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Incentive and spill-over effects of supplementary sickness compensation

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WORKING PAPER 2007:16

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ISSN 1651-1166

Incentive and spill-over effects of supplementary sickness compensation*

by
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June 19, 2007

Abstract

In 1998 the Swedish national sickness insurance policy changed to allow additional compensation from e.g. collective agreements after the 90th day of absence without a reduction of the public sickness benefit. We estimate the effects of this policy change on the duration of sickness absence for employees in the municipal sector. After the change in policy, this group received 10 percentage points additional compensation during day 91 to 360 in a sick leave. The results indicate that durations of at least 91 days increased by 4.7 days on average. As a consequence, the cost for the national sickness insurance increased by 3.0 percent. For the supplementary insurance to cover its total cost, insurance premiums should be increased by 22 percent.

Keywords: Social insurance, sickness absence, collective agreements.
JEL-codes: H51, H55, I38, J22

* The authors would like to thank Peter Fredriksson, Erik Grönkvist, Per Johansson, Peter Skogman Thoursie, seminar participants at IFAU and at SOFI for comments and suggestions. Financial support from the Swedish council for working life and social research (FAS, dnr 2004-2005) is acknowledged.
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1 Introduction

The current Swedish social insurance system consists of numerous insurance policies targeted at the working age population; examples include sickness-absence compensation, disability retirement, paid parental leave, child allowance and income support. To this, one should add the generous unemployment insurance, which is not classified in Sweden as a part of the social insurance system. The total public cost of these insurance policies amounts to almost 10 percent of national GDP.

During the 1990s, the national sickness insurance system changed frequently and most changes led to reductions of the replacement level during sickness absence. In the beginning of the 1990s the replacement level was 90 percent and the subsequent reductions were motivated by a relatively high level of sickness absence and the economic crisis in Sweden (Sjögren Lindquist & Wadensjö, 2005). In addition to the replacement from public sickness insurance, employees working where collective agreements are present can receive additional compensation from collective sickness insurances. The extent of these insurances is negotiated between the employers' associations and the labour unions. Between March 1991 and January 1998 no additional compensation from collective insurances was allowed after the 90th day of sickness absence due to a reduction policy[1] in the national sickness insurance. In January 1998 the policy was changed as the government had the opinion that the collectively agreed insurance solutions were discriminated by the policy in comparison to private insurance solutions. After the policy change additional compensation from collective insurances of up to 10 percent of the wage after the 90th day of absence was allowed. The ceiling on the additional compensation had two motivations: the replacement level should not be so high that the costs in the public insurance increased and differences in conditions between groups on the Swedish labour market should not be too large. (Government bill 1996/97:63)

In connection to the policy change, collectively agreed insurance for absence longer than 90 days was reintroduced for two groups on the Swedish labour market. Both blue-collar workers in the private sector and employees in

[1] The compensation from the national sickness insurance should be reduced by the amount received from collectively agreed insurance policies.

the municipal sector[2] were granted ten percent of their wage in additional sickness absence compensation for day 91 to 360 of their absence spell. The policy change did not affect the additional compensation for the two other groups on the Swedish labour market – central government employees and white-collar workers in the private sector.

Previous studies have shown that the replacement rate increases the individual's absence – at least for relatively short term absence. For example, Johansson & Palme (2005) finds that a decrease in the replacement rate during the first days of sickness absence decreases both incidence and prevalence. No previous study has analyzed the effect of replacement rate changes for long term sickness absence. It has only been analyzed in aggregate numbers in one published report (Lidwall et al, 2004), where the effect is hard to disentangle due to simultaneous replacement rate changes for short-term absence. In addition, no previous study has analyzed the effects of collectively agreed sickness absence compensation.

This essay aims to estimate the effect of replacement level change on the length of long-term sickness absence of an increased replacement rate caused by the change in reduction policy. The continued restriction on additional compensation was partly motivated by the ambition of keeping the costs of the public sickness insurance unaffected. For this reason it is interesting to examine whether there were any effects of the increased replacement and what the possibly increased length of absence implies for the costs in the national sickness insurance.

In relation to earlier studies, the present one brings new knowledge on economic incentives' effect on individuals who already have been absent for a long period of time. These individuals have doctors' certificates of illnesses which justify a long period of absence and as they already have been absent from work for at least three months they are accustomed to not working.

The data used in this essay comes from a database covering the entire Swedish population between 16 and 64 years of age. This database includes e.g. income variables from the tax register. To this dataset, sickness absence spell data from the Swedish Social Insurance Agency has been matched.

The results show that the increased replacement rate due to the reintroduction of collectively agreed additional sickness compensation for sick spells of at least 91 days increases the conditional sickness absence duration by

[2] In this essay we also include counties and congregations into the municipal sector.

on average 4.7 days. As a consequence of the increased duration, the costs for the publicly provided sickness absence insurance for spell durations of 91 to 360 days increased with 3.0 percent. In total for municipal workers with incomes below the ceiling, the public cost increased with 102 million SEK for sick spells started in 1999. If the insurance should bear the full burden of the policy, insurance premiums should be increased by at least 22 percent.

