

**Moral hazard among the sick and unemployed:
Evidence from a Swedish social insurance
reform[♥]**

by

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Preliminary, do not quote!

Abstract

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1 Introduction

Moral hazard a common problem associated with insurance...

This paper looks at a specific type of moral hazard that arises in the interplay between two large public insurance systems in Sweden, namely the sickness insurance (SI) and the unemployment insurance (UI). More specifically, we address the question of whether and how differences in benefit generosity affect the use of SI benefits among unemployed persons. It is possible for unemployed to report sick and receive SI benefits even for a short period. This rule is based on the idea that work search is comparable with work. In order to be eligible for UI benefits, an unemployed person should actively search for jobs and be able to accept a work offer at short notice. Unemployed who loose their work (search) capacity due to sickness should therefore receive benefits from the SI rather than the UI.

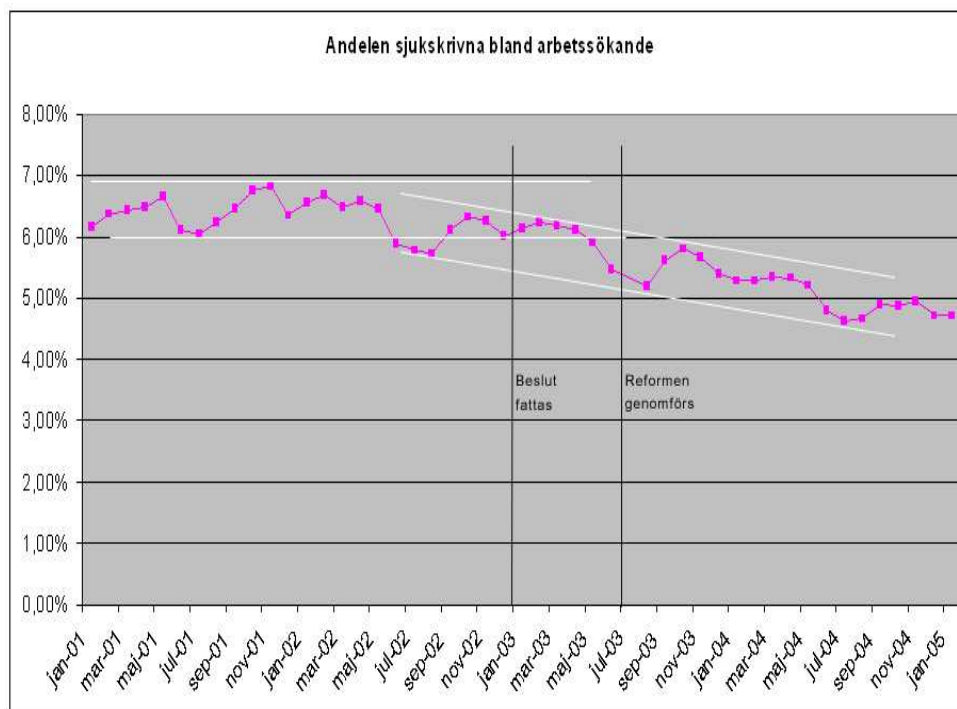
There are at least two sources of moral hazard in this context. First, UI benefits are limited to 300 work days, whereas SI benefits in principle can be received forever. Hence, by reporting sick an unemployed person can postpone the UI expiration date. There is a previous study from Sweden (Larsson, 2006) showing that the probability of reporting sick among the unemployed increases drastically as the UI expiration dates approaches. Whether this result is due to economic incentives or to actual health deterioration caused by stress remains however to be explored further.

Second, moral hazard can arise from the benefit size structure. For some unemployed, benefits from the SI are higher than benefits from the UI. Both benefits are determined by the worker's pre-unemployment wage, the replacement rate being approximately the same whereas the cap – i.e. the maximum amount – for most periods has been higher in the SI in the UI system. Thus, high-wage unemployed have been able to receive higher benefits from the SI than from the UI. In the early 2000s, SI benefits could be up to 20 percent higher than maximum UI benefits. For unemployed who have received UI benefits for 100 days, the UI benefits drops by approximately 7 percent, implying that the SI benefits could be nearly 30 percent higher for such 'long-term' unemployed. Larsson (2006) looks into this potential source of moral hazard as well and finds that the difference in benefits seems to increase the probability of reporting sick.

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In this study, we explore the question further. We use a reform of the SI system that came in force 1 July, 2003, to identify the effect of economic incentives arising from the different benefit sizes. Basically, the reform was supposed to remove the difference in benefits by lowering the SI benefit cap to the same level as the UI benefit cap during the first 100 days of unemployment. We would expect sickness absence to decrease due to the reform as it is no longer more advantageous for unemployed persons to be on SI instead of UI. Aggregated statistics do indeed suggest that this happened, shown in Figure 1.

Figure 1 Share of SI recipients among unemployed



Source: Andersson & Brinkeborn Beselin (2005).

However, it is by far not certain whether the decrease was due to the harmonization of benefit caps or to some other factors. The trend in overall sickness absence has been decreasing after 2002. Besides, the reform also changed the net replacement rate of SI from 80 percent to 77.6 percent. Thus,

in order to define the effect of the reform we have to compare the factual outcome after July 2003 with the counterfactual outcome of no reform.

