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“Never on a Sunday”: Economic Incentives and Sick Leave in Sweden

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Abstract

Using a longitudinal data for about 1800 persons observed between 1986 and 1991, this study investigates the incentive effects on short-term sickness spells of two important regime changes in the social insurance system in Sweden implemented in 1987 and 1991. The results indicate that the rules influenced people’s decisions about when to report the beginning and ending of sickness spells. The 1991 reform, which reduced the replacement rate, had a stronger effect on reducing the duration of short-term absences than the 1987 reform, which restricted the payment of sickness cash benefit to only scheduled workdays.

Key words: short-term absenteeism due to sickness, sickness insurance, reform, multiple spells, unobserved heterogeneity.

JEL classification: I18; J22; J32; J33.

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I. Introduction

The rapidly rising absence from work due to sick leave, and related huge increase in compensation from the national sickness insurance system, experienced in last decade in Sweden has caused great political concern. Because compensation systems are politically sensitive to change, the economic burden has to some extent been passed over from the public insurance system to the employers by making those financially responsible for the short-term absences. While pure medical indicators show that Swedes gradually have become healthier, reported sickness points in the opposite direction. A rather heated political debate about incentive structure and potential misuse of the insurance system has followed. The purpose of this paper is to analyze the impact on individual behavior, especially the duration and weekly time pattern of sick leave, caused by changes in the compensation system. I will focus on the rapidly increasing short-term sickness spells, since it seems obvious that the incentive problems are especially serious here.

In Sweden, the total number of reported sick days *covered by the social insurance* more than doubled between 1996 and 2002, and in 2002 they are 1.5 times higher than in 1992.[1] In reality, the *actual* days of absence from work due to illness are even higher, due to the fact that since 1992 the financial responsibility for the *first* (two, three, or four) *weeks* of each sick leave period was moved to the employers (called *the employer*

[1] The Swedish National Social Insurance Board (RFV) is the source of data for the entire paper.

period).[2] The days paid by the employer are no longer recorded in the national insurance statistics, which makes it difficult (or almost impossible) to analyze the short-term sickness spells. To my knowledge, there are no available statistics about the total days of sickness covered by the employer after 1992. However, the statistics before 1992 are rich on information about short-term spells (i.e., duration of 7 days or less). For example, during the period 1988-1990, when the total number of reported sick days covered by the social insurance was approximately the same as in 2002, the spells of short-term absenteeism represented about 85% of all sickness spells, and accounted for about 23% of all days with a sickness benefit. In most of the cases, a medical certificate was required from day eight of each spell.

In both economic and psychological research, a common assumption is that individuals rationally allocate their labor supply by making daily decisions to attend the work or non-work setting with the highest expected utility.[3] Thus one would expect that some of the short-term spells may be *voluntary absenteeism*, i.e., people might take some days off by reporting sick and receive the compensation of their loss of earnings (which is somewhat lower than what they would get if they would be working). However, in the political debate, the causes behind the rapid increase in the number of

[2] Before January 1, 1992, all compensation for earnings lost during sickness was paid by the social insurance system, but since then, during the first days of a sickness period (called the sick pay period), employees receive sick pay directly from their employer. From 1992 to 1996, the sick pay period was 14 days, then through March 1998, it was 28 days, and since then it has once again been 14 days until July 2003, when it increases to 21 days.

[3] See e.g., Winkler (1980), Chelius (1981), Youngblood (1984), Lantto (1991).

sick days are highly controversial and especially whether there are strong disincentive effects on work from high compensation levels in the publicly financed sickness insurance system.

More than 12 important changes in the insurance rules have occurred since 1955, when the compulsory sickness cash-benefit insurance was implemented in Sweden. Most of them concern the waiting period before compensation, the time limit for the coverage and the compensation level. There are some previous Swedish studies analyzing the effect of the rules' change on sickness absenteeism.[4] Empirical results indicate that when the benefits become more generous, i.e., higher compensation rates compared to the previous period (as in 1963, 1967, 1974, 1987, and 1998), the number of sick days increase, and when the compensation rates decrease (as in 1991 and 1995), the number of sick days fall.[5]

The contribution of this study is an analysis of the effects of two important reforms (implemented in 1987 and 1991 in the Swedish social insurance system) on short-term sick spells (i.e., spell of seven days or less) Using a longitudinal data for about 4500 persons observed between 1986 and 1991, this study analyzes the duration

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[4] See e.g., Latto and Lindblom (1987), Johansson and Palme, (1996, 2002), Johansson and Brännäs (1998), Bäckman (1998), Lidwall and Thoursie (2000), Broström et al. (2002), Henrekson and Persson (2004), and Skogman Thoursie (2002). *Economic incentives* are captured by the after-tax wage rate, or the difference (or ratio) between the wage rate and the sick-leave compensation. The analyses are done either at a single point in time, or over time.

[5] See e.g., Lantto and Lindblom (1987), Bäckman (1998), Lidwall and Thoursie (2000), Johansson and Palme (2002), and Henrekson and Persson (2004).

and weekly time pattern of sick spells with regard to individual and labor market characteristics, but also with regard to characteristics directly related to the spells: diagnosis, the season when they occurred, the weekday when they started and the daily loss in earnings, controlling for changes in the rules and unobserved heterogeneity.