The paper is outlined as follows. The next section offers a brief survey of previous studies and their findings. This section also includes a discussion on how economic incentives could affect sickness absent individuals at a late stage of sickness absence. Section 3 presents the Swedish national sickness insurance and the collectively agreed sickness insurance. In section 4, the identification strategy is presented together with the econometric specification. The data are presented in section 5 and the results in section 6. Finally, section 7 concludes.

2 Sickness absence and economic incentives

The numerous changes in the Swedish sick leave replacement rate have affected the direct cost of sickness absence for the individual and the income lost during sick leave is likely to affect an individual's willingness to call in sick. Five studies on the effect of the cost of being absent on sickness absence behaviour are presented in *Table 1*.

Three published studies by Johansson and Palme deal with sickness absence among Swedish blue-collar workers. The study published in 1996 shows that the direct cost of being absent has a negative effect on male sickness absence. The second study, published in 2002, shows that increased cost of being absent decreases the incidence of sick leave and increases the intensity of returning to work if absent. In the third study (2005), they analyze the effect of the reduction in the sickness absence benefit on March 1st 1991, finding a negative effect of the reduced replacement rate on the probability of being sickness absent.

Table 1. Five studies on the connection between the replacement rate and sickness absence.

	Data	Dependent variable	Identification	Results
Johansson & Palme, 1996	Individual data from the 1981 Swedish Level of Living Survey on blue-collar workers between ages 20 and 64 together with sickness absence data from the Social Insurance Office -registers and income variables from tax registers.	Number of compensated days from the sickness insurance for each individual.	The direct cost of absence depends on the net hourly wage rate which in turn depends on the marginal income tax rate. The direct cost is ten percent of the net hourly wage if the yearly income is below the social insurance ceiling.	The estimated parameter of the cost variable is used to calculate an elasticity of the mean number of days absent with respect to the compensation level in share of income when working. This elasticity is estimated to 4.6 for men. The Slutsky condition is rejected for women.
Johansson & Palme, 2002	Individual data from the 1991 Swedish Level of Living Survey on employed blue-collar workers.	Duration of work and work absence for each individual.	A reform in the sickness insurance on March 1st 1991 reduced the replacement level for the first 90 days of an absence spell and a tax reform on January 1st 1991 reduced the marginal income tax.	A model used to simulate the effect of the sickness insurance reform shows that both the incidence and the duration of work absence spells decrease when the cost of being absent increases.
Henreksson & Persson, 2004	Aggregated data from the Social Insurance Office 1955-1999 together with complementary data on sick spells during the sick-pay period from the Swedish Employers' Confederation 1992-1999.	Average number of sick days per person per year.	Some reforms in the sickness insurance system during the period 1955-1999 are used as explanatory variables. The reforms could imply changes in the cost of sickness absence or changes in the strictness of the administrative routines.	In most cases the reforms in the sickness insurance significantly affected the sick leave behaviour. When the sick leave compensation was made more generous the number of sick days per person increased and the opposite occurred when the compensation was made less generous.

Table 1, cont.

	Data	Dependent variable	Identification	Results
Lidwall, Marklund & Skogman Thoursie, 2004	Three types of data are used: aggregated data on compensated sick-days from the Social Insurance Office 1955-2002, survey data on absence from the Labour Force Surveys 1963-2002 and monthly data on the number of long-term absence spells from the Social Insurance Office.	Three different dependent variables: average number of compensated sickness absence days per year, share sickness absent individuals during the whole reference week each year and the number of long term sickness absent individuals of 1000 insured each month 1992:12 to 2003:09.	Linear regression analysis with reforms in the sickness insurance system, relative unemployment, mortality and consumption of alcohol as explanatory variables.	Some reforms gave a significant effect on the number of compensated days but fewer reforms gave a significant effect on the share absent during a reference week. More restrictive replacement and regulation gave significant effects on long-term absence for both men and women but higher replacement rate had no significant effect. The effects of the restrictive reforms were stronger for men than for women.
Johansson & Palme, 2005	Individual data from the 1991 Swedish Level of Living Survey on blue-collar workers between 20 and 64 years of age together with the Social Insurance Office register on compensated sickness absence.	Incidence and duration of work absence for each individual.	A reform in the sickness insurance on March 1st 1991 led to increased direct cost of being absent for the first 90 days of an absence spell.	There is a significant negative effect of the reform on incidence of sickness absence for both men and women, and the effect is stronger for men. For the absence duration there is a significant increase in the hazard of ending a short absence spell (< 4 days for men and < 8 days for women) after the reform. The hazard of ending an absence spell longer than 90 days decreases after the reform according to the results.

Henrekson and Persson (2004) study the effect of changes in the sickness insurance system on the sickness absence rate using aggregated Swedish time-series data covering 1955-1999. Their finding is that the generosity of the sickness insurance system significantly affects the sickness absence behaviour. Lidwall et al. (2004) find, in a similar study on the average number of sick days using a time-series from 1955 to 2002, that some of the reforms in the sickness insurance system have had a significant effect on the absence rate. Lidwall et al. also make a separate analysis of long-term absence finding significant effects of the restrictive reforms on the number of long absence spells each month.