We identify the effect of economic incentives using the fact that the reform affected various groups of unemployed differently. There was an overall drop in SI benefits relative to UI benefits for everybody as the net replacement rate of the SI decreased from 80 percent to 77.6 percent. This effect cannot, however, be separated from the time trend. For unemployed above the UI benefit cap, however, there was a further drop as the maximum SI benefits were lowered by almost a fourth. The extent to which an unemployed was affected by the reform thus depends on the person's UI benefits, which in turn are determined by the pre-unemployment wage.

Our results suggest strong negative effects on incidence but no effects on duration...

2 Unemployment and sickness insurance in Sweden

SI and UI form an integral part of the compulsory public social insurance in Sweden. Benefits from the public social insurance are income-related and for the most part financed by taxes. The system, being a part of the Swedish Welfare State, can be characterized as general rather than selective. That is, most citizens are comprised by the system, and the degree of economic means tests in the allocation of rights is low. Moreover, the Swedish system is often perceived as generous in international comparisons.

2.1 Description of the unemployment insurance

The purpose of the UI is to provide economic compensation during periods of involuntary unemployment. Benefits from the UI are either income-related or fixed, depending on the person's work history. For income-related benefits, the unemployed has to fulfill three conditions¹:

- *The basic condition* that the unemployed is available for vacant jobs. In practice this means that he has to be registered at the public employment office as a job seeker and that he is willing to accept a job.

¹ For a detailed description, see e.g. the web-page at www.aea.se.

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- *The membership condition* that the unemployed has been a member of a UI fund for at least twelve months prior to unemployment. Membership is voluntary.
- *The working condition* that the unemployed has worked at least six months during the last twelve months preceding unemployment.

If the unemployed has been a member of a UI fund for a shorter period than a year but still fulfills the other two conditions, he is entitled to the fixed basic amount of compensation. This is also the case if he fulfills the first two but not the working condition, given that he has recently completed full-time studies.

The UI is administered by 39 unemployment insurance funds representing workers from different occupational groups. All together, the UI funds have approximately 3.8 million members, corresponding to 86 percent of the work force and 67 percent of the adult population. The funds are formally independent, but they must be officially approved by the state and follow common regulations in order to receive a grant from the state. The main source of finance for the UI benefits is the state grant, the rest is financed by membership fees.

The UI funds work closely with the local public employment offices, especially in controlling whether the unemployed fulfills the rules concerning job search. The unemployed person has to meet his employment officer regularly and he is obliged to apply for any job the officer assigns him. If not, the employment officer must write a report to the UI fund, which then decides on a suitable sanction. In short, either the unemployed is suspended from the UI, or his benefits are reduced. These sanctions are time-limited or permanent, depending on if the person has broken against the rules before, and the expected duration of the employment he refuses to accept.

UI benefits are time-limited to 60 weeks, corresponding to 300 benefit days. These benefit days can be received either continuously or with breaks in the unemployment period. If working long enough – basically at least six months – during a break, a person can qualify for a new period of 300 benefit days. If he has not re-fulfilled the working condition by the end of the 300 benefit day period, the employment officer will assess his need of intensified counseling. If such a need is found, he will be assigned into a labor market program called *activity guarantee*, which implies that he is offered the entire spectrum of services and labor market programs available to job seekers at the employment offices. The compensation is equal to the UI benefits. If the unemployed refuses to participate in the program, his UI benefits will expire. If no need for

intensified counseling is found, the unemployed can renew his entitlement to UI benefits for another 300 day period.² This is possible only one time.

The income-related UI benefits are 80 percent of the worker's average earnings during the last six months of work, with a lower and an upper limit. Figure 2 illustrates. The fixed basic amount of SEK 7,040 (\approx € 750)³ per month constitutes the minimum, corresponding to 80 percent of a monthly wage of SEK 8,800. The upper limit varies depending on how long the person has been unemployed. During the first 100 days of unemployment, the maximum benefits are 80 percent of a monthly wage of SEK 20,075. After that, the cap is reduced to 80 percent of SEK 18,700.⁴

The first five days of involuntary unemployment are uncompensated. If the unemployment is voluntary – i.e. if the person has left his job without a valid reason or if he has been laid off because of improper behavior – the uncompensated period is up to 45 benefit days.

² There are no formal guidelines for the employment officer's assessment on this issue. The unemployed person's education, previous work experience and unemployment history play presumably a role. For a Swedish description of the activity guarantee, see Fröberg & Persson, 2002.

³ Exchange rate April, 2006.

⁴ These amounts correspond to the time period 1 July 2002 – **today**.