The next section mainly describes the institutional setting, and Section 3 presents the data. The econometric specification and results are presented in Sections 4 and 5 respectively. Section 6 summarizes and draws conclusions.

II. Sickness cash benefit in Sweden, rules and statistics

This study analyzes the period from January 1986 through December 1991, during which all residents of Sweden, aged 16-64 years, and whose annual income was at least 6000 Swedish Krona (i.e., about 1100 US dollars in 1991) were eligible for a sickness cash benefit if they lost income due to sickness.[6] The National Insurance Act gives no general definition of sickness, but according to the National Social Insurance Board's recommendation, *sickness* is an abnormal physical or mental condition; if it reduces normal work capacity by at least 25%, the afflicted individual can qualify for a sickness cash benefit.[7] *Normal work capacity* is defined as either the ability to perform the same task, or the ability to earn the same income, as prior to sickness.

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[6] This applied not just to employees, but also to the self-employed, who had a choice of applicable coverage, however.

[7] The sickness cash benefit is actually granted by the local social insurance offices. The National Social Insurance Board cannot set binding policy for them, but can only recommend its interpretation of law.

There were two social insurance reforms during the study period, effective December 1, 1987, and March 1, 1991. The changes that affected short-term absenteeism due to sickness are summarized in Table 1.

< Table 1 here >

Before December 1987,[8] there was one unpaid qualifying or waiting day before a sickness cash benefit could be claimed. For sickness spells of 7 days or less (excluding the first day), the compensation was not provided for non-working days (at most, two days).[9] However, during 1974-1987 it was possible to avoid the waiting period by reporting sick before midnight on the preceding day (even if this was a Sunday).[10] Starting with December 1987, the waiting day was abolished, and a sickness cash benefit was provided from the day the sickness was reported to the social insurance office. However, a cash benefit was now only provided for scheduled workdays during the first *fourteen* days of absence. Until March 1991, the sickness cash benefit replaced 90% of lost earnings, while afterwards decreases to 65% for the first 3 days, and 80% from day 4 to day 90. The cash benefits, as many other social insurance payments, are linked to the so-called *base amount*, which is an amount of Swedish Krona, fixed one

[8] The last reform before December 1987 was in 1974, when the sickness cash benefits were made taxable, and the replacement rate changed to 90% of the gross earnings.

[9] For longer spells, compensation was paid for all days, except the registration day.

[10] In 1985 some administrative changes (for state employees) implied that also the day for calling in sick and weekends were counted as sickness absence days.

year at a time.[11]

Table 2 (which motivated the interest for this study) shows that about 85% of all sickness spells which ended in 1991 had a duration of 7 days or less, and accounted for about 20% of all days with a sickness benefit.[12] On the other hand, sickness spells of 90 days or more accounted for only 2% of the cases, but for over 55% of compensated days.

< Table 2 here >

The percentage of 1-7 day cases had been substantially lower in 1986 and 1987. The jump in 1988 (and thereafter) appears to relate to the fact that, from December 1987, the previous unpaid "waiting day" was eliminated, although the compensation was provided for only those days when people were scheduled to work.

III. The data

The sample used in this study is from the LS-database provided by the National Social Insurance Board of Sweden.[13] It is a random sample of the *entire population* of Sweden who were eligible for a sickness cash benefit (i.e., annual income was at least 6000 Swedish Krona and they lost at least 25% of their work capacity). It contains

[11] The amount is appreciated in line with price changes, measured by the Consumer Price Index. The amount is also used when calculating the **upper limit** (7.5 times the base amount per year), which was **SEK 241 500** for 1991 (i.e., about USD 40 000 in December 1991, the end of the period analyzed here).

[12] During the study period, excepting one waiting day before December 1987, social insurance covered all days of employees' sickness.

[13] LS stands *long-term sickness*.

information about all spells of sickness from January 1, 1986 through December 31, 1991, with exact dates and employment status when they started and ended, and their diagnosis,[14] but also about individuals' demographic characteristics and their income.

Given the goal of this paper (to explain the length of the short-term absenteeism under different institutional settings), we select *only* spells of maximum 7 days. Descriptive statistics at the individual and spell level of the analyzed sample are presented in Appendix (Tables A1 and A2). On average, people had around 9 spells of short-term absence during 1986-1991. As Figure 1 shows, the frequency of one- and two-day spells increased substantially after the 1987 reform eliminated the unpaid waiting day, while the frequency of six-day spells decreased dramatically. The increases suggest strongly that the number of short-term sick leaves was affected by the availability of a sickness cash benefit from the first day after the reform. On the other hand, the decrease in six-day (but not seven-day) spells might be interpreted as a "timing" of absenteeism.

<Figure 1 here>

After the 1991 reform (that reduced the replacement rate) people seem to have returned to work sooner; i.e., the proportion of one- and two-day absences again increased for both samples, and the proportion of 6-day (and even 7-day) absences again decreased.