Thus, according to all these results, there seem to be a positive relationship between the sick-leave replacement rate and sickness absence. None of the previous studies take direct consideration to changes in the collectively agreed compensation. The collectively agreed compensation increases the compensation level for some groups on the Swedish labour market and causes differences between groups which may be important when measuring effects of replacement level changes.

2.1 Long-term sickness absence and economic incentives

If an individual's current health-status ranges from extremely poor to extremely good, then there is a certain level of health under which it is impossible for any individual to attend work or fulfil any relevant tasks; i.e. these individuals cannot be affected by any economic incentives. At the top end of the health-distribution there is a level over which no doctor would sick-list an individual as the health – if visible – is too good to qualify the individual as ill or work limited. In between the two levels is a grey zone where it is possible – to different extents – for an individual to attend work but it is also possible to get a doctor's certificate of illness. In Sweden, a physician is only supposed to write a certificate of illness for an individual who have such an impaired health due to illness that he/she can not fulfil his/hers ordinary – or possible temporary – work-assignments[3].

[3] If the working ability is limited by less than ¼ then no sickness benefits should be available. The extent of the working-time the individual is sick-listed should reflect the extent of the impaired working ability. If the individual is unable to perform ¼ of the daily work then he/she is supposed to be sick-listed for ¼ of the working-time only (Lag (1962:381) om allmän försäkring).

Two surveys were made in one Swedish county (Englund & Svärdsudd, 2000 and Englund, 2001) showing that doctors often issue certificates of illness on the patient's own initiative despite that they would not recommend sickness absence for the patient. This indicates that the patient can have a strong influence on the sickness absence even if a doctor's certificate is required.

The final decision to sick-list an individual in Sweden is made by the Social Insurance Office – the doctor's certificate is only a recommendation. The cases where the Social Insurance Office has made a decision against the doctor's recommendation are few but have increased during the last few years[4] (Försäkringskassan, 2005). The obvious final decision is made by the individual; he or she can choose not to prolong the sick-listing or choose to return to work earlier.

If the individual can choose between staying absent and returning to work and is indifferent between the two alternatives at the current health-status, working-conditions, replacement level etc, then theoretically a change in the replacement-level can affect the decision of attending or not attending work (Holmlund, 1991). None of the studies presented in Section 2 discusses how/if economic incentives can affect sickness absent individuals after a long period of absence. The incentives, analyzed in this report, changes after three months of absence and the magnitude of their effect can not be predicted using previous results.

3 Sick-leave compensation in Sweden

3.1 The national sickness insurance

Private insurance for wage replacement during sickness absence has been available in Sweden since the mid 18th century. In the late 19th century, the government started to regulate the sick leave insurance market and subsidized parts of the administrative costs (Edebalk, 2005). Publicly provided sickness insurance was introduced in 1955 and were from the beginning (and still is) an income replacement insurance.

[4] The share of applications for new or continuing sickness benefits not granted were 0.69 percent in May 2005.

The Swedish sick leave compensation scheme has been changed numerous times during the 1990s, affecting both the compensation level and the employer's responsibility for the sick leave compensation (the sick-pay period). The replacement levels, from employers and from the sickness insurance, for the relevant time-period – between 1997 and 2003 – are presented in *Table 2*. A doctor's certificate is required from the 8th day of sickness absence.

In 1996 and 1997, the government-provided sick leave replacement rate was 75 percent of the lost income. The sick-pay period was extended to 28 days during the period January 1997 to March 1998, at April 1st 1998, it returned to 14 days. The replacement rate was raised to 80 percent of lost income in January 1998 and remained at that level until July 2003.

Table 2. Replacement rates from employers (sick-pay) and from the National Sickness Insurance (sickness benefit) by sickness duration, 1997-2003.

Day in sick leave	**Jan 1997-Dec 1997**		**Jan 1998-Mar 1998**		**Apr 1998 – June 2003**	
	Empl.	*NSI*	*Empl.*	*NSI*	*Empl.*	*NSI*
1	0	0	0	0	0	0
2-14	75	0	80	0	80	0
15-28	75	0	80	0	(10)	80
29-90	(10)	75	(10)	80	(10)	80
91-360	0	75	(10)*	80	(10)*	80
361-	0	75	0	80	0	80

Note: The figures to the left hand side for each time period show the sick-pay from employers, figures in brackets indicate compensation regulated through collective agreements. Figures denoted by an asterisk indicate collective agreements covering only blue-collar workers in the private sector and workers in the municipal sector. The figures to the right hand side for every time period show the replacement level (of income under the ceiling – income over the ceiling is not compensated) in the national sickness insurance.

3.2 Collective agreements

In 1899, the first collective agreement regulating sickness compensation was introduced covering brewery workers in Stockholm. The number of collective agreements including sickness benefits increased rapidly during the following 20 years, and in 1921 more than 800 collective agreements (mainly local) covering fully 25 percent of the labour force included sickness absence compensation schemes. (Edebalk, 2005)

As a consequence of the introduction of publicly provided sickness insurance in 1955, some groups (mainly private white-collar workers) were facing a reduction in compensation if their collective agreement regulated compensation was removed. This lead to renegotiation of many collective agreements which resulted in, for example, extra compensation and sick-pay during the waiting days in the national sickness insurance. In the beginning of the 1970's, collectively agreed additional sickness compensation covering municipal employees and private blue-collar workers took effect.