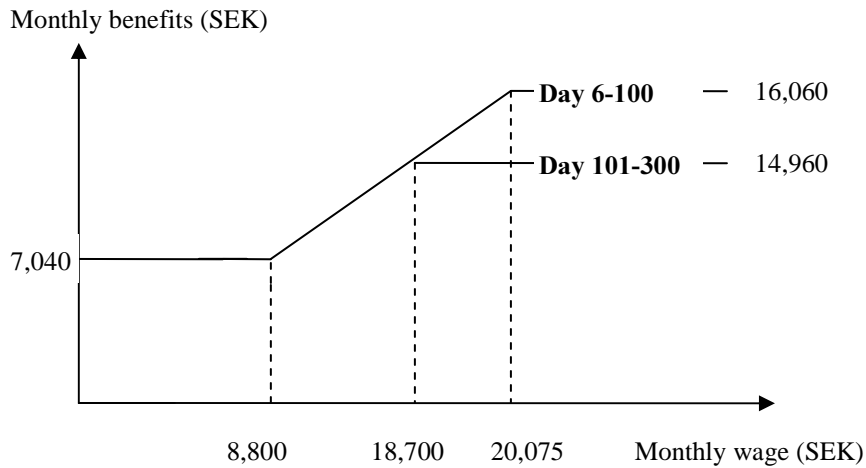


Figure 2 UI benefits in 2003

2.2 Description of the sickness insurance

The purpose of the SI is to provide economic maintenance when the worker is too sick to work and support himself. Basically all employed workers are automatically covered by the SI. Students and unemployed workers are also eligible for SI benefits as long as they fulfill certain conditions. An unemployed person must be registered at a local employment office as job seeker. The size of his SI benefits is not based on his UI benefits but on his wage before unemployment. Thus, unemployed persons without any employment history do not receive SI benefits.

SI is administered by 21 local social insurance offices and financed by payroll taxes. Employers are responsible for the employees' sickness compensation during the first 14 days of sickness⁵, after that the local social insurance office takes over.⁶ Sick pay to unemployed is paid by the social insurance office from day two.

⁵ Except for the first day of sickness which is uncompensated.

⁶ The employers' responsibility was extended to 21 days in July 2003 and remained at this length until January 2005.

The SI system contains some control instruments to prevent unjustified use of the insurance. After reporting sick by contacting either his employer (employed workers) or the local insurance office (non-employed) the person must visit a doctor within seven days of sickness in order to receive additional compensation after the first week. Again after four weeks, a doctor's certificate must be provided to the SI authorities. Unjustified absence shorter than one week is made less attractive by not providing any compensation for the first day of sickness.

The size of the SI benefits depends on the person's wage prior to the sick period. For unemployed workers, it is based on the wage prior to unemployment. The reform in July, 2003, changed the marginal replacement rate in two ways, the effect being different for employed and unemployed workers. Figure 3 illustrates the case for an unemployed worker.

Prior to the reform, the replacement rate was 80 percent of the previous (pre-unemployment) wage. The minimum wage for receiving any SI benefits was SEK 775 per month, and the maximum SEK 24,125 per month. In other words, SI benefits varied between SEK 620 and SEK 19,300 per month.⁷ The reform implied two changes: First, it reduced the marginal replacement rate to 77.6 percent. This concerned all insured, employed and unemployed. Second, for the unemployed insured, the maximum SI benefits were reduced to SEK 16,060 per month, which corresponds to the maximum monthly UI benefits.

⁷ Not accounting for the first uncompensated day.

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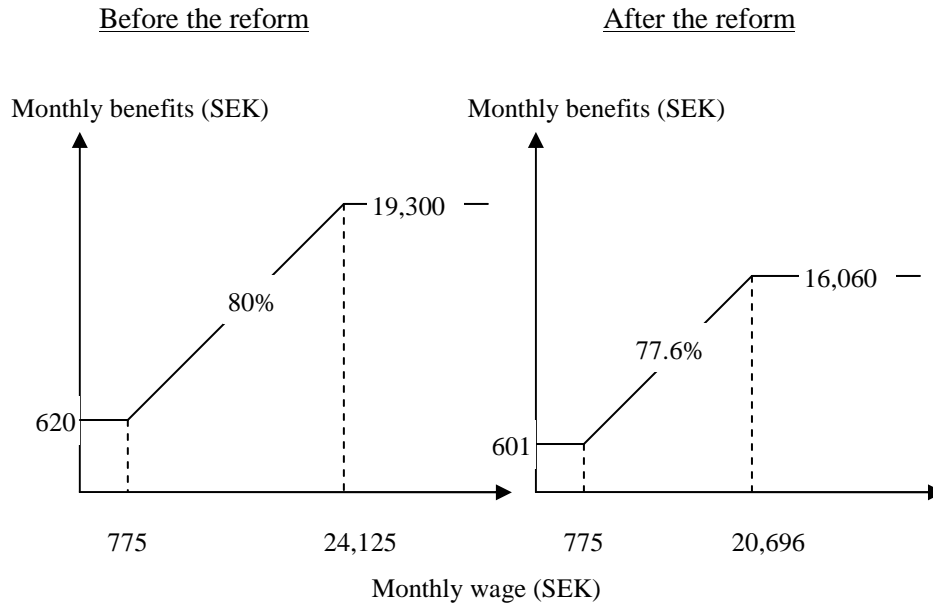


Figure 3 SI benefits for unemployed workers, before and after the reform in July, 2003.

3 Identification strategy

The fundamental research question of interest is how the size of economic compensation affects sickness absence among unemployed workers. We can use the reform to identify this effect by dividing the population into *treated* and *non-treated*. Let us look more closely into how the reform affected the difference between SI and UI benefits for various types of unemployed. Recall that the difference depended on i) the previous, pre-unemployment wage, and ii) whether the unemployed had received UI benefits for less or more than 100 days. Figure 4 illustrates the case of an unemployed person who has not passed the 100-day limit, i.e. before the UI benefit cap drops.