Figures 2 shows the three regimes compared with respect to the weekday when

[14] Most of diagnoses on short-term absenteeism are decided at the social insurance office based on the description that the insured persons give when they report their absence due to sickness.

reported short-term absences began and ended. Before the 1987 reform, the highest proportion of reported short-term sickness started on Tuesdays. In principle, the database is designed to record all days of sickness, including uncompensated days (such as waiting days and regular non-working days, mainly for the state employees). However, the Tuesday phenomenon could indicate that some spells recorded then during the first regime actually began on Monday (which would have been the unpaid waiting day). After the 1987 reform, this sort of "confusion" would have disappeared, and Monday clearly became the most "popular" starting day during the remaining two regimes. After the 1987 reform eliminated coverage on non-working days, there were also fewer spells reported starting on the weekend. The 1987 reform clearly had a big impact on the weekday when spells ended. Before the reform, spells ended most often on Sunday (regardless of when they started), but afterwards they ended most often on Friday. The 1991 reform made little difference in this respect.

<Figure 2 here>

IV. Econometric specification

This study applies a multiple-duration model to estimate the hazard of ending the spell of short-term absence. I will estimate the hazard of ending the spell of *short*-term absence, by analyzing multiple spells of that length 1-7 days.

In the applied econometric literature on the estimation of multiple-duration models, the range of different models is actually not very large. I will here apply the proportional hazards model with random effects,[15] an extension of the Cox model, which has become very popular for analyzing multivariate survival data.[16] The model is also called the mixed proportional hazards model or the frailty model. A rather general description of frailty models has been given by Vaida and Xu (2000). Frailty models for survival data are the counterparts for mixed effects models for normal data; the main idea is to have a model that can handle survival times that are dependent within clusters.

Frequently in the analysis of survival data (e.g., how long sick employees "survive" before returning to work, recurrent event times for a patient), survival times within the same "group" are correlated due to unobserved covariates. The approach taken here is to include such covariates in the model as *frailties*. A frailty term represents the common covariates that are not observed or are neglected. A *frailty model*

[15] Van den Berg (2001) provides an overview of duration analysis, with an emphasis on models for multiple durations, especially on the mixed proportional hazard (MPH) model and its multivariate extensions. For the multivariate mixed proportional hazard model, in which the marginal duration distributions each satisfy an MPH specification, and the durations can only be dependent by way of their unobserved determinants, he discusses the dimensionality of the heterogeneity distribution, and compares the flexibility of different parametric heterogeneity distributions.

[16] Clayton (1978) and Oakes (1982) were the first to consider frailty models for multivariate survival data, using gamma distribution for the frailty. Hougaard (1986) introduced the G-family of distributions, which includes the gamma distributions and inverse Gaussian distributions. He also used the positive stable distribution for the frailty, along with arbitrary and Weibull hazards. Lu and Bhattacharyya (1990) used the Weibull distribution to model the frailty parameter, while Whitmore and Lee (1991) studied a model with inverse gamma frailties.

is a random effects model for time variables, where the random effect (the frailty) has a multiplicative effect on the hazard. This model can be used to describe the influence of unobserved covariates in a proportional hazard model, for example with multivariate failure times generated independently given the frailty for "groups" (both for survival times for related individuals, like twins or family members, and for repeated events for the same individual).[17] These frailty random block effects generate dependency between the survival times of the individuals that are conditionally independent given the frailty. Here I will assume that all individual variation in the hazard function can be characterized by a finite-dimensional vector of observed explanatory variables x and an unobserved heterogeneity term u.

(1) $h_{ij}(t; x_{ij}, u_i) = h_0(t) u_i \exp(\beta x_{ij})$, $i = 1, 2, \ldots, G$, $j = 1, 2, \ldots, n_i$, and $0 < t < t^*$,

where h_{ij} represents the hazard rate of subject j in group i; G is the number of individuals; n_i is the number of spells for each group, and t^* is a time horizon. $h_0(t)$ is the baseline hazard function, and x_{ij} are the explanatory variables, which in our data, except gender, all are time-varying. u_i (u_i=exp(σw_i) can be interpreted as a function of unobserved explanatory variables. I assume a *gamma* frailty distribution, which is commonly used because of mathematical convenience.

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[17] Much empirical research in economics is concerned with the analysis of duration data. In many applications multiple durations of a given individual are observed with possible covariates. Examples of multiple-spell duration data can be found in Van den Berg (2001)'s survey.

V. Empirical Results

Sick leave time pattern

In the first step, a preliminary analysis of the short-term absences due to sickness was produced using nonparametric estimation (Figure A1 in Appendix). The hazard plots suggest that, in general, the closer was the beginning of the spell to the following weekend, the shorter was the spell, so that the most likely *ending* day was Friday. This effect is especially visible (in both of the following periods) after the 1987 reform, which restricted the coverage of the earnings lost only to scheduled work (which increased the probability of uncompensated weekends). These estimates suggest that there were differences across regimes, and also that, during each regime, there was a relationship between the weekday when the absenteeism started and its duration; i.e. spells that started at the beginning of the week were longer than those that started at the end of week. The result that (the few) absences that started on a Sunday or Saturday after 1991 are the longest, can be interpreted as an effect of the lower replacement rates during the first 3 days. If people are not scheduled to work, then they are not entitled to compensation during the weekends. Even though in practice for these employees these days were nor accounted as compensation days, it might happen that people expected that they will get, from the social insurance, 65% only on Monday (being the third day of the sickness spell), and 80% thereafter.

Explanatory factors

In the next step of the analysis, the effect of various factors on short-term absence due to sickness was estimated using a frailty model. Table 3 shows coefficient estimates, standard errors, and hazard ratios of the gamma frailty model, during the entire period

1986-1991, using dummies for the three policy regimes. Kendall's τ was quite small (about 0.10), which suggests weak association within the groups. There was thus a relatively small significant random effect related to the duration of short-term absences.

