79,565

Note: probit in first step

Table 5: AIC values for the discrete marginal distributions and copulas with a cloglog in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	168,492	83,550	81,013	80,578	Normal	103,261	78,178	78,819	78,898
Frank	167,590	83,539	81,000	80,560	Frank	103,549	78,150	78,349	78,399
AMH	168,133	83,551	81,008	80,574	AMH	102,966	78,182	78,674	78,716
FGM	167,448	83,534	80,999	80,555	FGM	102,500	78,190	78,666	78,717
Student-t	167,533	83,642	81,017	80,597	Student-t	103,207	**78,112**	78,500	78,597
Clayton	169,182	83,565	81,020	80,589	Clayton 90	101,324	78,163	78,286	78,946
Clayton 180	168,307	83,282	80,957	80,485	Clayton 270	103,461	78,233	78,910	78,944
Joe	168,174	83,227	80,945	**80,472**	Joe 90	103,460	78,217	78,912	78,946
Joe 180	168,800	83,565	81,020	80,589	Joe 270	101,225	78,174	78,267	78,946
Gumbel	168,692	83,435	80,986	80,539	Gumbel 90	103,460	78,173	78,884	78,946
Gumbel 180	168,807	83,565	81,020	80,589	Gumbel 270	102,314	78,141	78,500	78,588

Note: cloglog in first step

Table 6: BIC values for the discrete marginal distributions and copulas with a cloglog in first step

	Sickness absence (SA)					Sickness presenteeism (SP)			
Copula	Poisson	PIG	NB I	NB II	Copula	Poisson	PIG	NB I	NB II
Normal	169,585	84,652	82,114	81,679	Normal	104,355	79,279	79,920	79,999
Frank	168,684	84,640	82,102	81,662	Frank	104,643	79,252	79,451	79,500
AMH	169,227	84,652	82,109	81,675	AMH	104,059	79,284	79,775	79,818
FGM	168,542	84,636	82,100	81,656	FGM	103,593	79,291	79,767	79,818
Student-t	168,626	84,743	82,119	81,699	Student-t	104,301	**79,214**	79,601	79,698
Clayton	170,275	84,667	82,122	81,690	Clayton 90	102,417	79,264	79,387	80,047
Clayton 180	169,400	84,384	82,059	81,587	Clayton 270	104,554	79,335	80,012	80,045
Joe	169,267	84,328	82,047	**81,573**	Joe 90	104,553	79,319	80,012	80,047
Joe 180	169,893	84,667	82,122	81,690	Joe 270	102,318	79,275	79,369	80,047
Gumbel	169,786	84,537	82,087	81,641	Gumbel 90	104,554	79,274	79,986	80,047
Gumbel 180	169,901	84,667	82,122	81,690	Gumbel 270	103,408	79,243	79,601	79,689

Note: cloglog in first step

B Estimates of models with various restrictions of the sample of study

In this section, we present different regressions in which we relax the restrictions imposed on our sample. The first table below presents the results of the paper with confidence intervals instead of standard errors. This allows us to determine whether the coefficients in the robustness tables that follow belong to the confidence intervals of the coefficients estimated in the original paper. Then, Table 8 provides the results without the restriction on the age of the individuals and Table 9 presents the results without the restriction on the declared working time. Tables 10 and 11 give the results of the regressions when we change the total duration of the illness under consideration: either to 30, 120 or 365 days.

Table 7: SA and SP models presented in the original paper with confidence intervals in square brackets

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**1.407**	−0.005	**1.167**	−0.044
	[0.687; 2.127]	[−0.724; 0.713]	[0.614; 1.721]	[−0.763; 0.675]
Health (ref: good)				
bad or very bad	**0.587**		**0.445**	
	[0.475; 0.700]		[0.348; 0.542]	
rather good	**0.179**		**0.286**	
	[0.112; 0.245]		[0.234; 0.339]	
very good	**−0.083**		**−0.150**	
	[−0.164; −0.001]		[−0.214; −0.086]	
Chronic disease	**0.199**		**0.063**	
	[0.137; 0.261]		[0.013; 0.113]	
Occupation (ref: employee)				
labourer	0.055	0.059	−0.025	0.076
	[−0.049; 0.159]	[−0.052; 0.169]	[−0.109; 0.058]	[−0.035; 0.186]
intermediate	0.069	−0.003	−0.005	−0.005
	[−0.016; 0.155]	[−0.096; 0.089]	[−0.072; 0.062]	[−0.097; 0.087]
executive	−0.029	−0.080	0.002	−0.064
	[−0.155; 0.096]	[−0.206; 0.046]	[−0.092; 0.096]	[−0.189; 0.061]
Seniority	0.004	**0.022**	−0.006	**0.024**
	[−0.008; 0.015]	[0.011; 0.034]	[−0.015; 0.003]	[0.012; 0.035]
Seniority^2	−0.000	**−0.001**	0.000	**−0.001**
	[−0.000; 0.000]	[−0.001; −0.000]	[−0.000; 0.000]	[−0.001; −0.000]
Work alone	−0.067	**0.091**	0.020	**0.100**
	[−0.137; 0.002]	[0.018; 0.164]	[−0.034; 0.073]	[0.027; 0.173]
Supervisor	**−0.194**	**−0.227**	−0.016	**−0.207**
	[−0.294; −0.094]	[−0.324; −0.131]	[−0.089; 0.058]	[−0.303; −0.111]
Public	**0.156**	**0.134**	−0.002	**0.112**
	[0.071; 0.240]	[0.042; 0.225]	[−0.068; 0.064]	[0.021; 0.204]
Temporary contract	**−0.466**	**−0.516**	0.036	**−0.506**
	[−0.621; −0.312]	[−0.652; −0.380]	[−0.077; 0.149]	[−0.641; −0.370]
working time	**0.067**	**0.041**	−0.014	**0.040**
	[0.045; 0.088]	[0.022; 0.060]	[−0.029; 0.000]	[0.021; 0.058]
working time^2	**−0.001**	**−0.001**	**0.000**	**−0.001**