Day 6-100 on UI benefits

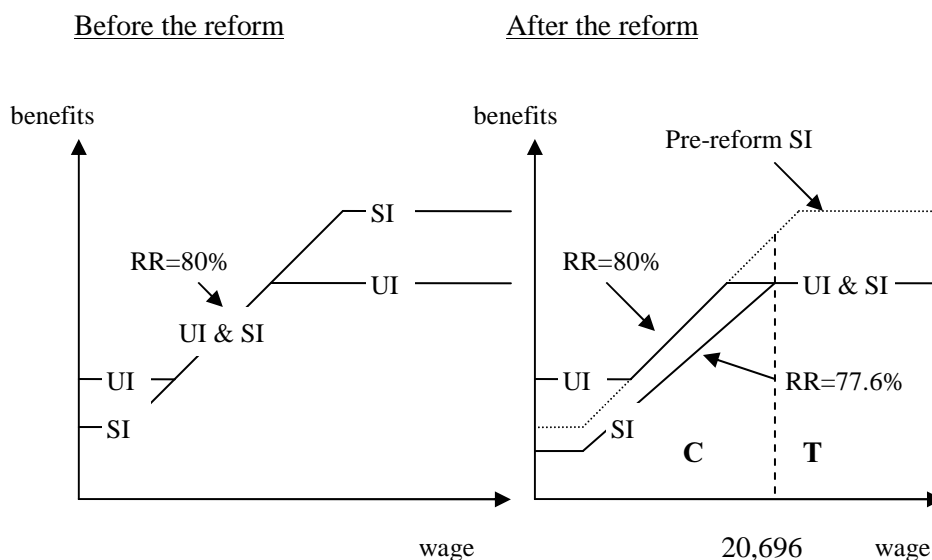


Figure 4 The change in relative benefit size due to the reform, during the first 100 UI benefit days

The reform changed the SI benefits for everybody, as the marginal replacement rate was reduced from 80 to 77.6 percent. Thus, the relative SI benefits (as compared with UI benefits, determined as SI/UI) were reduced for all unemployed. However, up to the previous wage of SEK 20,696 the change was relatively small and, more importantly, constant.⁸ We denote this group by C (comparison group). For unemployed with a previous wage above that level,

⁸ The reform reduced the relative SI benefits (SI/UI) with 3 percent for all unemployed with a previous wage up to SEK 20,696. For an unemployed with previous wage below the SI minimum, the reduction in (SI/UI) was from $(SEK\ 620/SEK\ 7,040) \approx 0.0881$ to $(SEK\ 601/SEK\ 7,040) \approx 0.0854$. For an unemployed with previous wage between the UI minimum and SEK 20,696, the reduction in (SI/UI) was from 1.00 to 0.97. Between the SI minimum and the UI minimum, both the pre-reform and the post-reform (SI/UI) linearly approached 1.00 and 0.97, respectively. Thus, the change in (SI/UI) was a constant 3 % even there.

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denoted by T (treatment group), the reform implied a reduction in relative SI benefits that varied from 3 to almost 17 percent.

Figure 5 illustrates the case for an unemployed person who has passed the first 100 UI benefit days. The pattern is somewhat different as the UI benefit cap now is lower, implying that even after the reform, benefits from the SI are higher than benefits from the UI for high-wage unemployed. But the effect of the reform on the benefit *difference* is similar as in Figure 4: up to a previous wage of SEK 20,696 the difference was reduced by 3 percent. From that level upwards, the reduction was larger, the higher the previous wage, varying between 3 and almost 17 percent. So again, the population can be divided into T and C according to their previous wage, the dividing line being at SEK 20,696.

Day 101-300 on UI benefits

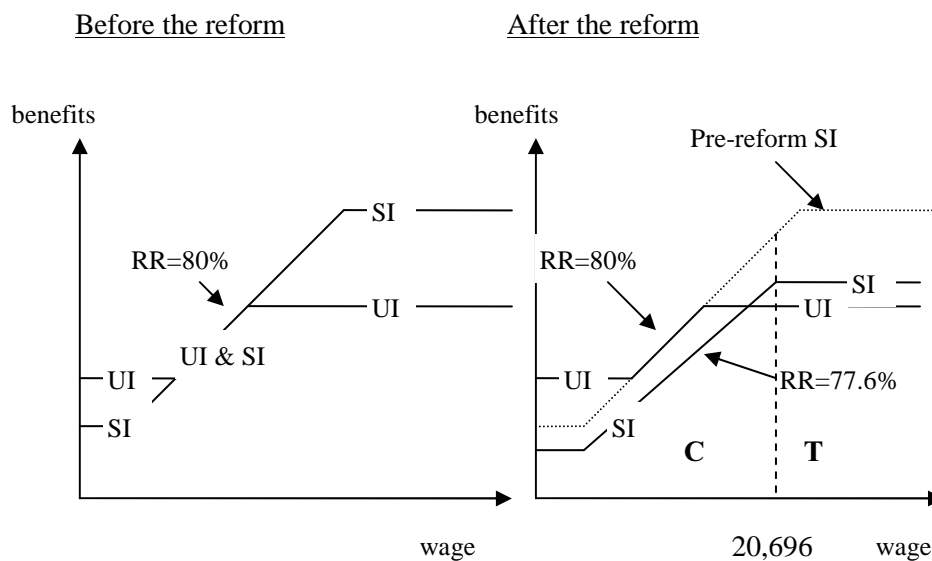


Figure 5 The change in relative benefit size due to the reform, after the first 100 UI benefit days