Women had about 22% higher hazard of ending short-term absenteeism than men. In general, the hazard of ending absenteeism was lower for older people, which means that younger people generally returned to work sooner. For nationalized Swedes and other foreign born individuals, for both samples, the hazard of ending absenteeism was about 82-86% of that of Swedish born people, which means that Swedish born generally returned to work sooner. A poor health background, selection to specific work environments due to ethnic background, and/or cultural differences might explain this. For married people, the hazard of ending absenteeism was slightly higher (about 10%) than for singles; i.e., married employees returned to work sooner.

Although, the absence rate during summer months was the lowest during the year, the hazard ratios by quarter show that short-term absences that began during summer lasted longest. The hazard of ending absenteeism was about 81% of that of winter's spells. Those whose absences started during the week (Monday-Friday) returned to work faster than those whose absences started on a weekend (i.e., 11-22% higher hazards).

<Table 3 here>

Daily earnings loss due to absence (computed function of potential earnings, replacement rate and ceiling's level) is another factor that had a statistically significant impact on absence duration. For each 100 Swedish Krona in daily earnings loss, the hazard of ending an absenteeism spell went up by 0.5%. Regional unemployment, however failed to pass the significance test.

Persons with musculoskeletal and cardiovascular diagnoses, as well as injuries and poisonings, were slower to return to work than those with general symptoms. Neither of the previous sickness history variables (total cases and total cases of long-term sickness) was found to be a significant determinant of short-term absence duration.

The regime dummies are also statistically significant, and show that the 1991 reform had an especially strong impact on absenteeism. After both reforms, people were more likely to return to work sooner compared to the period before December 1987: 13% higher hazard after the 1987 reform and 32% higher after the 1991 reform. Given the differences on the magnitude of regime dummies, a separate analysis was also done for each regime, whose results are presented in Table 4. The gamma frailty model was estimated for the first two regimes, but a standard Cox model for the last.[18]

<Table 4 here>

Kendall's τ was quite small (about 0.08) for the first two regimes regimes, which suggests weak association within the groups. During all three regimes, women returned to work faster than men (hazard ratios were in the range 1.24-1.30). In general, as one might expect, younger people returned to work faster than did older people. Across all regimes, the hazard of ending absenteeism for foreign-born people (whether nationalized or not) was always lower than that for Swedish born. In fact, it seemed to go down after the first reform, and it went down further after the second. The hazard for

[18] The data for the last regime (i.e., after the 1991 reform) did not support the gamma frailty model, possibly due to a short time horizon for this regime. The EM algorithm computes a likelihood assuming independence, i.e., $\theta = 0$, and then increases this values until it finds a likelihood which is larger than the likelihood at $\theta = 0$. From there, it starts a numerical routine to find the root. If it cannot find that point, then it is considered the independence case. Therefore, only *the first* spell of short-term absence after the 1991 reform was used, i.e., 559 spells out of 967 total. For the other two regimes there is a significant random effect related to absence duration by person.

ending absenteeism was higher for married people than for those who were unmarried, though it fell after the first reform, and still further after the second.

The results again show that there was a *timing of absenteeism* with respect to the weekday when the spell began, after the 1987 reform. Regardless of which weekday their absence began on, employees were less likely to return to work sooner (compared to the weekend) before the first reform, and even after this reform (except for Friday), but the trend disappeared after the second reform.

Daily loss of earnings had a modest effect. For each 100 Swedish Krona increase in daily earnings loss, the hazard of ending an absenteeism spell went up by about one half percent. The level of regional unemployment had no significant effect on absence duration before the 1987 reform, nor after the 1991 reform. This may suggest that the regional unemployment rate does not have effect on the duration of short-term absenteeism, but it is not excluded that it has effect on peoples´ decision of being short-term absent from work. During all three regimes the hazard of ending absenteeism was lower for those with musculoskeletal and cardiovascular diagnoses, as well as those with injuries or poisonings, compared to those with general symptoms.

In comparison with the earlier studies, the unique feature of this study is the analyses the short-term absenteeism for three different regimes using individual longitudinal data. Some of the estimated results are in line with the previous findings, but some are adding more information. For example, Henrekson and Persson (2004), using time-series data for Sweden during 1955-1999, find that the 1987 reform has a positive effect, while the 1991 reform has a negative effect on sickness absenteeism, while my estimates show that both reforms have a significant positive effect on *short-term* absenteeism. Johansson and Palme (2002) analyze the effect of economic incentives on worker absenteeism in Sweden during 1990-1991, and find that the cost of being absent (computed under the settings of both sickness insurance and tax systems) has a significant effect on work absence behavior. Even though this paper analyzes only the effect of daily earnings loss on absenteeism (i.e., the sickness insurance settings) I find no significant effect after the 1991 reform, but significant effects for the two earlier regimes. For each 100 Swedish Krona increase in daily earnings loss, the hazard of ending a spell of ST- absenteeism went up by about one half percent before the 1991 reform. This effect might be higher or lower if controlled for tax effects.