	SA days	Illness	SP days	Illness
	[−0.001; −0.001]	[−0.001; −0.000]	[0.000; 0.000]	[−0.001; −0.000]
Atypical schedules	**−0.101**	**−0.075**	**0.056**	−0.064
	[−0.162; −0.040]	[−0.139; −0.010]	[0.008; 0.105]	[−0.128; 0.000]
Wage (ref:1,800-2,499)				
100-1,199	0.085	−0.023	−0.002	−0.021
	[−0.046; 0.216]	[−0.161; 0.116]	[−0.104; 0.100]	[−0.160; 0.117]
1,200-1,499	0.067	−0.080	−0.012	−0.051
	[−0.026; 0.160]	[−0.182; 0.022]	[−0.086; 0.063]	[−0.153; 0.051]
1,500-1,799	0.066	−0.072	0.051	−0.065
	[−0.019; 0.150]	[−0.166; 0.021]	[−0.017; 0.118]	[−0.158; 0.029]
2,500-2,999	0.028	−0.089	0.076	−0.089
	[−0.094; 0.149]	[−0.211; 0.033]	[−0.016; 0.168]	[−0.210; 0.033]
3,000-20,000	0.011	**−0.154**	−0.001	**−0.155**
	[−0.121; 0.144]	[−0.281; −0.027]	[−0.099; 0.097]	[−0.281; −0.029]
Quantified target	0.063	**0.120**	**0.086**	**0.107**
	[−0.006; 0.132]	[0.045; 0.196]	[0.032; 0.140]	[0.031; 0.183]
Work rhythm paced by:				
machine	0.067	**0.192**	0.014	**0.182**
	[−0.025; 0.159]	[0.081; 0.304]	[−0.061; 0.089]	[0.070; 0.294]
external demand	**−0.136**	−0.018	**0.056**	−0.009
	[−0.204; −0.068]	[−0.089; 0.053]	[0.002; 0.111]	[−0.080; 0.062]
norms	0.016	0.064	0.007	**0.077**
	[−0.049; 0.080]	[−0.005; 0.132]	[−0.043; 0.058]	[0.009; 0.145]
computing control	0.010	0.034	0.003	0.037
	[−0.054; 0.074]	[−0.036; 0.103]	[−0.047; 0.054]	[−0.032; 0.107]
monitoring	0.047	**0.151**	0.041	**0.142**
	[−0.020; 0.113]	[0.075; 0.226]	[−0.012; 0.093]	[0.066; 0.217]
colleagues	−0.009	**0.104**	0.015	**0.100**
	[−0.075; 0.056]	[0.031; 0.178]	[−0.037; 0.067]	[0.026; 0.173]
Help from supervisors	−0.040	**−0.268**	**−0.075**	**−0.261**
	[−0.101; 0.022]	[−0.336; −0.201]	[−0.124; −0.026]	[−0.329; −0.193]
Help from colleagues	0.089	0.090	**−0.126**	**0.095**
	[−0.000; 0.179]	[−0.001; 0.182]	[−0.193; −0.060]	[0.003; 0.186]
Tensions at work	**0.132**	**0.473**	**0.111**	**0.473**
	[0.065; 0.199]	[0.408; 0.538]	[0.057; 0.165]	[0.408; 0.537]
Lack of time	0.006	**0.270**	**0.099**	**0.269**
	[−0.060; 0.072]	[0.193; 0.346]	[0.048; 0.151]	[0.193; 0.345]
Under pressure	0.013	**0.324**	**0.144**	**0.309**
	[−0.054; 0.081]	[0.247; 0.400]	[0.091; 0.198]	[0.232; 0.385]
Choice of methods	**−0.095**	−0.061	0.023	−0.046
	[−0.167; −0.024]	[−0.142; 0.020]	[−0.035; 0.081]	[−0.128; 0.036]
Initiative	−0.034	0.044	**0.094**	0.042
	[−0.095; 0.027]	[−0.020; 0.109]	[0.047; 0.142]	[−0.023; 0.106]
Work-to-life conflicts	−0.031	**0.317**	0.036	**0.321**
	[−0.107; 0.045]	[0.227; 0.407]	[−0.022; 0.095]	[0.231; 0.410]
Fear of job future	−0.062	**0.223**	**0.092**	**0.219**
	[−0.136; 0.011]	[0.140; 0.306]	[0.036; 0.149]	[0.136; 0.302]
Organizational changes	**0.131**	**0.270**	0.022	**0.263**
	[0.070; 0.191]	[0.206; 0.334]	[−0.026; 0.070]	[0.199; 0.327]
Family conflicts		**0.361**		**0.405**
		[0.292; 0.429]		[0.337; 0.474]
sigma	21.123	21.123	1.698	1.698
theta	1.820	1.820	−0.511	−0.511
tau	0.312	0.312	−0.341	−0.341
AIC	80,348	80,348	77,958	77,958
Log Likelihood	−40032.815	−40032.815	−38838.129	−38838.129
Num. obs.	19285	11073	19285	11073

* Null hypothesis value outside the confidence interval.

Table 8: SA and SP models without restriction on age

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**1.285*****	−0.266	**1.241*****	−0.286
	(0.364)	(0.338)	(0.281)	(0.338)
Health (ref: good)				
bad or very bad	**0.588*****		**0.446*****	
	(0.057)		(0.049)	
rather good	**0.180*****		**0.285*****	
	(0.034)		(0.027)	
very good	**−0.084****		**−0.149*****	
	(0.042)		(0.033)	
Chronic disease	**0.197*****		**0.064****	
	(0.032)		(0.025)	
Occupation (ref: employee)				
labourer	0.055	0.058	−0.026	0.074
	(0.053)	(0.056)	(0.043)	(0.056)
intermediate	0.069	−0.007	−0.006	−0.008
	(0.044)	(0.047)	(0.034)	(0.047)
executive	−0.033	−0.085	0.002	−0.068
	(0.064)	(0.064)	(0.048)	(0.064)
Seniority	0.004	**0.021*****	−0.006	**0.023*****
	(0.006)	(0.006)	(0.004)	(0.006)
Seniority^2	−0.000	**−0.000*****	0.000	**−0.000*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	−0.066*	**0.091****	0.019	**0.100*****
	(0.035)	(0.037)	(0.027)	(0.037)
Supervisor	**−0.195*****	**−0.226*****	−0.015	**−0.206*****
	(0.051)	(0.049)	(0.037)	(0.049)
Public	**0.158*****	**0.138*****	−0.003	**0.117****
	(0.043)	(0.047)	(0.034)	(0.047)
Temporary contract	**−0.467*****	**−0.520*****	0.036	**−0.509*****
	(0.079)	(0.069)	(0.058)	(0.069)
Working time	**0.067*****	**0.041*****	**−0.014****	**0.040*****
	(0.011)	(0.009)	(0.007)	(0.009)
Working time^2	**−0.001*****	**−0.001*****	**0.000****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.101*****	**−0.077****	**0.056****	**−0.066****
	(0.031)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.085	−0.021	−0.003	−0.019
	(0.067)	(0.070)	(0.052)	(0.071)
1,200-1,499	0.066	−0.077	−0.011	−0.049
	(0.047)	(0.052)	(0.038)	(0.052)
1,500-1,799	0.066	−0.073	0.050	−0.065
	(0.043)	(0.048)	(0.034)	(0.048)
2,500-2,999	0.029	−0.090	0.076	−0.090
	(0.062)	(0.062)	(0.047)	(0.062)
3,000-20,000	0.012	**−0.148****	−0.001	**−0.150****
	(0.068)	(0.065)	(0.050)	(0.064)
Quantified target	0.062*	**0.119*****	**0.087*****	**0.107*****
	(0.035)	(0.039)	(0.028)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.066	**0.194*****	0.014	**0.183*****
	(0.047)	(0.057)	(0.038)	(0.057)
external demand	**−0.135*****	−0.016	**0.055****	−0.007
	(0.035)	(0.036)	(0.028)	(0.036)
norms	0.017	0.065*	0.006	**0.079****
	(0.033)	(0.035)	(0.026)	(0.035)
computing control	0.009	0.033	0.004	0.037
	(0.033)	(0.035)	(0.026)	(0.035)
monitoring	0.046	**0.153*****	0.040	**0.144*****
	(0.034)	(0.039)	(0.027)	(0.039)
colleagues	−0.010	**0.107*****	0.016	**0.102*****
	(0.034)	(0.037)	(0.026)	(0.037)
Help from supervisors	−0.038	**−0.267*****	**−0.075*****	**−0.259*****
	(0.031)	(0.035)	(0.025)	(0.035)
Help from colleagues	**0.091****	**0.098****	**−0.127*****	**0.102****
	(0.046)	(0.047)	(0.034)	(0.047)
Tensions at work	**0.131*****	**0.475*****	**0.111*****	**0.474*****
	(0.034)	(0.033)	(0.028)	(0.033)
Lack of time	0.005	**0.268*****	**0.100*****	**0.268*****
	(0.034)	(0.039)	(0.026)	(0.039)
Under pressure	0.014	**0.321*****	**0.143*****	**0.307*****
	(0.034)	(0.039)	(0.027)	(0.039)
Choice of method	**−0.094****	−0.061	0.023	−0.046
	(0.037)	(0.041)	(0.030)	(0.042)
Initiative	−0.035	0.043	**0.094*****	0.041
	(0.031)	(0.033)	(0.024)	(0.033)
Work-to-life conflicts	−0.033	**0.318*****	0.037	**0.321*****
	(0.039)	(0.046)	(0.030)	(0.046)
Fear of job future	−0.061	**0.222*****	**0.092*****	**0.219*****
	(0.038)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.130*****	**0.268*****	0.022	**0.261*****
	(0.031)	(0.033)	(0.024)	(0.033)
Family conflicts		**0.359*****		**0.404*****
		(0.035)		(0.035)
sigma	21.110	21.110	1.695	1.695
theta	1.814	1.814	−0.511	−0.511
tau	0.311	0.311	−0.342	−0.342
AIC	80457.202	80457.202	78061.854	78061.854
Log Likelihood	−40087.601	−40087.601	−38889.927	−38889.927
Num. obs.	19334	11084	19334	11084