We will analyze the behavioral response to the compensation size both in terms of incidence and duration of sickness absence in the unemployed population. Our identification strategy exploits two features of the policy change. The first feature is the fact that the population can be divided into T and C and the other relates to the timing of the reform. The timing feature arises when we use duration data and have a fixed reform date. Sampling unemployed people during some period of time then implies that those included in the sample are affected by the reform at different lengths into their unemployment period (given that they are still unemployed at the date of the reform). We use this variation to identify the effect of the reform date by comparing the evolution of hazard rates into sickness (incidence) and out of sickness (duration) for people who experience the reform at different stages of their unemployment. For example, the unemployed who experience the reform 30 days into their unemployment are compared with those whose unemployment spells are longer than 30 days but who do not experience the reform, either until after day 30 or ever.⁹

This strategy enables us to identify the effect of the reform *date*. It is possible that other changes in the environment occurred around the time of the reform affecting transitions out of unemployment. In order to separate the effect of the compensation size from such factors, we compare the reform-date effect for the treatment and comparison group. If the effect is larger for the treatment group, which experienced a larger cut in the replacement rate, we have evidence of responsiveness to economic incentives. Hence, the policy change we use to identify the behavioral response to the compensation size is not the entire reduction in SI benefits due to the reform in July 2003, but rather the reduction over and above the general 3 percent reduction in the replacement rate. The effect of the 3 percent reduction cannot be identified as long as we believe that other changes in the environment occurred around the time of the reform.

To estimate both incidence and duration, we use discrete time Cox regression models. The advantage of imposing this semi-parametric structure instead of estimating fully non-parametric hazard rates and survival functions is that we can control for some potentially important confounders, such as changes in the unemployment rate. The baseline specification to be estimated can be written as:

⁹ This is a similar identification strategy as used by Hesselius & Nilsson (2005).

$$(1) \quad \lambda(t) = \lambda_0(t) \exp\{f(x, z(t), \Omega) + \delta D_i^{July03} + \gamma D^T + \beta D_i^{July03} D^T\},$$

where λ_0 is the base-line hazard rate, i.e. the pre-reform hazard either into sickness (incidence) or out of sickness (duration) for an individual with the value zero on all covariates. $f(\cdot)$ is a function of the time-invariant covariates x and the time-varying covariates $z(t)$. D_i^{July03} is a time-varying dummy variable, where $D_i^{July03} = 0$ prior to July 2003 and $D_i^{July03} = 1$ thereafter. D^T is a dummy for the treatment group, where $D^T = 0$ if the previous wage is below SEK 20,696 and $D^T = 1$ for wages above that. The effect of the reduction in the SI benefit cap is obtained by comparing the hazard rates for the treatment and the comparison groups before and after the 1st of July 2003. The effect of the policy change is given by the coefficient of the interaction variable, β .

The underlying assumption behind this “difference-in-difference” approach is that everything else that changed around the time of the policy reform affected the treated and the comparisons similarly. The assumption is violated if, for example, the labor market opportunities developed differently for the two groups around July, 2003, leading to different changes in the composition of the two unemployed groups. We obtain an upward bias in the estimated effect on absence incidence if the average health status improved more in the high-skilled – high-wage – unemployed population than in the low-skilled population. This could be the case if the demand for low-skilled workers increased relative to the demand for high-skilled labor. It is plausible to assume that persons with relatively good health are the ones to be recruited first, implying that the smaller the remaining population of unemployed, the worse is their average health. It is thus important to check for such divergent changes in the composition of the two populations. We do it by...

When estimating the effect of the policy change on sickness absence duration, divergent compositional changes in the inflow into sickness absence are highly probable. Thus, we will identify the effect only using the inflow until the reform but not thereafter. This and other aspects of the sampling procedure are described in the following section.

4 Data¹⁰

We combine data from several different sources for the empirical analysis. The database *ASTAT*, originating from the unemployment insurance funds and the *Sickness Benefit Register (SFR)* from the National Social Insurance Board constitute the two main sources. Merged with these registers is also the *IFAU-database* which includes several demographic variables, collected from e.g. tax registers.

ASTAT contains information on benefit payments for all unemployed persons who have been entitled to either basic-amount or income-related UI benefits. It is most common to receive income-related benefits; during 2003 only about 9 percent of all benefit days were on the basic-amount. Each week *ASTAT* registers the number of benefit days together with information on benefit amounts and the number of days left until a person's UI benefits expire. For unemployed with income-related benefits the database also includes information on the previous wage.

SFR contains information on SI benefit payments for all people who have been sick and entitled to such benefits, hence both employed and unemployed persons. For each sick spell, *SFR* records the start and end date, the income on which the benefits are based, and if benefits were given on a full or part-time basis. The SI benefits can be of a few different types: regular benefits for illness, compensation for work related injury, rehabilitation benefits, and benefits for preventive care. Regular SI benefits for illness are the most common, covering about 83 percent¹¹ of the sick spells starting in 2003.

Using *ASTAT* as the data source for unemployment spells means that the condition for being defined as unemployed is to receive funding from the UI. This implies that participants in labor market programs and people who are registered at the public employment office as unemployed but who are not qualified for UI benefits¹² are not included in our sample. The main reason for

¹⁰ Thus far, we have used LINDA data for the period 1 January 2002 – 31 December 2003. However, the quality of the previous wage variable in the *ASTAT* register is not very reliable for persons above the UI benefit cap until November 2002. Thus, in our (main) empirical analysis, we have used the inflow into UI benefits from 1 December 2002.

¹¹ About 89 percent if we also count those periods where regular benefits for illness were given together with one of the other benefit types.