Moreover, Johansson and Palme (1996) model absenteeism as an individual day-to-day decision. Analyzing the change in male work absence between 1990 and 1991, they found that the number of days compensated by sickness insurance in the kind of spells affected by the change in the compensated level (since March 1, 1991) decreased on average by 16%. The 1991 reform affected the short-term absenteeism the most, the compensation decreasing from 90% to only 65% during the first three days and 80% thereafter but, as mention previously, I do not find any significant effect of the daily earnings loss on the duration of short-term absenteeism after the 1991 reform.

Earlier findings (e.g., Henrekson and Persson, 2004, Broström et al., 2002) show that the economic incentives appear to be the predominant factor in explaining the higher work-absence rate of females. For example, one third of the gender difference in work absence behavior during 1990-1991 can be attributed to differences in costs of being absent (see Broström et al., 2002). However, our estimates show that women had about 20% higher hazard of ending ST-absenteeism than men, which further research should consider when analyzing the sickness absenteeism using the registered data after 1991. Nevertheless, this can give some input to the political debate that is still concerned with the questions about why women are sick often and longer than men.

VI. Summary and conclusions

This study investigates the incentive effects on short-term sick spells of two important regime changes in the social insurance system in Sweden implemented in 1987 and 1991. The results suggest that economic incentives are important determinants behind the observed time pattern of sick spells. There were significant differences across regimes, and also, during each regime, there was a relationship between the weekday when the absenteeism started and its duration. Those whose absences started during the week (Monday-Friday) returned to work faster than those whose absences started on a weekend.

Women had about 20% higher hazard of ending short-term absenteeism than men. In general, the hazard of ending absenteeism was lower for older people, for Swedish born people, and for married. Persons with musculoskeletal and cardiovascular diagnoses, as well as injuries and poisonings, were slower to return to work than those with general symptoms. Neither of the previous sickness history variables (total cases and total cases of long-term sickness) was found to be a significant determinant of short-term absence duration. Moreover, the economic incentives (before taxes) had a modest effect, and the level of regional unemployment had no significant effect on absence duration before the 1987 reform, nor after the 1991 reform.

In sum, the 1991 reform, which reduced the replacement rate, had a stronger effect on reducing the duration of short-term absences than the 1987 reform, which restricted the payment of sickness cash benefit to only scheduled workdays. After the 1987 reform, fewer reported sickness starting on the weekend, and more on Monday. Generally, the closer to the end of the week was the beginning of the absence, the shorter was the spell. In conclusion, the *rules* clearly influenced people’s decisions about *when* to report the beginning and ending of sickness spells.

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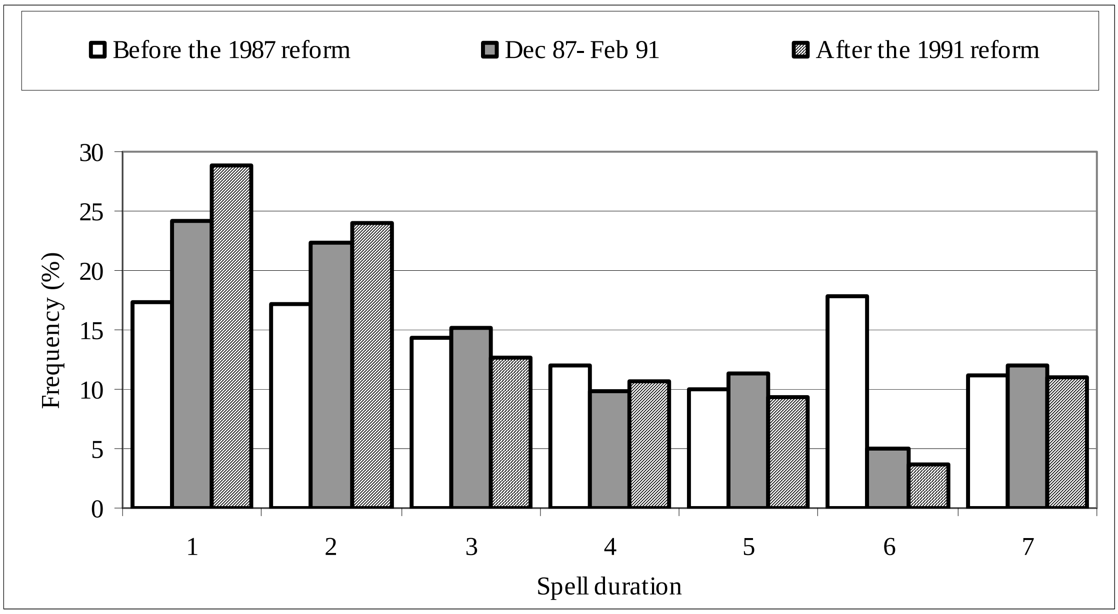


Figure 1 Distribution of short-term sickness spell-durations under three regimes.