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

Table 9: SA and SP models without restriction on working time

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**2.113*****	0.572*	**0.808*****	0.503
	(0.334)	(0.327)	(0.250)	(0.329)
Health (ref: good)				
bad or very bad	**0.585*****		**0.443*****	
	(0.057)		(0.049)	
rather good	**0.177*****		**0.284*****	
	(0.034)		(0.027)	
very good	**−0.086****		**−0.152*****	
	(0.042)		(0.032)	
Chronic disease	**0.203*****		**0.064****	
	(0.032)		(0.025)	
Occupation (ref: employee)				
labourer	0.057	0.072	−0.027	0.090
	(0.053)	(0.056)	(0.042)	(0.056)
intermediate	0.059	−0.015	−0.003	−0.016
	(0.044)	(0.047)	(0.034)	(0.047)
executive	−0.063	−0.111*	0.016	−0.094
	(0.064)	(0.064)	(0.047)	(0.063)
Supervisor	**−0.207*****	**−0.244*****	−0.011	**−0.221*****
	(0.051)	(0.049)	(0.037)	(0.049)
Public	**0.160*****	**0.137*****	−0.005	**0.117****
	(0.043)	(0.047)	(0.034)	(0.046)
Seniority	0.003	**0.022*****	−0.006	**0.023*****
	(0.006)	(0.006)	(0.004)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Temporary contract	**−0.471*****	**−0.511*****	0.033	**−0.502*****
	(0.078)	(0.068)	(0.057)	(0.068)
Working time	**0.026*****	0.006	0.003	0.006
	(0.008)	(0.005)	(0.003)	(0.005)
Working time^2	**−0.000*****	−0.000	0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.107*****	**−0.080****	**0.058****	**−0.070****
	(0.031)	(0.033)	(0.025)	(0.033)
Work alone	**−0.074****	**0.085****	0.023	**0.093****
	(0.035)	(0.037)	(0.027)	(0.037)
Wage (ref:1,800-2,499)				
100-1,199	0.026	−0.107	0.037	−0.103
	(0.066)	(0.068)	(0.050)	(0.068)
1,200-1,499	0.069	−0.082	−0.003	−0.054
	(0.047)	(0.052)	(0.038)	(0.052)
1,500-1,799	0.067	−0.072	0.050	−0.065
	(0.043)	(0.047)	(0.034)	(0.047)
2,500-2,999	0.017	−0.090	0.076	−0.088
	(0.062)	(0.062)	(0.047)	(0.062)
3,000-20,000	−0.021	**−0.187*****	0.009	**−0.186*****
	(0.068)	(0.064)	(0.050)	(0.064)
Quantified target	0.056	**0.116*****	**0.087*****	**0.102*****
	(0.035)	(0.038)	(0.027)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.069	**0.196*****	0.011	**0.184*****
	(0.047)	(0.057)	(0.038)	(0.057)
demand	**−0.135*****	−0.013	0.054*	−0.003
	(0.035)	(0.036)	(0.028)	(0.036)
norms	0.017	0.066*	0.010	**0.078****
	(0.033)	(0.035)	(0.025)	(0.035)
computing control	0.007	0.035	0.003	0.039
	(0.033)	(0.035)	(0.026)	(0.035)
monitoring	0.053	**0.152*****	0.041	**0.144*****
	(0.034)	(0.038)	(0.027)	(0.038)
colleagues	−0.003	**0.102*****	0.014	**0.098*****
	(0.034)	(0.037)	(0.026)	(0.037)
Help from supervisor	−0.037	**−0.265*****	**−0.076*****	**−0.258*****
	(0.031)	(0.034)	(0.025)	(0.034)
Help from colleagues	**0.090****	**0.095****	**−0.122*****	**0.100****
	(0.046)	(0.046)	(0.034)	(0.046)
Tensions at work	**0.141*****	**0.477*****	**0.106*****	**0.476*****
	(0.034)	(0.033)	(0.027)	(0.033)
Lack of time	−0.000	**0.265*****	**0.100*****	**0.265*****
	(0.034)	(0.039)	(0.026)	(0.039)
Under pressure	0.008	**0.309*****	**0.146*****	**0.292*****
	(0.034)	(0.039)	(0.027)	(0.039)
Choice of methods	**−0.089****	−0.061	0.023	−0.047
	(0.037)	(0.041)	(0.029)	(0.041)
Initiative	−0.037	0.039	**0.096*****	0.037
	(0.031)	(0.033)	(0.024)	(0.033)
Work-to-life conflicts	−0.040	**0.305*****	0.042	**0.310*****
	(0.038)	(0.045)	(0.030)	(0.045)
Fear of job future	−0.067*	**0.225*****	**0.094*****	**0.222*****
	(0.037)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.130*****	**0.269*****	0.023	**0.262*****
	(0.031)	(0.033)	(0.024)	(0.033)
Family conflicts		**0.361*****		**0.407*****
		(0.035)		(0.035)
sigma	21.216	21.216	1.695	1.695
theta	1.818	1.818	−0.514	−0.514
tau	0.312	0.312	−0.343	−0.343
AIC	81109.588	81109.588	78756.515	78756.515
Log Likelihood	−40413.794	−40413.794	−39237.258	−39237.258
Num. obs.	19510	11181	19510	11181

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

Table 10: SP days with different restrictions on the illness duration

	Sickness presenteeism					
	30 days of illness		120 days of illness		365 days of illness	
Equation	SP days	Illness	SP days	Illness	SP days	Illness
Distribution	(PIG)	(logit)	(PIG)	(logit)	(PIG)	(logit)
Copula	Student-t		Student-t		Student-t	
Constant	**0.788*****	−0.164	**1.408*****	−0.003	**1.887*****	0.110
	(0.269)	(0.373)	(0.294)	(0.362)	(0.314)	(0.357)
Health (ref: good)						
bad or very bad	**0.359*****		**0.522*****		**0.527*****	
	(0.051)		(0.049)		(0.048)	
rather good	**0.256*****		**0.309*****		**0.298*****	
	(0.026)		(0.028)		(0.029)	
very good	**−0.150*****		**−0.143*****		**−0.144*****	
	(0.031)		(0.034)		(0.035)	
Chronic disease	0.045*		**0.074*****		**0.053****	
	(0.025)		(0.026)		(0.027)	
Occupation (ref: employee)						
labourer	−0.039	0.080	−0.005	0.076	0.009	0.064
	(0.041)	(0.057)	(0.044)	(0.055)	(0.047)	(0.055)
intermediate	−0.027	−0.003	−0.001	−0.010	−0.022	−0.002
	(0.033)	(0.048)	(0.036)	(0.046)	(0.039)	(0.046)
executive	−0.007	−0.070	0.015	−0.080	0.036	−0.086
	(0.046)	(0.065)	(0.051)	(0.063)	(0.054)	(0.062)
Seniority	−0.005	**0.024*****	−0.007	**0.023*****	−0.007	**0.022*****
	(0.004)	(0.006)	(0.005)	(0.006)	(0.005)	(0.006)
Seniority^2	0.000	**−0.001*****	0.000*	**−0.001*****	**0.000****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	0.019	**0.104*****	0.018	**0.101*****	0.031	**0.088****
	(0.026)	(0.038)	(0.028)	(0.037)	(0.030)	(0.036)
Supervisor	−0.015	**−0.210*****	−0.017	**−0.205*****	−0.013	**−0.195*****
	(0.035)	(0.050)	(0.039)	(0.048)	(0.041)	(0.048)
Public	−0.004	**0.131*****	0.031	**0.097****	0.007	**0.102****
	(0.032)	(0.048)	(0.035)	(0.046)	(0.038)	(0.045)
Temporary contract	0.037	**−0.481*****	0.063	**−0.526*****	**0.133****	**−0.543*****
	(0.054)	(0.070)	(0.060)	(0.068)	(0.063)	(0.068)
Working time	**−0.017****	**0.040*****	**−0.022*****	**0.041*****	**−0.022*****	**0.039*****
	(0.007)	(0.010)	(0.007)	(0.009)	(0.008)	(0.009)
Working time^2	**0.000*****	**−0.000*****	**0.000*****	**−0.001*****	**0.000*****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**0.059****	−0.058*	**0.056****	**−0.067****	**0.061****	**−0.070****
	(0.023)	(0.033)	(0.026)	(0.032)	(0.027)	(0.032)
Wage (ref:1,800-2,499)						
100-1,199	−0.002	−0.039	0.011	−0.008	−0.008	0.026
	(0.050)	(0.072)	(0.054)	(0.070)	(0.057)	(0.068)
1,200-1,499	−0.018	−0.060	−0.028	−0.042	−0.028	−0.017
	(0.036)	(0.053)	(0.040)	(0.051)	(0.042)	(0.050)
1,500-1,799	0.023	−0.084*	0.048	−0.056	0.049	−0.041
	(0.033)	(0.049)	(0.036)	(0.047)	(0.039)	(0.046)
2,500-2,999	0.078*	−0.070	0.092*	−0.095	**0.107****	−0.090
	(0.044)	(0.063)	(0.049)	(0.061)	(0.053)	(0.060)
3,000-20,000	−0.005	**−0.145****	0.012	**−0.166*****	0.034	**−0.187*****
	(0.047)	(0.065)	(0.053)	(0.064)	(0.056)	(0.063)
Quantified target	**0.071*****	**0.113*****	**0.072****	**0.108*****	**0.069****	**0.111*****
	(0.026)	(0.039)	(0.029)	(0.038)	(0.031)	(0.038)
Work rhythm paced by:						
machine	0.016	**0.183*****	0.017	**0.183*****	−0.011	**0.193*****
	(0.037)	(0.058)	(0.040)	(0.056)	(0.043)	(0.055)
external demand	0.037	−0.001	**0.075*****	−0.026	**0.092*****	−0.043
	(0.027)	(0.037)	(0.029)	(0.036)	(0.031)	(0.035)