¹² That is, people who have not fulfilled the *working condition* or the *study condition*, (see section 2.1).

excluding these groups is that we neither have information on their benefits (if any) nor on their previous wages, which we need in order to know their SI compensation in case of sickness.¹³ Since the previous wage is unknown also for unemployed who are only entitled to the basic-amount of UI benefits, we also exclude this group.

Excluding these groups implies that we cannot generalize our results to the entire unemployed population. However, the economic incentives to repost sick are quite weak among most of these excluded unemployed persons. The unemployed who are not registered with the employment office receive neither UI nor SI benefits. Participants in labor market programs receive compensation from the employment service that is equal to their UI benefits. When sick, the general practice is to let them continue receiving this compensation¹⁴. Only if the sickness period is assumed to get very long, they may be shifted over to SI benefits.

Some of the unemployed who receive the basic-amount can in principle be eligible for much higher SI benefits than the basic amount, so this group would be the most interesting to include in our analysis. In section X, we present results from the sensitivity analysis where we have included this group in the analysis of sickness duration. That is possible since we can observe what wage their SI benefits are based on, but not the wage that determines their UI benefits.

4.1 Sampling

We have data on all individuals who began an unemployment period with income-related UI benefits during the period 1 December 2002¹⁵ – 31 December 2003. Each unemployment spell beginning during this time period is followed until it ends, or at most, until the end of 2004. A transition to SI benefits or an interruption in the UI benefit payments for more than one week defines the end of an unemployment period. No distinction is made between different types of SI benefits or between full and part-time sick leave. That is,

¹³ Data on participants in labor market programs can be obtained from the database *Händel*, which is also included in the IFAU-database. However, since *Händel* neither includes information on benefits nor on previous wages, this data is not very helpful for our purposes.

¹⁴ Except for the first day, which is uncompensated.

¹⁵ Before this date, the income variable is truncated for individuals belonging to some of the UI funds.

all SI periods are regarded the same. If a UI period ends for some other reason than sickness, we treat it as censored. For about 50 percent of the unemployed, our dataset includes multiple unemployment spells.

Since we are also interested in the length of the sickness spells, we construct an additional dataset by following the sub-sample unemployment periods that has ended in sickness until they end, or at most, until the end of 2004. This dataset includes multiple sickness periods for about 21 percent of the people.

Describe the two samples...

Table 1 Descriptive spell statistics. Treatment and comparison groups separately.¹⁶

	Treatment group		Comparison group	
	Before reform	After reform	Before reform	After reform
No UI spells	3,293	2,685	16,541	12,040
No ind. with a UI spell	2,191	1,804	8,568	6,748
No SI spells	178	126	738	671
No ind. with an SI spell	143	111	618	596
No censored SI spells	21	34	78	183
Average spell length				
UI benefits	54.4	27.9	35.7	20.3
SI benefits	57.1	31.0	56.7	36.8
No SI spells lasting:				
1 days	2	1	10	5
2-7 days	73	52	303	247
8-28 days	38	30	155	139
29-89 days	32	28	124	187
90- days	33	15	146	93

Note: Spells before reform include all spell that start between 1 December 2002 – 30 June 2003. Spells after include spells start start 1 July – 31 December 2003.

¹⁶ Thus far, our analysis is based on LINDA data for the period 1 December 2002 – 31 December 2003.

Table 2 Descriptive covariate statistics

	Sample of unemployed (inflow Dec02—Dec03)		Sample of sick (inflow Dec02—June03)	
	Treatment	Comparison	Treatment	Comparison
Female	0.30	0.69	0.31	0.70
Age	41.2	37.5	45.0	40.3
Immigrant: OECD	0.05	0.04	0.06	0.04
Immigrant: other	0.05	0.10	0.03	0.12
Education: High school	0.84	0.83	0.84	0.80
Education: Post high school	0.27	0.15	0.30	0.12
Married	0.47	0.47	0.54	0.51
Presence of children<18	0.36	0.44	0.33	0.50
Days left until UIbenefit expiration (in the beginning of the spell)	205	186	171	164
Average (previous) wage	25,289	15,650	25,473	15,310
Local unemployment rate	4.06	4.15	3.98	4.16
No of obs	5,978	28,551	178	738

5 Empirical results

5.1 Incidence

The results on incidence are reported in Table 1 that consist of three various specifications. Let us begin with column (1) that presents the results from a model that only includes a dummy for the reform date, 1 July 2002. The statistically significant estimate of -0.302 suggest that the incidence of sick report after the reform was approximately 74 percent of the incidence of sick report before the reform.¹⁷ This is overall effect of the reform on all unemployed. The results from model (1) as specified in Section 3 are presented in column (2). The effect of reduced SI benefit cap on the treated population,

¹⁷ The relative risk of reporting sick is obtained by taking $\exp(\beta)$, and the percentage effect is calculated by $100 * (\exp(\beta) - 1)$ where β is the parameter of interest.

called the ‘cap reform effect’, is shown to be statistically significant and quite strong: the incidence is reduced by slightly less than 30 percent among the treated, as compared to among the non-treated. The model in column (3) controls for whether the unemployed individual has passed the 100 UI benefit day-limit. Controlling for that does not significantly change the results.