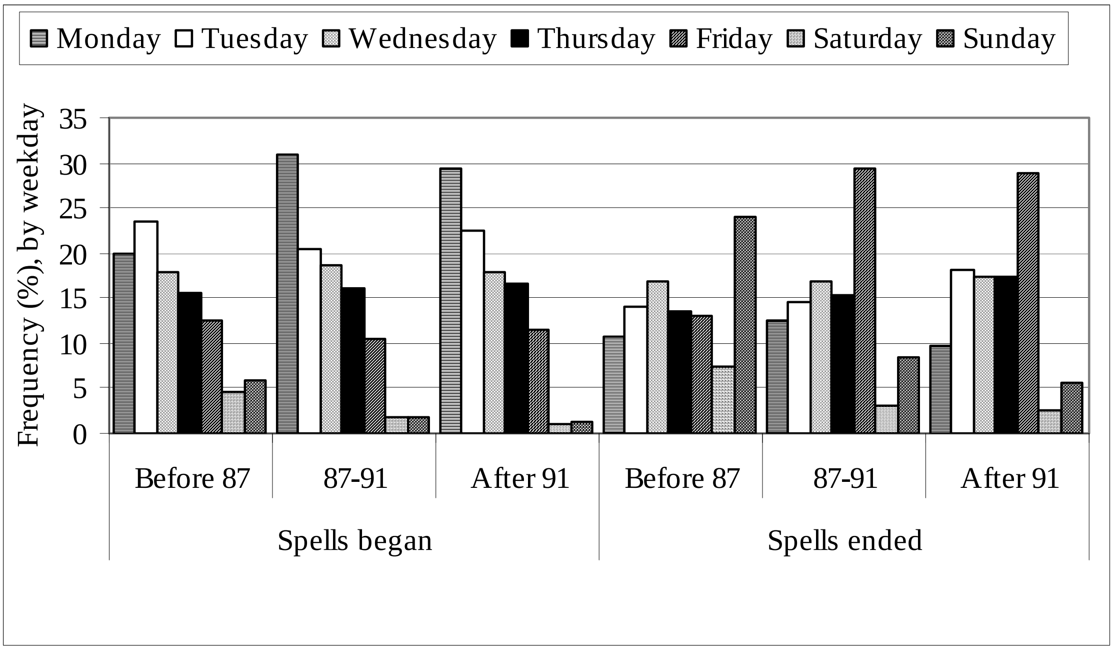


Figure 2 Distribution of short-term sickness spells by the day they began and ended under the three regimes.

Table 1 Social insurance rule changes affecting short-term absenteeism during 1986-1991.

Changes (in **bold**)	Regime 1	Regime 2	Regime 3
	Jan 1986 - Nov 1987	Dec 1987 - Feb 1991	March - Dec 1991
Coverage	• The first day of reported sickness NOT covered. • Holidays NOT covered	• **The first day of reported sickness covered** • **Only scheduled work days are covered.**	
Social insurance replacement rate (to a *ceiling level*)	90%	90%	**65% first 3 days** **80% day 4 - day 90** **90% day 91-**
Collective agreements		**+10%**	+10%

Table 2 Sickness spells and the total number of sickness cash benefit days, by spell-duration, 1986-91 (%).

	Cases of sickness concluded			Days of sickness cash benefit		
Year	1-7* days	8-89* days	90+ days	1-7* days	8-89* days	90+ days
1985*	75.6	22.3	2.1	16.2	39.7	44.1
1986*	76.9	21.1	2.0	16.8	38.1	45.1
1987*	77.4	20.6	2.0	16.8	37.0	46.2
1988	84.4	14.0	1.6	23.8	30.3	45.9
1989	84.9	13.4	1.7	23.0	29.0	48.0
1990	85.6	12.7	1.7	22.8	27.4	49.8
1991	85.4	12.6	2.0	19.9	24.4	55.7

*Before December 1, 1987, the day when the sickness was reported was not covered by social insurance, so that for most of the cases the number of actual sickness cash benefit days was 1-6, 7-89, and 90+.

Table 3 Estimation results for short-term absences during 1986-1991 (gamma frailty).

Variables	Estimate	Standard error	Hazard ratio
Frailty	**0.096**	0.008	1.101
Female (CG[a]: Male)	**0.194**	0.030	1.214
Age (CG: -35 years)			
36-45 years	-0.046	0.032	0.955
46-55 years	**-0.136**	0.035	0.873
56-65 years	**-0.203**	0.044	0.816
Citizenship (CG: Swedish born)			
Nationalized Swede	**-0.195**	0.061	0.823
Other foreign born	**-0.151**	0.053	0.860
Married (CG: Unmarried)	**0.090**	0.027	1.095
Quarter (CG: Winter)			
Spring	-0.007	0.026	0.993
Summer	**-0.096**	0.026	0.908
Autumn	-0.028	0.025	0.972
Diagnosis (CG: Respiratory)			
Musculoskeletal	**-0.074**	0.033	0.929
Cardiovascular	-0.199	0.119	0.820
Mental	-0.180	0.111	0.835
General symptoms	**0.375**	0.030	1.454
Injuries and poisoning	**-0.127**	0.050	0.881
Other	**0.376**	0.024	1.456
Weekday when absence started (CG: Weekend)			
Monday	**0.100**	0.044	1.105
Tuesday	**0.182**	0.045	1.200
Wednesday	**0.196**	0.046	1.216
Thursday	**0.193**	0.047	1.213
Friday	**0.178**	0.049	1.195
Previous cases [b]	-0.001	0.001	*-0.072*
Previous LTS[c] **cases**	-0.006	0.024	*-0.643*
Daily loss[d] (100 SEK)	**0.005**	0.001	*0.475*
Unemployment Rate	-0.005	0.011	*-0.500*
Regime (CG: before Dec 1987)			
Dec 1987 - Feb 1991	**0.127**	0.027	1.135
After Feb 1991	**0.275**	0.046	1.316
Kendall's τ	0.046		
	no Frailty	Frailty	Chi-Square
-2 Log Likelihood	54312.35	53901.91	410.4417

Note: **Bolds** are significant for the IP sample at the 5% level, *Italics* for hazard ratio indicate that, for the continuous variables, it has been recomputed as *phr* = 100*(*hr*-1). [a] CG indicates the comparison group. [b] Previous cases of sickness before the analyzed spell, since January 1983, regardless of their duration. [c] Previous cases of long-term sickness (LTS) before the analyzed spell, since January 1983, given that are at least 60 days of duration. [d] Daily earnings loss (before taxes) due to absence (computed function of potential earnings, replacement rate and ceiling's level).