The replacement levels in the national sickness insurance were lowered in March 1991 and at the same time a reduction policy was introduced in the sickness insurance. The new policy implied that any extra compensation after the 90th day in a sickness absence spell would lead to an equivalent reduction of the benefit paid by the national sickness insurance[5]. In January 1998 this policy was changed, allowing extra compensation up to a maximum of 10 percent of the normal wage during all days of sickness absence.

The size of the extra compensation was negotiated between the employers' associations and the labour unions during 1998. The agreement covering blue-collar workers in the private sector was signed in June 1998 and implied ten percent in additional compensation between day 91 and day 360 of a sickness absence spell[6]. The agreement covering employees in the municipal sector was signed at the end of December 1998 and gave the same additional compensation. Both agreements came into effect retroactively as of the 1st of January 1998. This meant that individuals who had been absent during 1998 could receive compensation retroactively.

[5] The part of the income that was over the ceiling of 7.5 base amounts could be compensated to the same rate as the income under the ceiling without any reductions of the national sickness benefit. This base amount follows the Swedish consumer price index and is annually recalculated.

[6] This compensation was paid through private insurance provided by employers.

White-collar workers in the private sector and employees in the central government sector have had additional sickness absence compensation after the 90th day of absence, during the studied time-period, only if they had an annual income higher than the ceiling in the national sickness insurance[7]. Their additional sickness absence compensation was equally generous before and after the change of the reduction policy. (Försäkringskassan, 2006)

The conditions for private insurances giving compensation during sickness-absence did not change when the policy changed on the 1st of January 1998. Private insurance for income loss due to sickness absence was allowed despite the reduction policy – this policy only regulated collectively agreed compensation.

The changes in the collectively agreed compensation in 1998 implied that all employees, with incomes below the ceiling, had the same level of replacement during all days of the sickness absence spell except from day 91 to day 360. Due to the collectively agreed compensation the employees in the municipal sector and blue-collar workers in the private sector have ten percentage points higher replacement level than all other employees from day 91 to day 360. The collectively agreed additional compensation during sick leave for these two groups reduces their cost of absence by as much as 50 percent.

4 Identification strategy

4.1 The policy experiment

The replacement level, after the 90th day of absence, is not randomly assigned to different individuals but assigned on the basis of sector or in the private sector on the basis of blue/white-collar worker. The data restricts us from defining the collective agreement coverage in the private sector. To make the identification of those affected by the additional compensation easier we exclude the employees in the private sector from the analysis and focus on the employees in the municipal and government sector.

[7] The NSI-ceiling was 7.5 base amounts until 1st July 2006, 7.5 base amounts was 297,750 SEK≈ 31,410 € (June 1, 2007).

Individuals employed by municipalities were affected by the agreement signed in December 1998, whereas government employees were not – their compensation did not change. This can be regarded as a quasi-experiment. The employees in the municipal sector had as far as they knew 80 percent in replacement after the 90th day of sickness-absence until the 21st of December 1998 when the additional compensation was introduced. They can thus be assumed to be unaffected by the additional compensation until then. One potential problem of comparing employees in these two sectors is that the individuals working in the different sectors may have different tasks, and therefore might have different absence behaviour. Furthermore, the labour force composition may differ between the two sectors.

The additional compensation was not a new intervention in 1998. Before the ban in 1991 almost all sectors in Sweden had it, but one exception was government employees. This makes the introduction of additional compensation for municipal workers in 1998 just a reintroduction. It seems likely that private blue collar workers were pushing the law change as they were fast in reintroducing their additional compensation. As the municipal workers were encouraged by the private blue collar workers' reintroduction, it can therefore be seen as rather exogenous for municipal workers.

One other source of endogenity might be that individuals with bad health or absence proneness employed by the government change jobs to the municipal sector. This is not so likely. First, the labour market in Sweden during the 1990s is characterized by high unemployment and the number of vacancies was low, and secondly the studied time period is short.

The magnitude of the effect on sickness absence of the additional compensation depends on how well the information about the compensation was spread. If a large share of the employees in the municipal sector initially was unaware of the additional compensation the effect could be small but become larger with time as the information was spread. As the collective agreement regulating the additional sickness compensation was signed 3 days before Christmas Eve, the information about the replacement rate increase is likely to be delayed. We have found some evidence that the advertising about the agreement first were made in January and February 1999. This can imply that the insured were not aware of the compensation until then and the effect would be evident later in 1999 and in-turn only affect a small portion of spells started in 1998.

It is also possible that some employees in the municipal sector suspected the possibility of receiving the compensation retroactively before the decision was made. This would imply that some of the absence spells were affected before the 21st of December 1998. This effect would reasonably be quite small as the extent of the compensation was not known and the date when the compensation was to be paid was unknown.