	SP days	Illness	SP days	Illness	SP days	Illness
norms	0.018	**0.074****	0.011	**0.078****	0.002	**0.078****
	(0.024)	(0.036)	(0.027)	(0.034)	(0.028)	(0.034)
computing control	0.023	0.033	0.003	0.031	−0.006	0.033
	(0.024)	(0.036)	(0.027)	(0.035)	(0.029)	(0.035)
monitoring	0.042	**0.123*****	0.043	**0.149*****	0.038	**0.145*****
	(0.026)	(0.039)	(0.028)	(0.038)	(0.030)	(0.037)
colleagues	−0.000	**0.091****	0.023	**0.096*****	0.004	**0.099*****
	(0.025)	(0.038)	(0.028)	(0.037)	(0.030)	(0.036)
help form supervisors	**−0.063*****	**−0.249*****	**−0.063****	**−0.263*****	−0.045	**−0.268*****
	(0.024)	(0.035)	(0.026)	(0.034)	(0.028)	(0.034)
Help form colleagues	**−0.115*****	**0.103****	**−0.135*****	**0.093****	**−0.144*****	0.080*
	(0.033)	(0.048)	(0.035)	(0.046)	(0.038)	(0.045)
Tensions at work	**0.141*****	**0.470*****	**0.111*****	**0.466*****	**0.085*****	**0.454*****
	(0.026)	(0.034)	(0.029)	(0.033)	(0.030)	(0.032)
Lack of time	**0.106*****	**0.273*****	**0.108*****	**0.264*****	**0.106*****	**0.251*****
	(0.025)	(0.039)	(0.028)	(0.038)	(0.030)	(0.038)
Under pressure	**0.121*****	**0.307*****	**0.147*****	**0.319*****	**0.111*****	**0.328*****
	(0.026)	(0.040)	(0.029)	(0.039)	(0.031)	(0.038)
Choice of methods	0.020	−0.031	0.016	−0.058	0.018	−0.069*
	(0.028)	(0.043)	(0.031)	(0.041)	(0.033)	(0.040)
Initiative	**0.093*****	0.039	**0.094*****	0.046	**0.091*****	0.042
	(0.023)	(0.034)	(0.025)	(0.033)	(0.027)	(0.032)
Work-to-life conflicts	0.031	**0.327*****	0.007	**0.323*****	−0.010	**0.322*****
	(0.028)	(0.046)	(0.031)	(0.045)	(0.034)	(0.044)
Fear of job future	**0.088*****	**0.217*****	**0.098*****	**0.214*****	**0.077****	**0.231*****
	(0.028)	(0.043)	(0.030)	(0.042)	(0.032)	(0.041)
Organizational changes	0.038*	**0.261*****	0.023	**0.268*****	0.017	**0.262*****
	(0.023)	(0.033)	(0.026)	(0.032)	(0.027)	(0.032)
Family conflicts		**0.409*****		**0.399*****		**0.378*****
		(0.036)		(0.034)		(0.032)
sigma	1.113	1.113	2.400	2.400	4.349	4.349
theta	−0.391	−0.391	−0.585	−0.585	−0.726	−0.726
tau	−0.255	−0.255	−0.398	−0.398	−0.517	−0.517
AIC	70878.028	70878.028	82955.541	82955.541	86804.850	86804.850
Log Likelihood	−35298.014	−35298.014	−41336.771	−41336.771	−43261.425	−43261.425
Num. obs.	18425	10213	19904	11692	20343	12131

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

Table 11: SA days with different restrictions on the illness duration

	Sickness absenteeism					
	30 days of illness		120 days of illness		365 days of illness	
Equation	SA days	Illness	SA days	Illness	SA days	Illness
Distribution	(NB II)	(logit)	(NB II)	(logit)	(NB II)	(logit)
Copula	Joe		Joe		Joe	
Constant	0.747*	−0.157	**1.754*****	0.017	**2.131*****	0.005
	(0.396)	(0.374)	(0.349)	(0.360)	(0.327)	(0.355)
Health (ref: good)						
bad or very bad	**0.506*****		**0.699*****		**0.829*****	
	(0.066)		(0.052)		(0.046)	
rather good	**0.167*****		**0.190*****		**0.183*****	
	(0.037)		(0.032)		(0.029)	
very good	−0.073*		**−0.087****		−0.067*	
	(0.044)		(0.039)		(0.036)	
Chronic disease	**0.178*****		**0.218*****		**0.243*****	
	(0.034)		(0.030)		(0.027)	
Occupation (ref: employee)						
labourer	0.056	0.052	0.073	0.068	0.066	0.072
	(0.057)	(0.058)	(0.051)	(0.055)	(0.048)	(0.054)
intermediate	0.065	−0.011	0.044	−0.012	0.040	−0.016
	(0.047)	(0.048)	(0.042)	(0.046)	(0.040)	(0.046)
executive	−0.051	−0.091	−0.091	−0.106*	−0.085	−0.110*
	(0.068)	(0.065)	(0.062)	(0.063)	(0.058)	(0.063)
Seniority	0.001	**0.022*****	0.006	**0.023*****	0.007	**0.023*****
	(0.006)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	−0.000	**−0.001*****	−0.000*	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	**−0.089****	**0.090****	−0.041	**0.099*****	−0.033	**0.102*****
	(0.038)	(0.038)	(0.034)	(0.037)	(0.032)	(0.036)
Supervisor	**−0.217*****	**−0.229*****	**−0.178*****	**−0.220*****	**−0.155*****	**−0.202*****
	(0.055)	(0.050)	(0.049)	(0.048)	(0.046)	(0.048)
Public	**0.196*****	**0.137*****	**0.125*****	**0.123*****	**0.126*****	**0.117*****
	(0.046)	(0.048)	(0.041)	(0.046)	(0.039)	(0.045)
Temporary contract	**−0.421*****	**−0.486*****	**−0.501*****	**−0.533*****	**−0.531*****	**−0.556*****
	(0.083)	(0.071)	(0.075)	(0.068)	(0.070)	(0.068)
Working time	**0.079*****	**0.041*****	**0.060*****	**0.040*****	**0.056*****	**0.038*****
	(0.012)	(0.010)	(0.010)	(0.009)	(0.010)	(0.009)
working time^2	**−0.001*****	**−0.001*****	**−0.001*****	**−0.001*****	**−0.001*****	**−0.000*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.102*****	**−0.068****	**−0.097*****	**−0.073****	**−0.081*****	−0.062*
	(0.033)	(0.034)	(0.030)	(0.032)	(0.028)	(0.032)
Wage (ref:1,800-2,499)						
100-1,199	0.025	−0.049	0.101	0.004	**0.132****	0.048
	(0.072)	(0.072)	(0.064)	(0.069)	(0.060)	(0.068)
1,200-1,499	0.065	−0.089*	0.085*	−0.060	**0.121*****	−0.022
	(0.050)	(0.053)	(0.045)	(0.051)	(0.043)	(0.050)
1,500-1,799	0.026	**−0.097****	0.054	−0.063	0.058	−0.045
	(0.046)	(0.049)	(0.042)	(0.047)	(0.040)	(0.046)
2,500-2,999	0.098	−0.070	0.016	−0.092	0.015	−0.092
	(0.064)	(0.063)	(0.060)	(0.061)	(0.057)	(0.061)
3,000-20,000	0.023	**−0.147****	−0.013	**−0.158****	−0.057	**−0.178*****
	(0.072)	(0.066)	(0.065)	(0.064)	(0.062)	(0.063)
Quantified target	**0.082****	**0.116*****	0.053	**0.116*****	**0.073****	**0.122*****
	(0.038)	(0.039)	(0.034)	(0.038)	(0.032)	(0.037)
Work rhythm paced by:						
machine	0.052	**0.186*****	**0.088****	**0.202*****	**0.119*****	**0.216*****
	(0.051)	(0.058)	(0.045)	(0.056)	(0.042)	(0.055)
external demand	**−0.150*****	−0.015	**−0.144*****	−0.024	**−0.139*****	−0.025
	(0.037)	(0.037)	(0.033)	(0.035)	(0.031)	(0.035)