Table 4 Estimation results for short-term absences, by regime

	Before Dec 87 (n = 3580)			Dec 87 – Feb 91 (n =8326)			After Feb 91 (n = 559)		
Variables	Estimate	S.E.	HR	Estimate	S.E.	HR	Estimate	S.E.	HR
Frailty	**0.07**	0.02	1.07	**0.08**	0.01	1.08			
Female (CG[a]: Male)	**0.22**	0.05	1.25	**0.21**	0.03	1.24	**0.26**	0.10	1.30
Age (CG: -35 years)									
36-45 years	-0.03	0.05	0.97	-0.05	0.04	0.95	-0.17	0.12	0.85
46-55 years	**-0.19**	0.06	0.83	**-0.11**	0.04	0.90	**-0.21**	0.12	0.81
56-65 years	**-0.29**	0.08	0.75	**-0.14**	0.05	0.87	**-0.38**	0.14	0.68
Citizenship (CG: Swedish Born)									
Nationalized Swede	-0.08	0.09	0.93	**-0.20**	0.07	0.82	**-0.40**	0.22	0.67
Foreign born	-0.13	0.08	0.88	**-0.14**	0.06	0.87	-0.26	0.18	0.77
Married (CG: Unmarried)	**0.13**	0.04	1.14	**0.08**	0.03	1.08	0.02	0.09	1.02
Quarter (CG: Winter)									
Spring	0.01	0.05	1.01	0.00	0.03	1.00	-0.09	0.11	0.92
Summer	-0.06	0.05	0.94	**-0.09**	0.03	0.91	-0.25	0.13	0.78
Autumn	0.05	0.05	1.05	-0.04	0.03	0.96	0.19	0.43	1.21
Diagnosis (CG: Respiratory)									
Musculoskeletal	**-0.15**	0.06	0.86	-0.05	0.04	0.95	-0.15	0.15	0.86
Cardiovascular	**-0.41**	0.25	0.66	-0.15	0.15	0.86	-0.24	0.52	0.79
Mental	**-0.32**	0.19	0.73	-0.14	0.15	0.87	-0.45	0.43	0.64
General symptoms	**0.19**	0.06	1.21	**0.39**	0.04	1.48	**0.73**	0.13	2.07
Injuries & poisoning	**-0.18**	0.09	0.84	**-0.13**	0.07	0.88	0.13	0.26	1.13
Other	**0.24**	0.05	1.28	**0.42**	0.03	1.52	**0.47**	0.11	1.59
Weekday when absence started (CG: Weekend)									
Monday	-0.02	0.07	0.98	**0.15**	0.07	1.16	0.24	0.29	1.27
Tuesday	**0.16**	0.07	1.17	**0.21**	0.07	1.23	0.36	0.29	1.43
Wednesday	**0.23**	0.07	1.26	**0.24**	0.07	1.27	0.21	0.30	1.23
Thursday	**0.20**	0.07	1.22	**0.25**	0.07	1.28	0.21	0.31	1.24
Friday	**0.25**	0.07	1.28	**0.20**	0.07	1.22	0.29	0.30	1.33
Previous cases [b]	**-0.01**	0.01	*-1.00*	0.00	0.00	*-0.20*	-0.01	0.00	*-0.48*
Previous LTS[c] cases	-0.12	0.09	*-11.51*	-0.03	0.03	*-2.49*	0.07	0.07	*6.74*
Daily loss[d] (100 SEK)	**0.01**	0.00	*0.78*	**0.01**	0.00	*0.47*	0.00	0.00	*0.18*
Unemployment rate	-0.02	0.02	*-2.14*	0.01	0.02	*0.93*	-0.02	0.05	*-2.07*
Kendall's τ	0.03			0.04					
	No frailty	Frailty	Chi-Sq.	No frailty	Frailty	Chi-Sq.	No covariate	Cov.	Chi-Sq.
-2 Log Likelihood	15462.6	15422	39.9	34583.4	34435	148.9	6254	6174	79.7