Table 3 Estimated average cap reform effect on incidence

	(1)	(2)	(3)
Past July 2003 effect (D_t^{July03})	-0.302*** (0.050)	-0.250*** (0.055)	-0.258*** (0.055)
Income > 20,696 (D^T)		-0.197** (0.084)	-0.131 (0.084)
Cap reform effect ($D_t^{July03} * D^T$)		-0.310** (0.129)	-0.335*** (0.129)
Before 100 UI days limit			-0.537*** (0.052)
-2 Log likelihood	31861.947	31826.197	31719.355
No of obs	34,559	34,559	34,559

Table 4 presents results for some further specifications of model (1) in Section 3. For comparison, column (1) is identical with column (3) in the previous table. Including covariates does not change the results...

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Table 4 Estimated effects on incidence and covariate effects

	(1)	(2)	(3)	(4)	(5)
Past July 2003 (D_t^{July03})	-0.258*** (0.055)	-0.256*** (0.055)	-0.254** (0.106)	-0.284*** (0.106)	-0.286*** (0.106)
Income > 20,696 (D^I)	-0.131 (0.084)	-0.118 (0.084)	-0.125 (0.084)	0.012 (0.088)	0.013 (0.088)
Cap reform effect ($D_t^{July03} * D$)	-0.335*** (0.129)	-0.334*** (.129)	-0.336*** (0.129)	-0.357*** (0.129)	-0.362*** (0.129)
Before 100 UI days limit (=300-201 days until UI-expiration)	-0.537*** (0.052)				
300-251 days until UI-exp.		-0.580*** (.083)	-0.589*** (0.083)	-0.536*** (0.084)	-0.533*** (0.084)
250-201 days until UI-exp.		-0.331*** (.090)	-0.335*** (0.090)	-0.302*** (0.090)	-0.304*** (0.090)
200-151 days until UI-exp.		-0.004 (0.091)	-0.009 (0.091)	0.021 (0.091)	0.020 (0.091)
150-101 days until UI-exp.		-0.229*** (0.082)	-0.227*** (0.082)	-0.193** (0.083)	-0.197** (0.083)
100-51 days until UI-exp.		-0.211** (0.086)	-0.206** (0.086)	-0.187** (0.086)	-0.193** (0.086)
50-1 days		ref.	ref.	ref.	ref.
Inflow into unemployment (month)	no	no	yes	yes	yes
Female				0.440*** (0.054)	0.445*** (0.054)
Age				0.111*** (0.017)	0.111*** (0.017)
Age2				-0.001*** (0.000)	-0.001*** (0.000)
Immigrant: OECD				0.028 (0.110)	0.014 (0.109)
Immigrant: other				-0.017 (0.077)	-0.029 (0.076)
Education: High school				0.059 (0.065)	0.062 (0.065)
Education: Post high school				-0.271*** (0.068)	-0.280*** (0.068)
Married				0.037 (0.058)	0.032 (0.057)
Presence of children<18 (def ?)				0.123** (0.063)	0.131** (0.063)
County dummies				yes	no
Local unemployment rate				no	0.057* (0.034)
-2 Log likelihood	31719.355	31700.424	31657.562	31380.500	31406.123
No of obs	34,559	34,559	34,559	34,519	34,487

5.2 Heterogeneous effects

Table 5 Interacting the cap reform effect with previous wage and duration until UI benefit expiration

	(1)	(2)	(3)	(4)	(5)
Past July 2003 effect (D_t^{July03})	-0.302*** (0.050)	-0.250*** (0.055)	-0.251*** (0.055)	-0.257*** (0.055)	-0.258*** (0.055)
Income > 20,696 (D^T)		-0.197** (0.084)		-0.132 (0.084)	
Middle wage (20,696–24,125) (D^{T1})			-0.133 (0.104)		-0.096 (0.104)
High wage (>24,125) (D^{T2})			-0.290** (0.126)		-0.185 (0.127)
Before 100 UI days limit				-0.530*** (0.054)	-0.528*** (0.054)
Cap reform effect ($D_t^{July03} * D^T$)		-0.310** (0.129)			
Cap reform effect*middle wage ($D_t^{July03} * D^{T1}$)			-0.183 (0.156)		
Cap reform effect*high wage ($D_t^{July03} * D^{T2}$)			-0.528** (0.206)		
Cap reform*before 100d-limit ($D_t^{July03} * D^T * before\ 100\ days$)				-0.406** (0.188)	
Cap reform*after 100d-limit ($D_t^{July03} * D^T * after\ 100\ days$)				-0.299** (0.145)	
Cap ref*bef 100d-limit*middle wage ($D_t^{July03} * D^{T1} * before\ 100\ days$)					-0.184 (0.228)
Cap ref*after 100d-limit *middle wage ($D_t^{July03} * D^{T1} * after\ 100\ days$)					-0.210 (0.174)
Cap ref*bef 100d-limit*high wage ($D_t^{July03} * D^{T2} * before\ 100\ days$)					-0.728** (0.308)
Cap ref*after 100d-limit*high wage ($D_t^{July03} * D^{T2} * after\ 100\ days$)					-0.469** (0.235)
Log likelihood	31861.947	31826.197	31818.021	31719.072	31712.795
No of obs	34,559	34,559	34,559	34,559	34,559