4.2 Econometric specification

To estimate the effect of the collectively agreed additional sickness compensation a difference-in-differences approach is used. For each sector (municipal (M) or government (G)) and time period (before $(t=0)$ and after $(t=1)$) the average number of benefited sickness absence days $\left(\overline{SA}\right)$ is calculated for durations of at least 91 days. Spells longer than 360 days are censored at day 360.
This can be formalized as:

$$DiD = \left(\overline{SA}^{M}_{t=1} - \overline{SA}^{M}_{t=0}\right) - \left(\overline{SA}^{G}_{t=1} - \overline{SA}^{G}_{t=0}\right). \quad (1)$$

The DiD estimate in (1) can be expressed as a linear regression model:

$$SA_{it} = \alpha + \beta_1 M_{it} T_t + \beta_2 M_{it} + \beta_3 T_t + \varepsilon_{it}, \quad (2)$$

where SA_{it} is the sickness absence spell of individual i started in time period t, M_{it} is a dummy variable indicating whether or not the individual is working in the municipal sector when beginning the sick spell, and T_t is a dummy variable indicating the time period after the reintroduction of the additional compensation.

Model (2) can easily be modified to include individual characteristics:

$$SA_{it} = \alpha + \beta_1 M_{it} T_t + \beta_2 M_{it} + \beta_3 T_t + \gamma_1 Z_{1it} + ... + \gamma_k Z_{kit} + \varepsilon_{it} \quad (3)$$

where Z_{jit} $(j = 1,2,..,k)$ denotes observed individual varying covariates. This removes time invariant differences in sickness duration between individuals explained by observed individual characteristics.

Extending the analysis to incorporate more than two time periods yields the following model:

$$SA_{it} = \alpha + \beta_1 M_{it} T_t + \beta_2 M_{it} + \gamma_1 Z_{1it} + ... + \gamma_k Z_{kit} + \tau_t + \varepsilon_{it} \quad (4)$$

where τ_t is a time dummy which will capture year specific time effects which are equal for both groups. To control for different linear time trends between sectors a variable can be included in the regression capturing the time trend in one of the sectors.

Estimating a "fixed-effect" type model using time-series data may yield serial correlation in the standard errors which, in turn, will give an ambiguous bias in the standard error estimates (Bertrand et al., 2003). One way to deal with this problem is to use a robust regression parameter variance estimator (Arellano, 1987). This variance estimator is also known as the "cluster" estimator and it is robust to serial correlation and heteroskedasticity in the error term.

5 Data

5.1 The sample

The data used in this study comes mainly from the IFAU-database. This database consists of matched employer-employee registers covering all individuals between 16 and 65 years of age in Sweden[8]. The income variables are collected from tax registers and workplace information is collected from official registers which makes it possible to distinguish which sector an individual is employed in. To this dataset the sick-leave register is matched. This contains all sickness-absence spells compensated by the Swedish Social Insurance Agency[9] and information on the income that the sickness absence compensation is based on.

[8] From 2001 and onwards it covers all individuals between 16 and 74 years of age.

[9] There is no information included in this register on absence spells which are compensated by the employer and ends before the Social Insurance Office takes the responsibility of compensation.

To achieve the purpose of this study all individuals with sickness absence spells of at least 91 days during the period 1997-1999 in the municipal and the governmental sector are sampled. These individuals have the main part of their income from the respective sector the month before the sickness absence spell was started. All individuals which are self-employed, have an income below two base amounts or have an income over the sickness benefit ceiling each year are excluded. In the sensitivity analyses, corresponding data from 1995 to 2001 is used. The pre- and post-treatment section uses data of sick spells of at least 30 days up till 730 days.

5.2 Descriptive statistics

In 1998, most individuals are employed in the private sector (63.1 percent) and the second largest group is employed in the municipal sector (30.6 percent). The central government sector employs a relatively small part of the Swedish work-force with only about six percent of the employees. The share of female employees is not equal over the sectors: almost 80 percent of the employees in the municipal sector are women compared to around 40 percent in the private sector and central government sector.

In *Table 3* descriptive statistics are presented for the sample consisting of individuals in the municipal and government sector with absence spells longer than 90 days. Absence spells longer than 360 days are censored at day 360. As the additional compensation only affects the spells up till the 360s day, no direct effect of the additional compensation will be found for spells longer than 360 days. The indirect effect on longer spells will be analysed separately. There are significant differences across sectors in the share of women, mean age, mean income and the conditional average number of sick days.

The average length of the absence spells, conditional on being at least 90 days and censored at day 360, for the two sectors during different years are presented in *Figure 1*. The average number of days in an absence spell increases each year in both sectors – showing parallel trends until 1999 when the average in the municipal sector exceeds the governmental sector for the first time in this time-series.

Table 3. Descriptive statistics for durations of at least 91 days and censored at day 360, all years.