Appendix

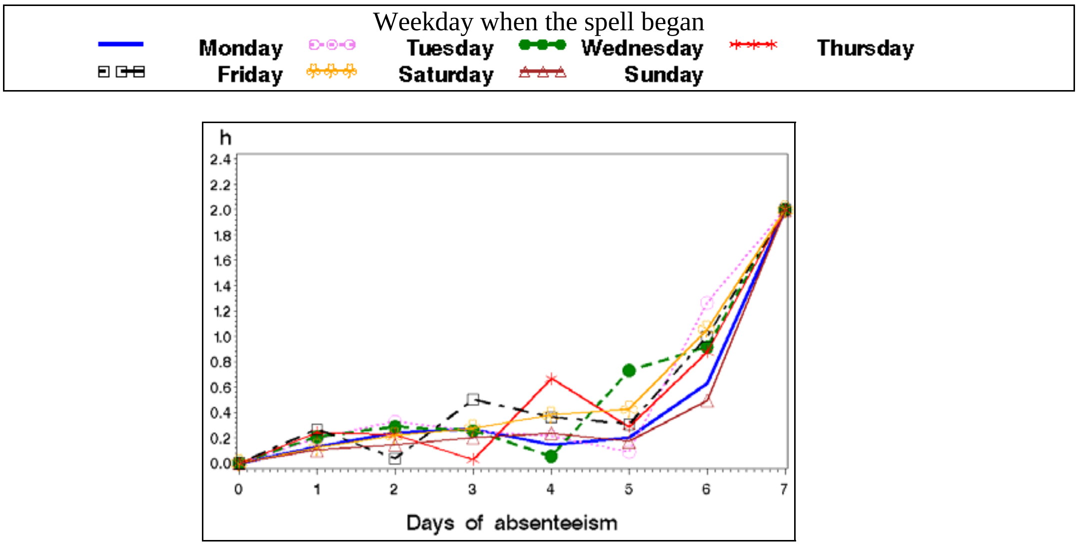
Table A1 Descriptive statistics of individuals, 1991.

Variable	Insured population (n=1813)		Insured population with short-term absence (n=1416)	
	Mean	Std Dev	Mean	Std Dev
Age	44.56	11.25	42.68	11.17
Gender (1= Female, 0=Male)	0.49	0.50	0.52	0.50
Citizenship				
Swedish born	0.88	0.33	0.88	0.33
Foreigner born	0.07	0.26	0.07	0.26
Nationalized Swede	0.05	0.22	0.05	0.22
Marital Status				
Unmarried	0.17	0.38	0.20	0.40
Married	0.74	0.44	0.70	0.46
Divorced	0.08	0.27	0.09	0.28
Widow/er	0.01	0.10	0.01	0.11
Annual earnings (deflated, CPI 1997), SEK	183365	100998	189497	90523
Absent during 1986-1991	0.78	0.43	1	0

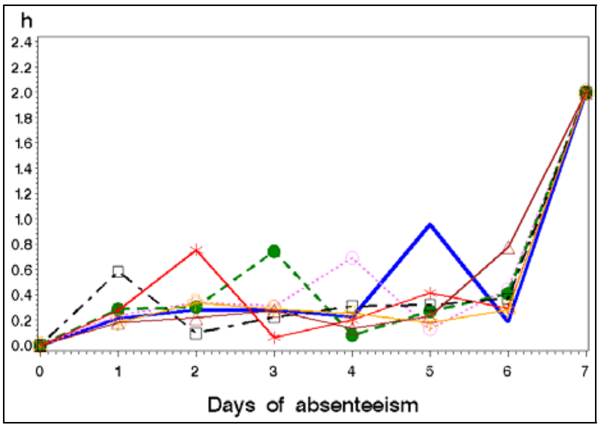
Note: *Italics* indicate dummy variables.

Table A2 Descriptive statistics of reported short-term absences by individual, 1986-1991.

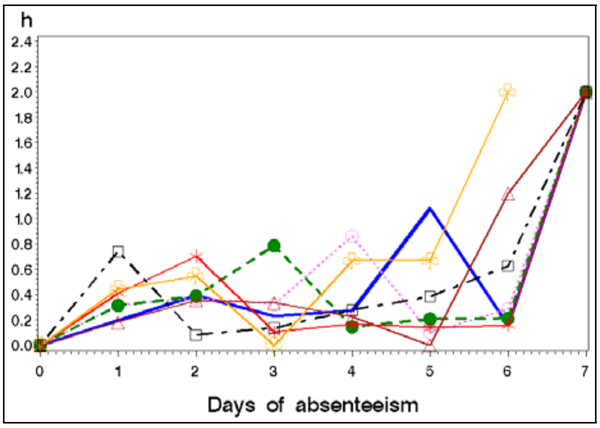
Variables	Insured population with short-term absence (n=1416) Mean	Std Dev
Total days short-term absent due to sickness, 1986-91	30.85	29.75
Total days of short-term sickness, 1986-91, by diagnosis		
Musculoskeletal	3.71	8.68
Cardiovascular	0.23	1.47
Respiratory	15.66	16.60
Mental	0.31	2.75
General symptoms	3.34	6.06
Injuries and poisonings	1.39	3.78
Others	6.21	9.12
Total number of short-term sickness spells, 1986-91	9.11	8.19
Total number of short-term spells, 1986-91, by diagnosis		
Musculoskeletal	0.93	2.12
Cardiovascular	0.06	0.35
Respiratory	4.25	4.10
Mental	0.07	0.65
General symptoms	1.20	2.02
Injuries and poisonings	0.34	0.81
Others	2.27	3.20
Number of spells, by the weekday they began		
Monday	2.53	2.73
Tuesday	1.95	2.27
Wednesday	1.67	2.05
Thursday	1.46	1.77
Friday	1.02	1.48
Weekend	0.48	1.01



a) Regime 1: before the 1987 reform



b) Regime 2: after the 1987 reform & before the 1991 reform



c) Regime 3: after the 1991 reform

Figure A1 Hazard Functions (*h*) by the weekday when absences began, and by regime.