Table 6 Estimated effect of incidence, women and men separately

	(1)		(2)	
	Men	Women	Men	women
Past July 2003 (D_t^{July03})	-0.333*** (0.101)	-0.226*** (0.065)	-0.232 (0.181)	-0.305** (0.132)
Income > 20,696 (D^T)	0.100 (0.114)	-0.032 (0.142)	0.037 (0.116)	0.000 (0.145)
Cap reform effect ($D_t^{July03} * D^T$)	-0.330* (0.176)	-0.368* (0.209)	-0.370** (0.176)	-0.356* (0.209)
300-251 days until UI-exp.	-0.564*** (0.148)	-0.565*** (0.101)	-0.551*** (0.149)	-0.528*** (0.101)
250-201 days until UI-exp.	-0.301* (0.155)	-0.344*** (0.111)	-0.269* (0.155)	-0.327*** (0.111)
200-151 days until UI-exp.	-0.310** (0.151)	0.179 (0.114)	-0.271* (0.152)	0.192* (0.115)
150-101 days until UI-exp.	-0.454*** (0.139)	-0.103 (0.103)	-0.428*** (0.139)	-0.067 (0.103)
100-51 days until UI-exp.	-0.186 (0.136)	-0.232** (0.111)	-0.187 (0.136)	-0.203* (0.111)
50-1 days	ref.	ref.	ref.	ref.
Inflow into unemployment (month)			yes	yes
Age			0.154*** (0.028)	0.083*** (0.022)
Age2			-0.001*** (0.000)	-0.000*** (0.000)
Immigrant: OECD			0.032 (0.169)	-0.013 (0.143)
Immigrant: other			0.011 (0.123)	-0.058 (0.097)
Education: High school			0.092 (0.104)	0.043 (0.084)
Education: Post high school			-0.443*** (0.121)	-0.202** (0.083)
Married			0.152 (0.110)	0.007 (0.068)
Presence of children<18 (def ?)			-0.087 (0.119)	0.222*** (0.080)
Local unemployment rate			-0.048 (0.058)	0.109** (0.042)
-2 Log likelihood	10194.250	19219.540	10077.659	19096.827
No of obs	12,734	21,825	12,697	21,790

5.3 Sensitivity analysis

5.3.1 changes in sample composition

Table 7 Testing changes in the composition of the sample of unemployed: Estimated effects on incidence, controlling for inflow into unemployment (1), excluding post-reform UI spells (2) and using the week of inflow into unemployment as a stratification unit (3).

	(1)	(2)	(3)
Past July 2003 (D_t^{July03})	-0.286*** (0.106)	-0.216* (0.111)	-0.806*** (0.252)
Income > 20,696 (D^T)	0.013 (0.088)	-0.014 (0.089)	0.027 (0.088)
Cap reform effect ($D_t^{July03} * D^T$)	-0.362*** (0.129)	-0.453** (0.185)	-0.392*** (0.130)
Six categories for # days until UI benefit expiration	yes	yes	yes
Inflow into unemployment (month)	yes	yes	no
Stratification by week of inflow	no	no	yes
All other covariates included (with local unemployment rate)	yes	yes	yes
-2 Log likelihood	31406.123	20997.117	18502.106
No of obs	34,487	19,788	34,487

5.3.2 What is reform, what is season?

To check for whether and how much the “past July 2003” effect contains seasonal variation, we have estimated the model with data from 2002 only, with a “hypothetical” reform in July 2002. The estimate of “past July 2002” is zero, whereas we obtain a significantly positive “cap reform effect”. This suggest that, given that seasonal variation was the same in 2002 as in 2003, the estimate for “past July 2003” shows the overall effect of the reform on sickness absence among the population of unemployed. Moreover, if anything, we should expect our estimate of the “cap reform effect” to be downward biased.

5.3.3 Effects of persistent heterogeneity

Table 8 Estimated effects on incidence, using the individual as a stratification unit, “fixed effects”.

	(1) Main results	(2) Individual “fixed effects”
Past July 2003 (D_i^{July03})	-0.286*** (0.106)	-0.595*** (0.222)
Income > 20,696 (D^T)	0.013 (0.088)	0.848 (0.598)
Cap reform effect ($D_i^{July03} * D^T$)	-0.362*** (0.129)	-0.384 (0.247)
Six categories for # days until UI benefit expiration	yes	yes
Inflow into unemployment (month)	yes	yes
local unemployment rate	yes	yes
All other covariates included	yes	yes
-2 Log likelihood	31406.123	2144.927
No of obs	34,487	34,487(??)

5.4 Duration

All results are insignificant, independent on how we define the sample and which sub-group we study. We interpret it as an expected consequence of the strong effect on incidence: if the reduction of the incidence is (mainly) due to reduced moral hazard, we would expect the average health of the treated population on SI benefits to be worse after the reform than before. Thus, the average duration of SI spells should not reduce. In other words, the threshold for a few days’ sick period due to minor illness is higher after the reform, thereby increasing the average length of SI periods. After all, regional social insurance offices require a doctor’s certificate to pay out more than a week’s worth of compensation, which implies that it may be difficult to let other factors besides health determine the length of a SI spell after the first seven days of an SI spell.

6 How effective was the reform?

Estimation of the “economic significance” of the results – how much did the Government save? Increased administration?

7 Conclusion

Can we say something about how sickness among unemployed relative to sickness among employed changed over the reform period? Some other ways of addressing the question whether the reform made people report sick as employed instead of as unemployed? How common is it that a person becomes unemployed while sick (and thus starts receiving lower benefits if above the UI ceiling)? Do we know anything about the administration costs of social insurance offices? Should increase as the new rules require more control (stick tests to check whether employed persons on sick leave have become unemployed but not reported it, plus information campaign, plus...?)

References