	SA days	Illness	SA days	Illness	SA days	Illness
norms	0.020	0.065*	0.025	0.064*	0.031	0.060*
	(0.035)	(0.036)	(0.032)	(0.034)	(0.030)	(0.034)
computing control	−0.010	0.032	0.006	0.030	0.012	0.030
	(0.035)	(0.036)	(0.031)	(0.035)	(0.030)	(0.034)
monitoring	0.015	**0.131*****	**0.072****	**0.163*****	**0.069****	**0.168*****
	(0.037)	(0.039)	(0.033)	(0.038)	(0.031)	(0.037)
colleagues	−0.048	**0.095****	−0.012	**0.100*****	0.001	**0.105*****
	(0.036)	(0.038)	(0.032)	(0.037)	(0.031)	(0.036)
Help form supervisors	−0.008	**−0.258*****	−0.058*	**−0.268*****	**−0.096*****	**−0.279*****
	(0.034)	(0.035)	(0.030)	(0.034)	(0.028)	(0.033)
Help form colleagues	**0.107****	**0.103****	**0.090****	0.088*	**0.101****	0.088*
	(0.050)	(0.048)	(0.043)	(0.046)	(0.041)	(0.045)
Tensions at work	**0.109*****	**0.466*****	**0.159*****	**0.476*****	**0.181*****	**0.473*****
	(0.036)	(0.034)	(0.032)	(0.033)	(0.030)	(0.032)
Lack of time	−0.007	**0.266*****	0.013	**0.271*****	0.028	**0.275*****
	(0.036)	(0.040)	(0.032)	(0.038)	(0.031)	(0.038)
Under pressure	−0.010	**0.309*****	**0.068****	**0.342*****	**0.096*****	**0.353*****
	(0.037)	(0.040)	(0.033)	(0.039)	(0.031)	(0.038)
Choice of methods	−0.060	−0.045	**−0.111*****	−0.072*	**−0.095*****	−0.069*
	(0.040)	(0.042)	(0.035)	(0.041)	(0.033)	(0.040)
Initiative	−0.040	0.048	−0.012	0.050	−0.022	0.041
	(0.033)	(0.034)	(0.030)	(0.032)	(0.028)	(0.032)
Work-to-life conflicts	−0.040	**0.314*****	−0.012	**0.314*****	0.045	**0.335*****
	(0.042)	(0.046)	(0.037)	(0.045)	(0.035)	(0.044)
Fear of job future	**−0.085****	**0.221*****	−0.048	**0.226*****	0.010	**0.249*****
	(0.041)	(0.043)	(0.036)	(0.042)	(0.034)	(0.041)
Organizational changes	**0.132*****	**0.266*****	**0.146*****	**0.276*****	**0.145*****	**0.274*****
	(0.033)	(0.033)	(0.029)	(0.032)	(0.028)	(0.032)
Family conflicts		**0.365*****		**0.343*****		**0.321*****
		(0.036)		(0.034)		(0.032)
sigma	12.390	12.390	38.675	38.675	76.958	76.958
theta	1.686	1.686	2.259	2.259	3.158	3.158
tau	0.276	0.276	0.407	0.407	0.536	0.536
AIC	69470.049	69470.049	89897.785	89897.785	97941.076	97941.076
Log Likelihood	−34594.025	−34594.025	−44807.892	−44807.892	−48829.538	−48829.538
Num. obs.	18425	10213	19904	11692	20343	12131

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

C Models with different choice of copula

In this section we show the sensitivity of our results to the choice of copula, the margins remaining unchanged. The first table below, Table 12, shows what happens if the error in the choice of copula is not very serious, meaning that we have chosen the copula with the second-best AIC. Table 13 reports the results with the worst choice of copula, where we selected the copula with the highest AIC.

Table 12: SA and SP models with the second best choice of copula

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Clayton 180		Gumbel 270	
Constant	**1.412*****	−0.007	**1.134*****	−0.015
	(0.365)	(0.367)	(0.285)	(0.369)
Health (ref: good)				
bad or very bad	**0.585*****		**0.445*****	
	(0.057)		(0.050)	
rather good	**0.177*****		**0.285*****	
	(0.034)		(0.027)	
very good	−0.081*		**−0.149*****	
	(0.041)		(0.033)	
Chronic disease	**0.198*****		**0.058****	
	(0.032)		(0.025)	
Occupation (ref: employee)				
labourer	0.052	0.061	−0.026	0.076
	(0.053)	(0.056)	(0.043)	(0.057)
intermediate	0.070	−0.003	−0.003	−0.003
	(0.044)	(0.047)	(0.035)	(0.047)
executive	−0.027	−0.080	0.005	−0.064
	(0.063)	(0.064)	(0.049)	(0.064)
Seniority	0.004	**0.022*****	−0.007	**0.024*****
	(0.006)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	**−0.070****	**0.091****	0.014	**0.096****
	(0.035)	(0.037)	(0.028)	(0.037)
Supervisor	**−0.194*****	**−0.227*****	−0.009	**−0.212*****
	(0.051)	(0.049)	(0.038)	(0.049)
Public	**0.156*****	**0.134*****	−0.008	**0.110****
	(0.043)	(0.047)	(0.034)	(0.047)
Temporary contract	**−0.460*****	**−0.516*****	0.062	**−0.502*****
	(0.078)	(0.070)	(0.058)	(0.070)
Working time	**0.067*****	**0.042*****	**−0.016****	**0.040*****
	(0.011)	(0.010)	(0.007)	(0.010)
Working time^2	**−0.001*****	**−0.001*****	**0.000*****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.101*****	**−0.076****	**0.058****	**−0.069****
	(0.031)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.084	−0.025	−0.005	−0.031
	(0.066)	(0.071)	(0.053)	(0.071)
1,200-1,499	0.068	−0.078	−0.013	−0.055
	(0.047)	(0.052)	(0.038)	(0.052)
1,500-1,799	0.066	−0.074	0.053	−0.064
	(0.043)	(0.048)	(0.035)	(0.048)
2,500-2,999	0.029	−0.087	0.076	−0.095
	(0.061)	(0.062)	(0.048)	(0.062)
3,000-20,000	0.015	**−0.153****	0.005	**−0.161****
	(0.067)	(0.065)	(0.051)	(0.065)
Quantified target	0.062*	**0.120*****	**0.085*****	**0.111*****
	(0.035)	(0.039)	(0.028)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.066	**0.192*****	0.011	**0.181*****
	(0.047)	(0.057)	(0.039)	(0.057)
external demand	**−0.137*****	−0.019	**0.056****	−0.016
	(0.034)	(0.036)	(0.028)	(0.036)
norms	0.015	0.066*	0.002	**0.075****
	(0.033)	(0.035)	(0.026)	(0.035)
computing control	0.009	0.035	0.003	0.040
	(0.033)	(0.036)	(0.026)	(0.036)
monitoring	0.045	**0.151*****	0.039	**0.146*****
	(0.034)	(0.039)	(0.027)	(0.039)
colleagues	−0.011	**0.104*****	0.013	**0.107*****
	(0.033)	(0.038)	(0.027)	(0.038)
Help form supervisors	−0.038	**−0.269*****	**−0.070*****	**−0.267*****
	(0.031)	(0.035)	(0.025)	(0.035)
Help from colleagues	**0.089****	0.091*	**−0.128*****	0.089*
	(0.045)	(0.047)	(0.034)	(0.047)
Tensions at work	**0.124*****	**0.473*****	**0.090*****	**0.471*****
	(0.034)	(0.033)	(0.028)	(0.033)
Lack of time	0.004	**0.269*****	**0.094*****	**0.270*****
	(0.034)	(0.039)	(0.027)	(0.039)
Under pressure	0.011	**0.324*****	**0.138*****	**0.317*****
	(0.034)	(0.039)	(0.028)	(0.039)
Choice of methods	**−0.095*****	−0.062	0.026	−0.052
	(0.036)	(0.041)	(0.030)	(0.042)
Initiative	−0.034	0.044	**0.093*****	0.046
	(0.031)	(0.033)	(0.025)	(0.033)
Work-to-life conflicts	−0.032	**0.319*****	0.032	**0.325*****
	(0.039)	(0.046)	(0.030)	(0.046)
Fear of job future	−0.064*	**0.222*****	**0.085*****	**0.218*****
	(0.037)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.127*****	**0.270*****	0.011	**0.262*****
	(0.031)	(0.033)	(0.025)	(0.033)
Family conflicts		**0.364*****		**0.404*****
		(0.035)		(0.035)
sigma	21.160	21.160	1.463	1.463
theta	0.898	0.898	−1.519	−1.519
tau	0.310	0.310	−0.342	−0.342
AIC	80359.074	80359.074	77990.544	77990.544
Log Likelihood	−40038.537	−40038.537	−38854.272	−38854.272
Num. obs.	19285	11073	19285	11073