	Government employees			Municipal employees		
	Mean	**Std. error**	**Min/Max**	**Mean**	**Std. error**	**Min/Max**
Share women	0.613	0.0016	0/1	0.863	0.0006	0/1
Days in sickness absence	252.6	0.336	91/360	252.0	0.183	91/360
Age	47.5	0.034	20/65	46.5	0.018	20/65
Yearly income (100,000 sek)	1.75	0.0018	0.086/2.767	1.71	0.0008	0.090/2.767
Number of observations		88,772			339,570	

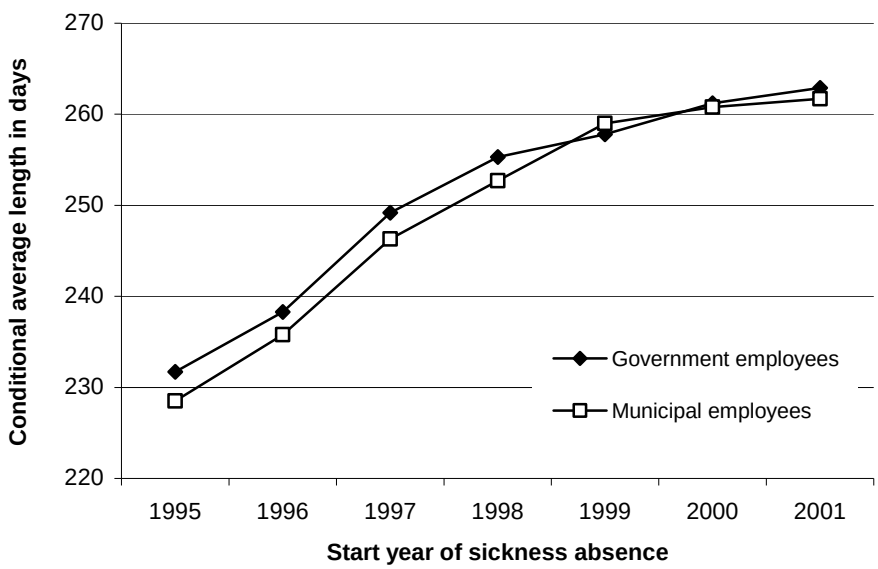

Figure 1. Average length of absence spells longer than 90 days and censored at day 360 in the two sectors 1995 to 2001.

6 Results

First we estimate the baseline difference-in-differences parameter (municipal vs. central government employees over two time periods) on sickness absence. The results are presented in *Table 4*, where the year denotes the starting year of the included sickness absence spells.

The DiD for spells started (the first day) in 1997 and 1998 yields a small non-significant positive increase in duration (0.8 days) of the collectively agreed insurance. A small or inconsiderable effect is expected as the collective insurance was not introduced until the 21st of December 1998 and it seems like the information was delayed which implies that only a few of the absence spells starting in 1998 would be affected by this insurance. Performing DiD on absence spells starting in 1998 and 1999 gives a significant increase in sickness absence duration by 3.4 days.

Using 1997 and 1999 might yield a better DiD estimate as the spells which started in 1997 are not affected at all by the collective insurance and the spells started in 1999 are likely to all be affected. The DiD estimates, using 1997 and 1999, gives a significant increase in sickness absence by 4.1 days associated with the collectively agreed additional compensation. Including individual characteristics and county dummies increases the effect of the collectively agreed insurance slightly but not significantly to 4.7 days.

The average sickness duration for municipal employees in 1999, conditional on at least 91 days duration and censoring at day 360, was 259.8 days. The findings suggest that the collectively agreed insurance yielded a 4.7 days increase in sickness duration of at least 91 days, i.e. a 2.8 percent increase in sickness durations of at least 91 days.

6.1 Pre- and post-treatment effects

The collectively agreed insurance affects sickness durations at day 91 to day 360. We have ignored the potential effects occurring prior to day 91 and after day 360. Such pre- and post-treatment effects are certainly possible. A pre-treatment effect might occur before day 91 and the treatment might also yield a lasting effect after day 360. To test this we apply the model used in *Table 4* column 4 on sickness durations of at least 30 days censored at day 90 and on sickness durations of at least 361 days censored at day 730. The results are shown in *Table 5* and the time series are plotted for each group in *Figure 2* and *Figure 3*. No pre-treatment effect is found, i.e. the effect of the additional

compensation does not affect sick spells before day 91. The effect on day 361 and onward is positive but insignificant.

If the introduction of the collectively agreed additional insurance coincides with group specific health shocks or the group compositions we should find effects on days in sick spells before and after the ones that the insurance are affecting. There is no evidence to support such an explanation.

Table 4. Difference-in-difference results, sickness absence duration in days.

	1997 vs. 1998	**1998 vs. 1999**	**1997 vs. 1999**	**1997 vs. 1999**
CA effect	0.76 (1.60)	3.35* (1.49)	4.11** (1.55)	4.66** (1.52)
Second year	5.51** (1.42)	3.13* (1.33)	8.64** (1.38)	9.09** (1.35)
Municipal employer	-2.69* (1.17)	-1.93 (1.08)	-2.69* (1.17)	-2.05 (1.17)
Woman	-	-	-	3.92** (0.82)
Age	-	-	-	6.94** (0.24)
Age sq.	-	-	-	-0.06** (0.00)
Annual earnings	-	-	-	-65.24** (3.39)
Annual earnings sq.	-	-	-	17.72** (1.02)
County dummies	-	-	-	Yes
Intercept	249.74** (1.04)	255.25** (0.96)	249.74** (1.04)	93.77** (7.16)
No. obs.	108,441	127,065	116,878	116,878
R-sq.	0.00	0.00	0.00	0.05

Note: Standard errors in parentheses. * Significant at 5%, ** significant at 1%.