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

Table 13: SA and SP models with the worst choice of copula

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Student-t		Clayton 270	
Constant	**1.725*****	0.003	**1.224*****	0.026
	(0.330)	(0.370)	(0.304)	(0.368)
Health (ref: good)				
bad or very bad	**0.541*****		**0.460*****	
	(0.053)		(0.052)	
rather good	**0.161*****		**0.296*****	
	(0.031)		(0.028)	
very good	−0.070*		**−0.152*****	
	(0.038)		(0.033)	
Chronic disease	**0.181*****		**0.065****	
	(0.029)		(0.026)	
Occupation (ref: employee)				
labourer	0.035	0.066	−0.018	0.071
	(0.047)	(0.057)	(0.043)	(0.057)
intermediate	0.068*	0.001	−0.004	−0.001
	(0.039)	(0.048)	(0.035)	(0.047)
executive	−0.011	−0.076	−0.001	−0.074
	(0.057)	(0.065)	(0.048)	(0.065)
Seniority	−0.000	**0.023*****	−0.004	**0.024*****
	(0.005)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	**−0.084*****	**0.088****	0.021	**0.096****
	(0.031)	(0.038)	(0.028)	(0.038)
Supervisor	**−0.155*****	**−0.229*****	−0.035	**−0.207*****
	(0.046)	(0.050)	(0.038)	(0.049)
Public	**0.131*****	**0.136*****	0.002	**0.121*****
	(0.038)	(0.047)	(0.034)	(0.047)
Temporary contract	**−0.351*****	**−0.519*****	0.011	**−0.513*****
	(0.071)	(0.070)	(0.058)	(0.070)
Working time	**0.059*****	**0.044*****	−0.012	**0.041*****
	(0.010)	(0.010)	(0.007)	(0.010)
Working time^2	**−0.001*****	**−0.001*****	**0.000****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.088*****	**−0.080****	0.048*	**−0.080****
	(0.028)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.080	−0.039	−0.014	−0.035
	(0.060)	(0.072)	(0.053)	(0.071)
1,200-1,499	0.072*	−0.073	−0.022	−0.059
	(0.042)	(0.053)	(0.038)	(0.052)
1,500-1,799	0.073*	−0.078	0.047	−0.071
	(0.038)	(0.048)	(0.035)	(0.048)
2,500-2,999	0.041	−0.085	0.065	−0.088
	(0.055)	(0.062)	(0.047)	(0.063)
3,000_20,000	0.046	**−0.145****	−0.026	**−0.153****
	(0.060)	(0.065)	(0.050)	(0.065)
Quantified target	0.042	**0.118*****	**0.099*****	**0.114*****
	(0.031)	(0.039)	(0.028)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.040	**0.189*****	0.022	**0.183*****
	(0.042)	(0.058)	(0.039)	(0.058)
external demand	**−0.126*****	−0.023	0.046	−0.023
	(0.031)	(0.036)	(0.028)	(0.036)
norms	0.002	**0.071****	0.011	**0.077****
	(0.029)	(0.035)	(0.026)	(0.035)
computing control	0.004	0.039	0.008	0.041
	(0.029)	(0.036)	(0.026)	(0.036)
monitoring	0.021	**0.147*****	0.051*	**0.149*****
	(0.030)	(0.039)	(0.028)	(0.039)
colleagues	−0.024	**0.105*****	0.030	**0.106*****
	(0.030)	(0.038)	(0.027)	(0.038)
Help from supervisors	−0.005	**−0.272*****	**−0.097*****	**−0.268*****
	(0.028)	(0.035)	(0.026)	(0.035)
Help from colleagues	0.075*	**0.094****	**−0.131*****	**0.094****
	(0.041)	(0.047)	(0.034)	(0.047)
Tensions at work	0.039	**0.471*****	**0.148*****	**0.464*****
	(0.031)	(0.033)	(0.029)	(0.033)
Lack of time	−0.029	**0.268*****	**0.116*****	**0.257*****
	(0.030)	(0.039)	(0.028)	(0.039)
Under pressure	−0.031	**0.323*****	**0.172*****	**0.318*****
	(0.031)	(0.040)	(0.029)	(0.039)
Choice of methods	**−0.081****	−0.063	0.017	−0.074*
	(0.033)	(0.042)	(0.030)	(0.042)
Initiative	−0.036	0.045	**0.104*****	0.046
	(0.028)	(0.033)	(0.025)	(0.033)
Work-to-life conflicts	−0.061*	**0.330*****	0.056*	**0.317*****
	(0.035)	(0.046)	(0.031)	(0.046)
Fear of job future	**−0.089*****	**0.219*****	**0.105*****	**0.215*****
	(0.034)	(0.043)	(0.030)	(0.043)
Organizational changes	**0.079*****	**0.267*****	0.039	**0.261*****
	(0.028)	(0.033)	(0.025)	(0.033)
Family conflicts		**0.398*****		**0.406*****
		(0.036)		(0.036)
sigma	23.141	23.141	2.284	2.284
theta	0.249	0.249	−0.728	−0.728
tau	0.160	0.160	−0.267	−0.267
AIC	80460.959	80460.959	78085.045	78085.045
Log Likelihood	−40089.479	−40089.479	−38901.522	−38901.522
Num. obs.	19285	11073	19285	11073

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

D Models with alternative exclusion restrictions

In this section, we present the results using the other two exclusion restrictions discussed in the paper. These two exclusion variables are dummies indicating whether the individual had been subjected, before the age of 18, to violence at school or in the neighbourhood (Table 14) or to physical and/or psychological mistreatment (Table 15).