Table 5. Difference-in-difference results (1997 and 1999) using durations of at least 30 days, censored at day 90, and durations of at least 360 days, censored at day 730.

	Durations of at least 30 days, censored at day 90	**Durations of at least 361 days, censored at day 730**
CA effect	0.17 (0.23)	2.77 (2.84)
No. obs.	250,393	49,433
R-sq.	0.01	0.04

Note: Second year dummy, municipal dummy, individual characteristics, county dummies and an intercept are included in the models but not presented (equivalent to the last model in Table 4). Standard errors in parentheses. * Significant at 5%, ** significant at 1%.

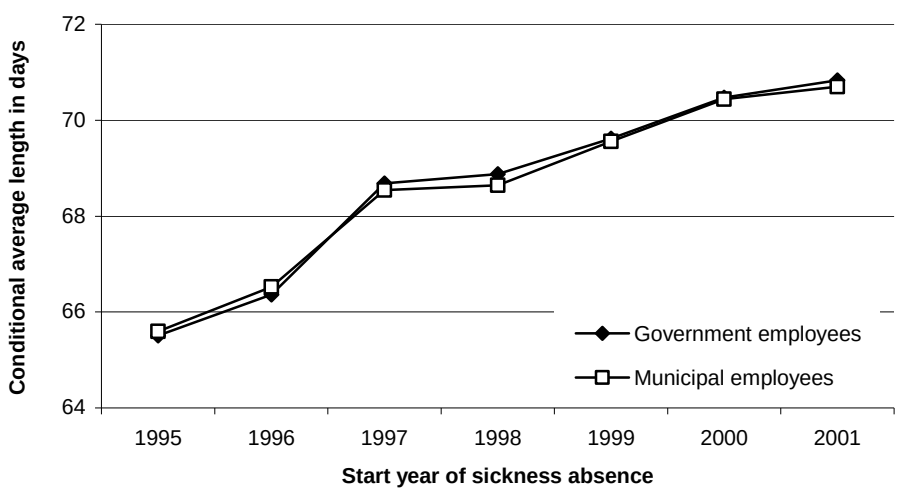

Figure 2. Average length of absence spells of at least 30 days and censored at day 90 in the two sectors 1995 to 2001.

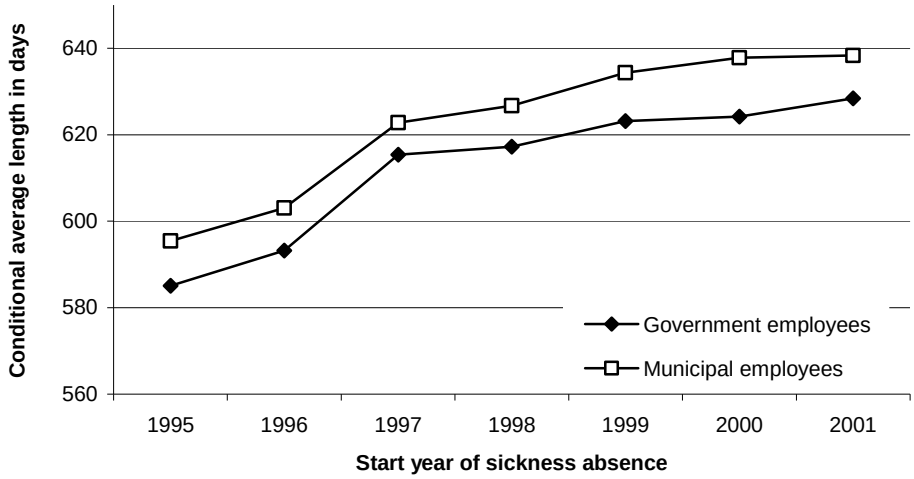

Figure 3. Average length of absence spells of at least 361 days and censored at day 730 in the two sectors 1995 to 2001.

6.2 Sensitivity analyses

In *Table 6*, the estimates of some sensitivity analyses are presented. DiD estimates are presented as effects of hypothetical compensation changes affecting only municipal employees before and after the real change (a "placebo effect"). This placebo analysis is a way of examining whether the previous results are due to different time trends in the two sectors. The results show small non-significant "placebo effects" without a clear time pattern, which indicates that a sector specific time trend is unlikely.

One interesting pattern in *Table 6* is that the time invariant municipal effect is negative in the pre-1998 DiD's, whereas positive in the post-1998 DiD's. This indicates that a structural change has occurred in sector relative sickness absence before and after 1998, which is in accordance with our main results.

In *Table 7* the time-period 1995 to 2001, excluding 1998, is used to estimate the effect of the reintroduction of the collective sickness absence insurance. The years prior to 1998 and the years subsequent to 1998 are used to estimate the structural break during 1998. This yields an estimated effect of 3.9 days increase in duration due to the additional compensation, controlling for individual characteristics and local county effects. In the second model of

Table 7 the prior model is enhanced with a control for a time-trend specific to the municipal sector. In this model the estimated effect of the additional compensation is an increase in the sickness absence duration by 5.6 days. According to the estimate no specific linear time-trend in the municipal sector is evident as the parameter is small and far from significant. None of the results in *Table 7* differ significantly from the main DiD result (in *Table 4*).

Table 6. Sensitivity analyses, "placebo effects".

	1995 vs. 1996	**1996 vs. 1997**	**1999 vs. 2000**	**2000 vs. 2001**
CA "placebo effect"	0.02 (1.58)	-0.33 (1.63)	-0.15 (1.37)	-1.27 (1.33)
Second year	5.73** (1.39)	9.30** (1.45)	2.89** (1.22)	2.61* (1.19)
Municipal employer	-1.53 (1.10)	-1.31 (1.18)	2.00* (1.01)	1.80 (0.96)
No. obs.	100,079	96,291	142,447	152,086

Note: Individual characteristics, county dummies and an intercept are included in the models but not presented (equivalent to the model used in Table 4, last column). Standard errors in parentheses. * Significant at 5%, ** significant at 1%.

Table 7. Regression results using the time-series.

	1995-1997 and 1999-2001	**1995-1997 and 1999-2001**
CA effect	3.93** [0.98]	5.58** [1.39]
Municipal linear trend		-0.40 [0.33]
No. obs.	369,043	369,043

Note: Individual characteristics, county dummies, time dummies and an intercept are included in the models but not presented. County clustered robust standard errors in brackets, * Significant at 5%, ** significant at 1%.

7 Economic implications

The national sickness insurance replacement rate during 1998 to June 2003 was 80 percent of estimated annual earnings and the amount per day is calculated by dividing this amount by the number of days per year. Thus, all calendar days were benefited by an amount relative to the per calendar day income loss. On average, using all sick spells started in 1999 by municipal employees with income below the ceiling, the number of benefited days for durations of at least 91 days followed till day 360 was 169.8. The corresponding average amount of benefits paid was 64,728 SEK per person.

To avoid the assumption of equal treatment effect for all incomes, the average increase in the amount benefits paid due to the collective agreement is estimated by adopting the model used in *Table 4* column 4 on actual paid benefits. The result shows on an average increase in costs for the public sickness insurance by 1,882 SEK per sick spell. This yields that the public cost were increased by 3.0 percent due to the collectively agreed insurance.

The number of sick spells (longer than 90 days) started in 1999 by municipal employed individuals with income below the ceiling amounted to 54,241. This yields that the total cost for the Swedish Social Security Agency was increased by 102 million SEK. The true amount is likely to be larger as individuals with salaries over the income ceiling are excluded in this analysis. Assuming that the workers in each sector contributes on average the same amount to the sickness insurance through pay-roll taxes, the municipal employees are only contributing approximately 30 percent of the increased public cost due to the collectively agreed insurance.[10]

The cost for the collectively agreed insurance was 10 percent of the daily income loss, during day 91 to 360 in a sick spell. For sick spells started in 1999 by municipal employed individuals with income below the ceiling, the total potential cost[11] amounted to 439 million SEK and is financed by insurance premiums paid by the employer. To cover the increased cost for the national sickness insurance the premiums should be increased by 22 percent. As the municipal employers is assumed to be contributing 30 percent of the increased public cost through pay-roll taxes, the net increased cost for the employer should be just under 16 percent.

[10] In 1999, 30.5 percent of the labour force is working within the municipal sector.
[11] If all beneficiaries are claiming the additional compensation.

8 Concluding remarks

The reintroduction in end of 1998 of the collectively agreed additional sickness compensation of 10 percent for sick spells of at least 91 days increased the conditional absence duration by 4.7 days according to our results. No corresponding effect is found prior to the 91st day or after the 360th day in sickness absence.

The cost for the public sickness insurance was increased due to the reintroduction of the collective agreed insurance. For municipal workers, the cost during day 91 to 360 in the sickness absence spells for the public sickness insurance increased on average with 3.0 percent. In total, the cost of municipal workers sickness absence started in 1999 was increased by 102 million SEK of the insurance. Thus, not all the costs of the collectively agreed sickness insurance are borne by the insurance beneficiaries. If the additional insurance took full burden of its costs, the insurance premium should be increased by 22 percent.

The ten percentage units increase in sickness compensation from 80 to 90 percent results in a 12.5 percentage increase in compensation. Thus, the increase by 2.8 percent in conditional sickness absence duration by the compensation shift yields an elasticity of 0.22. Increasing the compensation by 1 percent thus leads to a 0.22 percent increase in number of days in absence between day 91 and 360. In comparison to the elasticity of 4.6, as calculated in Johansson & Palme (1996) for all spell lengths, this elasticity is small but seems quite realistic. The individuals affected by the additional compensation have been absent from work for a long period of time and probably have worse health conditions.

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