Table 14: SA and SP models with violence at school as exclusion

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**1.369*****	−0.018	**1.171*****	−0.042
	(0.368)	(0.366)	(0.283)	(0.366)
Health (ref: good)				
bad or very bad	**0.581*****		**0.450*****	
	(0.058)		(0.049)	
rather good	**0.175*****		**0.290*****	
	(0.034)		(0.027)	
very good	**−0.082****		**−0.151*****	
	(0.041)		(0.033)	
Chronic disease	**0.196*****		**0.065****	
	(0.032)		(0.025)	
Occupation (ref: employee)				
labourer	0.056	0.053	−0.025	0.071
	(0.053)	(0.056)	(0.043)	(0.056)
intermediate	0.069	−0.001	−0.005	−0.002
	(0.044)	(0.047)	(0.034)	(0.047)
executive	−0.032	−0.081	0.001	−0.063
	(0.064)	(0.064)	(0.048)	(0.064)
Seniority	0.004	**0.022*****	−0.006	**0.023*****
	(0.006)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	−0.064*	**0.096*****	0.020	**0.105*****
	(0.035)	(0.037)	(0.027)	(0.037)
Supervisor	**−0.197*****	**−0.225*****	−0.015	**−0.206*****
	(0.051)	(0.049)	(0.037)	(0.049)
Public	**0.156*****	**0.136*****	−0.001	**0.116****
	(0.043)	(0.047)	(0.034)	(0.047)
Temporary contract	**−0.474*****	**−0.513*****	0.032	**−0.505*****
	(0.079)	(0.069)	(0.058)	(0.069)
Working time	**0.068*****	**0.040*****	**−0.015****	**0.039*****
	(0.011)	(0.009)	(0.007)	(0.009)
Working time^2	**−0.001*****	**−0.001*****	**0.000****	**−0.000*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.101*****	**−0.076****	**0.055****	**−0.065****
	(0.031)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.087	−0.024	−0.004	−0.021
	(0.067)	(0.070)	(0.052)	(0.071)
1,200-1,499	0.067	−0.076	−0.013	−0.047
	(0.047)	(0.052)	(0.038)	(0.052)
1,500-1,799	0.066	−0.074	0.049	−0.066
	(0.043)	(0.048)	(0.034)	(0.048)
2,500-2,999	0.029	−0.089	0.076	−0.085
	(0.062)	(0.062)	(0.047)	(0.062)
3,000-20,000	0.008	**−0.162****	−0.002	**−0.165*****
	(0.068)	(0.065)	(0.050)	(0.064)
Quantified target	0.063*	**0.125*****	**0.087*****	**0.115*****
	(0.035)	(0.038)	(0.028)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.070	**0.196*****	0.015	**0.184*****
	(0.047)	(0.057)	(0.038)	(0.057)
external demand	**−0.136*****	−0.012	**0.056****	−0.002
	(0.035)	(0.036)	(0.028)	(0.036)
norms	0.015	0.067*	0.009	**0.081****
	(0.033)	(0.035)	(0.026)	(0.035)
computing control	0.011	0.030	0.002	0.033
	(0.033)	(0.035)	(0.026)	(0.035)
monitoring	0.050	**0.156*****	0.040	**0.149*****
	(0.034)	(0.039)	(0.027)	(0.038)
colleagues	−0.009	**0.108*****	0.016	**0.103*****
	(0.034)	(0.037)	(0.026)	(0.037)
Help from supervisors	−0.042	**−0.270*****	**−0.076*****	**−0.262*****
	(0.031)	(0.034)	(0.025)	(0.034)
Help from colleagues	**0.091****	0.090*	**−0.126*****	**0.093****
	(0.046)	(0.047)	(0.034)	(0.047)
Tensions at work	**0.137*****	**0.485*****	**0.114*****	**0.487*****
	(0.034)	(0.033)	(0.028)	(0.033)
Lack of time	0.009	**0.266*****	**0.100*****	**0.267*****
	(0.034)	(0.039)	(0.026)	(0.039)
Under pressure	0.018	**0.341*****	**0.146*****	**0.330*****
	(0.034)	(0.039)	(0.027)	(0.039)
Choice of methods	**−0.097*****	−0.049	0.023	−0.030
	(0.037)	(0.041)	(0.030)	(0.042)
Initiative	−0.034	0.048	**0.094*****	0.044
	(0.031)	(0.033)	(0.024)	(0.033)
Work-to-life conflicts	−0.028	**0.321*****	0.037	**0.328*****
	(0.039)	(0.046)	(0.030)	(0.045)
Fear of job future	−0.058	**0.229*****	**0.092*****	**0.227*****
	(0.038)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.134*****	**0.284*****	0.022	**0.279*****
	(0.031)	(0.033)	(0.024)	(0.033)
School violence		**0.340*****		**0.358*****
		(0.073)		(0.073)
sigma	21.325	21.325	1.689	1.689
theta	1.874	1.874	−0.502	−0.502
tau	0.326	0.326	−0.335	−0.335
AIC	80433.626	80433.626	78071.705	78071.705
Log Likelihood	−40075.813	−40075.813	−38894.852	−38894.852
Num. obs.	19285	11073	19285	11073

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

Table 15: SA and SP models with mistreatment as exclusion

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**1.376*****	0.038	**1.192*****	0.023
	(0.368)	(0.366)	(0.283)	(0.366)
Health (ref: good)				
bad or very bad	**0.582*****		**0.449*****	
	(0.058)		(0.049)	
rather good	**0.176*****		**0.288*****	
	(0.034)		(0.027)	
very good	**−0.082****		**−0.151*****	
	(0.041)		(0.033)	
Chronic disease	**0.198*****		**0.064****	
	(0.032)		(0.025)	
Occupation (ref: employee)				
labourer	0.057	0.051	−0.026	0.067
	(0.053)	(0.056)	(0.043)	(0.056)
intermediate	0.069	0.000	−0.006	−0.000
	(0.044)	(0.047)	(0.034)	(0.047)
executive	−0.030	−0.079	0.001	−0.061
	(0.064)	(0.064)	(0.048)	(0.064)
Seniority	0.004	**0.022*****	−0.006	**0.023*****
	(0.006)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	−0.065*	**0.095****	0.019	**0.104*****
	(0.035)	(0.037)	(0.027)	(0.037)
Supervisor	**−0.197*****	**−0.226*****	−0.014	**−0.206*****
	(0.051)	(0.049)	(0.037)	(0.049)
Public	**0.155*****	**0.136*****	−0.002	**0.116****
	(0.043)	(0.047)	(0.034)	(0.047)
Temporary contract	**−0.472*****	**−0.510*****	0.035	**−0.503*****
	(0.079)	(0.069)	(0.058)	(0.069)
Working time	**0.068*****	**0.041*****	**−0.015****	**0.039*****
	(0.011)	(0.010)	(0.007)	(0.009)
Working time^2	**−0.001*****	**−0.001*****	**0.000*****	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.102*****	**−0.076****	**0.056****	−0.064*
	(0.031)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.087	−0.021	−0.003	−0.021
	(0.067)	(0.070)	(0.052)	(0.071)
1,200-1,499	0.066	−0.076	−0.013	−0.048
	(0.047)	(0.052)	(0.038)	(0.052)
1,500-1,799	0.066	−0.075	0.050	−0.067
	(0.043)	(0.048)	(0.034)	(0.048)
2,500-2,999	0.027	−0.087	0.077*	−0.083
	(0.062)	(0.062)	(0.047)	(0.062)
3,000-20,000	0.008	**−0.155****	0.001	**−0.157****
	(0.068)	(0.065)	(0.050)	(0.064)
Quantified target	0.063*	**0.123*****	**0.086*****	**0.112*****
	(0.035)	(0.039)	(0.028)	(0.039)
Work rhythm paced by:				

	SA days	Illness	SP days	Illness
machine	0.070	**0.201*****	0.014	**0.190*****
	(0.047)	(0.057)	(0.038)	(0.057)
external demand	**−0.136*****	−0.015	0.054*	−0.008
	(0.035)	(0.036)	(0.028)	(0.036)
norms	0.015	0.067*	0.008	**0.081****
	(0.033)	(0.035)	(0.026)	(0.035)
computing control	0.011	0.032	0.002	0.034
	(0.033)	(0.035)	(0.026)	(0.035)
monitoring	0.049	**0.153*****	0.040	**0.146*****
	(0.034)	(0.039)	(0.027)	(0.038)
colleagues	−0.010	**0.106*****	0.015	**0.100*****
	(0.034)	(0.037)	(0.026)	(0.037)
Help from supervisors	−0.041	**−0.270*****	**−0.074*****	**−0.263*****
	(0.031)	(0.034)	(0.025)	(0.034)
Help from colleagues	**0.091****	**0.094****	**−0.126*****	**0.097****
	(0.046)	(0.047)	(0.034)	(0.047)
Tensions at work	**0.137*****	**0.484*****	**0.109*****	**0.484*****
	(0.034)	(0.033)	(0.028)	(0.033)
Lack of time	0.009	**0.267*****	**0.099*****	**0.266*****
	(0.034)	(0.039)	(0.026)	(0.039)
Under pressure	0.017	**0.339*****	**0.143*****	**0.324*****
	(0.034)	(0.039)	(0.027)	(0.039)
Choice of methods	**−0.097*****	−0.051	0.025	−0.032
	(0.037)	(0.041)	(0.030)	(0.042)
Initiative	−0.033	0.044	**0.094*****	0.041
	(0.031)	(0.033)	(0.024)	(0.033)
Work-to-life conflicts	−0.028	**0.321*****	0.036	**0.327*****
	(0.039)	(0.046)	(0.030)	(0.046)
Fear of job future	−0.059	**0.228*****	**0.092*****	**0.226*****
	(0.038)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.133*****	**0.282*****	0.021	**0.278*****
	(0.031)	(0.033)	(0.024)	(0.033)
Mistreatment		**0.349*****		**0.410*****
		(0.061)		(0.060)
sigma	21.273	21.273	1.706	1.706
theta	1.858	1.858	−0.515	−0.515
tau	0.322	0.322	−0.344	−0.344
AIC	80421.762	80421.762	78048.535	78048.535
Log Likelihood	−40069.881	−40069.881	−38883.267	−38883.267
Num. obs.	19285	11073	19285	11073

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.

E Additional controls for past health and employment history

Finally, in this last section, we present the results associated with models including additional control variables relating to past health and employment history in order to control for the possible self-selection of employees in their employment.

Table 16: SA and SP models with additional controls about past health and employment history

	Sickness absenteeism		Sickness presenteeism	
Equation	SA days	Illness	SP days	Illness
Distribution	(NB II)	(logit)	(PIG)	(logit)
Copula	Joe		Student-t	
Constant	**1.575*****	0.236	**1.180*****	0.173
	(0.368)	(0.369)	(0.283)	(0.369)
Health (ref: good)				
bad or very bad	**0.584*****		**0.442*****	
	(0.057)		(0.050)	
rather good	**0.176*****		**0.285*****	
	(0.034)		(0.027)	
very good	−0.080*		**−0.149*****	
	(0.042)		(0.033)	
Chronic disease	**0.194*****		**0.060****	
	(0.032)		(0.025)	
Unemployment 3-12 months	0.050	**0.092*****	−0.032	**0.082****
	(0.032)	(0.034)	(0.025)	(0.034)
Unemployment >1 year	**0.134*****	**0.236*****	0.017	**0.230*****
	(0.037)	(0.040)	(0.029)	(0.040)
Health problem >1 year	**0.166*****	**0.224*****	0.018	**0.245*****
	(0.059)	(0.074)	(0.049)	(0.075)
Other break >1 year	0.001	−0.019	0.039	−0.027
	(0.039)	(0.043)	(0.031)	(0.043)
Occupation (ref: employee)				
labourer	0.061	0.072	−0.024	0.088
	(0.053)	(0.057)	(0.043)	(0.057)
intermediate	0.084*	0.020	−0.004	0.016
	(0.044)	(0.047)	(0.034)	(0.047)
executive	−0.018	−0.058	0.005	−0.042
	(0.064)	(0.064)	(0.048)	(0.064)
Seniority	0.006	**0.025*****	−0.006	**0.027*****
	(0.006)	(0.006)	(0.005)	(0.006)
Seniority^2	−0.000	**−0.001*****	0.000	**−0.001*****
	(0.000)	(0.000)	(0.000)	(0.000)
Work alone	**−0.073****	**0.084****	0.019	**0.093****
	(0.035)	(0.037)	(0.027)	(0.037)
Supervisor	**−0.196*****	**−0.229*****	−0.015	**−0.207*****
	(0.051)	(0.049)	(0.037)	(0.049)
Public	**0.148*****	**0.125*****	−0.002	**0.106****
	(0.043)	(0.047)	(0.034)	(0.047)
Temporary	**−0.483*****	**−0.542*****	0.036	**−0.533*****
	(0.079)	(0.070)	(0.058)	(0.070)
Working time	**0.065*****	**0.039*****	−0.014*	**0.038*****
	(0.011)	(0.010)	(0.007)	(0.009)
Working time^2	**−0.001*****	**−0.001*****	**0.000****	**−0.000*****
	(0.000)	(0.000)	(0.000)	(0.000)
Atypical schedules	**−0.098*****	**−0.069****	**0.056****	−0.058*
	(0.031)	(0.033)	(0.025)	(0.033)
Wage (ref:1,800-2,499)				
100-1,199	0.058	−0.064	−0.005	−0.060
	(0.067)	(0.071)	(0.052)	(0.071)
1,200-1,499	0.047	**−0.112****	−0.011	−0.080
	(0.047)	(0.052)	(0.038)	(0.052)

	SA days	Illness	SP days	Illness
1,500-1,799	0.056	−0.087*	0.049	−0.078
	(0.043)	(0.048)	(0.034)	(0.048)
2,500-2,999	0.035	−0.079	0.077*	−0.079
	(0.062)	(0.062)	(0.047)	(0.062)
3,000-20,000	0.029	**−0.131****	−0.000	**−0.139****
	(0.068)	(0.065)	(0.050)	(0.064)
Quantified target	0.060*	**0.116*****	**0.085*****	**0.103*****
	(0.035)	(0.039)	(0.028)	(0.039)
Work rhythm paced by:				
machine	0.058	**0.176*****	0.012	**0.168*****
	(0.047)	(0.057)	(0.038)	(0.057)
demand	**−0.137*****	−0.018	**0.055****	−0.010
	(0.035)	(0.036)	(0.028)	(0.036)
norms	0.015	0.064*	0.008	**0.077****
	(0.033)	(0.035)	(0.026)	(0.035)
computer control	0.010	0.033	0.003	0.037
	(0.033)	(0.036)	(0.026)	(0.036)
monitoring	0.048	**0.151*****	0.041	**0.140*****
	(0.034)	(0.039)	(0.027)	(0.039)
colleagues	−0.008	**0.107*****	0.014	**0.101*****
	(0.034)	(0.038)	(0.026)	(0.038)
Help from supervisors	−0.038	**−0.266*****	**−0.074*****	**−0.260*****
	(0.031)	(0.035)	(0.025)	(0.035)
Help from colleagues	**0.093****	**0.095****	**−0.126*****	**0.099****
	(0.046)	(0.047)	(0.034)	(0.047)
Tensions at work	**0.128*****	**0.471*****	**0.110*****	**0.472*****
	(0.034)	(0.033)	(0.028)	(0.033)
Lack of time	0.008	**0.271*****	**0.100*****	**0.270*****
	(0.034)	(0.039)	(0.026)	(0.039)
Under pressure	0.016	**0.327*****	**0.144*****	**0.310*****
	(0.034)	(0.039)	(0.027)	(0.039)
Choice of methods	**−0.092****	−0.055	0.023	−0.040
	(0.037)	(0.041)	(0.030)	(0.042)
Initiative	−0.031	0.051	**0.094*****	0.048
	(0.031)	(0.033)	(0.024)	(0.033)
Work-to-life conflicts	−0.034	**0.315*****	0.036	**0.318*****
	(0.039)	(0.046)	(0.030)	(0.046)
Fear of job future	−0.066*	**0.215*****	**0.094*****	**0.213*****
	(0.038)	(0.042)	(0.029)	(0.042)
Organizational changes	**0.130*****	**0.270*****	0.021	**0.262*****
	(0.031)	(0.033)	(0.024)	(0.033)
Family conflicts		**0.354*****		**0.398*****
		(0.035)		(0.035)
sigma	21.102	21.102	1.703	1.703
theta	1.820	1.820	−0.516	−0.516
tau	0.312	0.312	−0.345	−0.345
AIC	80293.115	80293.115	77907.737	77907.737
Log Likelihood	−39997.558	−39997.558	−38804.868	−38804.868
Num. obs.	19285	19285	19285	19285
Selected obs.	11073	11073	11073	11073

Notes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$
We control for individual characteristics, firm sectors and firm size.